FHWA-NC-EIS-11-01-F
Federal Highway Administration
Region 4

ADMINISTRATIVE ACTION
FINAL ENVIRONMENTAL IMPACT STATEMENT
VOLUME II OF II: APPENDICES

U.S. Department of Transportation, Federal Highway Administration
North Carolina Department of Transportation

US 70 Havelock Bypass
Craven County, NC

Federal Aid Project No. NHF-70(49)
WBS No. 34360
S.T.I.P ID No. R-1015

Submitted Pursuant to the National Environmental Policy Act
42 U.S.C. 4332 (2)(c)

Cooperating Agencies:
United States Department of the Army, Corps of Engineers
United States Department of Agriculture, Forest Service

10/20/15
Date of Approval

FOR Richard Hancock, PE, Manager
North Carolina Department of Transportation
Project Development and Environmental Analysis Branch

10/27/15
Date of Approval

for John F. Sullivan, III, PE
Division Administrator
Federal Highway Administration

The following persons may be contacted for additional information concerning this document:

Mr. John F. Sullivan, III, PE
Division Administrator
Federal Highway Administration
310 New Bern Avenue, Suite 410
Raleigh, NC 27601
(919) 747-7000

Mr. Richard Hancock, PE, Manager
Project Development and Environmental Analysis Branch
NC Department of Transportation
1548 Mail Service Center
Raleigh, NC 27699-1548
(919) 707-6000

The proposed action is the construction of a US 70 bypass of the City of Havelock in Craven County, North Carolina. This statement documents the need for improvements to the existing US 70 corridor and evaluates alternatives with respect to cost, and social, economic, and environmental consequences. Current and projected future traffic conditions in the study area are described. A preferred alternative is identified.

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ADMINISTRATIVE ACTION
FINAL ENVIRONMENTAL IMPACT STATEMENT

U.S. Department of Transportation, Federal Highway Administration
North Carolina Department of Transportation

Federal Aid Project No. NHF-70(49)
WBS No. 34360
S.T.I.P ID No. R-1015

Documentation Prepared by:
STANTEC CONSULTING SERVICES INC.

Oct. 20, 2015
Date

Paul R. Koch, PE, AICP
Principal

Oct. 20, 2015
Date

Amy C. Sackaroff, AICP
Project Manager

Documentation Prepared for:
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Project Development and Environmental Analysis Unit

10/20/15
Date

Robert P. Hanson, PE
Eastern Project Development Engineer

10-20-15
Date

Brian F. Yamamoto, PE
Eastern Project Engineer

10-20-15
Date

John G. Conforti, REM
Project Planning Engineer

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Appendix A

Correspondence Regarding Prescribed Burns

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

BEVERLY EAVES PERDUE
GOVERNOR

EUGENE A. CONTI, JR.
SECRETARY

January 9, 2012

Ms. Marisue Hilliard
Forest Supervisor
National Forests in North Carolina
U. S. Forest Service
160 Zillicoa Street, Suite A
Asheville, North Carolina 28801-1082

RE: Closure of Proposed Bypass for Prescribed Burning, Project R-1015
US 70 Havelock Bypass, Craven County

Dear Ms. Hilliard:

I am writing as a follow-up to the March 17, 2011 meeting between staff from the U.S. Forest Service (USFS) and NCDOT regarding coordination of prescribed burning on National Forest System lands between existing US 70 and the proposed US 70 Havelock Bypass.

It is my understanding that the USFS conducts prescribed burning to maintain the Red-cockaded Woodpecker habitat and other types of habitat on National Forest System lands. USFS and the U.S. Fish and Wildlife Service agree that, although other habitat maintenance techniques exist, no other methods of habitat maintenance achieve the same level of effectiveness as burning.

Your staff has indicated that USFS typically conducts summer burns from late June through the middle of July, and tries to avoid Fridays, Saturdays, and Sundays. It is also our understanding that USFS will avoid burn events on holiday weekends including Memorial Day, July 4th, and Thanksgiving. In addition, I am requesting that other days with anticipated higher traffic volumes be avoided. They estimated that they will need about 3 days to burn each block, and typically start burning between 10:00 and 11:00 a.m. and end by about 3:00 p.m. Therefore, the proposed Havelock Bypass may need to be closed for about five hours on each of the three days during a burn event for each block, and may require on average about five to six days per year. It is my understanding that the USFS will also notify the Department of these prescribed burn events as far ahead of the event as possible.

Under these general conditions and as documented in the attached minutes from the March 17, 2011 meeting, the Department agrees to close the proposed Havelock Bypass for prescribed burning of National Forest System lands located between existing US 70 and the proposed Havelock Bypass when necessary.

MAILING ADDRESS:
NC DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATOR
1536 MAIL SERVICE CENTER
RALEIGH NC 27699-1536

TELEPHONE: 919-733-7384
FAX: 919-733-9428

WEBSITE: WWW.DOH.DOT.STATE.NC.US

LOCATION:
TRANSPORTATION BUILDING
1 SOUTH WILMINGTON STREET
RALEIGH NC

We appreciate the coordination between your staff and NCDOT. Should you want to further discuss this issue, please contact me at (919) 707-2500 or at tgibson@ncdot.gov.

Sincerely,

Terry R. Gibson, P.E.
State Highway Administrator

TRG/mp

cc w/attachment: Jim Trogdon, PE, Chief Operating Officer
Debbie Barbour, PE, Director of Preconstruction
Neil Lassiter, PE, Division Engineer
Greg Thorpe, Ph.D., Project Development & Environmental Analysis
Mark Pierce, PE, Project Planning Engineer
John Smith, Croatan District Ranger

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

BEVERLY EAVES PERDUE
GOVERNOR

EUGENE A. CONTI, JR.
SECRETARY

April 25, 2011
(Monday)

MEMORANDUM TO: Meeting Attendees

FROM: Mark Pierce, P.E., Project Planning Engineer, Eastern Project Development Unit

SUBJECT: Minutes from March 17, 2011 Prescribed Burning Meeting
R-1015: US 70 – Havelock Bypass – Craven County

Representatives from the U.S. Forest Service, the U.S. Fish and Wildlife Service, and NCDOT conducted a meeting from 10:00 to 11:05 a.m. on Thursday, March 17, 2011, to coordinate prescribed burning on National Forest System lands between the existing US Highway 70 and the proposed US 70 Havelock Bypass. The following individuals attended the meeting.

1. James Cherry (U.S. Forest Service)
2. Aaron Everett (NCDOT – Division 2)
3. Mary Frazer (NCDOT – Natural Environment Unit)
4. Robert Hanson (NCDOT – Eastern Project Development Unit)
5. Gary Jordan (U.S. Fish and Wildlife Service)
6. Neil Lassiter (NCDOT – Division 2)
7. Mark Pierce (NCDOT – Eastern Project Development Unit)
8. Lee Thornhill (U.S. Forest Service)
9. Ted Walls (NCDOT – Roadway Design Unit)
10. Brian Yamamoto (NCDOT – Eastern Project Development Unit)

Purpose of this Meeting

The purpose of this meeting was to continue our discussions on coordination of prescribed burning on National Forest System lands between the existing US Highway 70 and the proposed US 70 Havelock Bypass.

Purpose & Value of Prescribed Burning

USFS conducts prescribed burning to maintain the Red-cockaded Woodpecker habitat and other types of habitat on National Forest System lands. USFS and USFWS agree that, although other habitat maintenance techniques exist, no other methods of habitat maintenance achieve the same level of effectiveness as burning.

MAILING ADDRESS:
NC DEPARTMENT OF TRANSPORTATION
PROJECT DEVELOPMENT &
ENVIRONMENTAL ANALYSIS BRANCH
1548 MAIL SERVICE CENTER
RALEIGH NC 27699-1548

TELEPHONE: 919-707-6000
FAX: 919-707-6052

WEBSITE:
www.ncdot.org/doh/preconstruct/pe/

LOCATION:
CENTURY CENTER BLDG A
1000 BIRCH RIDGE DRIVE
RALEIGH NC 27610

Scheduled Burns & Exceptions to the Burn Calendar

USFS conducts prescribed burn events during the "growing" season and during the "dormant" season. USFS typically conducts summer burns from late June through the middle of July, and tries to avoid Fridays, Saturdays, and Sundays. Typically, USFS will try to avoid burn events on Fridays, but reserves the option of conducting winter burns on Fridays and Saturdays. USFS will avoid prescribed burning on holiday weekends including Memorial Day, July 4th, and Thanksgiving.

Burn Rotations

USFS has established a "block" system to coordinate burns on their various parcels. All of their blocks are on different rotations, and each block is not necessarily burned each year.

USFS intends to burn two blocks in succession for each burn event. For example, USFS will burn the block associated with Red-cockaded Woodpecker Clusters 12-44R and 58 during the same event, and Cluster 901 during a different event.

USFS has established a three-year rotation on burn events, but sometimes burns each block every two years.

Duration, Starting Times, & Ending Times for Prescribed Burning

USFS estimates that they will need about 3 days to burn each block. USFS typically starts burning between 10:00 and 11:00 a.m. and ends by about 3:00 p.m.

Initiation of Prescribed Burns

A helicopter flies along designated lines and drops nine to ten "fire balls" per acre. The fire balls are about the size of a golf ball and serve as the mixing and delivery vessel for a reaction of potassium permanganate and ethylene glycol.

Smoke Management

USFS conducts prescribed burns and manages smoke migration for sensitive areas such as the U.S. Marine Corps Air Station – Cherry Point, existing US 70, and the adjacent neighborhoods. USFS desires winds from the south or southeast during burn events to avoid or minimize smoke migration to those receptors.

Closure of the Proposed Havelock Bypass

The proposed Havelock Bypass would need to be closed for about five hours on each of the three days during a burn event for each block.

NCDOT has agreed to close the proposed Havelock Bypass to facilitate prescribed burning of National Forest System lands located between existing US 70 and the proposed Havelock Bypass. USFS anticipates that road closures are possible every year, and will require about five to six days per year.

NCDOT is considering various methods to prevent drivers from using the proposed Havelock Bypass during prescribed burn events, and will continue discussions with the USFS to determine appropriate road closure methods.

Public Notification of Prescribed Burn Events

USFS notifies the N.C. Division of Forestry, Craven County, the Havelock Fire Chief, and local media of prescribed burning. USFS also places notices on the doors of the affected homes and businesses.

USFS will provide NCDOT with a one-day notice of a prescribed burn event, and will notify NCDOT the morning of the burn if weather conditions change. NCDOT anticipates using highway message boards to notify drivers of the prescribed burn events and closure of the proposed bypass.

NCDOT will need to notify Spirit Aerosystems of the prescribed burn events with respect to their overland traffic on existing US 70 and the proposed Havelock Bypass.

Coordination of Traffic Signals on Existing US 70 during Closure of the Havelock Bypass

NCDOT will coordinate the traffic signals on existing US 70 during closure of the Havelock Bypass during prescribed burn events.

Preferred Alternative

NCDOT updated all of the human and natural environment studies within the past couple of years. Based upon the findings from those studies, NCDOT is still recommending Alternate 3 as the Preferred Alternative.

Section 7 Consultation with USFWS

NCDOT has agreed to close the proposed Havelock Bypass to facilitate prescribed burning in accordance with the measures discussed during this meeting.

With implementation of prescribed burning of the Red-cockaded Woodpecker habitat and pending the biological assessment for the Endangered Species Act Section 7 analysis, USFWS anticipates a finding that the proposed Havelock Bypass "may affect, but is not likely to adversely affect" the species. Without prescribed burning to maintain the RCW habitat, USFWS anticipates a jeopardy call for the species.

Other Issues

USFS requested that Hibbs Road, between US 70 and NC 24 near Newport, be closed periodically for prescribed burning. USFS and NCDOT will continue to coordinate on prescribed burning for that facility.

Summary

USFS maintains the Red-cockaded Woodpecker habitat by prescribed burning on a three-year rotation during the "growing" season and during the "dormant" season. USFS tries to avoid Fridays, Saturdays, and Sundays for the summer burn events, and will avoid burn events on holiday weekends including Memorial Day, July 4th, and Thanksgiving.

NCDOT has agreed to close the proposed Havelock Bypass to facilitate prescribed burning of National Forest System lands located between existing US 70 and the proposed Havelock Bypass. USFS anticipates that road closures are possible every year, and will require about five to six days per year. The proposed Havelock Bypass will need to be closed for about five hours on each of the three days during a burn event for each block.

With implementation of prescribed burning of the Red-cockaded Woodpecker habitat, USFWS anticipates a finding that the proposed Havelock Bypass "may affect, but is not likely to adversely affect" the species.

Action Items

1. USFS and NCDOT will coordinate to notify the public of burn events and closure of the proposed Havelock Bypass.
2. NCDOT will develop measures to prevent traffic from entering the Havelock Bypass during burn events.
3. NCDOT will coordinate the traffic signals on existing US 70 during closure of the Havelock Bypass for prescribed burning.
4. USFS requested that Hibbs Road, between US 70 and NC 24 near Newport, be closed periodically for prescribed burning. USFS and NCDOT will continue to coordinate on closure of Hibbs Road for prescribed burning.
5. Mr. Terry Gibson, the State Highway Administrator, will need to review and approve these commitments for prescribed burning and closure of the proposed Havelock Bypass. Mr. Neil Lassiter will meet with Mr. Gibson to discuss this issue.

Acknowledgements

Please review these minutes and provide me with your corrections, additions, or approval. Should you have comments or questions during your review or want to further discuss any of these issues, please contact me at (919) 707-6035 or mspierce@ncdot.gov. I appreciate your time and look forward to your response.

Appendix B

Agency Correspondence and Coordination

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US 70 Havelock Bypass, TIP Project No. R-1015
Section 404/NEPA Interagency Merger Process Team Concurrence Meeting for Corridor Selection (CP3 Revisited)

Meeting Date: April 10, 2012
Distribution: October 23, 2012 Revision (Original September 10, 2012)

Place/Time: NCDOT Structure Design Conference Room, Raleigh 9:00 am

Attendees:
Jessi O'Neal Baker, NC Division of Marine Fisheries {via phone}
Amy Billings, NCDOT – Hydraulics Unit
Gordon Box, NCDOT – Geoenvironmental Unit
Joseph Carter, III, J.H. Carter & Associates
Gordon Cashin, NCDOT – Natural Environment Section
Hardee Cox, NCDOT – NCDOT TIP Unit
Andrea Dvorak-Grantz, Stantec
Tristram Ford, NCDOT – Human Environment Section
Mary Frazer, NCDOT – Natural Environment Section
Rob Hanson, NCDOT – Eastern Project Development Section
Phil Harris, NCDOT – Natural Environment Section
Jim Hauser, NCDOT – Natural Environment Section
Larry M. James, Jr., NCDOT – Utilities Unit
Gary Jordan, US Fish & Wildlife Service
Drew Joyner, NCDOT – Human Environment Section
Paul Koch, Stantec
Neil Lassiter, NCDOT – Highway Division 2
Ed Lewis, NCDOT – Public Involvement & Community Studies
Ron Lucas, Federal Highway Administration
Elizabeth Lusk, NCDOT – Natural Environment Section
Kevin Markham, Environmental Services, Inc.
Scott McLendon, US Army Corps of Engineers
Art McMillan, NCDOT – Hydraulics Unit
Colin Mellor, NCDOT – Natural Environment Section
Chris Militscher, US Environmental Protection Agency {via phone}
Glenn Mumford, NCDOT – Roadway Design Unit
Cyrus Parker, NCDOT – Geoenvironmental Unit
Mark Pierce, NCDOT – Eastern Project Development Section
Rachelle Powell, US Forest Service
Chris Rivenbark, NCDOT – Natural Environment Section
Jeanette Sabo, J.H. Carter & Associates
Ron Sechler, NOAA-Fisheries
Amy Simes, NC DENR
Matt Smith, Environmental Services, Inc.
Steve Sollod, NC Division of Coastal Management
James Speer, NCDOT – Roadway Design Unit
Mark Staley, NCDOT – Roadside Environmental Unit
Tom Steffens, US Army Corps of Engineers
Greg Thorpe, NCDOT PDEA Unit
James Upchurch, NCDOT – Transportation Planning Branch
David Wainwright, NC Division of Water Quality
Allison White, NCDOT – Roadway Design Unit
Travis Wilson, NC Wildlife Resources Commission
Brian Yamamoto, NCDOT – Eastern Project Development Section

Reference: R-1015 US 70 Havelock Bypass Corridor Selection (CP3 Revisited)

PURPOSE OF MEETING:
The purpose of the meeting was to reinitiate the merger process due to the amount of time elapsed since the last interagency team meeting. The purpose also included selecting the Least Environmentally Damaging Practicable Alternative (LEDPA) based on updated studies and the updated (2003) Red-cockaded woodpecker (RCW) Recovery Plan. The currently recommended LEDPA is Corridor 3. An exhibit showing alternative Corridors 1, 2, and 3 is attached.

AGENDA TOPICS:
The Concurrence Point 3 handout included the following agenda for the meeting:

1. Meeting Purpose and Agenda
2. Project Information
3. Merger Process History
4. Reinitiate Merger Process
5. Updated Technical Reports & Environmental Documents
6. Comments on Draft EIS
7. Comments from Corridor Public Hearing
8. Evaluation of Corridors and Impact Matrices
9. Corridor Selection Discussion
10. Next Steps
11. Summary & Action Items

ITEMS OF DISCUSSION:
The following paragraphs summarize the discussions and decisions resulting from this meeting:

Project Information and Merger Process History:
An overview of the project's history was presented that included previous decision points and milestones. NCDOT presented a graphic on the white board showing how the project had progressed through Concurrence Point 3 (LEDPA) and Concurrence Point 4B (Hydraulic Design). It was explained that due to elapsed time and project developments, specifically changing the document type from an Environmental Assessment (EA) to an Environmental Impact Statement (EIS) and the update of the RCW Recovery Plan, the merger process is being reinitiated at Concurrence Point 3. Below are project milestones that were reviewed in the discussion of project history:

- (1996) Original CP3 Meeting
- (1997) NCDOT purchased Croatan Wetland Mitigation Bank
- (1998) Approved Environmental Assessment
- (2000) CP 2A Agreement on bridge lengths
- (2002) CP 4B, 30% hydraulic review
- (2003) RCW Recovery Plan
- (2003) Determined EIS as appropriate document format
- (2006 – 2010) Updated Environmental Studies
- (September 2011) Approved Draft Environmental Impact Statement
- (December 2011) Corridor Public Hearing

Reinitiate Merger Process:
The team discussed reinitiation of the merger process at Concurrence Point 3 (LEDPA). It was also discussed that there has been inconsistent reporting of the proposed bridge lengths for hydraulic crossings along the project. Specifically the lengths previously shown for Concurrence Point 2A (Bridging Decisions and Alignment Review), Concurrence Point 4B

(30% Hydraulic Review), and within the Draft Environmental Impact Statement (DEIS) are not the same. The group discussed that the re-initiation of the merger process would begin with Concurrence Point 3 and then the associated bridge lengths would need to be re-verified.

Updated Technical Reports & Environmental Documents:
A summary was verbally provided to the team listing the status of the environmental document and updates of associated technical reports. The DEIS was approved in September 2011 and the FEIS is currently in development. Reports that are in the process of being updated since the approval of the DEIS include the Proposed, Endangered, Threatened, and Sensitive (PETS) species surveys and report, the RCW presence/ absence surveys and report, and the traffic noise analysis and report. These studies are all being conducted in 2012.

Comments on Draft EIS:
Comments that had been received on the DEIS were discussed to provide clarification or to discuss their relevance to the selection of the LEDPA. The comment discussions, by subject, are provided below:

Traffic Forecasting and Capacity Analysis
The U.S. Environmental Protection Agency (EPA) comments requested clarification of the traffic analysis summary in the DEIS. Specifically that the results show levels of service (LOS) on US 70 will still be at failing levels in the Build condition.

NCDOT responded that if the bypass is in place, the traffic forecast shows it would divert 10,000-15,000 vehicles per day (vpd) off of US 70. Although many of the intersections along existing US 70 are predicted to still have undesirable design year LOS in the Build scenario, this reduction of vehicles will result in a major reduction in delay and queue lengths. NCDOT also described the City of Havelock's plans for existing US 70 once the bypass is constructed, which include transforming existing US 70 to a "complete streets" facility.

The EPA requested providing more detailed traffic summary information prior to the next meeting. The EPA stated that this traffic information is critical to their selection of a LEDPA and needs to be presented in more detail in the environmental document.

Stream Mitigation
During the meeting, the EPA asked how stream mitigation was being provided for the project and if the Croatan Wetland Mitigation Bank (CWMB) was intended to provide stream mitigation. NCDOT responded that the CWMB is intended to address stream mitigation needs for the project, and that details of the stream mitigation elements of the CWMB would be included in the FEIS.

Red-cockaded Woodpecker and Section 7 Consultation
The U.S. Fish & Wildlife Service (USFWS) comments on the DEIS indicate that the USFWS does not oppose Corridor 3 as the Preferred Alternative and that formal Section 7 consultation is not needed. USFWS clarified that these comments are based on the assumption that NCDOT allows road closures and that USFS is able to conduct prescribed burns per the NCDOT prescribed burn commitments.

The group discussed that there were some inconsistencies in the DEIS regarding agreements and discussions to-date with respect to RCW impacts. USFWS pointed out that there were several inconsistencies within the document regarding whether or not the project

would have an adverse effect on RCW. Some of these inconsistencies were due to the timing of final documentation of NCDOT's commitment to closing the bypass for prescribed burns versus the publication of the DEIS. The USFWS and others confirmed that, with the NCDOT commitment and agreement to allow prescribed burns, there would not be an adverse effect on RCWs. NCDOT responded that the commitments to prescribed burning and bypass closure; and the associated no adverse effect would be clearly stated in the FEIS. The group also acknowledged the potential for some small effects to other T&E species that are currently being studied in technical report updates. These affects, if any, will be clearly represented in the FEIS.

NCDOT noted that updated PETS Species Surveys, including RCWs, are being conducted from April 2012 to September 2012.

EPA asked which corridor has the most impact regarding RCWs. USFWS responded that based on the RCW guidelines, all three corridors are below the threshold for a "take" and therefore it is a "no adverse effect" for each of the three corridors.

Hickman Hill Convenience Center

EPA commented that the project may result in the loss of the only solid waste facility in the area (the Hickman Hill Convenience Center). EPA asked where citizens will take their trash if there is not a transfer facility and commented that this is an unresolved issue. In the discussion, USFS noted that they had been approached by Havelock to use National Forest Service lands for a new transfer facility. However, the USFS has told the city this would not be an option.

NCDOT responded that during right of way acquisition, NCDOT will work with Havelock on purchasing and relocating to a new site, but it is up to the city to choose the new site. As an action item, NCDOT is continuing to coordinate with Craven County to ensure that the County is aware of the impact to this facility.

US 70 Median Project in Havelock

The U.S. Army Corps of Engineers (USACE) asked how the recent median construction on US 70 was currently affecting traffic. NCDOT responded that there have been reductions in left turn movements and that the project was considered a safety improvement.

Residential Relocations for Corridor 2

USACE asked about the residential relocation numbers in the impact summary table; specifically that they show Corridor 2 a magnitude higher than Corridors 1 or 3 for relocations.

NCDOT responded that the estimated relocations were based on preliminary plans and right-of-way relocation reports. The group added that there was a HUD apartment complex on Lake Road accounting for many of the 133 relocations on Corridor 2. The apartment complex is shown in the footprint of the proposed interchange and indicated on the relocation reports in the DEIS. USACE asked if the relocations at the proposed Lake Road interchange could be minimized.

Comments from Corridor Public Hearing:

A summary of the December 6, 2011 public hearing comments was presented to the team. The summary provided statistics of the written and verbal comments. Of the 37 written and 21 verbal comments, roughly half of the input opposed the project and/or supported study of an Improve Existing Alternative. It was pointed out that this feedback is consistent with other

regional projects where locally impacted residents are not necessarily the beneficiaries of the intended regional travel benefits.

It was noted that an NCDOT project to install medians on US 70 had gotten underway just prior to the hearing. Many citizens were unhappy with the median project, and that sentiment was carried into the Havelock Bypass Hearing.

EPA asked if the citizen comments opposing the project seemed to mostly be based on environmental effects or on effects to existing businesses and properties. NCDOT responded that most of the comments verbalized seemed to be based on effects to businesses and properties.

Evaluation of Corridors and Impact Matrices:

The comparison matrix of alternatives was presented in the Concurrence Point 3 packet. The Impacts comparison table is shown below:

Updated Comparison of Bypass Alternatives from DEIS (2011)			
	Alternate 1	**Alternate 2**	**Alternate 3**
Length (miles)	10.85	9.91	10.31
Costs (year dollars)			
Construction (08)	$156,400,000	$138,800,000	$149,600,000
Utility Relocation (07)	1,600,000	2,800,000	2,800,000
Right of Way (09)	9,800,000	29,000,000	10,600,000
TOTAL	**$167,800,000**	**$170,600,000**	**$163,000,000**
Relocations (2009)			
Residences (minorities)	13 (0)	133 (18)	16 (0)
Churches (members)	0	0	0
Businesses (employees)	1 (2)	3 (9)	1 (2)
Non-profit	1 (3)	1 (3)	1 (3)
TOTAL	**15**	**137**	**18**
Physical Environment (Based on ROW)			
Croatan National Forest (acres)	189	225	240
Potentially-Contaminated Sites	1	1	1
Major Stream Crossings	3	3	3
Natural Resources (Acres)			
Prime Farmland by Soils in R/W	66	112	71
Jurisdictional Areas (Based on Slope Stakes +25 feet on each side)			
Wetlands (acres)	109	78	115
Streams (lin. ft.)	2,581	3,094	2,505
Neuse River Riparian Buffers (sq. ft.)	69,534	142,025	106,647
Jurisdictional Areas on National Forest System Lands (Based on Slope Stakes +25 feet on each side)			
Wetlands (acres)	81	67	88
Streams (lin. ft.)	1,012	1,764	1,387

Reference: R-1015 US 70 Havelock Bypass Corridor Selection (CP3 Revisited)

Updated Comparison of Bypass Alternatives from DEIS (2011)			
	Alternate 1	**Alternate 2**	**Alternate 3**
RCW (USFS Field Survey, Fall 2011)			
Active clusters (58 & 902)	2	2	2
Inactive clusters	2 N, 2 R*	1 N, 2 R*	2 N, 2 R*
	* N=Natural, R= Recruitment		

Corridor Selection Discussion:
After presenting the comparison of impacts for each alternative, NCDOT asked if the team concurred with reaffirmation of Corridor 3 as LEDPA. Reasons for recommending Corridor 3 as LEDPA are listed below:

Corridor 3 provides:

- 2nd lowest number of relocations
- Lowest stream impacts
- 2nd lowest prime farmland impacts
- 2nd shortest project length
- Best compromise between impacts to the Croatan National Forest and Town of Havelock
- Lowest cost

The following items were discussed in relation to the selection of LEDPA.

The N.C. Division of Water Quality (DWQ) noted that Corridor 3 has the highest wetland impacts and that although the reasons for selecting it as LEDPA were understood, asked if further reduction of wetland impacts could be considered. NCDOT noted that Corridor 3 was recommended as a compromise between Corridors 1 and 2 (Corridor 1 has greater impacts to USFS lands and Corridor 2 has greater relocation impacts).

EPA pointed out that the impacts table indicates that Corridor 1 has the least impacts and could be considered LEDPA. The U.S. Forest Service (USFS) responded that Corridor 1 would have greater effect on RCWs because it would make prescribed burning extremely difficult; it would make it more difficult to manage RCW clusters and would make it difficult to access and manage lands. USFWS reinforced that Corridor 1 would make it more difficult to manage RCW clusters.

WRC stated concurrence with Corridor 3 as LEDPA, noting that indirect and cumulative effects and fragmentation are higher with Corridor 1. EPA suggested that the impacts table should attempt to capture some of the decision-making features, such as habitat fragmentation, so that the LEDPA decision is more clearly presented in the FEIS. DWQ also commented that it would be important to carefully document these other LEDPA-decision factors in the FEIS.

NCDOT noted that the results of the latest PETS studies still support recommendation of Corridor 3 as LEDPA and that these recommendations have been documented in correspondence. EPA asked if any of the updated studies changed the decision factors regarding LEDPA. NCDOT confirmed that none of the updated studies changed the recommendations.

Reference: R-1015 US 70 Havelock Bypass Corridor Selection (CP3 Revisited)

The USACE reminded the group that the proposed bridge lengths for the project are inconsistently reported between the DEIS and the Concurrence Point 4B recommendations. NCDOT acknowledged the inconsistent documentation of lengths and responded that the bridge lengths will be reviewed and follow-up coordination will be conducted with the Interagency Team.

The group discussed the need to create a new concurrence form. But it was decided that since the current form had not been rescinded and the recommendation for LEDPA was unchanged, there was no need for a revised form. FHWA confirmed that the current CP3 Concurrence Form was still valid and that the minutes of this meeting would be sufficient to verify the previous LEDPA decision.

Concurrence Decision:
Team members representing the following agencies at this April 10, 2012 meeting verbally reaffirmed and reached concurrence on Corridor 3 as the Least Environmentally Damaging Practicable Alternative (LEDPA):

- Federal Highway Administration
- US Army Corps of Engineers
- US Fish and Wildlife Service
- NC Wildlife Resources Commission
- US Forest Service
- NC Department of Transportation

Corridor 3 was selected for the following reasons:

- 2nd Lowest number of relocations
- Lowest stream impacts
- 2nd lowest prime farmland impacts
- 2nd shortest project length
- Lowest cost
- Minimizes fragmentation of Red-cockaded Woodpecker habitat

The EPA abstained from concurrence stating that no significant updates regarding the previous LEDPA decision had occurred and that more clarity is needed in the documentation of the decision factors. EPA did not state any opposition to the recommendation of Corridor 3 as LEDPA.

Summary of Action Items:
The following items discussed at the meeting warranted further action or follow up. An update on the resolution or continuing efforts for each of these action items is described in the next section.

- The EPA requested further clarification on the details of the traffic analysis.
- The USFWS requested that NCDOT's prescribed burn commitments and the associated No Adverse Effect for RCW need to be better clarified in the FEIS.
- The EPA requested further clarification on the relocation of the county waste transfer facility (Hickman Hill Convenience Center).
- The EPA requested more information regarding stream mitigation for the project.
- The group discussed the need to clarify and finalize the proposed bridge lengths associated with Corridor 3.
- The USACE requested further discussion of relocation impacts, specifically the higher estimates for Corridor 2 (how they were estimated, opportunities for minimization) as the project moves forward.

Reference: R-1015 US 70 Havelock Bypass Corridor Selection (CP3 Revisited)

Update on Action Items Since CP3R Meeting:
The following action items were generated prior to or during the April 10, 2012 meeting. An update on the resolution of each action item is presented in italics.

Traffic Forecasting & Capacity Analysis
Mr. Chris Militscher (U.S. Environmental Protection Agency) requested clarification of the capacity analysis summary that was presented in the Draft Environmental Impact Statement, and requested more detailed information regarding traffic volumes.

Resolution - Mr. Militscher, Mr. Darryl Austin (NCDOT Transportation Planning), Ms. BenJetta Johnson (NCDOT Congestion Management), and Mr. Mark Pierce (NCDOT Project Development) met by telephone on May 3, 2012 to review the presentation of the traffic volumes and capacity analysis in the Draft Environmental Impact Statement. The group discussed the no-build and build forecasts, the traffic forecast diagrams, the level of service tabulation, and the anticipated volumes on the proposed bypass. Mr. Militscher requested and Mr. Pierce agreed that NCDOT will expand the discussion of the capacity analysis and the discussion of the benefits of the proposed bypass in the Final Environmental Impact Statement.

Red-cockaded Woodpecker
Mr. Gary Jordan (U.S. Fish and Wildlife Service) stated that, with prescribed bums, there would not be an adverse effect to the Red-cockaded Woodpecker species and formal Section 7 consultation would not be needed. However, Mr. Jordan requested that the discussions regarding impacts to RCWs need to be documented more clearly in the Final Environmental Impact Statement.

Resolution- NCDOT is preparing an update of the RCW Analysis that will be documented and submitted to the resource agencies during late 2012 or early 2013, and included in the Final Environmental Impact Statement. NCDOT will clarify the RCW discussions to be included in the Final Environmental Impact Statement and will continue coordination with USFWS on this issue.

Hickman Hill Convenience Center
Mr. Chris Militscher (U.S. Environmental Protection Agency) requested that NCDOT coordinate further with Craven County to ensure that the waste transfer station (Hickman Hill Convenience Center) can be relocated prior to construction of this project.

Resolution- On May 22, 2012, Mr. Mark Pierce (NCDOT Project Development) and Mr. Rusty Cotton (Director of the Craven County Department of Solid Waste & Recycling) spoke by telephone regarding the proposed bypass project with respect to the waste transfer station (Hickman Hill Convenience Center) and the closed landfill immediately adjacent to the transfer station. Mr. Pierce summarized the telephone conversation via an e-mail to Mr. Cotton on May 22, 2012. Mr. Pierce also provided Mr. Cotton with a link to the Public Hearing Map and a graphic showing the bypass corridors, parcels owned by the U.S. Forest Service and other parcels in Township 6 of Havelock.

Mr. Pierce called Mr. Cotton on July 11, 2012 to follow up on the County's review of the mapping and information e-mailed to him on May 22, 2012. Mr. Cotton said that Craven County is aware that the bypass will affect the convenience center and will require relocation of the facility. Mr. Cotton also said that the County is reviewing their options for relocation of the facility to private lands. NCDOT will continue dialog with Craven County on relocation of the Hickman Hill Convenience Center during the Right of Way Acquisition Process, which is currently scheduled to begin in fiscal year 2014.

Reference: R-1015 US 70 Havelock Bypass Corridor Selection (CP3 Revisited)

Stream Mitigation

Mr. Chris Militscher (U.S. Environmental Protection Agency) inquired about mitigation for stream impacts. Mr. Mark Pierce (NCDOT Project Development) responded that the Croatan Wetland Mitigation Bank provided mitigation for wetland impacts, stream impacts, and habitat fragmentation.

Resolution - Mr. Pierce further responded to this issue via the an e-mail to Mr. Militscher on April 30, 20I2 including a copy of the "Croatan Mitigation Bank Addendum to the NCDOT UMBI (May 2009)." Pages 9 and 10 describe the determination of credits. Approximately 140 acres of riverine wetlands have been classified as riparian headwater stream mitigation, which resulted in almost 61,000 linear feet of stream, or approximately 34,700 credits. Mr. Militscher reviewed this information and determined that stream mitigation issues have been addressed as noted in an e-mail dated May 1, 2012.

Bridge Lengths

During a telephone conversation with Mr. Mark Pierce (NCDOT Project Development) on December 1, 2011, Mr. Tom Steffens (U.S. Army Corps of Engineers) noted a discrepancy in the bridge lengths listed in the Draft Environmental Impact Statement (September 6, 2011) as compared with the bridge lengths presented in the minutes from the Avoidance & Minimization (CP4B) Concurrence Meeting (June 20, 2002). Mr. Steffens also documented his comment on the bridge lengths in a December 2, 2011 letter including this and other formal comments by the U.S. Army Corps of Engineers on the Draft Environmental Impact Statement, which were discussed during this meeting.

Resolution - The NCDOT Hydraulics Unit reviewed their files including the original Bridge Survey Reports and meeting minutes. They concluded that the bridge length for the Southwest Prong of Slocum Creek was incorrectly stated at the CP4B Meeting as 899 feet rather than 925 feet. After review of the East Prong of Slocum Creek, they noted that the approximate length of 1,476 feet was for a skewed crossing and that the adjusted perpendicular length is 1,618 feet. Therefore, NCDOT is now recommending the following for the three major crossings and requests that the Interagency Merger Process Team offer their comments or concurrence. An e-mail dated July 17, 2012 was sent to the Interagency Merger Process Team providing more details on the bridging decisions summary and revised recommendations.

Tributary of Tucker Creek:	*Double Box Culvert at 9 'x 7 ' x 384'*
Southwest Prong of Slocum Creek:	*925-foot Bridge*
East Prong of Slocum Creek:	*1,618-foot Bridge*

Corridor 2 Relocations

Mr. Scott McLendon (U.S. Army Corps of Engineers) and Mr. Tom Steffens (U.S. Army Corps of Engineers) requested that NCDOT review the relocations for Corridor 2 since they are much higher than Corridors 1 and 3. In particular, Mr. McLendon and Mr. Steffens requested that NCDOT review the type and location of the Lake Road Interchange to determine whether shifting to the east or west would reduce the number of relocations for Corridor 2.

Resolution - Mr. Steffens, Mr. Robert Woodard (NCDOT Right of Way Branch), Mr. Fred Barkley (NCDOT Right of Way Branch), and Mr. Mark Pierce (NCDOT Project Development) met in the Transportation Building in Raleigh on May 9, 2012 to discuss types of interchanges that could be utilized at Lake Road and Corridor 2. Shifting the interchange to the east or west, to further minimize residential relocations in that vicinity, was also reviewed. As discussed during the meeting, the location of Corridor 2 was

Reference: R-1015 US 70 Havelock Bypass Corridor Selection (CP3 Revisited)

selected to "hug" the western limits of Havelock in order to minimize impacts to the Croatan National Forest, and, in particular, RCW Cluster 902. Therefore, numerous multi-family dwellings located on Lake Road would be directly affected. We also discussed that NCDOT had previously studied a diamond interchange, a compressed diamond interchange, and a half-clover interchange to minimize relocations in this vicinity, and previously studied shifting the interchange eastward or westward to minimize relocations. NCDOT concluded that the interchange could not be shifted enough eastward or westward to avoid impacts to the multi-family dwellings. Mr. Pierce summarized the May 9, 2012 meeting via an e-mail to Mr. Steffens on May 23, 2012.

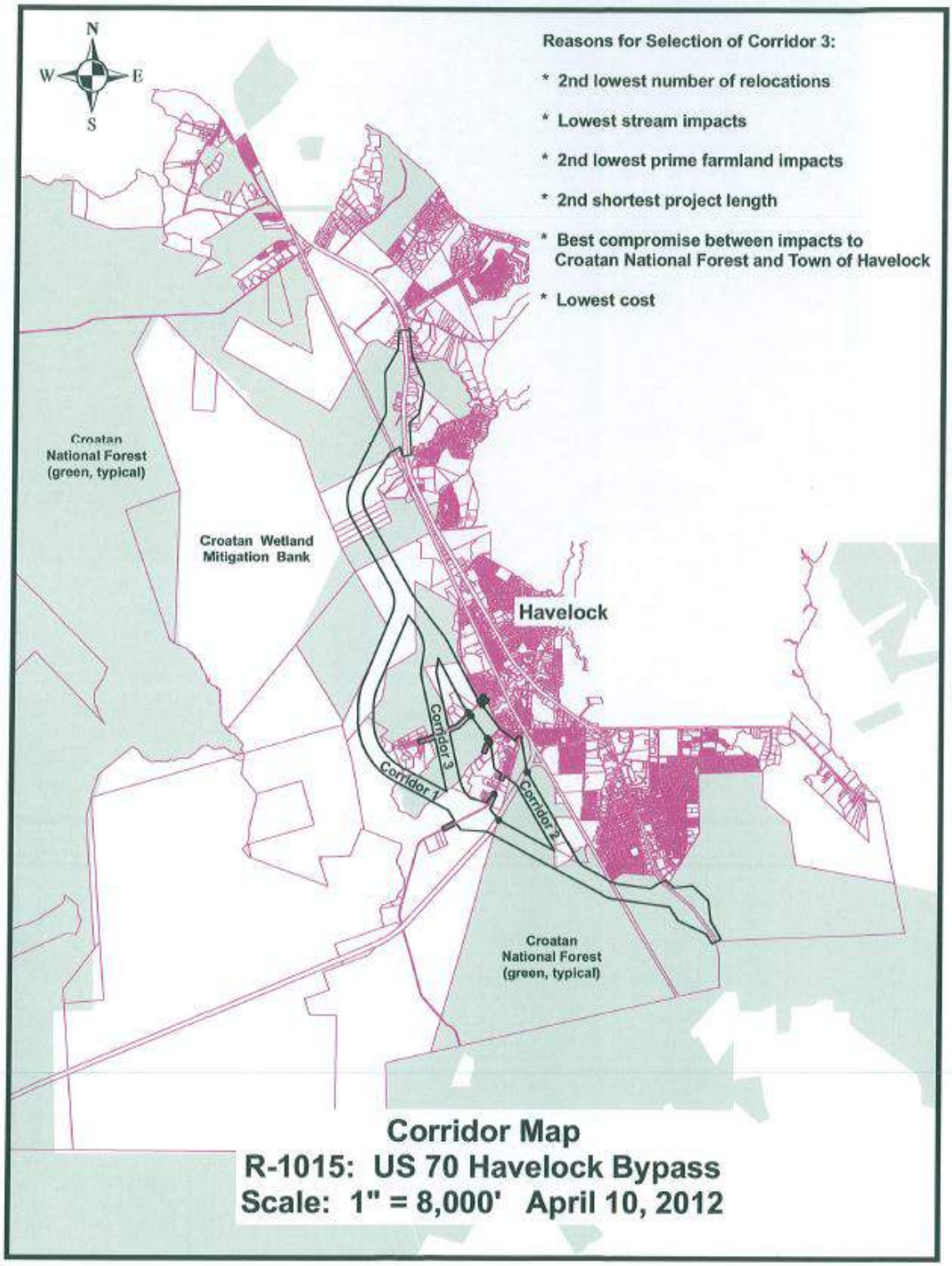
CORRECTIONS & OMISSIONS: This summary is the writer's interpretation of the events, discussions, and transactions that took place during the meeting. If there are any additions and/or corrections please inform Mark Pierce at (919) 707-6035 or at mspierce@ncdot.gov, or Paul Koch at (919) 865-7394 or at paul.koch@stantec.com.

Paul R. Koch, PE
Project Manager
paul.koch@stantec.com

PRK/

attachment: corridor map
cc: attendees
file

Reference: R-1015 US 70 Havelock Bypass Corridor Selection (CP3 Revisited)



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Raleigh Field Office
Post Office Box 33726
Raleigh, North Carolina 27636-3726

November 19, 2013

Richard W. Hancock, P.E.
North Carolina Department of Transportation
Project Development and Environmental Analysis
1598 Mail Service Center
Raleigh, North Carolina 27699-1598

Dear Mr. Hancock:

This letter is in response to your letter of November 12, 2013 and accompanying Biological Assessment (dated November 8, 2013), which provided the U.S. Fish and Wildlife Service (Service) with the biological conclusion of the North Carolina Department of Transportation (NCDOT) that the proposed US 70 Havelock Bypass in Craven County (TIP No. R-1015) may affect, but is not likely to adversely affect the federally endangered red-cockaded woodpecker (*Picoides borealis*, RCW). All other federally listed species will be addressed by NCDOT in a separate letter. The following comments are provided in accordance with Section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531-1543).

We have reviewed the Biological Assessment and found it to adequately address the potential effects to the RCW. Based on information provided in the Biological Assessment and on other information obtained over several years of coordination, the Service concurs with your conclusion that the proposed project may affect, but is not likely to adversely affect the red-cockaded woodpecker. **It is important to note that this concurrence is also based, in part, on NCDOT's agreement to allow periodic closures of the Bypass in order for Croatan National Forest staff to conduct prescribed burns as management for the RCW.** Without this agreement, the U.S. Forest Service would be unable to conduct the necessary prescribed burns in the vicinity of the Bypass, thus causing an indirect adverse effect on the RCW.

We believe that the requirements of Section 7(a)(2) of the ESA have been satisfied for this species. We remind you that obligations under Section 7 consultation must be reconsidered if: (1) new information reveals impacts of this identified action that may affect listed species or critical habitat in a manner not previously considered in this review; (2) this action is subsequently modified in a manner that was not considered in this review; or (3) a new species is listed or critical habitat determined that may be affected by this identified action.

The Service appreciates the opportunity to review this project. If you have any questions regarding our response, please contact Mr. Gary Jordan at (919) 856-4520 (Ext. 32).

Sincerely,

Gary Jordan

for Pete Benjamin
Field Supervisor

Electronic copy: Tom Steffens, USACE, Washington, NC
Ron Lucas, FHWA, Raleigh, NC
Travis Wilson, NCWRC, Creedmoor, NC
Rachelle Beauregard, NCDOT, Raleigh, NC
John Hammond, USFWS, Raleigh, NC
Will McDearman, USFWS, Jackson, MS
Rachelle Powell, USFS, New Bern, NC

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

PAT MCCRORY
GOVERNOR

ANTHONY J. TATA
SECRETARY

US 70 Havelock Bypass, STIP Project No. R-1015

Meeting To Discuss USFS Comments on the September 2011 DEIS

Date: March 31, 2014

Place/Time: Century Center Building B, PD&EA Large Conference Room

Attendees:
Kevin Markham, Environmental Services, Inc.
Matthew Smith, Environmental Services, Inc.
Clarence Coleman, FHWA – NC Division
Donna Dancausse, FHWA – NC Division
Ron Lucas, FHWA - NC Division
Paul J. Nobles, NCDOT - Archaeology
Brian Yamamoto, NCDOT - Eastern Project Development Section
Mary Frazer, NCDOT - Natural Environment Section
Dennis Herman, NCDOT - Natural Environment Section
Colin Mellor, NCDOT - Natural Environment Section
Jim Hauser, NCDOT - Natural Environment Section
Rachelle Beauregard, NCDOT - Natural Environment Section
Gordon Cashin, NCDOT - Natural Environment Section
Chris Rivenbark, NCDOT - Natural Environment Section
Ted Devens, NCDOT - PDEA
Rob Hanson, NCDOT - PDEA
David Harris, NCDOT - REU
Mark Staley, NCDOT - REU
James Speer, NCDOT - Roadway Design
Allison White, NCDOT - Roadway Design
Karen Compton, US Forest Service
Jim Gumm, US Forest Service
Gary Kauffman, US Forest Service
Rachelle Powell, US Forest Service (via telephone)
Paul Koch, Stantec
Amy Sackaroff, Stantec

Distribution:
Attendees
Tom Henry, NCDOJ
Tom Steffens, USACE

North Carolina Department of Transportation (NCDOT), Federal Highway Administration (FHWA), and United States Forest Service (USFS) representatives met on February 19, 2014 to discuss the proposed Havelock Bypass. The purpose of the meeting was to provide the USFS with an update on the

MAILING ADDRESS:
NC DEPARTMENT OF TRANSPORTATION
PROJECT DEVELOPMENT AND ENVIRONMENTAL ANALYSIS
1548 MAIL SERVICE CENTER
RALEIGH NC 27699-1548

TELEPHONE: 919-707-6000
FAX: 919-250-4224
WEBSITE:
HTTPS://CONNECT.NCDOT.GOV/RESOURCES/ENVIRONMENTAL/PAGES/DEFAULT.ASPX

LOCATION:
CENTURY CENTER, BUILDING A
1000 BIRCH RIDGE DRIVE
RALEIGH NC 27610

project, discuss USFS comments on the DEIS and actions taken to date to resolve comments, and identify any further actions needed to resolve lingering concerns.

MEETING HIGHLIGHTS: Updates were provided on major project actions since the DEIS, the Croatan Wetland Mitigation Bank, impact minimization measures, and project commitments. Discussion of USFS comments on the DEIS followed, with a focus on USFS primary concerns including Red-cockaded Woodpecker (RCW), USFS rare plant species, invasive plant species, and access to NFS lands along the bypass.

ITEMS OF DISCUSSION AND DECISIONS: The following bullets summarize the discussion items and conclusions reached.

- *ESSENTIAL FISH HABITAT* – The NCDOT response is adequate. No EFH exists in the project area, so the FEIS can document such.

- *TUSCARORA NATION COORDINATION* - NCDOT initiated coordination and awaits a response. In the meantime NCDOT is developing an environmental commitment to install highly-visible protective fence around an archaeological site. USFS was OK with this, and wishes to be apprised of any Tuscarora responses. NCDOT will confirm a final commitment in the NEPA document(s).

- *RED-COCKADED* WOODPECKER –. It was noted that in November 2013, USFWS issued a letter to NCDOT documenting their concurrence on the biological conclusion of "May Effect, Not Likely to Adversely Affect" for the RCW (which included consideration of mitigation components such as the Prescribed Burn Plan and transfer of the Croatan Wetland Mitigation Bank). Discussion was held on whether the existing RCW analysis and USFWS concurrence meets USFS obligations under the ESA. The USFS indicated they could not judge if additional mitigation for impacts to the woodpecker may be needed until impacts are assessed according to USFS protocols. FHWA noted that, from their standpoint as the lead federal agency, NCDOT has followed Endangered Species Act protocol. Thus, USFWS concurrence means the project complies with Section 7 of the ESA in regard to RCW, as well as the other federally-listed species based on the USFWS October 2011 comment letter on the DEIS for this project. FHWA respects the determination of the separate federal agency (USFWS) that oversees ESA, and concludes that no further analysis is required. USFS offered to provide an example report and data regarding how to assess RCW impacts according to USFS protocol and habitat management areas (HMA's). NCDOT agreed to review the data and then consider whether to perform the analysis using the USFS protocol - in terms of how long any additional analysis might take, and whether the additional analysis would affect prior decisions.
  USFS comments on the draft minutes wish to clarify the USFS concern is not whether the analysis and concurrence meet USFS obligations under the ESA, but rather whether the analysis meets USFS requirements for RCW under the Croatan Land Management Plan. The USFS states, "For RCW, the Havelock bypass analysis was completed across a ½ mile buffer surrounding existing clusters. This analysis includes information both on USFS lands and adjacent private lands. The Croatan NF can only manage the land for healthy RCWs on USFS lands. As a result during the past plan amendment we partitioned all our existing and planned clusters in order to meet the requirements for RCW recovery on the Croatan NF. In order to determine the effects to RCW clusters from the proposed Havelock Bypass corridor we need to have the analysis done on the forest based on these partitions on the Croatan NF. This is the only way we will be able to determine if the proposal will have long-term implications to restore or maintain these clusters."

- *USFS RARE SPECIES* – Overall USFS was pleased with the Biological Evaluation; however certain gaps were identified. Coordination with the USFS is necessary to determine if additional surveys are needed for certain plant and animal species, including **rough-leaf loosestrife**. USFS (Kauffman) indicated comfort with the Biological Evaluation's "No Effect" finding for rough-leaf loosestrife; however indicated clarifications for other plant surveys/analysis. In particular, clarification is needed for **mountain mint**. If time allows, these surveys and subsequent impact assessments can be included in the FEIS. USFS (Kauffman) will coordinate with NCDOT (Frazer). If no surveys are done now, a commitment should be added to the FEIS indicating that surveys will be conducted prior to project construction. It was also noted that NEPA documents should include a discussion of potential impacts should a species be found in the area, not conclude that no species were found therefore no impacts. USFS anticipates that the **northern long-eared bat** (NLEB) will be listed as a federally-protected species soon, which could potentially require surveying for NEPA and Endangered Species Act consideration. USFS discussed placing the NLEB on its rare species list. USFS has data which may indicate this species' occurrence within the CNF, but it has not been processed yet. USFS asks that the FEIS include an **analysis** of "**management indicator species**." This was a new term to NCDOT, so the USFS (Powell, Kauffman) offered to share information on these species, which include black bear, wild turkey, and the wire grass plant community. If USFS requests any new mammal surveys, USFS (Powell) will identify such to NCDOT (Frazer).

- *NON-NATIVE INVASIVE SPECIES* – USFS agreed in concept to limited use of herbicides and requested that NCDOT disclose the effects of herbicide use for invasive species control, in accordance with **USFS's Regional Herbicide Management Plan**. USFS (Kauffman) will provide NCDOT with NNI information from Nantahala-Pisgah National Forest. NCDOT will clarify & define NNI strategies and/or commitments for:
    - FEIS: Along the proposed project, at CWMB, and USFS this section in NEPA.
    - CWMB MOU update
    - Consider including in the USFS easement transaction

- *VISUAL IMPACTS* – USFS noted the need for a plan to mitigate visual impacts on NFS lands and requested that a conceptual **landscaping plan** be developed prior to the issuance of the ROD with a commitment to follow up with a detailed plan prior to granting a USFS easement. The plan should identify opportunities to plant native species while minimizing erosion and should have language addressing the type of fencing proposed for the project. NCDOT agreed to provide a conceptual landscape plan prior to the ROD, and possibly to review a DRAFT landscaping plan at a **fall meeting**.
  **** USFS comments on the daft minutes clarify that the USFS philosophically agrees with limited use of herbicides but the impacts due to their use must be disclosed before the USFS approves their use in association with this project. The USFS may need to do a Forest Plan amendment to approve their use.***

- *CRAVEN COUNTY WASTE TRANSFER FACILITY/OLD LANDFILL SITE* – The USFS requested a remediation plan for the Hickman-Hill Convenience Center site, which Craven County is responsible for developing. The **remediation plan** should cover site closure, and will likely include soil analyses and monitoring wells. USFS wants the FEIS to state that remediation will be conducted to return the site to pre-existing conditions and that the County will work with the USFS on shutting the site down and subsequent actions. If Craven County intends to relocate on USFS lands, then an environmental analysis would be required. NCDOT reported previous Craven County coordination, and indicated the county understands they need to relocate elsewhere. NCDOT agreed to apprise Craven County of the project schedule and prompt the county for a closure plan.

- *CUMULATIVE EFFECTS* – Additional information is needed for cumulative effects discussions. The discussion should also include the nearby **Slocum Gate project** (TIP Number R-5516) and the Hickman-Hill **Waste Transfer Facility shutdown** and subsequent actions. NCDOT (Mellor) committed to send USFS a copy of the updated Indirect and Cumulative Effects (ICE) analysis.

- *NEOTROPICAL MIGRATORY BIRDS* – USFS has a **neotropical migratory bird database** for the CNF and will provide applicable information for use in preparing this section of the FEIS. It was noted that the Biological Assessment (BA) and Biological Evaluation (BE) information would also be added to this section of the FEIS.

- *ACCESS TO USFS ROADS* – Additional coordination with the USFS is needed to determine access locations and the type of fencing to be used along the project. Access will have to balance USFS needs with the need to maintain safety along the facility. It was noted that the project currently provides driveway access to the cell tower in the vicinity of the bypass. The proposed rail crossing and utility relocations will also need to be reviewed. It was decided that an **access review meeting** could be held in the summer after hydraulic design is completed to address these topics.

- *RECREATIONAL IMPACTS/IMPACTS TO HUNTING* – USFS requested that NCDOT disclose recreation/hunting impacts in FEIS and discuss the benefits of the CWMB transfer. Descriptions should note parking, parking gate design, and access fencing.- also noting that some of the 5.1-mile gravel road may only be suitable for foot or all-terrain vehicle access. It was decided that access for hunting and recreation will be discussed at the **access review meeting** to be held in the summer.

- *TIMBER HARVESTING/SALE* – USFS described its authority to harvest timber prior to highway construction. Timber disposition needs to be revealed in NEPA documentation. The USFS needs to publically disclose its intentions. It will determine if **temporary roads** are needed to harvest timber prior to project construction. The timber needs to be sold, not discarded, and will require a **timber sale contract**. The harvest and sale need to happen prior to construction, and USFS noted this can be a two-year process that occurs prior to highway clearing. USFS (Gumm) will provide language to include in NEPA documentation. It was also noted that timber harvesting could create riparian buffer impacts; NCDOT will coordinate with USFS on compliance with **Neuse River buffer rules**.

- USFS Highway Use Easement: USFS clarified that after ROD approval, the FHWA requests USFS to grant an easement for highway use. USFS would then generate a "letter of consent."

- *UTILITY RELOCATIONS* – USFS wishes to know what utilities will be relocated or abandoned. USFS noted that the NCDOT cannot allow utility use of NCDOT right-of-way easement, rather the authorization has to be granted by the USFS. It was agreed that a **fall meeting** could be held (after the current design effort is completed) to discuss utility relocations. The USFS requested that they be made aware of any previously undisclosed utilities found during surveys. NCDOT will add a project commitment on Division Construction – to cover utilities found during construction.

- *RAILROAD CROSSING* – NCDOT will provide the USFS with opportunity to review the proposed rail crossing to determine if the USFS's agreement with the Navy should be amended. This topic will be discussed at the **access review meeting** to be held in the summer.

- *CAMA CONSISTENCY DETERMINATION* – It was decided that a consistency determination would be included in the FEIS for eventual use in the permitting phase. The project is judged to be consistent with Craven County's CAMA land use plan.

- *CWMB DRAFT UPDATED MOU* –USFS would like an updated MOU before the ROD. The USFS requested that the MOU include more detailed language about the management of upland habitat, in particular: RCW management, recreational uses/trails, and water for fire management. It was noted that the USACE added language regarding stream and wetland preservation and credits, so modification of the MOU will require their input. It was also discussed whether the CWMB could be designated as WRC "gamelands" to reduce the complexity of USFS management. USFS (Gumm) will send a list of "desires" to NCDOT (Mellor) by end of February. NCDOT (Mellor) and USFS (Gumm) will work together on further refinements, also including USACE as appropriate - because of mitigation aspects. NCDOT (Mellor) will assess a timeframe for addressing and resolving MOU refinements.
    - The group discussed the general "intent" of the MOU, which is to transfer ownership of the CWMB to USFS while preserving the wetland and stream mitigation (both credited and uncredited) in such a way to allow USFS to actively manage in accordance with its own management plan (particularly in upland areas, possibly using the lake for fire suppression, etc.).

ACTION ITEMS: See attached table for the list of action items that resulted from this meeting.

Minutes Prepared and Revised by Amy Sackaroff, Stantec Engineering. If there are any questions, please contact Paul Koch, Stantec Project Manager, at (919) 865-7394 or paul.koch@stantec.com.

Stantec

Meeting Minutes

US 70 Havelock Bypass, STIP Project No. R-1015

NEPA/404 Merger Team Meeting – Concurrence Point 4A

Date:	August 20, 2014
Place/Time:	Century Center Building A, Structure Design Conference Room
Attendees:	Rachelle Beauregard, NCDOT Natural Environment Section Amy Billings, NCDOT Hydraulics Unit Gordon Cashin, NCDOT Natural Environment Section Karen Compton, US Forest Service Ted Devens, NCDOT Project Development – Eastern Region Ed Eatmon, NCDOT Division 2 Patrick Flanagan, Down East RPO (via phone) Mary Frazer, NCDOT Natural Environment Section Rob Hanson, NCDOT Eastern Project Development Section Jim Hauser, NCDOT Natural Environment Section Gary Jordan, US Fish & Wildlife Service Paul Koch, Stantec Stephen Lane, NC Division of Coastal Management Ron Lucas, Federal Highway Administration Colin Mellor, NCDOT Natural Environment Section Stephen Morgan, NCDOT Hydraulics Unit Glenn Mumford, NCDOT Roadway Design Unit Brian Radakovic, NCDOT Hydraulics Unit Chris Rivenbark, NCDOT Natural Environment Section Amy Sackaroff, Stantec M.G. Shailch, NCDOT Hydraulics Unit Matt Smith, Environmental Services, Inc. Steve Sollod, NC Division of Coastal Management James Speer, NCDOT Roadway Design Unit Mark Staley, NCDOT Roadside Environmental Unit Tom Steffens, US Army Corps of Engineers David Stutts, NCDOT Structures Unit Cynthia Van Der Wiele, US Environmental Protection Agency David Wainwright, NC Division of Water Quality Allison White, NCDOT – Roadway Design Unit Travis Wilson, NC Wildlife Resources Commission Brian Yamamoto, NCDOT Project Development – Eastern Region
Distribution:	Attendees Maurizia Chapman, New Bern Area MPO Jessi O'Neal Baker, NC Division of Marine Fisheries Fritz Rohde, National Marine Fisheries Service

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The NEPA/404 Merger Team met on August 20, 2014 to discuss the proposed Havelock Bypass. The purpose of the meeting was to provide an update on project activities and current status; reach agreement on Concurrence Point 4A (CP4A) (Avoidance and Minimization); and, determine next steps. (A separate CP4B meeting immediately followed, which involved the Hydraulics Unit guiding the Merger Team through plan sheets.)

MEETING HIGHLIGHTS: Updates were provided on major project actions since the DEIS, stream/wetland impacts, and avoidance/minimization measures included in the design to date. It was also noted that CP4A was originally discussed and agreed upon on January 18, 2001. Corrections to wetland calculations were shared, as were additional stream impacts due to new jurisdictional status. The Merger Team reviewed the proposed avoidance and minimization measures, including those identified on the 2001 CP4A signature form, and reached concurrence on an updated signature form (attached). There was brief discussion of other topics including the Hickman Hill Convenience Center and impacts to the longleaf pine forest community within the Croatan National Forest (CNF).

ITEMS OF DISCUSSION AND DECISIONS: The following bullets summarize the discussion items and conclusions reached.

CORRECTED WETLAND CALCULATIONS – A systematic error in the calculation of wetland impacts was discovered subsequent to the publication of the DEIS. The error resulted from conversion/scaling issues in transferring data between GIS and Microstation (highway design software). The miscalculation resulted in reporting the wetland impacts for each of the Preliminary Alternatives lower than actual measured areas. The conversion error only applied to wetland impacts. FEIS Chapter 2.10.3.3 will include discussion of this error and updated impact quantities. Team members agreed that the calculation error was not substantive such that an additional re-visit of the selected LEDPA was unnecessary.

UPDATED STREAM CALCULATIONS – Since the publication of the DEIS in 2011, total stream impacts for the LEDPA increased by 443 feet as a result of stream and wetland delineations conducted in 2013. Areas adjacent to Stream 7 (S7) and Stream 9 (S9) were originally considered part of Wetlands 10 and 13, respectively; however, the stream lines were extended in 2013 to reclassify areas previously categorized as wetlands. Team members agreed that the calculation error was not substantive such that an additional re-visit of the selected LEDPA was unnecessary.

RED-COCKADED WOODPECKER – Gary Jordan explained that restricting the clearing limit width to 200 feet for the refined 5,500-foot section of the project is necessary so that habitat to the east can be counted toward the minimum basal area and acreage necessary to maintain an RCW foraging partition, which avoids a "take" under ESA regulations. Gary also stated that ESA coordination is different from USFS requirements under the CNF Forest Plan. Karen Compton noted that RCW management has to be contained within the CNF. Rachelle Beauregard stated that the Biological Assessment only considers lands within the CNF.

HICKMAN HILL CONVIENIENCE CENTER – Cynthia Van Der Wiele requested an update on coordination efforts regarding the relocation of the convenience center and stated that it needs to be relocated to an area that would not cause additional jurisdictional impacts. Ted Devens noted that the project commitments state that NCDOT will coordinate with the City of Havelock on the relocation and that NCDOT is proactively coordinating with the City on this effort.

> ***After-Meeting Update: Ted Devens spoke with Rusty Cotton (Director, Craven County Solid Waste & Recycling Department) and was informed that his department is currently coordinating with the County Planning Department to actively search for a new location for the center. DENR Solid Waste Management is also aware of the planning effort.***

RIPARIAN BUFFER IMPACTS – It was asked why Zone 1 buffer impacts decreased but Zone 2 increased.

After-Meeting Update: Stantec reviewed riparian buffer impact calculations after the CP4A meeting. As noted above, stream impacts for the LEDPA increased by 443 feet as a result of updated stream and wetland delineations. S9 did not affect buffer calculations; however, the extension of S7 added 21,094 square feet of impact (Zone 1: 12,748; Zone 2: 8,346) to the total buffer impacts. Although stream impacts increased (due to reclassification), overall buffer impacts were reduced due to minimization measures that reduced the project footprint (area). FEIS Table 2.10.4 shows updated buffer impacts for the Preferred Alternative.

LONGLEAF PINE HABITAT – Karen Compton stated that the USFS is evaluating whether the Croatan Wetland Mitigation Bank (CWMB) will provide sufficient habitat to offset impacts to longleaf pine forest within the CNF. She noted that the project impacts longleaf pines estimated to be between 40 and 80 years old in some areas and in other areas greater than 80 years old. The Forest Plan directs the USFS to protect longleaf pine forests within the CNF. The USFS is also assessing logistics associated with conducting prescribed burns within the CWMB. Tom Steffens stated that the Corps would be agreeable to discussing prescribed burn logistics for the CWMB.

CONCURRENCE POINT 4A – The signed CP4A form (attached) includes the following measures:

- No new ditching in wetlands with inverts below existing wetland elevations. Relocated ditches shall match ditch elevations.
- 46-foot median (original CP4A 1/18/01)
- Bridge structures (reaffirmed CP3 4/10/12):
  - Tributary of Tucker Creek – Double Box Culvert at 10' x 8' x 400'
  - Southwest Prong of Slocum Creek – ~~925'~~ **945'** bridge
  - East Prong of Slocum Creek – ~~1,618'~~ **1,620'** bridge
  - Tucker Creek – retain and extend existing triple 9' x 7' box culvert approximately 25 feet upstream and 78 feet downstream
- Minimization efforts reflect that right-of-way limits (and clearing limits) do not exceed 200 feet in width for the 5,500-foot section from Station 338+00 to Station 393+00 (with the exception of very specific spot locations such as driveway entrances or drainage conveyance), to minimize impact to RCW habitat.

After-Meeting Update: During review of the draft CP4A meeting minutes, it was noted that the bridge lengths shown on the CP4A form did not match the lengths shown on the preliminary designs reviewed and concurred upon by the Merger Team at the CP4B meeting. The proposed bridge lengths should reflect an increase from 925' to 945' for the Southwest Prong of Slocum Creek and an increase from 1,618' to 1,620' for the East Prong of Slocum Creek.

ACTION ITEMS:

- USFS and USACE to discuss logistics associated with conducting prescribed burns on the CWMB and coordinate with NCDOT to update CWMB MOU as appropriate.
- NCDOT and USFS to coordinate on access needs. Project impacts subject to change based on USFS requests for access.

After-Meeting Update: A coordination meeting was held in Havelock, with the NCDOT project team, Karen Compton, and CNF staff, on August 26, 2014. At the meeting, the group identified and agreed upon potential access points along the bypass for USFS land

management (with FHWA approval), discussed a conceptual landscape plan, herbicide management aspects, and timbering issues.

CORRECTIONS & OMISSIONS: This summary is the writer's interpretation of the events, discussions, and transactions that took place during the meeting. If there are any additions and/or corrections please inform Ted Devens at 919-707-6018 or tedevens@ncdot.gov.

Amy C. Sackaroff, AICP
amy.sackaroff@stantec.com

cc: File

Attachments:
CP4A signature form
USFS correspondence on CP4A

NEPA/404 MERGER TEAM MEETING AGREEMENT
Concurrence Point No. 4A: Avoidance & Minimization

PROJECT NO./TIP NO./ NAME/DESCRIPTION:
TIP Project Number: R-1015
TIP Description: US 70 Havelock Bypass in the vicinity of the City of Havelock in Craven County, North Carolina

Avoidance and Minimization Measures (items 1-3 are carried forward from 1/18/01 meeting):
(italics denotes a modification from 1/18/01 merger meeting)

1) No *new* ditching in wetlands *with invert below existing wetland elevation. Relocated ditches shall match existing ditch elevations.*
2) Forty-six (46) foot median (original CP4A 1/18/01)
3) Bridge structures as listed below (reaffirmed CP3 4/10/12):
   - *Tributary of Tucker Creek – Double Box Culvert at 10 'x 8 ' x 400' (modified from 9' x 7'x 384' length at 1/18/01)*
   - Southwest Prong of Slocum Creek – 925-foot Bridge
   - East Prong of Slocum Creek – 1,618-foot Bridge
   - *Tucker Creek – retain and extend existing triple 9' x 7' box culvert approx. 25 feet upstream and 78 feet downstream.*
4) *Minimization efforts reflect that right-of-way limits (and clearing limits) do not exceed 200-feet in width for the 5,500-foot section from Station 338+00 to Station 393+00 (with the exception of very specific spot locations such as driveway entrances or drainage conveyance), to minimize impact to RCW habitat.*

After-Meeting Update: During review of the draft CP4A meeting minutes, it was noted that the bridge lengths shown on the CP4A form did not match the lengths shown on the preliminary designs reviewed and concurred upon by the Merger Team at the CP4B meeting. The proposed bridge lengths should reflect an increase from 925' to 945' for the Southwest Prong of Slocum Creek and an increase from 1,618' to 1,620' for the East Prong of Slocum Creek.

The Project Team concurred on this date of August 20, 2014 with the avoidance and minimization measures listed above, as indicated by the signatures below.

US Federal Highway Administration
NC Department of Transportation
US Army Corps of Engineers
US Environmental Protection Agency
US Forest Service — USFS TO SEND A LETTER (COVENS)
US Fish and Wildlife Service
National Marine Fisheries Service
NC Wildlife Resources Commission
NCDENR, Division of Coastal Management
NC Department of Cultural Resources
NCDENR, Division of Marine Fisheries
NCDENR, Division of Water Quality
Down East RPO

USDA United States Department of Agriculture | Forest Service | National Forests in North Carolina Supervisor's Office | 160 Zillicoa St Ste A Asheville NC 28801-1082 828-257-4200

File Code: 2730
Date: November 7, 2014

Mr. Ted Devens, PE
Project Manager
North Carolina Department of Transportation
1548 Mail Service Center
Raleigh, NC 27699-1548

After-Meeting Update: During review of the draft CP4A meeting minutes, it was noted that the bridge lengths shown on the CP4A form did not match the lengths shown on the preliminary designs reviewed and concurred upon by the Merger Team at the CP4B meeting. The proposed bridge lengths should reflect an increase from 925' to 945' for the Southwest Prong of Slocum Creek and an increase from 1,618' to 1,620' for the East Prong of Slocum Creek.

Dear Mr. Devens:

This letter is in response to your request regarding our concurrence with Concurrence Point 4A (Avoidance and Minimization) for the improvement of US 70 Havelock Bypass in the vicinity of the City of Havelock in Craven County (T.I.P. Project R-1015). The United States Forest Service concurs with the Avoidance and Minimization Measures that were discussed and approved at the August 20, 2014 Merger Team meeting. The items approved include:

1) No new ditching in wetlands with invert below existing wetland elevation. Relocated ditches shall match existing ditch elevations
2) Forty-six foot median (original CP4A 1/18/01)
3) Bridge Structures as listed below (reaffirmed CP3 4/10/12)
   - Tributary of Tucker Creek – Double Box Culvert at 10' X 8'X 400' (modified from 9' X 7' X 384' at CP4A on 1/18/01)
   - Southwest Prong of Slocum Creek - 925 foot bridge
   - East Prong of Slocum Creek - 1,618 foot bridge
   - Tucker Creek – Retain and extend existing triple 9' X 7' box-culvert approximately 25 feet upstream and 78 feet downstream.
4) Minimization efforts reflect that right-of-way limits (and clearing limits) do not exceed 200-feet in width for the 5,500 foot section from Station 338+00 to Station 393+00 (with the exception of very specific spot locations such as driveway entrances or drainage conveyance), to minimize impacts to RCW habitat.

The United States Forest Service concurs with the above listed avoidance and mitigation measures and will continue to work with the North Carolina Department of Transportation on any additional mitigation measures that are necessary for the protection of National Forest System lands. We look forward to continuing to participate in the merger process for the Havelock Bypass Project. If you have any questions regarding this, please contact Karen Compton at (828) 257-4230.

Sincerely,

Kristin M. Bail

KRISTIN M. BAIL
Forest Supervisor

Stantec

Meeting Summary

US 70 Havelock Bypass, STIP Project No. R-1015
8/26/14 Access & Landscaping Meeting

Discussion of Access and Landscaping Items

Date:	August 26, 2014
Place/Time:	Croatan Ranger Station, Havelock, 8:30 am
Attendees:	James Cherry, US Forest Service Karen Compton, US Forest Service Ted Devens, NCDOT Project Development – Eastern Region Will Dienst, US Forest Service Dennis Forster, US Forest Service Mary Frazer, NCDOT Natural Environment Section Jim Gumm, US Forest Service David Harris, NCDOT – Roadside Environmental Gary Kauffman, US Forest Service Paul Koch, Stantec David Nelson, US Forest Service James Speer, NCDOT Roadway Design Unit Allison White, NCDOT – Roadway Design Unit Brian Yamamoto, NCDOT Project Development – Eastern Region
Distribution:	Attendees

Members of the project team met to discuss access and landscaping issues specific to National Forest (NFS) land traversed by the Least Environmentally Damaging Practicable Alternative (LEDPA). Ted Devens provided an overview of the agenda and purpose of the meeting. Then Jim Speer and David Harris walked through the access and landscaping elements, respectively. The discussion points for each of these elements are provided below:

ACCESS: Jim Speer and Allison White provided a "walk-through" of the preliminary design; presenting each plan sheet and noting currently planned access points, major features, and utility crossings. Roadway design has included draft access points in locations of anticipated need, based on aerial photography, existing roads, etc. Below are the points of discussion regarding the incorporation of access to NFS land adjacent to the LEDPA.

- *Typical Access Design* – the concept for each access point is a gated gravel driveway entrance to connect with existing USFS roads or access points. All entrances would be right-in-right-out as the proposed facility is fully controlled access with no median breaks. USFS requested that entrances on steep (e.g. 10%) grades be paved where slopes occur - to allow heavy trucks to traverse the slope and then accelerate onto the highway. Roadway design responded that paved entrances would be added to the plans for steep grades. Betterment of USFS roads or trails is not included with the agreement.

- *Special Gate Detail* - The USFS will send their typical gate specifications (pipe gates designed for durability, as hunters often remove gates to gain access) to NCDOT for consideration and inclusion on the plans.

- *Signing* – Gate areas will be signed "no parking", "no hunting access".

- *Fencing* – The entire roadway, with the exception of openings beneath bridges, will be fenced with typical C/A fencing (~5-foot high woven wire, topped by two strands of barbed wire).

- *New Access Points Requested* – During the discussion, four locations were identified that would provide access to USFS lands. These locations were in addition to those already included in the preliminary design plans. The additional access points to be evaluated and included are:

    - Between the East Prong of Slocum Creek & the Camp Lejeune railroad on the west side of the bypass. (preliminary design plan sheet 15)
    - Off of Sunset Road (north of Sunset Road and west of the bypass. (preliminary design plan sheet 45)
    - At approximately station 495, provide access on the east side of the bypass. (preliminary design plan sheet 35)
    - At approximately station 550, extend the proposed service road on the west side of the bypass approximately an additional 1,000 feet. (preliminary design plan sheet 38)

- *Updated Plans* – Roadway Design will provide USFS with updated plans when the access points are incorporated onto plan sheets.

LANDSCAPING: David Harris provided a *Havelock Bypass Vegetation Management Plan* handout to demonstrate the currently proposed concepts. The group then discussed the following items associated with this plan.

- *Native Seed Mix* – USFS requested the use of native seed mix for the median and side slopes. USFS would be responsible for gathering and provide the seed mix to NCDOT. In response NCDOT proposed, for establishment and maintenance reasons, planting turf mix in the median areas and areas immediately adjacent to the roadway to allow effective use of herbicide to control invasives.

- *Planting Approach* – NCDOT proposed that turf mix would be planted first throughout the entire project. Then once established, a subsequent contract would be let to eradicate the turf and plant seed mix in designated areas. USFS will provide plan mark-ups to NCDOT showing areas where planting of native seed mix is requested. NCDOT would then sow the native seed mix to the extent of the seed quantity provided by USFS. In areas where native seeds may fail, then NCDOT will sow its planting turf mix.

- *Seed Mix Quantity* – NCDOT Roadway Design will provide the seeding quantity (area to be planted) to NCDOT Roadside Environmental based on the native planting areas designated by USFS. Roadside will then coordinate with USFS to determine if the sufficient native seed mix quantity is available.

- *Native Plantings in Median* – USFS asked about using natives in the median which would require burning for management. NCDOT responded that burning would most likely not be allowed due to potential compromise of the cable guardrail. It was suggested that this should be confirmed

with Division staff to investigate its feasibility. If burning cannot be used, it is understood that natives would not be a feasible median planting.

- *Project Commitments* – Current language regarding project commitments specific to planting were discussed and confirmed. Language was deleted from inclusion in the FEIS related to use of a weed torch and an allowance for piling/burning plants on site. Edits were recorded on a mark-up of the project commitments and will be incorporated in the FEIS.

OTHER ITEMS: The following bullets summarize other discussion items brought up during the meeting.

- *Prescribed Burning* – For the group's understanding, a general discussion of prescribed burning methodology provided the following information: burning would occur approximately three to five times per year on different parcels on a rotating schedule so that each parcel is burned on a three year cycle**. CNF staff agreed to provide a 7-10 day burn notice to appropriate NCDOT Division 2 staff, but all agreed that weather would dictate actual burn days.** Burn durations are typically five hours.

- *Prescribe Burn / Bypass Closure Details in ROD* – USFS requested that the following information associated with bypass closure for burning is included in the ROD: gates/enforcement, advance signing, advance notification, and timing windows.

- *Disclosure of Impacts to Hunting Access* – USFS requested that impacts to hunting access due to the controlled access facility be discussed in the FEIS.

- *Landscape Enhancement* – It was mentioned that this project qualifies for funding of 0.75% of the construction cost for landscape enhancement. Any betterments in excess of that would have to be borne by USFS.

- *Timber Disposition* – USFS requested that NCDOT provide clearing limits at least one year in advance of when timber sale/clearing needs to take place. NCDOT will investigate if the Location & Surveys Unit can locate the limits for USFS so they can then mark and quantify the timber.

- *New Herbicides* – The project commitments will include that if any new herbicides come onto the market, NCDOT would need to coordinate with USFS before using on NFS properties.

- *Discussion of Clearing Limits* – There was some uncertainty about the amount of trees that would need to be cleared within the right-of-way. NCDOT will coordinate with the Division office regarding construction methodology related to general clearing and the construction and location of the C/A fence - to determine actual amount necessary for clearing.

ACTION ITEMS: The following is a summary of actions from the discussion above or from sidebar conversations that occurred as the meeting came to a close. ***Additional coordination has occurred since this meeting. Status updates included in italics below. The attached exhibit, plan sheets, and project commitments reflect decisions made in coordination with the USFS subsequent to this meeting.***

- USFS to send CP4A response letter to NCDOT. ***(awaiting receipt)***
- USFS to send comments on the MIS study to NCDOT by August 29, 2014. ***(received)***

- NCDOT Roadway Design to show paved sections on steep (~10%) access point grades in the design plans. ***(see attached plan sheets)***
- USFS to provide special gate detail to NCDOT Roadway Design. ***(awaiting receipt)***
- NCDOT Roadway Design to add four new access points to the preliminary design as described in the preceding summary. ***(see attached exhibit and plan sheets)***
- USFS to provide map mark-ups to NCDOT Roadway Design showing requested areas to be planted with native seed mix. ***(awaiting receipt)***
- NCDOT Roadway Design to provide planting area quantity to NCDOT Roadside Environmental. ***(coordination pending receipt of mark-ups)***
- NCDOT Roadside Environmental to coordinate with USFS for determination of sufficient native seed quantity. ***(coordination pending receipt of mark-ups)***
- NCDOT Roadway Design to confirm clearing methodology with NCDOT Division. ***(coordination ongoing)***
- To the extent possible, NCDOT will capture any agreements made in this meeting into the project commitments section of the FEIS. ***(see attached project commitments)***

\prk

Attachments: Access Points exhibit
Preferred Alternative preliminary design plan sheets
Project Commitments

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

PATRICK L. MCCRORY
GOVERNOR

ANTHONY J. TATA
SECRETARY

November 14, 2014

Ms. Kristen M. Bail
Forest Supervisor
US Department of Agriculture Forest Service
160 Zillicoa Street, Suite A
Asheville, NC 28801-1082

Ms. Bail:

The purpose of this letter is to notify the US Forest Service (USFS) that the North Carolina Department of Transportation (NCDOT) has completed all USFS-requested surveys, analyses, and mitigation coordination for the proposed Havelock Bypass in Craven County (STIP Project No. R-1015). Years of project studies and coordination have resulted in a substantial array of commitments and mitigation that cumulatively provides a net benefit to the Croatan National Forest (CNF). NCDOT has completed numerous additional natural resource analyses that were requested by USFS, has specifically coordinated with USFS on access and planting/landscaping issues, and has agreed to a myriad of project commitments that includes a prescribed burning plan. NCDOT has also provided USFS with a draft Memorandum of Understanding (MOU) for the transfer of the 4,035 acre Croatan Wetland Mitigation Bank property.

After an approved Record of Decision (ROD), it is anticipated that the USFS will have sufficient information to issue a "Letter of Consent, which in turn will sanction FHWA to grant a transportation-use easement of federal lands from the Croatan National Forest. The Final Environmental Impact Statement (FEIS) will provide more detailed information on project designs, resulting impacts on the environment, and proposed mitigation. To that end and with this letter, NCDOT is documenting the current status of surveys, project commitments, and mitigation.

A summary of additional project studies performed specifically for the benefit of USFS include:

- Updated Spring Species (*Solidago verna*) Report (Sept. 2012);
- RCW Management Plan for CWMB (Nov. 2012);
- Summer Species Report (Aug. 2013);

MAILING ADDRESS:
NC DEPARTMENT OF TRANSPORTATION
PROJECT DEVELOPMENT & ENVIRONMENTAL ANALYSIS UNIT
1598 MAIL SERVICE CENTER
RALEIGH NC 27699-1548

TELEPHONE: 919-707-6000
FAX: 919-212-5785

WEBSITE:NCDOT.GOV

LOCATION:
CENTURY CENTER, BUILDING B
1020 BIRCH RIDGE DRIVE
RALEIGH NC 27610

- Fall species (*Paspalum*) report (Aug. 2013);
- Rare Plant Mitigation/Non-native Invasive Species Analysis (Oct. 2013);
- Bryophyte report (Nov. 2013);
- Herbicide Evaluation Report (Jun. 2014)
- Rare Plant Mitigation Measures: Summary of Evaluation for Awned Mountain Mint (*Pycnanthemum setosum*) (Jun. 2014)
- Migratory Bird Evaluation (Jun. 2014)
- Updated rare species assessment and Biological Evaluation Report (Jul. 2014)
- CNF RCW Territory Analysis (Aug. 2014)
- CNF Management Indicators Species Report (Sept. 2014)

NCDOT has completed the latest natural resources studies that assessed the potential effects of the proposed project on red cockaded woodpeckers (RCW) on USFS lands, utilizing USFS data and methods (see attached Croatan National Forest RCW Territory Analysis - Aug 2014). These studies concluded that the proposed project will not affect the viability of any RCW partitions on USFS lands, and thus will not affect the potential population size of RCW on the Croatan National Forest, or jeopardize the U.S. Fish and Wildlife Service (USFWS) Recovery Plan for the RCW (2003).

RCW studies for the Havelock Bypass were initiated in 1998 and a Biological Assessment was completed in 2013. The USFWS concurred with the "May Affect – Not Likely to Adversely Affect" conclusion rendered in this Biological Assessment, thereby resolving Endangered Species Act coordination for RCW. The USFS requested additional studies to comply with the Service's own standards and commitments of the RCW Recovery Plan. The results of these recent studies reaffirmed the conclusion of the Biological Assessment. The Havelock Bypass project will not result in the loss of any existing or proposed RCW territories on Croatan National Forest lands. Because no RCW territories will be lost, there is no need for NCDOT to provide RCW territory replacement. The RCW population goals established in the Recovery Plan will not be affected. With the completion of these studies and given NCDOT's commitments listed below, NCDOT now considers all RCW impact assessment associated with the Havelock Bypass to be resolved.

NCDOT has committed to several important design and management agreements as part of the Havelock Bypass RCW minimization measures to address both USFWS and USFS concerns. NCDOT has agreed to a median width no greater than 46 feet, as well as steepened 2:1 sideslopes that result in a cleared corridor width of less than 200 feet for a distance of 1.1 miles, through a section of USFS property containing RCW habitat. To facilitate management of CNF lands isolated by the bypass, NCDOT has also committed to provide the USFS with 13 separate access points along the controlled access freeway. More importantly, NCDOT has agreed to the unique commitment to periodically close US 70 Havelock Bypass and reroute traffic to accommodate USFS prescribed burning on adjacent land parcels. Coordination with USFS to facilitate prescribed burning establishes a perpetual commitment by the department and the traveling public to minimize impacts to RCW and associated habitats. Such a commitment does

not currently exist on any other US highway facility in NC. NCDOT will also compensate USFS for the appraised value of all timber cleared from CNF lands during project construction.

To compensate for the loss of a currently-estimated 240 acres of federal lands, NCDOT has offered to transfer ownership of the Croatan Wetland Mitigation Bank (CWMB) property in Craven County, N.C. to USFS. This property comprises approximately 4,035 acres and borders existing USFS property along a perimeter of 8.7 miles, filling in a substantial gap in USFS lands between the town of Havelock and the Sheep Ridge Wilderness. The property was purchased in 1998 in coordination with USFS personnel who recommended the site for acquisition. The CWMB is identified as an acquisition priority in the Croatan National Forest Land and Resource Management Plan (2002) to promote the Natural Resource Management Objective, described as "lands that would protect or promote the management of natural resources". Furthermore, the CWMB retains over five miles of gravel road access though its interior that will facilitate future forest management and recreation, and it provides road access to the shoreline of Long Lake, which the USFS currently does not have. The property bounds Long Lake along approximately 1.4 miles of shoreline. NCDOT contends that this 4,035-acre property will more than compensate the USFS for the estimated 240 acres of federal land required by the Havelock Bypass.

Although the CWMB was established principally as a wetland and stream mitigation site, sizable areas of dry and marginally wet soils exist across the northern and central portions of the property which could support mesic and wet pine flatwoods communities. NCDOT has identified areas on the property which could be managed as future RCW habitat, and determined that the potential exists to establish up to four future RCW territories on the property. Because the proposed Havelock Bypass does not eliminate any existing RCW territories, any clusters established at the CWMB would be additive to those previously identified in the Recovery Plan. Thus, long term RCW management of CWMB offers the likely potential to provide a net increase to the Croatan National Forest RCW population in excess of Recovery Plan goals.

In addition to providing the opportunity to expand the Croatan National Forest RCW population, the CWMB provides potential habitat for all of the Forest's other Management Indicator Species. Little habitat exists in the project corridor for two Management Indicator Species: wild turkey and black bear. Substantially more habitat for both of these species exists at CWMB in the form of pocosin, oak gum cypress forest, pond pine woodland, and mature pine/hardwood forest. With the addition of the CWMB property, the Croatan National Forest will realize a significant net gain in habitat for both species.

According to USFS estimates, the Havelock Bypass will impact approximately 85 acres of longleaf pine/wiregrass communities which occur within the proposed corridor. However, as stated by USFS, this loss of area represents less than 1% of the existing longleaf/wiregrass habitat on the CNF and will not have a significant effect on the amount of such habitat on the CNF. The status and future management of longleaf pine and wiregrass as Management Indicator Species will not be significantly affected by the proposed project. Furthermore, the CNF Land and Resource Management Plan (2002) identifies over 16,000 acres of suitable sites for potential longleaf pine forest that the CNF currently possesses, awaiting future restoration and management by the USFS. According to USFS, ongoing longleaf restoration activities on

these lands will recover the area of longleaf forest lost by the proposed project in 2-3 years. Thus, any impact of the proposed project on the total area of longleaf pine/wiregrass on the CNF will be temporary.

Longleaf/wiregrass communities occur in the proposed highway corridor and throughout the Croatan National Forest principally on Mesic and Wet Pine Flatwood sites with mineral soils. Substantial areas of these same soils occur on the CWMB, though most have not been managed with prescribed fire for many years. A long term prescribed fire management plan on the CWMB has the potential to establish substantial areas of mixed pine flatwoods communities with longleaf pine as a dominant component. Any longleaf pine/wiregrass communities established at the CWMB will be complementary to those identified for restoration in the CNF Land and Resource Management Plan (2002). Because the proposed Havelock Bypass will not have a significant negative effect on any of the CNF Management Indicator Species, including longleaf pine and wiregrass, NCDOT considers this issue to be resolved.

The document records associated with the CWMB clearly establish longleaf pine and RCW management as compatible and allowable activities on the property. The Final Mitigation Plan for the CWMB (2002) permits prescribed burning of "pine dominated stands". Implied in this allowance are the practices required to achieve such prescribed burning, such as the establishment of burn units and fire breaks. In addition, the mitigation plan states that "For pine-dominated natural communities, management may be used according to accepted methods for improving or restoring selected areas for RCW use." Studies performed by NCDOT have identified up to 1,041 acres of pine dominated stands on the CWMB where future prescribed burning and RCW management would be allowable. The Umbrella Mitigation Banking Instrument (UMBI) between NCDOT and the water resources agencies (2009) allows activities identified in the mitigation plan and in the Memorandum of Understanding (MOU) between NCDOT, USFS, and the U.S. Army Corps of Engineers (USACE) (2003). Thus, activities identified as allowable in the mitigation plan or the MOU are allowable under the UMBI by reference. Lastly, the MOU includes a provision to "allow for the active management of red cockaded woodpecker (RCW) territories in accordance with the RCW Recovery Plan (1992)". The intent of this document record clearly establishes that RCW and longleaf/wiregrass habitat management are compatible uses for portions of the CWMB where pines predominate.

The NCDOT asserts that all primary USFS concerns have been suitably addressed at this time. The Croatan National Forest RCW Recovery Plan will not be negatively affected by the proposed highway project. The Croatan Wetland Mitigation Bank property, which is being offered as compensation to the USFS, provides the long term opportunity to expand the RCW population beyond that detailed in the Recovery Plan. The Croatan Wetland Mitigation Bank also provides potential habitat for all of the Croatan National Forest Management Indicator Species, as well as additional species, some in substantial excess to probable project impacts. Future USFS management of the CWMB to achieve these habitat goals is allowable under existing agreements with other resource and permitting agencies. As compensation for highway impacts, the CWMB provides a net benefit to the CNF, which will enhance the overall management mission and objectives identified in the Land and Resource Management Plan (2002).

NCDOT appreciates the years of hard work and partnering coordination from USFS. Our mutual efforts have resulted in a substantial array of studies, commitments, and mitigation. As a result of these extensive efforts, NCDOT now maintains that for Havelock Bypass and in terms of USFS needs:

- No additional surveys (biotic or otherwise) are currently necessary.
- The project alignment and design, as provided to and reviewed by USFS for access and landscaping issues, is acceptable to USFS.
- As verified by USFS's recent CP4A Concurrence (avoidance and minimization) during the NEPA/404 Merger Process, USFS agrees with NCDOT's minimization efforts.
- Current project commitments (attached) will sufficiently resolve concerns thus far identified by USFS.
- The proposed mitigation measures for R-1015 Havelock Bypass are adequate, and no additional mitigation lands are required.

If USFS does not concur that these issues have been resolved, then in the spirit of cooperative partnering, NCDOT requests a clear and specific description of each objection, as well as a description of specific actions that USFS feels is necessary to achieve a resolution. The NCDOT project team intends to provide a Final Environmental Impact Statement for USFS review in early 2015. The FEIS will document all studies, commitments, and proposed mitigations and will reflect the conclusions made above. Should you have any concerns, questions, or require any clarification, please contact me at rwhancock@ncdot.gov and 919-707-6000.

Sincerely,

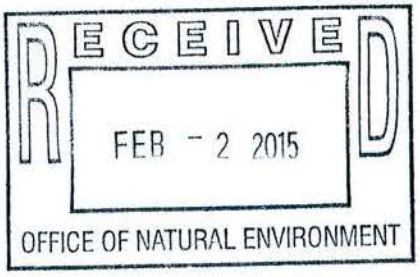
Richard W. Hancock, PE
Unit Head
NCDOT Project Development and Environmental Analysis Unit

Attachments:
Croatan National Forest RCW Territory Analysis (Aug 2014)
Minutes from coordination meeting w/ USFS ref: Access and Landscaping (Aug 2014)
Graphic: Proposed USFS access points on Havelock Bypass
R-1015 NCDOT Project Commitments (updated November 2014)
Minutes from coordination meeting w/ USFS ref: Prescribed Burning (Apr 2011)
NCDOT commitment letter ref: Prescribed Burning and Havelock Bypass Closure (Jan 2012)
R-1015 CP4A Concurrence Letter from USFS (Nov 2014)

cc: Karen Compton, USFS, Asheville
Jim Gumm, USFS, Croatan National Forest
Ron Lucas, FHWA
John Rouse, NCDOT
Debbie Barbour, NCDOT
Rob Hanson, NCDOT
Brian Yamamoto, NCDOT
Ted Devens, NCDOT
James Speer, NCDOT
Phil Harris, NCDOT
Colin Mellor, NCDOT
Jim Hauser, NCDOT
Gordon Cashin, NCDOT
Rachelle Beauregard, NCDOT
Chris Rivenbark, NCDOT

USDA United States Department of Agriculture Forest Service National Forests in North Carolina
160A Zillicoa Street
Asheville, NC 28801
828-257-4200
FAX: 828-257-4263

File Code: 2730
Date: January 28, 2014



Mr. Richard Hancock, PE
Unit Head, PDEA
North Carolina Department of Transportation
1548 Mail Service Center
Raleigh, NC 27699-1548

Dear Mr. Hancock:

Thank you for your November 14, 2014 letter regarding the United States Forest Service (USFS) requested surveys, analyses, and mitigation coordination for the proposed Havelock Bypass in Craven County (STIP Project No. R-1015). As you have acknowledged, a project this size that impacts National Forest System (NFS) lands requires a large amount of work to ensure that our resources are protected and our policies and regulations are met. We appreciate the time and commitment the North Carolina Department of Transportation (NCDOT) has made in helping us meet these requirements.

We look forward to the opportunity to review the Final Environmental Impact Statement (FEIS) in early 2015. We expect that all of the USFS comments on the Draft Environmental Impact Statement (DEIS) and issues from our subsequent meetings will be addressed in the FEIS. The Project Commitments document dated November 2014 is very thorough and does an excellent job of describing the many project commitments NCDOT has made and identifying areas where additional information or coordination are needed. It is important that the results of all of these analyses and mitigation commitments be included in the FEIS.

The Forest Service did not receive a copy of the most recent draft (June, 2014) of the Memorandum of Understanding (MOU) for the transfer of the 4,035 acre Croatan Wetland Mitigation Bank (CWMB) property until after we made an inquiry after receiving your letter. The USFS will continue working with NCDOT and the Corps of Engineers (COE) to revise and finalize the new MOU. We have a meeting scheduled with NCDOT and the COE to discuss the MOU on February 17, 2015. After that meeting, the USFS will be working with our lands staff and our Office of General Council staff on review of the legal language to be included in the MOU.

We are hoping the final MOU for the transfer of the CWMB and supporting documents such as the Croatan Mitigation Bank Addendum to the NCDOT UMBI will allow for achievable active management of the pine component in the CWMB to the standard that will enable it to function as effective Red-cockaded Woodpecker (RCW) habitat. If the MOU does not provide for adequate management of RCW habitat within the CWMB, the pine located within the CWMB cannot be used as compensation for RCW habitat lost in the right-of-way corridor.

The Biological Assessment evaluated the impact of the entire project on RCW and concluded that the project would have a "May Affect, Not Likely to Adversely Affect" on RCW; however, the USFS must meet the RCW recovery guidelines on NFS lands alone. We are currently working with

our Regional Office (RO) wildlife staff and other RCW experts to determine if the project, including the project commitments, meets the RCW Recovery Guidelines as they apply to NFS lands. As part of that evaluation, our RO staff will be assisting in the assessment of potential effectiveness of the management of the pine within the CWMB for RCW habitat. Once the MOU for the CWMB is finalized, and we have fully reviewed the impact of the project on the RCW, we can determine if the current project commitments are adequate for the protection of RCW and the loss of RCW habitat on NFS lands.

The USFS does not consider the issue concerning the need for replacement acres or other compensation for the taking of 85 acres of longleaf pine/wiregrass communities resolved. The requirements in the Croatan National Forest Land and Resource Management Plan (Forest Plan) for longleaf pine restoration are not synonymous with or solely for the purposes of recovery of RCW and management of RCW habitat. The Forest Plan promotes the restoration of longleaf pine to address concerns about ecosystem health, biological diversity, and rare species and communities. The direction to restore longleaf pine ecosystems on the Croatan National Forest (CNF) became a goal and desired condition with the signing of the Record of Decision (ROD) for the Forest Plan in December 2002. The ROD for the Forest Plan was signed after the mitigation plan for the CWMB was issued in April 2002. Restoration of longleaf pine/wiregrass community was never a goal of the CWMB.

Although the CWMB has soils where longleaf pine can grow, NCDOT has not demonstrated that longleaf pine has been, or can be, successfully regenerated on these sites within the CWMB. The plantings of longleaf pine within the CWMB have resulted in poor survival rates and failure to establish stands with longleaf pine as a dominate component. In addition, prescribed burning is a requirement for successful longleaf pine management. It is not enough that prescribed burning is allowed within the CWMB; it must be achievable to be an effective management tool.

The ongoing longleaf pine restoration on the CNF is directed by the Forest Plan and is taking place independent of implementation of the Havelock Bypass project. The USFS does not consider longleaf pine restoration activities we are currently undertaking on the CNF compensation for the longleaf pine that would be lost as a result of the Havelock Bypass project. The USFS would like to continue discussion with NCDOT on compensation for the loss of longleaf pine.

Prior to the receipt of your letter, the National Forests in North Carolina had not received copies of the following documents: 1) Final Herbicide Evaluation Report (June 2014), 2) Updated rare species assessment and Biological Evaluation Report (July 2014), 3) Rare Plant Mitigation Measures: Summary of Evaluation for Awned Mountain Mint (*Pycnanthemum setosum*) (June 2014), and 4) CNF Management Indicator Species Report (September 2014). Since receipt of your letter, we have requested and received all of these documents. Given that we did not receive these documents until December 2014 or January 2015, and some of the documents are very large, we are still reviewing these documents. Our reviews to date have shown that many of our comments and recommended changes to draft documents have been incorporated into the final documents. We will provide any final comments on these documents to NCDOT by February 13, 2015.

There are several additional items that still need to be addressed: 1) The transplant sites for rare plants need to be identified for finalization of the plant mitigation; 2) The USFS will provide NCDOT with a Cost Estimate for marking and preparing for sale the timber located in the right-of-

way. USFS requests the clearing limits of the project be provided to the USFS at least one year in advance of when the timber sale/clearing needs to take place; 3) Questions still remain concerning the clearing limits and access needed for installing the right-of-way fence; 4) Forest Service will provide gate design information to the NCDOT roadway design unit; 5) Finalization of the landscaping/revegetation plan with the NCDOT Roadside Environmental Unit of NCDOT.

The USFS appreciates the collaboration and partnership we have had with NCDOT during the years the proposed Havelock Bypass Project has been in the planning stages. We look forward to continuing to work with NCDOT on the final details of planning the Havelock Bypass project. Please continue to coordinate with Karen Compton, NCDOT liaison, and Jim Gumm, Croatan District Ranger, as we work together on resolution of the remaining issues and if you have any questions or concerns related to this letter.

Sincerely,

Kristin M. Bail

KRISTIN BAIL
Forest Supervisor National Forests in North Carolina

cc: Jim Gumm, District Ranger, Croatan NF
Ted Devens, NCDOT
Ron Lucus, FHWA

Meeting to review USFS comments on the preliminary draft FEIS for US 70 Havelock Bypass (STIP Project No. R-1015)

May 6, 2015

Attendees:
Clarence Coleman, FHWA
Ron Lucas, FHWA
Brian Yamamoto, NCDOT
Ted Devens, NCDOT
Paul Koch, Stantec
Amy Sackaroff, Stantec

FHWA, NCDOT, and USFS representatives met on May 6, 2015 to discuss the proposed Havelock Bypass. The purpose of the meeting was to review responses to USFS comments on the preliminary draft FEIS and identify future actions.

MEETING HIGHLIGHTS: NCDOT provided written responses to comments and excerpts of select text from the preliminary draft FEIS. To facilitate the discussion, major comments were grouped and reviewed by topic; minor comments/edits were reviewed separately.

ITEMS OF DISCUSSION AND DECISIONS: The following bullets summarize the discussion topics, conclusions, and action items.

- Edit Tables S.1 and 2.5.1 to show correct shoulder widths and dimensions ***(Stantec)***

- Research whether public lands are not considered farmland per statement in NRCS soil survey of Craven County ***(USFS)***

- Topics requiring additional coordination before transfer of easement:

    - Timber sale logistics: right-of-way is free but NCDOT must compensate for timber loss at amount determined by the USFS. Need to determine schedule for timber sale, timber marking, and other logistics such that the right-of-way is cleared within the contract time but not too far before construction; revise project commitment with additional details ***(USFS, FHWA)***

    - Longleaf pine forest impacts: develop cost estimates for longleaf pine forest impact compensation (i.e., cost estimate to manage/restore existing longleaf pine forest including NEPA analysis and implementation of thinning, burning, and other management activities on current NFS lands – compared to conducting these activities on the CWMB). USFS to provide estimates by June 1, 2015 ***(USFS)***

    - Prescribed burn plan details to be included in the ROD ***(USFS, FHWA, NCDOT)***

- Send visual impact assessment report to USFS and include in FEIS appendix ***(Stantec)***

- Send wetland mitigation bank credit information source to USFS ***(Stantec)***

- Check on status of Biological Evaluation update ***(NCDOT)***

- Send geoenvironmental report for the Craven County Waste Transfer Facility to USFS ***(Stantec)***

- It was noted that the timeframe for the FEIS signing is June 2015 with the ROD signing in December 2015 or January 2016.

- It was noted that the goal is to have remaining topics resolved prior to transfer of easement, not necessarily prior to the ROD. The preference is to have them resolved prior to the ROD, but with reasonable assurance, these issues can be resolved post-ROD.

- The USFS stated that there were no objections moving forward with the FEIS based on the comments and responses discussed at the meeting.

Appendix C

Technical Reports for Federally-Protected and USFS Rare Species

Red-cockaded Woodpecker Biological Assessment

Red-cockaded Woodpecker Territory Analysis

Red-Cockaded Woodpecker Management Plan for the Croatan Wetland Mitigation Bank

Biological Evaluation Report

USFS Management Indicator Species Report

USFS Migratory Bird Evaluation

Herbicide Evaluation Report

RED-COCKADED WOODPECKER
BIOLOGICAL ASSESSMENT
US HIGHWAY 70 HAVELOCK BYPASS
CRAVEN COUNTY, NORTH CAROLINA

T.I.P. Number R-1015

The North Carolina Department of Transportation
Division of Highways
Project Development and Environmental Analysis Unit
Natural Environment Section
Raleigh, North Carolina

8 November 2013

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1. INTRODUCTION

The North Carolina Department of Transportation (NCDOT) is proposing to construct a United States (US) Highway (Hwy.) 70 Bypass (Bypass) (R-1015), west of the City of Havelock, Craven County, North Carolina (NC). On 10 April 2012, the Federal Highways Administration (FHWA) and the Section 404/National Environmental Policy Act (NEPA) Merger Process Team confirmed Alternative 3 as the Least Environmentally Damaging Preferred Alternative (LEDPA) for the Bypass (M. Pierce, NCDOT, personal communication (pers. comm.)). The Bypass will pass through portions of the Croatan National Forest (CNF) and impact 5 red-cockaded woodpecker (*Picoides borealis*) (RCW) clusters and 4 habitat management areas (HMA) proposed for future RCW recruitment clusters. This report evaluates impacts of the proposed project on the federally endangered RCW pursuant to Sections 7 and 9 of the Endangered Species, as amended.

2. PROJECT AREA

The project area is located in the extreme east-central NC Coastal Plain (Figure 1). This region is characterized by sandy soils and terrain that is generally flat. The predominant soils in the project area are Lynchburg, Pantego and Rains fine sandy loams, Leaf silt loam, Goldsboro loamy fine sand, Leon sand, Croatan Muck and Bayboro mucky loam (US Department of Agriculture (USDA) 2013). Elevations in the project area range from 5 to 30 feet (ft.) above mean seal level. The project area is located in the Neuse River Basin. Slocum Creek and numerous unnamed tributaries run through the project area before merging with the Neuse River north of Havelock.

Much of the region southwest of Havelock is part of the CNF, which is approximately 161,273 acres in size. The project area is a mix of residential, commercial and industrial

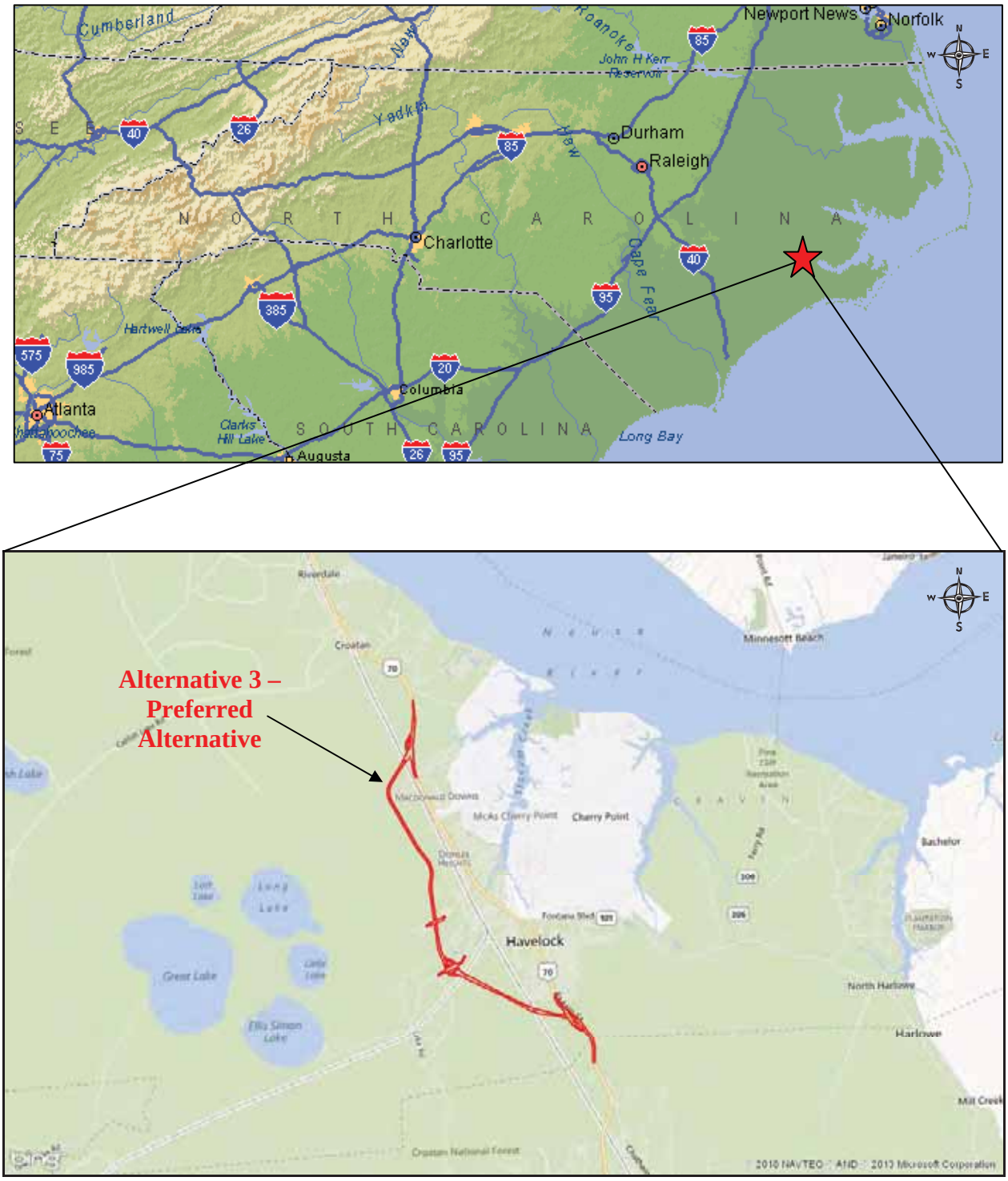

Figure 1. Location of the proposed US Highway 70 Havelock Bypass (R-1015), Craven and Carteret Counties, North Carolina.

developments and silvicultural and agricultural lands. Marine Corps Air Station (MCAS) Cherry Point is over 12,000 acres in size and is located north of Havelock and east of the Havelock Bypass.

Much of the habitat within the project area had been altered in the past by logging and/or ditching. Some land management activities on the CNF are hampered by fragmented ownership and the project area's proximity to Havelock. In particular smoke generated by prescribed burning is an ongoing concern on the CNF. Southeasterly and southwesterly winds are common along the NC coast and can "smoke in" Havelock and the MCAS Cherry Point during a prescribed burn on the CNF. Prescribed burning for fuel and midstory control is the preferred tool in the CNF due to the potential effects of herbicides on PETS species that inhabit the area (Gary Kauffman, USFS, pers. comm.).

Natural communities seldom matched exactly those described in the *Guide to Natural Communities of North Carolina: Fourth Approximation* (Schafale 2012), but were categorized as accurately as possible based on species composition, location and site history.

Mesic Pine Savanna (Coastal Plain subtype) is the predominant upland vegetative community type. Mesic Pine Savanna typically had a canopy of longleaf pine (*Pinus palustris*), with an understory of sparse scrub oaks (*Quercus* spp.), mixed with mesophytic and wetland species. Undisturbed sites had a ground cover dominated by Carolina wiregrass (*Aristida stricta*), Indiangrass (*Sorghastrum nutans*), clusterspike false indigo (*Amorpha herbacea var. herbacea*), vanillaleaf (*Carphephorus odoratissimus*) or occasionally bracken fern (*Pteridium aquilinum*), and a very diverse assemblage of leguminous species.

Wet Pine Flatwoods, Pond Pine Woodland, High Pocosin, Coastal Plain Small Stream Swamp-Blackwater Subtype and Cypress-Gum Swamp were widespread wetland forest types. Wet Pine Flatwoods include seasonally wet, open, grassy longleaf pine or pond pine (*Pinus serotina*) communities on coarse sandy spodosols. It naturally had more grasses than shrubs. The low shrub layer was often dominated by dangleberry (*Gaylussacia frondosa*), inkberry (*Ilex glabra*), sweet pepperbush (*Clethra alnifolia*), fetterbush (*Lyonia lucida)*, sweetbay (*Magnolia virginiana*), staggerbush (*Lyonia mariana*), coastal azalea (*Rhododendron atlanticum*) and switch cane (*Arundinaria tecta*). The herbaceous layer included Carolina wiregrass, bracken fern and a diverse assemblage of grasses and herbs.

Pond Pine Woodland had an open to nearly closed canopy of pond pine, sometimes co-dominant with loblolly bay (*Gordonia lasianthus*) and occasionally including red maple (*Acer rubrum*), Atlantic white cedar (*Chamaecyparis thyoides*) and loblolly pine (*Pinus taeda*). The shrub layer was tall and very dense, except when recently burned, and includes dangleberry, inkberry, sweet pepperbush, swamp titi (*Cyrilla racemiflora*), sweet gallberry (*Ilex coriacea*), fetterbush, swamp red bay (*Persea palustris*) and sweetbay. Switch cane was also common and may be dominant in the shrub layer. Herbs were generally sparse under the woody cover, but occasional netted chain-fern (*Woodwardia areolata*), Virginia chain-fern (*W. virginica*) and clumps of sphagnum mosses (*Sphagnum* spp.) occurred. This community type is subject to catastrophic fires which can temporarily suppress the understory and severely thin or eliminate the overstory. Peat soils can be consumed in such fires and depending on the depth of consumption, a different community type may become established.

High Pocosins (evergreen subtype) occurred on poorly drained peat deposits and on wet sands, and generally had a sparse canopy of pond pine with a dense shrub understory which included fetterbush, inkberry and swamp titi.

Coastal Plain Small Stream Swamp communities occurred along small streams and were predominantly forested with swamp tupelo (*Nyssa biflora*), loblolly pine, tulip poplar (*Liriodendron tulipifera*), red maple, swamp laurel oak (*Quercus laurifolia*), water oak (*Q.nigra*) and swamp chestnut oak (*Q. michauxii*). The understory was dominated by red maple, American holly (*Ilex opaca*), sweetbay and swamp red bay and the herbaceous layer was relatively sparse.

Cypress-Gum Swamp (Brownwater subtype) communities occurred along creeks and rivers and were predominantly forested with bald cypress (*Taxodium distichum*), pond cypress (*T. ascendens*), water tupelo (*Nyssa aquatica*), swamp tupelo and Carolina ash (*Fraxinus caroliniana*). The understory and shrub layers were usually poorly developed, but could be locally dense and consisted of saplings of the overstory species, red maple, swamp titi, Virginia willow (*Itea virginica*) and sweet pepperbush.

Plantations of loblolly pine occurred on some upland sites. Some pine stands were very dense due to a lack of timber management and exclusion of fire.

The CNF is part of the Mid-Atlantic Coastal Plain Recovery Unit, which contains 2 Primary Core Populations: 1) Coastal North Carolina, which is made up of the CNF, Holly Shelter Game Land (HSGL) and Marine Corps Base Camp Lejeune (MCBCL) and 2) Francis

Marion National Forest in South Carolina (SC). Each of these populations must have a RCW population of at least 350 potential breeding groups (pbgs) (or 400-500 active clusters) to reach recovery. It also contains 1 Essential Support Population (Northeast NC/Southeast Virginia) which must meet 100 pbgs to reach recovery.

3. PROJECT DESCRIPTION

The NCDOT is planning the construction of a 10-mile (mi.) median divided facility with full control of access (access only at interchanges) for US Hwy. 70 around the southwest side of the City of Havelock and MCAS in Craven County, NC. The project begins on existing US Hwy. 70 just south of the Carteret/Craven County line. The proposed facility will divert to the west of the existing US Hwy. 70 alignment just north of the county line and extend northwards on new location (Figure 2). A new interchange with Lake Rd. (State Rd. (SR) 1756) will be constructed approximately 1.6 mi. west of existing US Hwy. 70 and the proposed Bypass will continue north on new location west of US Hwy. 70. There will be 3 grade separations across railroads and one grade separation over Sunset Road. The proposed Bypass will eventually rejoin US Hwy. 70 approximately 1.7 mi. north of the Slocum Road intersection.

The purposes of the proposed project are to improve the traffic operations for regional and statewide traffic along US Hwy. 70 corridor and to enhance the ability of US Hwy. 70 to serve the regional transportation function in accordance with the Strategic Highway Corridors Plan.

For calculation purposes, the impact area was identified as the area between the proposed slope stakes (SS) plus 40 ft. on each side. The proposed right-of-way (ROW) limits vary, but are generally between 200 and 250 ft wide along most of the proposed Bypass with expansion at grade separations and interchanges. The powerline ROW running parallel to a portion of the Bypass is approximately 120-225 ft. wide (Figures 2 and 3).

4. PROJECT HISTORY

The proposed Bypass was included in the approved thoroughfare plan for Havelock in 1979 (NCDOT 1979). The Bypass was first included in the NCDOT Transportation Improvement Plan (TIP) in November 1983 (NCDOT 1983). The NC General Assembly enacted the NC Hwy. Trust Fund Act, which funded the NC Intrastate System of highways. in

Figure 2. Location of red-cockaded woodpecker (RCW) clusters and territories on the Croatan National Forest (CNF) impacted by the Havelock Bypass project (R-1015) in Craven and Carteret Counties, North Carolina.

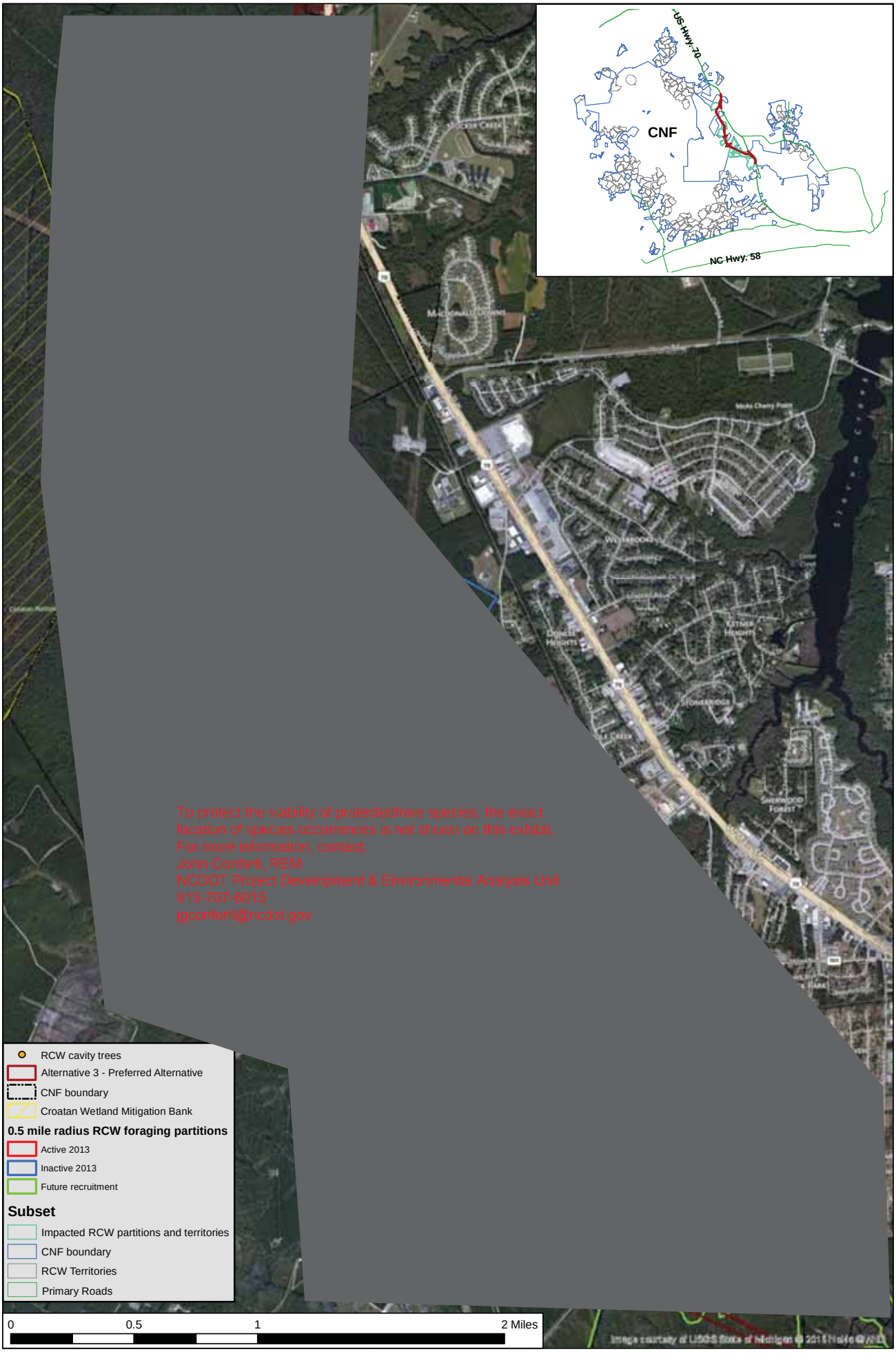

Figure 3. Location of red-cockaded woodpecker (RCW) clusters and cavity trees on the Croatan National Forest (CNF) near the Havelock Bypass project (R-1015) in Craven and Carteret Counties, North Carolina.

1989. The NC Intrastate System connects major population centers both inside and outside NC and was designed to support statewide growth and development objectives.

In 1992, a CNF RCW Management Plan was included as Appendix 5 in the report, *Red-cockaded woodpecker population and breeding study for the Croatan National Forest*, developed by Dr. Jeff Walters of NC State University (NCSU) and Warren Starnes, a CNF biologist (at the time) (Walters and Starnes 1992). This plan proposed to link the fragmented RCW sub-populations on the CNF. In the winter of 1992/1993, the United States Forest Service (USFS) contracted the NCSU RCW Research Project to create 9 RCW clusters with artificial cavities and provision cavities within 16 existing inactive clusters on the CNF. The artificial cavity provisioning was the first phase in a 5 phase plan to link the 5 subpopulations (as defined by Walters and Starnes) on the CNF and to stabilize isolated clusters on the CNF. Subpopulation 3 was expanded by the addition of 2 new clusters in the 1992/1993 contract. CNF 58 (active) was the only cluster in Subpopulation 3 at the time (Table 1). CNF Clusters 901 and 902 were created in 1992 by the NCSU RCW Research Project and CNF 144 was created in 2002 and 12-44R was created in 2007 by USFS (Table 1).

The population linkage design was eventually incorporated into the 2002 CNF Land and Resource Management Plan (2002 Plan) (USFS 2002). The 2002 Plan emphasized recovery of RCWs on the CNF and using cavity provisioning in order to attract new RCW breeding groups to existing unoccupied clusters or to newly created clusters. The subsequent 4 phases were not implemented according to the timeline suggested in the 1992 Management Plan, however, in recent years; the USFS has begun to implement those recommendations by provisioning artificial cavities to link the fragmented CNF RCW population.

The designation of CNF subpopulations were originally determined by demographics and relative cluster locations (Walters and Starnes 1992). CNF Clusters 144, 58, 901 and 902, 2 future recruitment clusters (11-15R and 12-44R) and 5 HMAs (132, 168, 169, 170 and 186) made up Subpopulation 3 (Figure 2). According to Walters and Starnes (1992), CNF Subpopulation 3 was isolated from the other subpopulations due to fragmentation by private property inholdings, unsuitable habitat and development.

In the spring of 1992, NCDOT, in conjunction with the FHWA, initiated a Draft and Final Environmental Impact Statement to develop and assess alternatives to either improve existing US Hwy. 70 or build a bypass around Havelock. In 1997, after substantial

Table 1. History of cluster activity and breeding status for Croatan National Forest (CNF) red-cockaded woodpecker (RCW) clusters impacted by the proposed Havelock Bypass (R-1015), Craven County, North Carolina.

Year	RCW Cluster				
	CNF 58	**CNF 144[1]**	**CNF 901[2]**	**CNF 902[2]**	**CNF 12-44R[3]**
1992	ACT - BG		IA[2]	IA[2]	-
1993	ACT - BG	-	IA	IA	-
1994	ACT - BG	-	IA	IA	-
1995	ACT - BG	-	IA	IA	-
1996	ACT - BG	-	IA	ACT - SOL	-
1997	ACT - BG	-	IA	ACT - SOL	-
1998	ACT - BG	-	IA	IA	-
1999	ACT - BG	-	IA	IA	-
2000	ACT - BG	-	IA	IA	-
2001	ACT - BG	-	IA	IA	-
2002	ACT - BG	IA[1]	IA	IA	-
2003	ACT - BG	IA	IA	IA	-
2004	ACT - BG	IA	IA	IA	-
2005	ACT - NBG	IA	ACT - SOL	IA	-
2006	ACT - BG	IA	ACT - SOL	ACT - SOL	-
2007	ACT - SOL	IA	ACT - SOL	IA	IA[3]
2008	IA[4]	IA[4]	IA[4]	IA[4]	IA[4]
2009	IA	IA	ACT - SOL	IA	IA
2010	ACT - UNK[5]	IA[5]	ACT - UNK [5]	ACT - UNK[5]	IA[5]
2011	IA[6]	IA	ACT - BG	ACT - SOL	IA
2012	IA[4]	IA[4]	ACT - BG[4]	IA[4]	IA[4]
2013	IA[4]	IA[4]	ACT - BG[4]	IA[4]	IA[4]

***USFS data used unless otherwise noted.**

[1]Artifical cavities installed in 2002.

[2]Artifical cavities installed in 1992.

[3]Artifical cavities installed in December 2007.

[4]JCA breeding season data used.

[5]JCA October 2010 data used.

[6]JCA November 2011 data used.

ACT - Active cluster
IA - Inactive cluster

BG - Breeding group
NBG - Non-breeding group
SOL - Solitary RCW
UNK - Unknown

environmental review by State and federal agencies, a decision was made to change the Draft Environmental Impact Statement (DEIS) to an Environmental Assessment. After the development of the EA in 1998 it was again decided that this project be evaluated in a Draft and Final Environmental Impact Statement (NCDOT 2011).

The DEIS evaluated 4 construction alternatives in detail, one option that would improve existing US Hwy. 70 and 3 new location bypass alternatives. A Biological Assessment, which discussed the impacts of each of the alternatives on active RCW Cluster CNF 58, was submitted on 10 April 1996 (Dr. J.H. Carter III & Associates, Inc. (JCA) 1996a). The US Fish and Wildlife Service (USFWS) concurred with the determination that Corridor 3 (which followed a route similar to the current design) or Corridor 4 (which ran parallel to Corridor 3 to the west) were "not likely to adversely affect the RCW" (USFWS 1996a), following guidance from the 1985 RCW Recovery Plan (USFWS 1985). In August 1996, CNF 902 was activated by a solitary male RCW. A Biological Assessment Addendum was submitted on 30 September 1996 (JCA 1996b) to evaluate the impacts of the project on this newly active cluster. The USFWS again concurred with the determination that the project was "not likely to adversely affect" the RCW (USFWS 1996b).

In February and March 2004, ground and aerial surveys were conducted by JCA and the activity and status of RCW clusters and/or cavity trees within the 0.50 mi. radius of the 3 Alternatives were collected. Between March 2004 and April 2005, foraging habitat data were collected on USFS property for CNF Clusters 11-15R, 12-44R, 144, 58, 901 and 902. The *Biological alternatives analysis for red-cockaded woodpecker and bald eagle impacts, US Highway 70 Bypass (R-1015), Craven County, North Carolina* (Alternatives Analysis) was submitted to NCDOT on 11 December 2007 (NCDOT 2007). At the time of the submittal, 2 recruitment clusters did not have cavity trees (CNF 11-15R and 12-44R), 2 clusters were inactive (CNF 144 and 902) and 2 RCW clusters were active (CNF 58 and 901) (JCA unpublished data) (Table 1). On 14 December 2007, the USFS installed artificial cavities in CNF recruitment cluster 12-44R. JCA revisited the project area during the 2008 nesting season and found no active RCW clusters within any of the proposed Bypass alternatives. JCA did not visit the CNF in 2009. According to USFS data, one cluster (CNF 901) within the project corridors was active during the 2009 nesting season and one cluster (CNF 58) was active during the 2010 breeding season. CNF 902 was not monitored by the USFS during the 2010 breeding season (Table 1).

On 5 October 2010, JCA made a site visit to the CNF and found 3 active RCW clusters (CNF 58, 901 and 902) (JCA 2011). Due to conflicting CNF data in 2010, Table 1 only shows observations from the October 2010 JCA site visit.

JCA biologists updated the midstory data and forest stand ages within the RCW foraging partitions impacted by one or more of the Bypass alternatives in October 2010. JCA biologists also updated the cluster activity status of all known RCW clusters within the project corridors (CNF 58, 901 and 902 were active at the time) (Table 1).

Representatives from the NCDOT, the USFS and the USFWS held a meeting on 17 March 2011 to coordinate future prescribed burning on the CNF between existing US Hwy. 70 and the proposed Bypass. NCDOT agreed to periodically close the Bypass to facilitate prescribed burning. The USFS anticipated that road closures would be possible every year and would require 5-6 days per year. Discussions are ongoing to determine appropriate road closure methods (NCDOT meeting minutes, 25 April 2011).

JCA resurveyed the 0.50 mi. radius around the 3 Alternatives by helicopter in January 2011 and updated RCW cluster activity status in October 2011 (Table 1). JCA submitted an *Addendum to the final biological alternatives analysis for red-cockaded woodpecker and bald eagle impacts, US Highway 70 Havelock Bypass (R-1015), Craven County, North Carolina* to NCDOT on 25 October 2011 (JCA 2011). JCA conducted morning and evening cluster visits in CNF 58 and 901 on 2 and 3 November 2011. No RCWs were seen or heard and all cavity trees were inactive. In CNF 901, a solitary male was identified and seen flying north over Slocum Creek towards the CNF 58 partition.

During the 10 April 2012 Interagency Team meeting, Alternative 3 was reaffirmed as the LEDPA. Since the LEDPA was reaffirmed, there was no need for a new agreement and concurrence was achieved through interagency meetings and letters (M. Pierce, NCDOT, pers. comm.).

On 22 May 2012, JCA made a site visit to the CNF and found one active RCW cluster (CNF 901) with a breeding pair of adults. JCA revisited the CNF in mid-August 2012 to conduct a morning and evening cluster visit at CNF 58 to confirm that it was inactive. No RCWs were seen or heard and no known cavity trees were active.

New forest stand data was collected and analyzed by JCA in January 2013 to reflect current habitat conditions. Data collected and/or analyzed included new RCW foraging habitat

data for the 5 impacted RCW clusters (CNF 12-44R, 144, 58, 901 and 902), a reanalysis of the future forested conditions of 4 HMAs (HMA 168, 169, 170 and 186) and updates of RCW cluster and cavity tree activity.

In the 1992 Management Plan (Walters and Starnes 1992), future recruitment cluster CNF 11-15R was proposed in an effort to link the eastern side of the CNF RCW population with the northern and southern subpopulations. CNF 11-15R was analyzed in previous reports but was not included in this report. CNF 11-15R is not presently listed by the USFS as part of their current plan to reach RCW recovery and is not planned for a designated RCW territory (R. Powell, USFS, email dated 7 May 2013). The property is not managed for RCWs and no RCW cavity trees exist onsite. However, because of the importance of this piece of property as a link between existing and planned RCW habitat, any future management on the property will be done to meet RCW guidelines. When the Croatan Wetland Mitigation Bank (CWMB) becomes part of the CNF, CNF 11-15R may be reevaluated as a potential recruitment cluster (R. Powell, USFS, email dated 7 May 2013).

5. METHODS

5.1. RCW SURVEY

JCA biologists surveyed the Bypass corridor and a 0.50 mi. radius around it for RCW cavity trees by helicopter in January 2011. For results from the aerial survey, please refer to the report (JCA 2011).

The activity status of all known RCW cavity trees within 5 cluster partitions impacted by the Bypass was updated on 9 May 2013. Newly found RCW cavity trees were flagged and their locations were documented using a Trimble® GeoXT and plotted on an aerial photograph.

5.2. FORAGING HABITAT ANALYSIS

Forest stand data was taken by JCA for RCW Clusters CNF 12-44R, 144, 58, 901 and 902 in January 2013 on CNF land only. Plots were placed every 5 chains (1 chain = 66 ft.) along transects spaced approximately 10 chains apart within each 0.50 mi. radius foraging habitat partition. The number of plots ranged from 43 (CNF 901) to 66 (CNF 144). Foraging substrate for the partitions was measured with a 10-factor basal area (BA) prism using the prism-plot method. Pine BA, the number of pines $\geq$4 inches in diameter at breast height (dbh) in 2-inch diameter classes

and the age of a representative dominant pine were obtained in each plot. Habitats were divided into 5 types: sparse pine (< 40 square feet ($ft.^2$) of pine BA/acre), moderately dense pine (≥40 to 70 $ft.^2$ of pine BA/ acre), dense pine (>70 $ft.^2$of pine BA/acre), pine plantation and unsuitable habitat. Unsuitable habitat consisted of hardwood-pine drains and pine plantations ≤30 years old. Non-foraging habitat consisted of clearcuts, agricultural lands, permanently cleared areas, treeless developed areas and road and powerline ROWs.

Pine stands were assessed by the density and height of the midstory in accordance with the 2003 RCW Recovery Plan (USFWS 2003) and its designation of quality requirements for RCW foraging habitat. Determining midstory density was subjective, but followed these basic criteria: a stand with a sparse hardwood midstory had few or no hardwoods present, a stand with a dense hardwood midstory had limited visibility and movement through the stand was difficult, and a stand with a moderately dense hardwood midstory was intermediate. Each habitat type was further subdivided according to hardwood midstory height. Midstory hardwoods less than 7 ft. in height were considered low, hardwoods from 7-15 ft. high were considered moderate and hardwoods more than 15 ft. high were considered tall.

Impacts were assessed pursuant to Sections 7 and 9 of the Endangered Species Act, as amended, using the Standard for Managed Stability (SMS) and the Recovery Standard Guidelines (RSG) (USFWS 2003). Foraging habitat was also evaluated pursuant to a memorandum issued by then USFWS Assistant Regional Director, Noreen E. Walsh, on 4 May 2005. According to the guidance presented in the memorandum, an incidental take is assumed for the group/cluster if the post-project foraging habitat totals are below the minimum pine BA and/or acreage required by the SMS.

5.2.1. SMS

The SMS requires a minimum of 3,000 $ft.^2$ of pine BA in stems ≥10 inches dbh on at least 75 acres of good quality foraging habitat as defined below (USFWS 2003).

1. Pine stands must be at least 30 years of age or older.
2. Average BA of pines ≥ 10 inches dbh should be between 40 and 70 $ft.^2$/acre.
3. Average BA of pines < 10 inches dbh should be less than 20 $ft.^2$/acre.
4. No hardwood midstory exists, or if a hardwood midstory is present, it must be sparse and less than 7 ft. in height.

5. Total stand BA, including overstory hardwoods, should be <80 ft.^{2}/acre.

Additionally, all land counted as foraging habitat must be within 200 ft. of another foraging stand and the cluster and all stands counted as foraging habitat should be within 0.25 mi. of the cluster (USFWS 2003).

USFWS guidance (W. McDearman, USFWS, pers. comm.) since the 2003 Recovery Plan has established the following clarifications of the total stand BA requirement:

- Overstory hardwood BA must be ≤10 ft.^{2}/acre.
- Total stand BA can exceed 80 ft.^{2}/acre if the maximum limits for overstory hardwood BAand pines <10 inches dbh are not exceeded, and the BA in pines 10-14 inches dbh is 40-70 ft.^{2}/acre (in other words, the excess BA is comprised of pines ≥14 inches dbh) (USFWS 2011; W. McDearman, USFWS, pers. comm.).

Pine stands that met the SMS overstory guidelines and had a sparse hardwood midstory, a moderately dense hardwood midstory that was low in height or a dense hardwood midstory that was low in height were considered "suitable" foraging habitat.

"Potentially suitable habitat" was described as stands that met most requirements, but exceeded the maximum limits for pine BA in certain dbh classes, hardwood midstory density/height and/or overstory hardwood density. These stands have the necessary pine BA and could meet the SMS with midstory removal, prescribed burning and/or thinning. Stands with suitable overstory characteristics containing a moderately dense or dense midstory that was moderate or tall in height were in this potentially suitable category.

All stands on sites managed for pine dominance that did not fall into the suitable or potentially suitable categories were classified as "future potential habitat." These stands will require time and management to meet the SMS requirements.

Foraging habitat available for a cluster was first evaluated using a 0.25 mi. radius foraging partition. If the minimum SMS requirements were not met within the 0.25 mi. radius partition, a 0.50 mi. radius partition was used.

5.2.2. RSG

The RSG requires a minimum of 120 acres of good quality foraging habitat in areas with high site productivity and 200-300 acres of good quality foraging habitat in areas of low productivity.

The RSG defines good quality foraging habitat as follows (USFWS 2003):

1. There should be a minimum of 18 pine stems >14 inches dbh per acre that are ≥ 60 years old. The minimum BA for these pines should be 20 $ft.^2$/acre.
2. The BA for pines from 10-14 inches dbh should be from 0-40 $ft.^2$/acre.
3. The BA of pines <10 inches dbh should be below 10 $ft.^2$/acre and below 20 stems / acre.
4. The minimum BA for categories 1 and 2 above should be 40 $ft.^2$/acre.
5. Native herbaceous ground cover should total 40 percent (%) or more.
6. No hardwood midstory exists, or if present, is sparse and less than 7 ft. in height.
7. Canopy hardwoods are absent or less than 10% of the number of canopy trees in longleaf forests and less than 30% of the number of canopy trees in loblolly and shortleaf forests. Restoration of longleaf pine has been identified as a high priority in the management of the national forests (USFWS 2003). Therefore, the <10% canopy hardwoods standard was used.
8. All habitat is within 0.50 mi. of the center of the cluster.
9. Foraging habitat is not separated by more than 200 ft. of non-foraging habitat.

Classification of suitable, potentially suitable and future potential habitat was the same as the classification used for the SMS analysis.

To determine the foraging habitat acreage requirements, the site indices associated with the soils in each partition were evaluated. These data provided the total number of acres that must be managed to meet the RSG for good quality foraging habitat per cluster (USFWS 2003). Soil types present in each partition were determined using soil survey data provided by USFS and the US Department of Agriculture, Natural Resources Conservation Service (USDA NRCS) web soil survey (USDA, NRCS 2012). Soils were analyzed based on a recommendation submitted to the USFWS to amend the

site index parameters in the RCW Recovery Plan (USFWS 2003) to include 3 categories of site productivity. Soils with a high site index (> 75 for the dominant pine species) would require 120-150 acres of suitable or potentially suitable habitat, soils with a medium site index (51-75 for the dominant pine species) would require 150-200 acres of suitable or potentially suitable habitat and soils with a low site index (≤ 50 for the dominant pine species) that would require 200-300 acres of suitable or potentially suitable foraging habitat (*Recommendations for revision of site index criteria for RCW foraging habitat guidelines* (J.H. Carter, pers. comm., 2004). In partitions where there was a combination of high, medium and/or low productivity soils, the amount of habitat needed for the RCW cluster was based on the percent of soil productivity types present. For example, the percent of low productivity soils present was multiplied by the mean number of acres required to be managed, approximately 250 acres. These totals were then added together to obtain the total number of acres that would need to be managed for that particular partition.

Foraging habitat removals for affected partitions (excluding CNF 12-44R) and HMAs were based on the SS project design provided by NCDOT including an additional 40 ft. on each side (impact area) (July 2013). Foraging habitat removals for CNF 12-44R were based on the right-of-way project design provided by NCDOT in August 2013 (R. Beauregard, NCDOT, pers. comm.). CNF 12-44R would have been a "direct take" since the impact area (SS plus 40 ft.) exceeded 200 ft. in width, thus making the other part of the partition noncontiguous and not counted as foraging habitat. Therefore, NCDOT re-designed the highway through the 12-44R partition to keep the ROW, and in turn the impact area, <200 ft. wide. There was a high degree of confidence that the impacts will not occur beyond the impact area because of coordination of the drainage, geotechnical and utility sections of NCDOT had worked on that section of the design (B. Yamamoto, pers. comm.). To calculate project removals, biologists created and overlaid a geographic information system (GIS) layer of the project design onto an aerial photograph. JCA biologists calculated foraging habitat removals using ArcGIS™ software. As defined in the RCW Recovery Plan (USFWS 2003), RCW foraging habitat separated by more than 200 ft. of non-habitat from another foraging stand or the cluster itself was considered

noncontiguous and was not counted as available habitat (USFWS 2003). Habitat made noncontiguous by project impacts was subtracted from post-project totals.

5.3. DETERMINATION OF ANTICIPATED INCIDENTAL TAKE

Guidance issued by the USFWS on 4 May 2005 (USFWS 2005) further defined the Recovery Plan's (USFWS 2003) specifications on conducting analyses of project impacts on the RCW by describing 5 levels of analysis: 1) foraging partition, 2) group, 3) neighborhood, 4) population and 5) recovery unit (this analysis is conducted by the USFWS). An analysis will generally proceed to the next level only if incidental take occurs at the partition or group level. For example, if a partition does not have enough foraging habitat to meet the SMS, the cluster is considered "taken" and further analysis is needed at the group level. If a project is large enough (i.e., impacts multiple clusters), an independent population-level analysis is still required (memo from R. Costa, 27 August 2006) even though no cluster is "taken." This process is necessary to determine if the population has enough partitions with enough habitat to meet the RSG post-project and thus meet its recovery goal.

5.3.1. Cluster Level Analysis

5.3.1.a. Cavity Trees

Clusters were considered to be "taken" by cavity tree loss if cavity trees were removed, less than 4 suitable cavities remained and there was an insufficient number of suitable trees for artificial cavities to replace the lost cavities. In order to assess potential harassment impacts, active cavity trees within 200 ft. of the Bypass were recorded.

5.3.1.b. Foraging Habitat

Foraging habitat was analyzed as described above and was assessed according to the SMS and RSG as defined in the Recovery Plan (USFWS 2003).

According to the SMS guidelines, clusters were considered to be "taken" if the 0.50 mi. radius foraging habitat partition fell below 3,000 $ft.^2$ of pine BA in stems $\geq$10 inches dbh on at least 75 acres of good quality foraging habitat.

5.3.2. Group Level Analyses

Per USFWS guidance (USFWS 2005), when Incidental Take is found to occur in the cluster level analysis, it is necessary to assess the impact of that loss on the demographic stability of neighboring RCW groups. This is done by examining the density of active RCW clusters on the landscape.

Retaining sufficient foraging habitat alone does not ensure the persistence of an RCW cluster. The continued occupation of a cluster not only depends on the amount of foraging habitat, but also depends on the density of active clusters around it (Hooper and Lennartz 1995). Research has shown that the more aggregated RCW clusters are, the higher the probability of persistence, even with substantial foraging habitat loss (Crowder et al. 1998, Letcher et al. 1998). RCW clusters in moderately dense to dense populations have been shown to be less sensitive (e.g., in group size and productivity) to significant loss in habitat relative to sparser populations with seemingly more available foraging habitat (Hooper and Lennartz 1995). Therefore, when active RCW clusters are to be "taken" for a project, it is necessary to assess the impact of that loss on the demographic stability of neighboring RCW clusters. This is done by examining the density of active RCW clusters on the landscape.

For the group density analysis, clusters having ≥ 4.7 active clusters within 1.25 mi. were considered healthy and were given a "dense" designation. Clusters with 2.6 to 4.6 active clusters within 1.25 mi. were considered to have "moderate" density. Clusters with ≤ 2.5 active clusters within 1.25 mi. were considered "sparse," and therefore more vulnerable to abandonment because of a lack of emigration/immigration (Conner and Rudolph 1991).

A 1.25 mi. radius buffer was drawn around the cluster center for every active cluster within 0.50 mi. of the project design and adjacent to a cluster "taken" (directly or indirectly) or affected by the Bypass (some foraging habitat or cavity trees removed). For each cluster analyzed, the number of active clusters within 1.25 mi. of its cluster center was calculated and included in the cluster density totals. These totals did not include the subject cluster if it was expected to be "taken" by the project. However, "taken" clusters were included in the pre-project density totals of their neighboring clusters.

Clusters with ≥ 4.7 active groups within 1.25 mi. post-project were considered to be unaffected by the project. Clusters whose densities were reduced from "dense" or "moderate" to "sparse" were considered to be affected and therefore vulnerable to abandonment as a result of the proposed project.

5.3.3. RCW Neighborhood Analysis

Per the 2005 USFWS guidance, when an "is likely to adversely affect" determination is made at the cluster or group levels, a neighborhood analysis will typically be warranted. The neighborhood-level analysis involved assessment of the density of RCW groups that were within the project "neighborhood," but were not directly affected by the project (USFWS 2005).

Guidance set forth in the *Endangered species consultation handbook: procedures for conducting consultation and conference activities under Section 7 of the Endangered Species Act* (USFWS and National Marine Fisheries Service (NMFS) 1998) states that "when determining an action area, it must include the project site and all the areas surrounding the activity up to where the effects will no longer be felt by the listed species." The intent of the "neighborhood analysis" is to account for the potential negative impacts of a project on RCW demography through habitat loss or "fragmentation" at the neighborhood level (USFWS 2003). Fragmentation is defined by the 2003 Recovery Plan as "habitat loss that results in isolated patches of remaining habitat" (USFWS 2003).

When demographic data are available, the average dispersal distance for each population is typically used to define the RCW neighborhood/Action Area surrounding a project site or impact area (USFWS 2005). In order to calculate this number, all documented successful RCW dispersals to and from clusters on CNF since 1989 were analyzed. According to this data, the average dispersal distance within the entire CNF, when measured from the territory center, is 4.0 mi. However, due to the relative isolation of the RCW clusters in the project area (Subpopulation 3) from the rest of the CNF, RCWs must disperse greater distances in order to find breeding vacancies. USFS dispersal data shows that RCWs from Subpopulation 3 dispersed an average of 8.42 mi. to other active RCW clusters on the CNF. As a result, an 8.42 mi. radius buffer was

overlaid on the NCDOT project design and all RCW clusters within the buffer were included in the neighborhood analysis.

As with the group-level analyses, if the post-project analysis showed less than 2.5 RCW groups would remain post-project within a 1.25-mi. radius of the subject cluster, it was considered "taken" at the neighborhood level.

5.3.4. Population Level Analysis

Per USFWS guidance (USFWS 2006b), all major projects are to be analyzed at the population level, regardless of whether or not there is an Incidental Take at the partition level. This is necessary because some project-related impacts may not reach the threshold of incidental take for some groups (i.e., going below the SMS), but may preclude those groups' partitions from meeting the RSG in the future (i.e., not being able to achieve 120 acres of good quality foraging habitat) (memo from R. Costa, 27 August 2006), "Because recovery cannot be achieved at managing partitions at the SMS, on federal populations it is also necessary to determine if partitions will meet the RSG (USFWS 2003). This analysis is necessary to determine if the population can reach its recovery goal population size in the future with a sufficient number of partitions meeting the RSG.

Calculating whether a population's recovery goal can be met sometime in the future, based on project-related impacts today, also requires knowledge, or estimates, of the percent of 1) inactive clusters, 2) solitary RCW groups and 3) captured clusters, at the time when the overall habitat-based population goal would likely be achieved (USFWS 2005). Values for these 3 parameters are subtracted from the population goal (measured in active clusters), along with estimates of groups that are predicted to be lost due to project-related impacts, to determine if the required number of potential breeding groups can be achieved in the future (USFWS 2005).

5.3.5. Recovery Unit Level Analysis (Jeopardy Analysis)

The jeopardy analysis occurs at the Recovery Unit level (USFWS 2003a, USFWS 2006b). According to the 1998 USFWS Consultation Handbook (USFWS and NMFS 1998), when determining jeopardy, the USFWS is to analyze the impact of the action in

question on the species as a whole. To facilitate this analysis, Recovery Units can be identified in a species' Recovery Plan that will provide a smaller-scale definition of Jeopardy. According to the 2003 Recovery Plan (USFWS 2003a):

> "Given that actions that appreciably impair or preclude the capability of such a recovery unit from providing the survival and recovery functions identified for it in a recovery plan may therefore represent jeopardy to the species, the Consultation Handbook indicates the jeopardy standard may be applied to individual recovery units identified as necessary for survival and recovery of the species in an approved final recovery plan."

Each Recovery Unit described in a species' Recovery Plan has a defined role in the downlisting, delisting and 'recovery' of the species. If an action is determined to jeopardize the ability of that Recovery Unit to serve the function described for it in the species' Recovery Plan, that action could be found to jeopardize the recovery of the species.

For the Mid-Atlantic Coastal Recovery Unit, the Recovery Plan (USFWS 2003) lists 2 Primary Core Populations: (1) Coastal North Carolina, consisting of CNF, HSGL and MCBCL and (2) the Francis Marion National Forest in SC. It also contains one essential support population: Northeast North Carolina/Southeast Virginia, consisting of Alligator River National Wildlife Refuge, Dare County Bombing Range, Palmetto-Peartree Preserve, Pocosin Lakes National Wildlife Refuge and Piney Grove Preserve. The Recovery Unit Level Analysis focuses on the ability of CNF to retain its function as part of the Primary Core Populations in the Mid-Atlantic Coastal Recovery Unit post-project.

The Recovery Unit is discussed in Section 7.2.5; however, the jeopardy analysis will be conducted by the USFWS. This analysis will be based upon information provided in this Biological Assessment for the other 4 levels of analyses.

6. RESULTS

6.1. RCW CHARACTERISTICS

The RCW is a small black and white woodpecker with horizontal bars on its back, spotted flanks and a white belly. The cap and chin stripe are black and the male has a small,

difficult to see, red spot on each side of the black cap. It is most easily identified by the large white cheek patches that distinguish it from similar species (USFWS 2003).

6.2. DISTRIBUTION AND HABITAT REQUIREMENTS

The RCW is endemic to mature, fire-maintained pine forests in the southeastern United States, where it was historically common. Prime nesting habitat for RCWs includes open, mature southern pine forests dominated by longleaf, loblolly, pond, slash (*Pinus elliotti*) or other southern pine species greater than 60 years of age with little or no mid- or understory development. Pine flatwoods and pine-dominated savannas, which have been maintained by frequent fires, serve as ideal nesting and foraging habitat for RCWs. Potential foraging habitat is defined as open pine or pine/hardwood stands 30 years of age or older (USFWS 2003).

6.3. THREATS TO THE SPECIES

Logging, fire exclusion and conversion of forestlands for agricultural and other uses have destroyed most of this species' habitat range-wide (USFWS 2003).

6.4. RECOVERY GOALS

The RCW Recovery Plan (USFWS 2003) lists 13 Primary Core Populations, 11 of which are required to have at least 350 pbgs for delisting of the species. The NC Coastal Plain Primary Core Population is made up of the CNF, HSGL and MCBCL (Figure 4). These properties must have a combined RCW population of at least 350 pbgs (or 400-500 active clusters) to reach recovery. According to the RCW Recovery Plan (USFWS 2003), the goals per property are: CNF = 137-169 pbgs, HSGL= 38 pbgs and MCBCL = 173 pbgs. As of 2013, there were approximately 202 pbgs in this Primary Core Recovery Population (CNF = 67 pbgs, HSGL = 35 pbgs and MCBCL = 100 pbgs (MCBCL number not finalized) (R. Powell, C. Phillips and J. Walters, pers. comms.).

An increase in the number of pbgs on the CNF will bring the CNF closer to reaching its population goal and thus bring the NC Coastal Plain Primary Core Population closer to reaching its overall recovery goal. To this end, the USFS quantified the amount of potentially suitable RCW habitat on the CNF, with a range of 137 to 169 pbgs as its population goal (USFS 2002). To date, 172 RCW territories have been designated on the CNF, ranging in size from 19 to 760

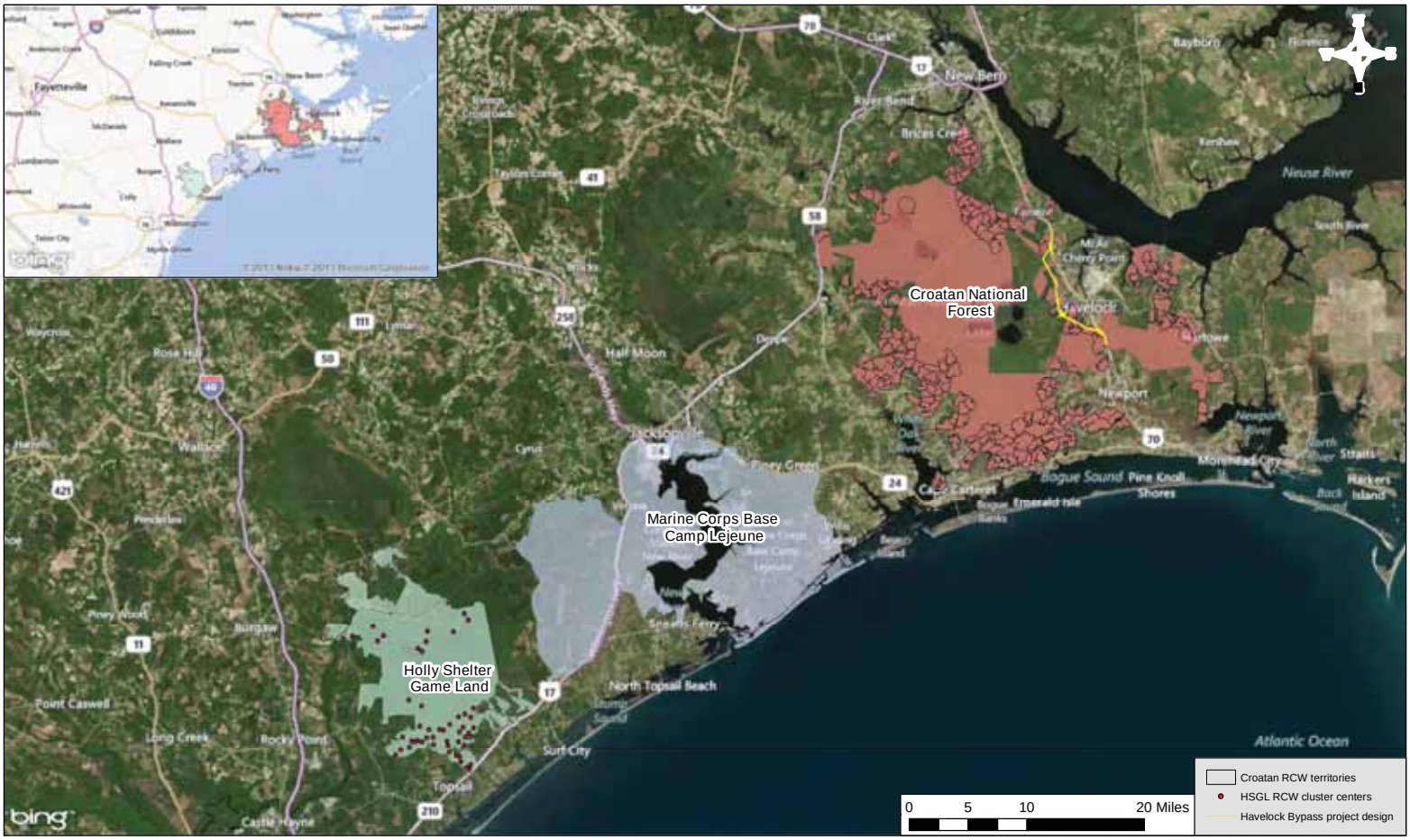

Figure 4. Location of the North Carolina red-cockaded woodpecker (RCW) Coastal Plain Primary Core Recovery Population which is made up of RCW sub-populations on the Croatan National Forest, Holly Shelter Game Land and Marine Corps Base Camp Lejeune in Craven, Carteret, Jones, Onslow and Pender Counties, North Carolina.

acres. These sites consist of potentially suitable foraging habitat, known RCW clusters, recruitment clusters, future recruitment clusters and HMAs. Only 1 RCW cluster was planned for each HMA. The large size for these HMAs was needed because the entire HMA may not be comprised of suitable or potentially suitable RCW habitat. These parameters form the framework for the following analysis.

The 172 designated RCW territories make up 5 RCW subpopulations across the CNF based on demographics and relative cluster locations (Walters and Starnes 1992). CNF Clusters 12-44R, 144, 58, 901 and 902 and 5 HMAs (132, 168, 169, 170 and 186) make up Subpopulation 3 (Figures 2-4). Even though CNF 12-44R does not currently have a designated territory on the CNF, it was included in the 1992 Management Plan, has artificial cavity trees and provides an important link between fragmented habitat (Walters and Starnes 1992). The 5 HMAs are slated for cavity provisioning between 2011 and 2072 (Figures 2 and 9).

6.5. RCW CLUSTER AND CAVITY TREE STATUS

No RCW cavity trees occur within the proposed Bypass or within 200 ft. of the Bypass impact area. Therefore, no RCW cavity trees will be "taken" by the project.

Recruitment cluster CNF 12-44R was proposed to help link the eastern side of the CNF RCW population with the northern and southern subpopulations in the 1992 Management Plan (Walters and Starnes 1992). Two drilled starts and 2 insert cavities were installed in December of 2007 by the USFS. This cluster has never been active (Table 1). No cavity trees will be removed as a result of the Bypass and all cavity trees will be at least 500 ft. from the proposed impact area (Figure 3, Table 2).

CNF Cluster 144 was created in 2002 in accordance with the 2002 Management Plan (USFS 2002). This cluster has 4 provisioned cavity trees, but has never been active (Table 1). The cavity trees are more than 1,000 ft. from the impact area and no cavity trees will be removed by the project (Figure 3).

CNF Cluster 58 is located within the Southwest Prong Flatwoods Natural Area designated by the NC Natural Heritage Program (NCNHP). This area was not designated by the USFS as a Special Interest Area in the 2002 Management Plan (USFS 2002). This cluster was active between 1992 and 2007, was inactive in 2008 and 2009 and was found to be active in the fall of 2010 by JCA biologists (Table 1). It has been inactive since 2011. In May 2013, there

Table 2. Location and 2013 status of red-cockaded woodpecker (*Picoides borealis*) (RCW) cavity trees for Croatan National Forest (CNF) Clusters 12-44R, 58, 144, 901 and 902 in Craven County, North Carolina.

CLUSTER	Tree #	Stage	Shape	Activity	X*	Y*
CNF 12-44R	2435	Drilled start	Healing over	Relic		
CNF 12-44R	2437	Drilled start	Normal	Inactive		
CNF 12-44R	2438	Insert	Normal	Relic		
CNF 12-44R	2476	Insert	Normal	Relic		
CNF 58	326	Cavity	Normal	Inactive		
CNF 58	327	Substart/Start	Healed over	Relic		
CNF 58	680	Start	Healing over	Relic		
CNF 58	710	Substart	Healing over	Relic		
CNF 58	954	Start	Healing over	Relic		
CNF 58	955	Substart/Start	Healing over	Relic		
CNF 58	993	Cavity	Normal	Inactive		
CNF 58	1048	Insert	Normal	Inactive		
CNF 58	1049	Insert	Normal	Inactive		
CNF 58	2038	Start	Normal	Relic		
CNF 58	2039	Substart/Start	Healing over	Relic		
CNF 58	2040	Start	Normal	Inactive		
CNF 58	2041	Start	Healing over	Relic		
CNF 58	2440	Advanced start	Normal	Inactive		
CNF 58	E5	Drilled start	Healing over	Relic		
CNF 58	E6	Insert	Normal	Inactive		
CNF 58	Untagged	Start	Normal	Inactive		
CNF 144	1093	Drilled cavity	Healing over	Relic		
CNF 144	1094	Drilled cavity	Slightly enlarged	Relic		
CNF 144	1095	Drilled start	Healed over	Relic		
CNF 144	1096	Drilled start	Healed over	Relic		
CNF 901	1081	Cavity	Normal	Active		
CNF 901	1082	Cavity	Enlarged	Active		
CNF 901	1083	Cavity	Enlarged	Inactive		
CNF 901	E90	Drilled start	Healing over	Relic		
CNF 901	E91	Drilled cavity	Nest tree 2013	Active		
CNF 901	E92	Drilled cavity	Enlarged	Inactive		
CNF 901	E93	Drilled start	Healed over	Relic		
CNF 901	E94	Drilled start	Healed over	Relic		
CNF 902	1084	Cavity	Enlarged	Inactive		
CNF 902	1085	Cavity	Enlarged	Relic		
CNF 902	1086	Drilled start	Normal	Inactive		
CNF 902	1087	Advanced start	Normal	Inactive		
CNF 902	2553	Cavity	Enlarged	Inactive		
CNF 902	E95	Drilled Start	Healed over	Relic		
CNF 902	E96	Drilled cavity	Normal	Relic		
CNF 902	E97	Drilled Start	Healed over	Relic		
CNF 902	E98	Drilled start	Healing over	Relic		
CNF 902	E99	Drilled Start	Healed over	Relic		

To protect the viability of protected/rare species, the exact location of species occurrences is not shown in this table. For more information, contact:
John Conforti, REM
NCDOT Project Development & Environmental Analysis Unit
919-707-6015
jgconforti@ncdot.gov

*GPS coordinates in NAD 1983 StatePlane North Carolina FIPS 3200 Meters

were 17 trees with cavities in various stages of completion and suitability (Figure 3, Table 2). No RCW cavity trees will be directly impacted by the Bypass and all cavity trees will be greater than 800 ft. from the proposed impact area (Figure 3, Table 2).

CNF Cluster 901 was originally created in 1992 and refurbished with new provisioned cavities in the fall of 2002. It contains 8 cavity trees in various stages of completion and suitability. Prior to 2005, the cluster contained no active cavity trees and had never been active, however, it has been periodically active since then. In May 2013, the cluster contained a breeding pair of RCWs and 3 active cavities (#s 1081, 1082 and E91). No cavity trees will be removed by the Bypass, but the project's impact area will come within approximately 400 ft. of the southern-most cavity trees (#s 1081, 1082 and 1083) (Figure 3, Table 2).

CNF Cluster 902 was originally created in 1992 and refurbished with new cavities in the fall of 2002. The cluster was occupied by a solitary male in 1997, then became inactive until May 2006 when it was reactivated by another solitary male. It was inactive in July 2007, but documented as active in the fall of 2010 and 2011 (Table 1). CNF 902 was inactive in May 2013 and contained 10 cavity trees in various stages of completion and suitability (Table 1). No cavity trees will be removed as a result of the Bypass and all cavity trees will be at least 1,000 ft. or more from the impact area (Figure 3).

6.6. FORAGING HABITAT ANALYSES

6.6.1. Impacts to CNF 12-44R

SMS, 0.25 mi. radius partition for CNF 12-44R

The pre-project SMS foraging habitat totals for the CNF 12-44R partition were 1,388.36 $ft.^2$ of pine BA on 27.63 acres of suitable habitat and 4,774.32 $ft.^2$ of pine BA on 60.98 acres of potentially suitable habitat (Figure 5; Table 3). CNF 12-44R meets the SMS requirements for the 0.25 mi. radius foraging partition pre-project assuming potentially suitable habitat is made suitable.

The impact area will remove 254.60 $ft.^2$ of pine BA on 4.57 acres of suitable habitat and 566.25 $ft.^2$ of pine BA on 6.62 acres of potentially suitable habitat (Table 3). The impact area was less than 200 ft. wide, therefore all habitat was counted as contiguous.

CNF 12-44R Stand Density and Height

Habitat Suitability using Standard for Managed Stability guidelines

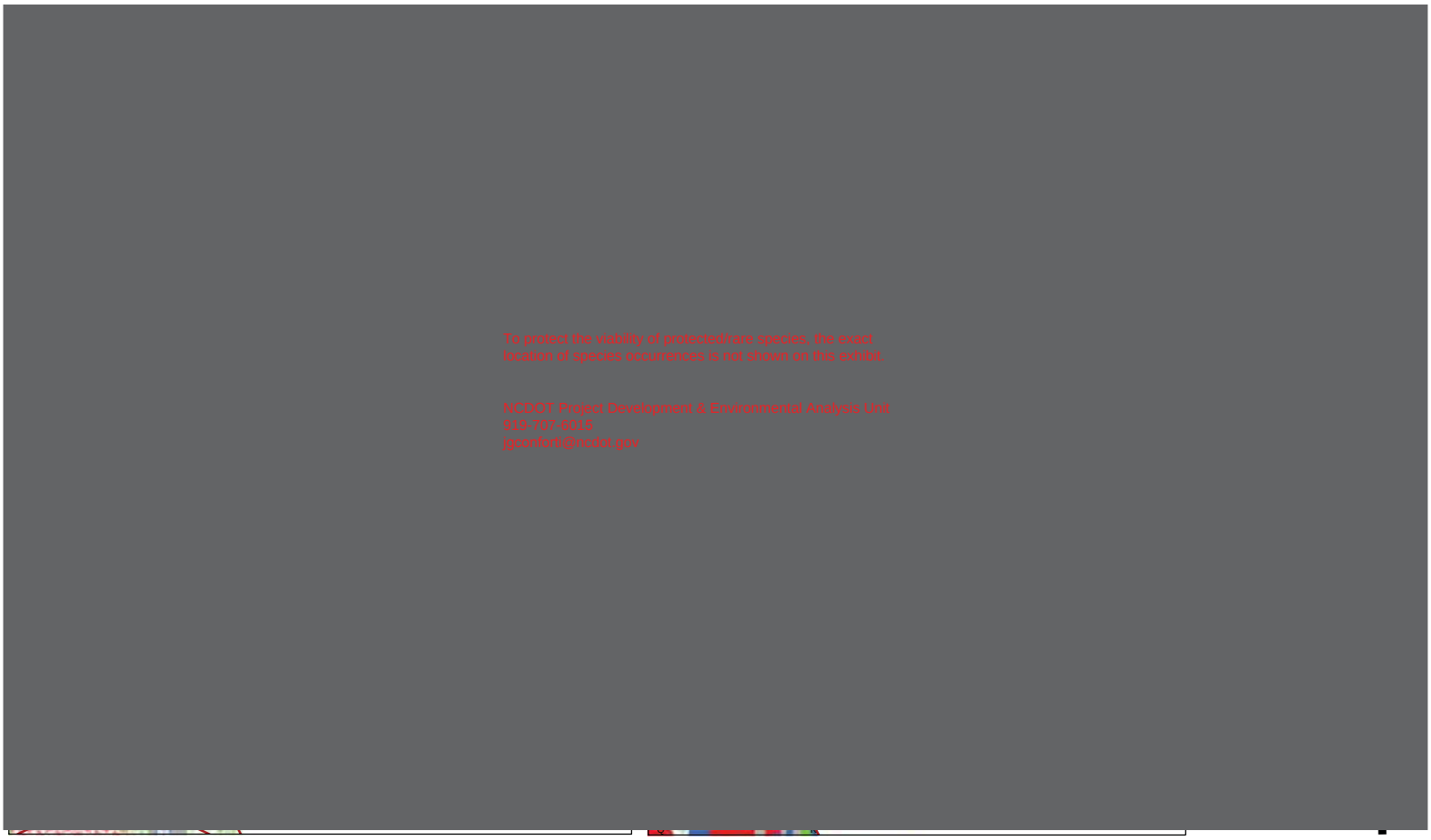

Figure 5. Foraging habitat for red-cockaded woodpecker (RCW) Croatan National Forest (CNF) Cluster 12-44R and project removals by the US Highway 70 Havelock Bypass project (R-1015), Craven County, North Carolina.

Table 3. Pre-project, project removals and post-project foraging habitat totals for the **0.25 mile radius** red-cockaded woodpecker (RCW) foraging habitat partition for Croatan National Forest Cluster **12-44R** using the **Standard for Managed Stability** guidelines (USFWS 2003), US Highway 70 Havelock Bypass (R-1015) project, Craven County, North Carolina.

Stand	Forested Habitat (acres)	Stand Age (years)	4.0-9.9 inches dbh		10.0-13.9 inches dbh		14.0+ inches dbh		10.0+ inches dbh		Total Hwd BA ≥10 in. dbh	Total Stand BA (Pine + Hwds ≥10 in. dbh)	Pine Density ≥10 in. dbh	Hardwood Midstory Density	Hardwood Midstory Height	Suitable Habitat		Removals Suitable Habitat		Potentially Suitable Habitat		Removals Potentially Suitable Habitat		Future Potential Habitat		Removals Future Potential Habitat	
			Avg. Stems[1]	Avg. BA	Avg. Stems	Avg. BA	Avg. Stems	Avg. BA	Avg. Stems	Avg. BA						Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA
A	30.98	76	7.47	2.50	8.91	7.50	24.67	42.81	33.58	50.31	4.40	54.71	Moderate	Moderate	Low	14.35	721.95	3.16	158.98								
														Dense	Low	5.10	256.58	0.71	35.72								
														Dense	Moderate					11.53	580.07						
														Subtotal		**19.45**	**978.53**	**3.87**	**194.70**	**11.53**	**580.07**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
B	7.64	77	0.00	0.00	0.00	0.00	24.43	42.78	24.43	42.78	1.10	43.88	Moderate	Sparse	Low	6.78	290.05										
														Moderate	Tall					0.86	36.79						
														Subtotal		**6.78**	**290.05**	**0.00**	**0.00**	**0.86**	**36.79**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
C	7.22	115	0.00	0.00	10.87	10.00	43.43	73.33	54.30	83.33	13.33	96.66	Dense	Moderate	Moderate					1.69	140.83						
														Dense	Moderate					5.53	460.81	0.07	5.83				
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**7.22**	**601.64**	**0.07**	**5.83**	**0.00**	**0.00**	**0.00**	**0.00**
D	41.79	90	12.05	2.22	18.57	16.67	48.44	68.89	67.01	85.56	0.00	85.56	Dense	Moderate	Moderate					35.43	3,031.39	6.55	560.42				
														Dense	Low	1.40	119.78	0.70	59.89								
														Dense	Moderate					4.96	424.38						
														Subtotal		**1.40**	**119.78**	**0.70**	**59.89**	**40.39**	**3,455.77**	**6.55**	**560.42**	**0.00**	**0.00**	**0.00**	**0.00**
F	0.75	73	7.58	3.33	7.25	6.67	50.36	108.33	57.61	115.00	10.00	125.00	Dense	Moderate	Tall					0.75	86.25						
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.75**	**86.25**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
H	0.23	43	38.86	15.00	52.02	36.67	18.37	23.33	70.39	60.00	0.00	60.00	Moderate	Dense	Moderate					0.23	13.80						
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.23**	**13.80**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Total	**88.61**															**27.63**	**1,388.36**	**4.57**	**254.60**	**60.98**	**4,774.32**	**6.62**	**566.25**	**0.00**	**0.00**	**0.00**	**0.00**

Unsuitable foraging habitat characteristics according to the SMS foraging habitat guidelines (USFWS 2003).
Dense pine stands with a BA of >70 ft^2/acre were counted as suitable only if the excess BA was in pines ≥14 inches dbh (USFWS pers. comm.).

[1]Average stems and BA are calculated per acre.

[2]S&P = Suitable and potentially suitable habitat.

Stands

A 76 year old moderately dense mixed pine habitat.
B 77 year old moderately dense longleaf and loblolly pine habitat.
C 115 year old dense longleaf and pond pine habitat.
D 90 year old dense longleaf pine habitat.
F 73 year old dense loblolly pine habitat.
H 43 year old dense loblolly pine plantation.

Acreage	**Suitable**	**Potential**	**Future**	**Total-All**	**Total-S&P[2]**
Total Pre-Project	27.63	60.98	0.00	88.61	88.61
Total Removals	4.57	6.62	0.00	11.19	11.19
Total Post-Project	23.06	54.36	0.00	77.42	77.42
BA					
Total Pre-Project	1,388.36	4,774.32	0.00	6,162.68	6,162.68
Total Removals	254.60	566.25	0.00	820.85	820.85
Total Post-Project	1,133.76	4,208.07	0.00	5,341.83	5,341.83

The post-project SMS foraging habitat totals for the CNF 12-44R partition were 1,133.76 ft.^{2} of pine BA on 23.06 acres of suitable habitat and 4,208.07 ft.^{2} of pine BA on 54.36 acres of potentially suitable habitat (Figure 5; Table 3). CNF 12-44R will meet the SMS requirements for the 0.25 mi. radius foraging partition post-project assuming potentially suitable habitat is made suitable.

SMS, 0.50 mi. radius partition for CNF 12-44R

The pre-project SMS foraging habitat totals for the 0.50 mi. radius partition were 3,493.83 ft.^{2} of pine BA on 74.69 acres of suitable habitat and 12,152.41 ft.^{2} of pine BA on 151.57 acres of potentially suitable habitat (Figure 5; Table 4). CNF 12-44R meets the SMS requirements for the 0.50 mi. radius foraging partition pre-project assuming potentially suitable habitat is made suitable.

The impact area will remove 471.43 ft.^{2} of pine BA on 8.88 acres of suitable habitat and 764.67 ft.^{2} of pine BA on 9.07 acres of potentially suitable habitat (Table 4). The impact area was less than 200 ft. wide, therefore all habitat was counted as contiguous.

The post-project SMS foraging habitat totals were 3,022.40 ft.^{2} of pine BA on 65.81 acres of suitable habitat and 11,387.74 ft.^{2} of pine BA on 142.50 acres of potentially suitable habitat (Figure 5; Table 4). CNF 12-44R will meet the SMS requirements for the 0.50 mi. radius foraging partition post-project assuming potentially suitable habitat is made suitable.

RSG, 0.50 mi. radius partition for CNF 12-44R

Fifteen percent of the CNF 12-44R partition was located on low productivity soils, 16% on medium productivity soils and the remaining 69% on high productivity soils. The CNF needs to manage an average of 158.45 acres for RCW foraging habitat in order to meet the RSG (Table 5).

The pre-project RSG foraging habitat totals were 3,493.83 ft.^{2} of pine BA on 74.69 acres of suitable habitat, 11,866.81 ft.^{2} of pine BA on 146.81 acres of potentially suitable habitat and 285.60 ft.^{2} of pine BA on 4.76 acres of future potential habitat

Table 4. Pre-project, project removals and post-project foraging habitat totals for the **0.50 mile radius** red-cockaded woodpecker (RCW) foraging habitat partition for Croatan National Forest Cluster **12-44R** using the **Standard for Managed Stability** guidelines (USFWS 2003), US Highway 70 Havelock Bypass (R-1015) project, Craven County, North Carolina.

Stand	Forested Habitat (acres)	Stand Age (years)	4.0-9.9 inches dbh		10.0-13.9 inches dbh		14.0+ inches dbh		10.0+ inches dbh		Total Hwd BA ≥10 in. dbh	Total Stand BA (Pine + Hwds ≥10 in. dbh)	Pine Density ≥10 in. dbh	Hardwood Midstory Density	Hardwood Midstory Height	Suitable Habitat		Removals Suitable Habitat		Potentially Suitable Habitat		Removals Potentially Suitable Habitat		Future Potential Habitat		Removals Future Potential Habitat	
			Avg. Stems[1]	Avg. BA	Avg. Stems	Avg. BA	Avg. Stems	Avg. BA	Avg. Stems	Avg. BA						Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA
A	64.81	76	7.47	2.50	8.91	7.50	24.67	42.81	33.58	50.31	4.40	54.71	Moderate	Moderate	Low	14.89	749.12	3.16	158.98								
														Moderate	Tall					2.60	130.81						
														Dense	Low	16.81	845.71	5.02	252.56								
														Dense	Moderate					30.51	1,534.96	0.51	25.66				
														Subtotal		**31.70**	**1,594.83**	**8.18**	**411.54**	**33.11**	**1,665.77**	**0.51**	**25.66**	**0.00**	**0.00**	**0.00**	**0.00**
B	49.94	77	0.00	0.00	0.00	0.00	24.43	42.78	24.43	42.78	1.10	43.88	Moderate	Sparse	Low	24.18	1,034.42										
														Moderate	Low	17.41	744.80										
														Moderate	Moderate					6.06	259.25						
														Moderate	Tall					2.29	97.97						
														Subtotal		**41.59**	**1,779.22**	**0.00**	**0.00**	**8.35**	**357.22**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
C	9.97	115	0.00	0.00	10.87	10.00	43.43	73.33	54.30	83.33	13.33	96.66	Dense	Moderate	Moderate					1.69	140.83						
														Dense	Moderate					8.28	689.97	0.07	5.83				
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**9.97**	**830.80**	**0.07**	**5.83**	**0.00**	**0.00**	**0.00**	**0.00**
D	49.24	90	12.05	2.22	18.57	16.67	48.44	68.89	67.01	85.56	0.00	85.56	Dense	Moderate	Moderate					40.94	3,502.83	8.25	705.87				
														Dense	Low	1.40	119.78	0.70	59.89								
														Dense	Moderate					6.90	590.36	0.01	0.86				
														Subtotal		**1.40**	**119.78**	**0.70**	**59.89**	**47.84**	**4,093.19**	**8.26**	**706.73**	**0.00**	**0.00**	**0.00**	**0.00**
E	25.27	81	14.23	5.00	25.80	20.00	51.16	80.00	76.96	100.00	0.00	100.00	Dense	Dense	Moderate					23.18	2,318.00						
														Dense	Tall					2.09	209.00						
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**25.27**	**2,527.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
F	9.73	73	7.58	3.33	7.25	6.67	50.36	108.33	57.61	115.00	10.00	125.00	Dense	Moderate	Tall					9.73	1,118.95	0.23	26.45				
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**9.73**	**1,118.95**	**0.23**	**26.45**	**0.00**	**0.00**	**0.00**	**0.00**
G	10.79	69	15.15	6.67	15.85	13.33	57.21	95.00	73.06	108.33	0.00	108.33	Dense	Moderate	Moderate					4.13	447.40						
														Moderate	Tall					3.60	389.99						
														Dense	Moderate					3.06	331.49						
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**10.79**	**1,168.88**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
H	4.76	43	38.86	15.00	52.02	36.67	18.37	23.33	70.39	60.00	0.00	60.00	Moderate	Dense	Moderate					4.76	285.60						
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**4.76**	**285.60**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
N	1.75	64	52.61	20.00	18.33	15.00	21.82	45.00	40.15	60.00	0.00	60.00	Moderate	Dense	Tall					1.75	105.00						
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**1.75**	**105.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Total	**226.26**															**74.69**	**3,493.83**	**8.88**	**471.43**	**151.57**	**12,152.41**	**9.07**	**764.67**	**0.00**	**0.00**	**0.00**	**0.00**

Unsuitable foraging habitat characteristics according to the SMS foraging habitat guidelines (USFWS 2003).

Dense pine stands with a BA of >70 ft^2/acre were counted as suitable only if the excess BA was in pines ≥14 inches dbh (USFWS pers. comm.).

[1]Average stems and BA are calculated per acre.

[2]S&P = Suitable and potentially suitable habitat.

Acreage	Suitable	Potential	Future	Total-All	Total-S&P[2]
Total Pre-Project	74.69	151.57	0.00	226.26	226.26
Total Removals	8.88	9.07	0.00	17.95	17.95
Total Post-Project	65.81	142.50	0.00	208.31	208.31
BA					
Total Pre-Project	3,493.83	12,152.41	0.00	15,646.24	15,646.24
Total Removals	471.43	764.67	0.00	1,236.10	1,236.10
Total Post-Project	3,022.40	11,387.74	0.00	14,410.14	14,410.14

Stands

A	76 year old moderately dense mixed pine habitat.	F	73 year old dense loblolly pine habitat.
B	77 year old moderately dense longleaf and loblolly pine habitat.	G	69 year old dense loblolly pine habitat.
C	115 year old dense longleaf and pond pine habitat.	H	43 year old dense loblolly pine plantation.
D	90 year old dense longleaf pine habitat.	N	64 year old dense loblolly and longleaf pine habitat.
E	81 year old dense longleaf and pond pine habitat.		

Table 5. Pre-project, project removals and post-project foraging habitat totals for the **0.50 mile radius** red-cockaded woodpecker (RCW) foraging habitat partition for Croatan National Forest Cluster **12-44R** using the **Recovery Standard Guidelines** (USFWS 2003), US Highway 70 Havelock Bypass (R-1015) project, Craven County, North Carolina.

Stand	Forested Habitat (acres)	Stand Age (years)	4.0-9.9 inches dbh		10.0-13.9 inches dbh		14.0+ inches dbh		10.0+ inches dbh		Total Hwd BA ≥10 in. dbh	Total Stand BA (Pine + Hwds ≥10 in. dbh)	Pine Density ≥10 in. dbh	Hardwood Midstory Density	Hardwood Midstory Height	Suitable Habitat		Removals Suitable Habitat		Potentially Suitable Habitat		Removals Potentially Suitable Habitat		Future Potential Habitat		Removals Future Potential Habitat	
			Avg. Stems[1]	Avg. BA	Avg. Stems	Avg. BA	Avg. Stems	Avg. BA	Avg. Stems	Avg. BA						Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA
A	64.81	76	7.47	2.50	8.91	7.50	24.67	42.81	33.58	50.31	4.40	54.71	Moderate	Moderate	Low	14.89	749.12	3.16	158.98								
														Moderate	Tall					2.60	130.81						
														Dense	Low	16.81	845.71	5.02	252.56								
														Dense	Moderate					30.51	1534.96	0.51	25.66				
														Subtotal		**31.70**	**1,594.83**	**8.18**	**411.54**	**33.11**	**1665.77**	**0.51**	**25.66**	**0.00**	**0.00**	**0.00**	**0.00**
B	49.94	77	0.00	0.00	0.00	0.00	24.43	42.78	24.43	42.78	1.10	43.88	Moderate	Sparse	Low	24.18	1034.42										
														Moderate	Low	17.41	744.80										
														Moderate	Moderate					6.06	259.25						
														Moderate	Tall					2.29	97.97						
														Subtotal		**41.59**	**1779.22**	**0.00**	**0.00**	**8.35**	**357.22**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
C	9.97	115	0.00	0.00	10.87	10.00	43.43	73.33	54.30	83.33	13.33	96.66	Dense	Moderate	Moderate					1.69	140.83						
														Dense	Moderate					8.28	689.97	0.07	5.83				
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**9.97**	**830.80**	**0.07**	**5.83**	**0.00**	**0.00**	**0.00**	**0.00**
D	49.24	90	12.05	2.22	18.57	16.67	48.44	68.89	67.01	85.56	0.00	85.56	Dense	Moderate	Moderate					40.94	3502.83	8.25	705.87				
														Dense	Low	1.40	119.78	0.70	59.89								
														Dense	Moderate					6.90	590.36	0.01	0.86				
														Subtotal		**1.40**	**119.78**	**0.70**	**59.89**	**47.84**	**4093.19**	**8.26**	**706.73**	**0.00**	**0.00**	**0.00**	**0.00**
E	25.27	81	14.23	5.00	25.80	20.00	51.16	80.00	76.96	100.00	0.00	100.00	Dense	Dense	Moderate					23.18	2318.00						
														Dense	Tall					2.09	209.00						
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**25.27**	**2527.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
F	9.73	73	7.58	3.33	7.25	6.67	50.36	108.33	57.61	115.00	10.00	125.00	Dense	Moderate	Tall					9.73	1118.95	0.23	26.45				
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**9.73**	**1118.95**	**0.23**	**26.45**	**0.00**	**0.00**	**0.00**	**0.00**
G	10.79	69	15.15	6.67	15.85	13.33	57.21	95.00	73.06	108.33	0.00	108.33	Dense	Moderate	Moderate					4.13	447.40						
														Moderate	Tall					3.60	389.99						
														Dense	Moderate					3.06	331.49						
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**10.79**	**1168.88**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
H	4.76	43	38.86	15.00	52.02	36.67	18.37	23.33	70.39	60.00	0.00	60.00	Moderate	Dense	Moderate									4.76	285.60		
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**4.76**	**285.60**	**0.00**	**0.00**
N	1.75	64	52.61	20.00	18.33	15.00	21.82	45.00	40.15	60.00	0.00	60.00	Moderate	Dense	Tall					1.75	105.00						
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**1.75**	**105.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Total	**226.26**															**74.69**	**3493.83**	**8.88**	**471.43**	**146.81**	**11,866.81**	**9.07**	**764.67**	**4.76**	**285.60**	**0.00**	**0.00**

Unsuitable foraging habitat characteristics according to the Recovery Standard foraging habitat guidelines (USFWS 2003).

[1]Average stems and BA are calculated per acre.

[2]S&P = Suitable and potentially suitable habitat.

Stands

A 76 year old moderately dense mixed pine habitat.

B 77 year old moderately dense longleaf and loblolly pine habitat.

C 115 year old dense longleaf and pond pine habitat.

D 90 year old dense longleaf pine habitat.

E 81 year old dense longleaf and pond pine habitat.

F 73 year old dense loblolly pine habitat.

G 69 year old dense loblolly pine habitat.

H 43 year old dense loblolly pine plantation.

N 64 year old dense loblolly and longleaf pine habitat.

Acreage	Suitable	Potential	Future	Total-All	Total-S&P[2]
Total Pre-Project	74.69	146.81	4.76	226.26	221.50
Total Removals	8.88	9.07	0.00	17.95	17.95
Total Post-Project	65.81	137.74	4.76	208.31	203.55
BA					
Total Pre-Project	3,493.83	11,866.81	285.60	15,646.24	15,360.64
Total Removals	471.43	764.67	0.00	1,236.10	1,236.10
Total Post-Project	3,022.40	11,102.14	285.60	14,410.14	14,124.54

(Figure 5; Table 5). CNF 12-44R meets the RSG requirements for the 0.50 mi. radius foraging partition pre-project assuming potentially suitable habitat is made suitable.

The impact area will remove 471.43 ft.^{2} of pine BA on 8.88 acres of suitable habitat and 764.67 ft.^{2} of pine BA on 9.07 acres of potentially suitable habitat (Table 5). The impact area was less than 200 ft. wide, therefore all habitat was counted as contiguous.

The post-project RSG foraging habitat totals were 3,022.40 ft.^{2} of pine BA on 65.81 acres of suitable habitat, 11,102.14 ft.^{2} of pine BA on 137.74 acres of potentially suitable habitat and 285.60 ft.^{2} of pine BA on 4.76 acres of future potential habitat (Figure 5; Table 5). CNF 12-44R will meet the RSG requirements for the 0.50 mi. radius foraging partition post-project assuming potentially suitable habitat is made suitable.

6.6.2. Impacts to CNF 144

SMS, 0.25 mi. radius partition for CNF 144

The pre-project foraging habitat totals for the 0.25 mi. radius SMS partition were 188.00 ft.^{2} of pine BA on 3.76 acres of suitable foraging habitat, 7,765.13 ft.^{2} of pine BA on 105.83 acres of potentially suitable habitat and 160.07 ft.^{2} of pine BA on 7.23 acres of future potential habitat (Figure 6, Table 6). CNF 144 meets the SMS requirements for the 0.25 mi. radius foraging partition pre-project assuming potentially suitable habitat is made suitable.

The impact area will remove 61.50 ft.^{2} of pine BA on 1.23 acres of potentially suitable habitat (Table 6).

The post-project SMS foraging habitat totals were 188.00 ft.^{2} of pine BA on 3.76 acres of suitable habitat, 7,703.63 ft.^{2} of pine BA on 104.60 acres of potentially suitable habitat and 160.07 ft.^{2} of pine BA on 7.23 acres of future potential habitat (Figure 6; Table 6). CNF 144 will meet the SMS requirements for the 0.25 mi. radius foraging partition post-project assuming potentially suitable habitat is made suitable.

SMS, 0.50 mi. radius partition for CNF 144

The pre-project foraging habitat totals for the 0.50 mi. radius SMS partition were 2,265.50 ft.^{2} of pine BA on 45.31 acres of suitable foraging habitat, 22,599.85 ft.^{2} of pine

CNF 144 Stand Density and Height

Habitat Suitability using Standard for Managed Stability guidelines

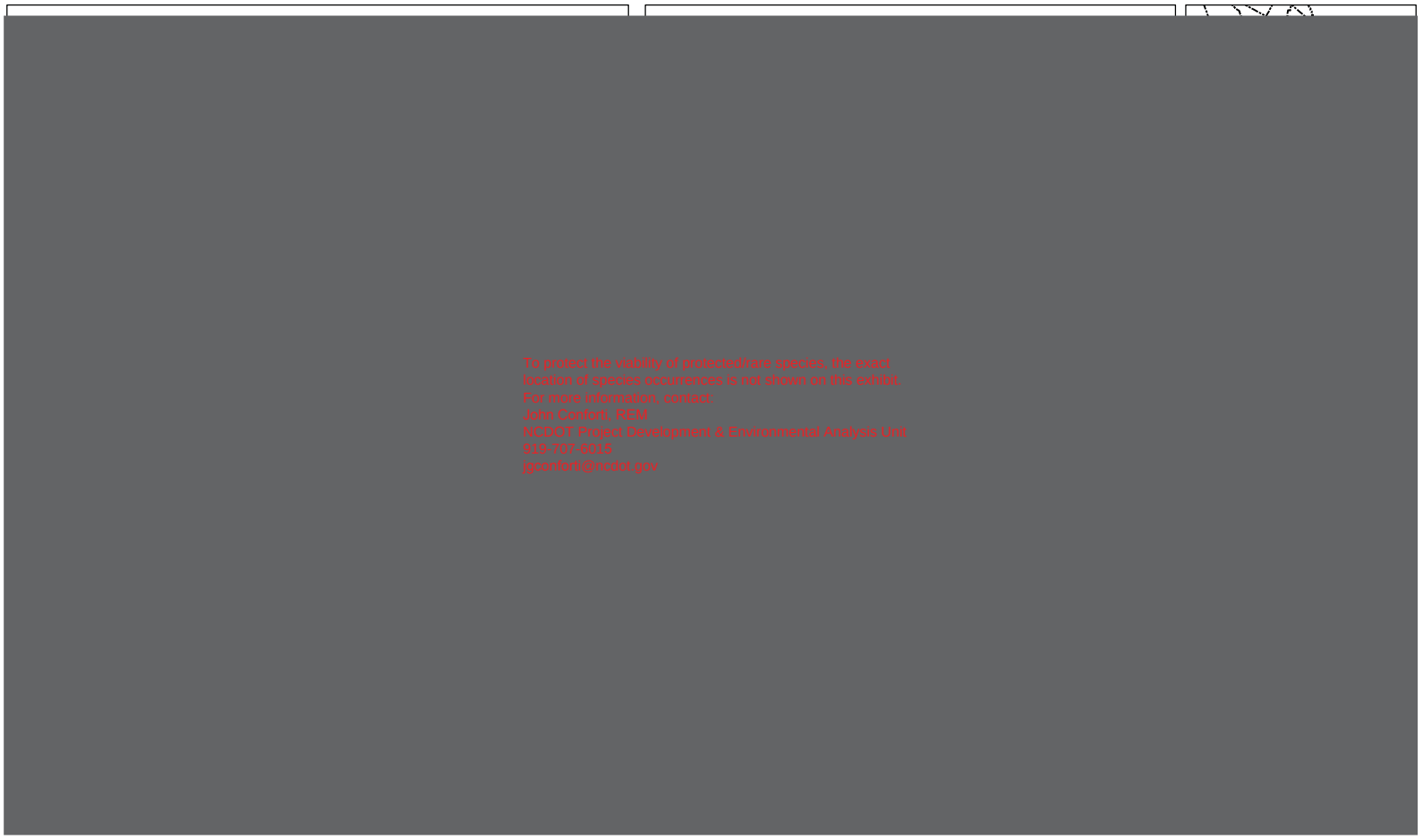

Figure 6. Foraging habitat for red-cockaded woodpecker (RCW) Croatan National Forest (CNF) Cluster 144 and project removals by the US Highway 70 Havelock Bypass project (R-1015), Craven County, North Carolina.

Table 6. Pre-project, project removals and post-project foraging habitat totals for the **0.25 mile radius** red-cockaded woodpecker (RCW) foraging habitat partition for Croatan National Forest (CNF) Cluster **144** using the **Standard for Managed Stability** guidelines (USFWS 2003), US Highway 70 Havelock Bypass project (R-1015), Craven County, North Carolina.

Stand	Forested Habitat (acres)	Stand Age (years)	4.0-9.9 inches dbh		10.0-13.9 inches dbh		14.0+ inches dbh		10.0+ inches dbh		Total Hwd BA ≥10 in. dbh	Total Stand BA (Pine + Hwds ≥10 in. dbh)	Pine Density ≥10 in. dbh	Hardwood Midstory Density	Hardwood Midstory Height	Suitable Habitat		Removals Suitable Habitat		Potentially Suitable Habitat		Removals Potentially Suitable Habitat		Future Potential Habitat		Removals Future Potential Habitat	
			Avg. Stems[1]	Avg. BA	Avg. Stems	Avg. BA	Avg. Stems	Avg. BA	Avg. Stems	Avg. BA						Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA
A	7.23	69	0.00	0.00	0.00	0.00	10.87	22.14	10.87	22.14	15.00	37.14	Sparse	Sparse	Tall										1.51	33.43		
														Dense	Low										4.88	108.04		
														Dense	Tall										0.84	18.60		
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**7.23**	**160.07**	**0.00**	**0.00**
B	2.64	93	6.17	1.67	7.02	5.83	20.66	47.50	27.68	53.33	5.00	58.33	Moderate	Dense	Tall					2.64	140.79								
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**2.64**	**140.79**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
E	44.10	86	2.27	1.00	2.72	2.50	26.57	47.50	29.29	50.00	0.00	50.00	Moderate	Sparse	Tall	0.44	22.00												
														Moderate	Tall					4.28	214.00	1.23	61.50					
														Dense	Low					36.06	1,803.00							
														Dense	Tall	3.32	166.00											
														Subtotal		**3.76**	**188.00**	**0.00**	**0.00**	**40.34**	**2,017.00**	**1.23**	**61.50**	**0.00**	**0.00**	**0.00**	**0.00**
F	1.82	77	9.57	3.64	14.14	11.82	34.63	71.82	48.77	83.64	2.73	86.37	Dense	Dense	Tall					1.82	152.22								
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**1.82**	**152.22**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
G	19.32	57	83.20	23.00	29.60	23.50	30.25	63.00	59.85	86.50	8.00	94.50	Dense	Dense	Moderate					19.31	1,670.32								
														Dense	Tall					0.01	0.87							
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**19.32**	**1,671.19**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
H	41.71	68	1.62	0.71	3.83	2.86	34.76	87.86	38.59	90.72	10.71	101.43	Dense	Sparse	Tall					6.04	547.95								
														Dense	Tall					35.67	3,235.98							
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**41.71**	**3,783.93**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Total	**116.82**															**3.76**	**188.00**	**0.00**	**0.00**	**105.83**	**7,765.13**	**1.23**	**61.50**	**7.23**	**160.07**	**0.00**	**0.00**

Unsuitable foraging habitat characteristics according to the SMS foraging habitat guidelines (USFWS 2003).
Dense pine stands with a BA of >70 ft^2/acre were counted as suitable only if the excess BA was in pines ≥14 inches dbh (USFWS pers. comm.).

[1]Average stems and BA are calculated per acre.
[2]S&P = Suitable and potentially suitable habitat.

Acreage	Suitable	Potential	Future	Total-All	Total-S&P[2]
Total Pre-Project	3.76	105.83	7.23	116.82	109.59
Total Removals	0.00	1.23	0.00	1.23	0.00
Total Post-Project	3.76	104.60	7.23	115.59	108.36
BA					
Total Pre-Project	188.00	7,765.13	160.07	8,113.20	7,953.13
Total Removals	0.00	61.50	0.00	61.50	0.00
Total Post-Project	188.00	7,703.63	160.07	8,051.70	7,891.63

Stands

A 69 year old sparse loblolly and longleaf pine habitat.
B 93 year old moderately dense loblolly pine habitat.
E 86 year old moderately dense mixed pine habitat.
F 77 year old dense mixed pine habitat.
G 57 year old dense loblolly pine plantation and loblolly/pond pine habitat.
H 68 year old dense loblolly and pond pine habitat.

BA on 289.34 acres of potentially suitable habitat and 445.68 ft.^{2} of pine BA on 20.13 acres of future potential habitat (Figure 6, Table 7). CNF 144 meets the SMS guidelines for the 0.50 mi. radius foraging partition pre-project assuming potentially suitable habitat is made suitable.

The impact area will remove 84.00 ft.^{2} of pine BA on 1.68 acres of suitable habitat, and 894.52 ft.^{2} of pine BA on 13.04 acres of potentially suitable habitat (Table 7). The impact area ranges between 240 and 560 ft. wide, making the remaining habitat on the eastern side of the partition noncontiguous. This will result in the removal of 981.30 ft.^{2} of pine BA on 14.91 acres of potentially suitable habitat (Figure 6, Table 7).

The post-project SMS foraging habitat totals were 2,181.50 ft.^{2} of pine BA on 43.63 acres of suitable habitat, 20,724.02 ft.^{2} of pine BA on 261.39 acres of potentially suitable habitat and 445.68 ft.^{2} of pine BA on 20.13 acres of future potential habitat (Figure 6, Table 7). CNF 144 will meet the SMS requirements for the 0.50 mi. radius foraging partition post-project assuming potentially suitable habitat is made suitable.

RSG, 0.50 mi. radius partition for CNF 144

Three percent of the partition was located on low productivity soils, 21% on medium productivity soils, with the remainder on high productivity soils. The CNF needs to manage an average of 146.97 acres for RCW foraging habitat in order to meet the RSG (Table 8).

The pre-project foraging habitat totals for the 0.50 mi. radius RSG partition were 294.50 ft.^{2} of pine BA on 5.89 acres of suitable foraging habitat, 19,325.48 ft.^{2} of pine BA on 268.12 acres of potentially suitable habitat and 5,691.05 ft.^{2} of pine BA on 80.77 acres of future potential habitat (Figure 6, Table 8). CNF 144 meets the RSG requirements for the 0.50 mi. radius foraging partition pre-project assuming potentially suitable habitat is made suitable.

The impact area will remove 84.00 ft.^{2}of pine BA on 1.68 acres of suitable habitat, 338.33 ft.^{2}of pine BA on 6.61 acres of potentially suitable habitat and 556.20 ft.^{2}of pine BA on 6.43 acres of future potential habitat (Table 8). The impact area ranges between 240 and 560 ft. wide, making the remaining habitat on the eastern side of the partition noncontiguous. This will result in the removal of 445.00 ft^{2}on 8.71 acres of

Table 7. Pre-project, project removals and post-project foraging habitat totals for the **0.50 mile radius** red-cockaded woodpecker (RCW) foraging habitat partition for Croatan National Forest (CNF) Cluster **144** using the **Standard for Managed Stability** guidelines (USFWS 2003), US Highway 70 Havelock Bypass project (R-1015), Craven County, North Carolina.

Stand	Forested Habitat (acres)	Stand Age (years)	4.0-9.9 inches dbh		10.0-13.9 inches dbh		14.0+ inches dbh		10.0+ inches dbh		Total Hwd BA ≥10 in. dbh	Total Stand BA (Pine + Hwds ≥10 in. dbh)	Pine Density ≥10 in. dbh	Hardwood Midstory Density	Hardwood Midstory Height	Suitable Habitat		Removals Suitable Habitat		Potentially Suitable Habitat		Removals Potentially Suitable Habitat		Noncontiguous Habitat Potentially Suitable Habitat		Future Potential Habitat		Removals Future Potential Habitat	
			Avg. Stems[1]	Avg. BA	Avg. Stems	Avg. BA	Avg. Stems	Avg. BA	Avg. Stems	Avg. BA						Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA
A	20.13	69	0.00	0.00	0.00	0.00	10.87	22.14	10.87	22.14	15.00	37.14	Sparse	Sparse	Tall										1.51	33.43		
														Dense	Low										4.88	108.04		
														Dense	Moderate										8.41	186.20		
														Dense	Tall										5.33	118.01		
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**20.13**	**445.68**	**0.00**	**0.00**
B	23.64	93	6.17	1.67	7.02	5.83	20.66	47.50	27.68	53.33	5.00	58.33	Moderate	Dense	Moderate					9.21	491.17								
														Dense	Tall					14.43	769.55								
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**23.64**	**1,260.72**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
C	18.40	82	0.00	0.00	0.00	0.00	23.57	52.50	23.57	52.50	17.50	70.00	Moderate	Dense	Moderate					7.83	411.08	3.10	162.75	3.80	199.50				
														Dense	Tall					10.57	554.93	0.03	1.58						
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**18.40**	**966.00**	**3.13**	**164.33**	**3.80**	**199.50**	**0.00**	**0.00**	**0.00**	**0.00**
D	28.64	78	0.00	0.00	0.00	0.00	17.28	53.00	17.28	53.00	16.00	69.00	Moderate	Dense	Tall					28.64	1,517.92								
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**28.64**	**1,517.92**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
E	53.70	86	2.27	1.00	2.72	2.50	26.57	47.50	29.29	50.00	0.00	50.00	Moderate	Sparse	Tall	2.57	128.50												
														Moderate	Tall					8.39	419.50	3.48	174.00	4.91	245.50				
														Dense	Low	3.32	166.00	1.68	84.00										
														Dense	Tall	39.42	1,971.00												
														Subtotal		**45.31**	**2,265.50**	**1.68**	**84.00**	**8.39**	**419.50**	**3.48**	**174.00**	**4.91**	**245.50**	**0.00**	**0.00**	**0.00**	**0.00**
F	54.25	77	9.57	3.64	14.14	11.82	34.63	71.82	48.77	83.64	2.73	86.37	Dense	Dense	Tall					54.25	4,537.47								
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**54.25**	**4,537.47**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
G	60.64	57	83.20	23.00	29.60	23.50	30.25	63.00	59.85	86.50	8.00	94.50	Dense	Sparse	Low					6.39	552.74								
														Dense	Moderate					41.97	3,630.41	6.43	556.20	6.20	536.30				
														Dense	Tall					12.28	1,062.22								
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**60.64**	**5,245.37**	**6.43**	**556.20**	**6.20**	**536.30**	**0.00**	**0.00**	**0.00**	**0.00**
H	95.38	68	1.62	0.71	3.83	2.86	34.76	87.86	38.59	90.72	10.71	101.43	Dense	Sparse	Tall					6.04	547.95								
														Dense	Tall					89.34	8,104.92								
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**95.38**	**8,652.87**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Total	**354.78**															**45.31**	**2,265.50**	**1.68**	**84.00**	**289.34**	**22,599.85**	**13.04**	**894.53**	**14.91**	**981.30**	**20.13**	**445.68**	**0.00**	**0.00**

Unsuitable foraging habitat characteristics according to the SMS foraging habitat guidelines (USFWS 2003).

Dense pine stands with a BA of >70 ft²/acre were counted as suitable only if the excess BA was in pines ≥14 inches dbh (USFWS pers. comm.).

[1]Average stems and BA are calculated per acre.

[2]S&P = Suitable and potentially suitable habitat.

Acreage	Suitable	Potential	Future	Total-All	Total-S&P[2]
Total Pre-Project	45.31	289.34	20.13	354.78	334.65
Total Removals	1.68	13.04	0.00	14.72	14.72
Total Noncontiguous	0.00	14.91	0.00	14.91	14.91
Total Post-Project	43.63	261.39	20.13	325.15	305.02
BA					
Total Pre-Project	2,265.50	22,599.85	445.68	25,311.03	24,865.35
Total Removals	84.00	894.53	0.00	978.53	978.53
Total Noncontiguous	0.00	981.30	0.00	981.30	981.30
Total Post-Project	2,181.50	20,724.02	445.68	23,351.20	22,905.52

Stands

A 69 year old sparse loblolly and longleaf pine habitat.
B 93 year old moderately dense loblolly pine habitat.
C 82 year old moderately dense mixed pine habitat.
D 78 year old moderately dense loblolly and pond pine habitat.
E 86 year old moderately dense mixed pine habitat.
F 77 year old dense mixed pine habitat.
G 57 year old dense loblolly pine plantation and loblolly/pond pine habitat.
H 68 year old dense loblolly and pond pine habitat.

Table 8. Pre-project, project removals and post-project foraging habitat totals for the **0.50 mile radius** red-cockaded woodpecker (RCW) foraging habitat partition for Croatan National Forest (CNF) Cluster **144** using the **Recovery Standard Guidelines** (USFWS 2003), US Highway 70 Havelock Bypass project (R-1015), Craven County, North Carolina.

Stand	Forested Habitat (acres)	Stand Age (years)	4.0-9.9 inches dbh		10.0-13.9 inches dbh		14.0+ inches dbh		10.0+ inches dbh		Total Hwd BA ≥10 in. dbh	Total Stand BA (Pine + Hwd ≥10 in. dbhs)	Pine Density ≥10 in. dbh	Hardwood Midstory Density	Hardwood Midstory Height	Suitable Habitat		Removals Suitable Habitat		Potentially Suitable Habitat		Removals Potentially Suitable Habitat		Noncontiguous Habitat Potentially Suitable Habitat		Future Potential Habitat		Removals Future Potential Habitat		Noncontiguous Habitat Future Potential Habitat	
			Avg. Stems[1]	Avg. BA	Avg. Stems	Avg. BA	Avg. Stems	Avg. BA	Avg. Stems	Avg. BA						Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA
A	20.13	69	0.00	0.00	0.00	0.00	10.87	22.14	10.87	22.14	15.00	37.14	Sparse	Sparse	Tall											1.51	33.43				
														Dense	Low											4.88	108.04				
														Dense	Moderate											8.41	186.20				
														Dense	Tall											5.33	118.01				
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**20.13**	**445.68**	**0.00**	**0.00**	**0.00**	**0.00**
B	23.64	93	6.17	1.67	7.02	5.83	20.66	47.50	27.68	53.33	5.00	58.33	Moderate	Dense	Moderate					9.21	491.17										
														Dense	Tall					14.43	769.55										
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**23.64**	**1,260.72**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
C	18.40	82	0.00	0.00	0.00	0.00	23.57	52.50	23.57	52.50	17.50	70.00	Moderate	Dense	Moderate					7.83	411.08	3.10	162.75	3.80	199.50						
														Dense	Tall					10.57	554.93	0.03	1.58								
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**18.40**	**966.00**	**3.13**	**164.33**	**3.80**	**199.50**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
D	28.64	78	0.00	0.00	0.00	0.00	17.28	53.00	17.28	53.00	16.00	69.00	Moderate	Dense	Tall					28.64	1,517.92										
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**28.64**	**1,517.92**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
E	53.70	86	2.27	1.00	2.72	2.50	26.57	47.50	29.29	50.00	0.00	50.00	Moderate	Sparse	Tall	2.57	128.50														
														Moderate	Tall					8.39	419.50	3.48	174.00	4.91	245.50						
														Dense	Low	3.32	166.00	1.68	84.00												
														Dense	Tall					39.42	1,971.00										
														Subtotal		**5.89**	**294.50**	**1.68**	**84.00**	**47.81**	**2,390.50**	**3.48**	**174.00**	**4.91**	**245.50**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
F	54.25	77	9.57	3.64	14.14	11.82	34.63	71.82	48.77	83.64	2.73	86.37	Dense	Dense	Tall					54.25	4,537.47										
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**54.25**	**4,537.47**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
G	60.64	57	83.20	23.00	29.60	23.50	30.25	63.00	59.85	86.50	8.00	94.50	Dense	Sparse	Low											6.39	552.74				
														Dense	Moderate											41.97	3,630.41	6.43	556.20	6.20	536.30
														Dense	Tall											12.28	1,062.22				
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**60.64**	**5,245.37**	**6.43**	**556.20**	**6.20**	**536.30**
H	95.38	68	1.62	0.71	3.83	2.86	34.76	87.86	38.59	90.72	10.71	101.43	Dense	Sparse	Tall					6.04	547.95										
														Dense	Tall					89.34	8,104.92										
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**95.38**	**8,652.87**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Total	**354.78**															**5.89**	**294.50**	**1.68**	**84.00**	**268.12**	**19,325.48**	**6.61**	**338.33**	**8.71**	**445.00**	**80.77**	**5,691.05**	**6.43**	**556.20**	**6.20**	**536.30**

Unsuitable foraging habitat characteristics according to Recovery Standard foraging habitat guidelines (USFWS 2003).

[1]Average stems and BA are calculated per acre.

[2]S&P = Suitable and potentially suitable habitat.

Stands

A 69 year old sparse loblolly and longleaf pine habitat.

B 93 year old moderately dense loblolly pine habitat.

C 82 year old moderately dense mixed pine habitat.

D 78 year old moderately dense loblolly and pond pine habitat.

E 86 year old moderately dense mixed pine habitat.

F 77 year old dense mixed pine habitat.

G 57 year old dense loblolly pine plantation and loblolly/pond pine habitat.

H 68 year old dense loblolly and pond pine habitat.

Acreage	**Suitable**	**Potential**	**Future**	**Total-All**	**Total-S&P[2]**
Total Pre-Project	5.89	268.12	80.77	354.78	274.01
Total Removals	1.68	6.61	6.43	14.72	8.29
Total Noncontiguous	0.00	8.71	6.20	14.91	8.71
Total Post-Project	4.21	252.80	68.14	325.15	257.01
BA					
Total Pre-Project	294.50	19,325.48	5,691.05	25,311.03	19,619.98
Total Removals	84.00	338.33	556.20	978.53	422.33
Total Noncontiguous	0.00	445.00	536.30	981.30	445.00
Total Post-Project	210.50	18,542.15	4,598.55	23,351.20	18,752.65

potentially suitable habitat and 536.30 ft.^{2}of pine BA on 6.20 acres of future potential habitat (Table 8).

The post-project RSG foraging habitat totals were 210.50 ft.^{2}of pine BA on 4.21 acres of suitable habitat, 18,542.15 ft.^{2} of pine BA on 252.80 acres of potentially suitable habitat and 4,598.55 ft.^{2} of pine BA on 68.14 acres of future potential habitat (Figure 6, Table 8). CNF 144 will meet the RSG requirements for the 0.50 mi. radius foraging partition post-project assuming potentially suitable habitat is made suitable.

6.6.3. Impacts to CNF 58

SMS, 0.25 mi. radius partition for CNF 58

The pre-project foraging habitat totals for the 0.25 mi. radius SMS partition were 3,120.00 ft.^{2} of pine BA on 62.40 acres of suitable foraging habitat, 2,401.92 ft.^{2} of pine BA on 35.46 acres of potentially suitable habitat and 346.51 ft.^{2} of pine BA on 10.18 acres of future potential habitat (Figure 7, Table 9). CNF 58 meets the SMS requirements for the 0.25 mi. radius foraging partition pre-project assuming potentially suitable habitat is made suitable.

The impact area will remove 12.50 ft.^{2} of pine BA on 0.15 acre of potentially suitable habitat and 1.05 ft.^{2} of pine BA on 0.03 acre of future potential habitat (Table 9).

The post-project SMS foraging habitat totals were 3,120.00 ft.^{2} of pine BA on 62.40 acres of suitable habitat, 2,389.42 ft.^{2} of pine BA on 35.31 acres of potentially suitable habitat and 345.46 ft.^{2} of pine BA on 10.15 acres of future potential habitat (Figure 7, Table 9). CNF 58 will meet the SMS requirements for the 0.25 mi. radius foraging partition post-project assuming potentially suitable habitat is made suitable.

SMS, 0.50 mi. radius partition for CNF 58

The pre-project foraging habitat totals for the 0.50 mi. radius SMS partition for CNF 58 were 5,424.63 ft.^{2} of pine BA on 101.54 acres of suitable foraging habitat, 10,058.54 ft.^{2} of pine BA on 142.57 acres of potentially suitable habitat and 1,186.78 ft.^{2} of pine BA on 34.48 acres of future potential habitat (Figure 7, Table 10). CNF 58 meets the SMS requirements for the 0.50 mi. radius foraging partition pre-project.

CNF 58 Stand Density and Height

Habitat Suitability using Standard for Managed Stability Guidelines

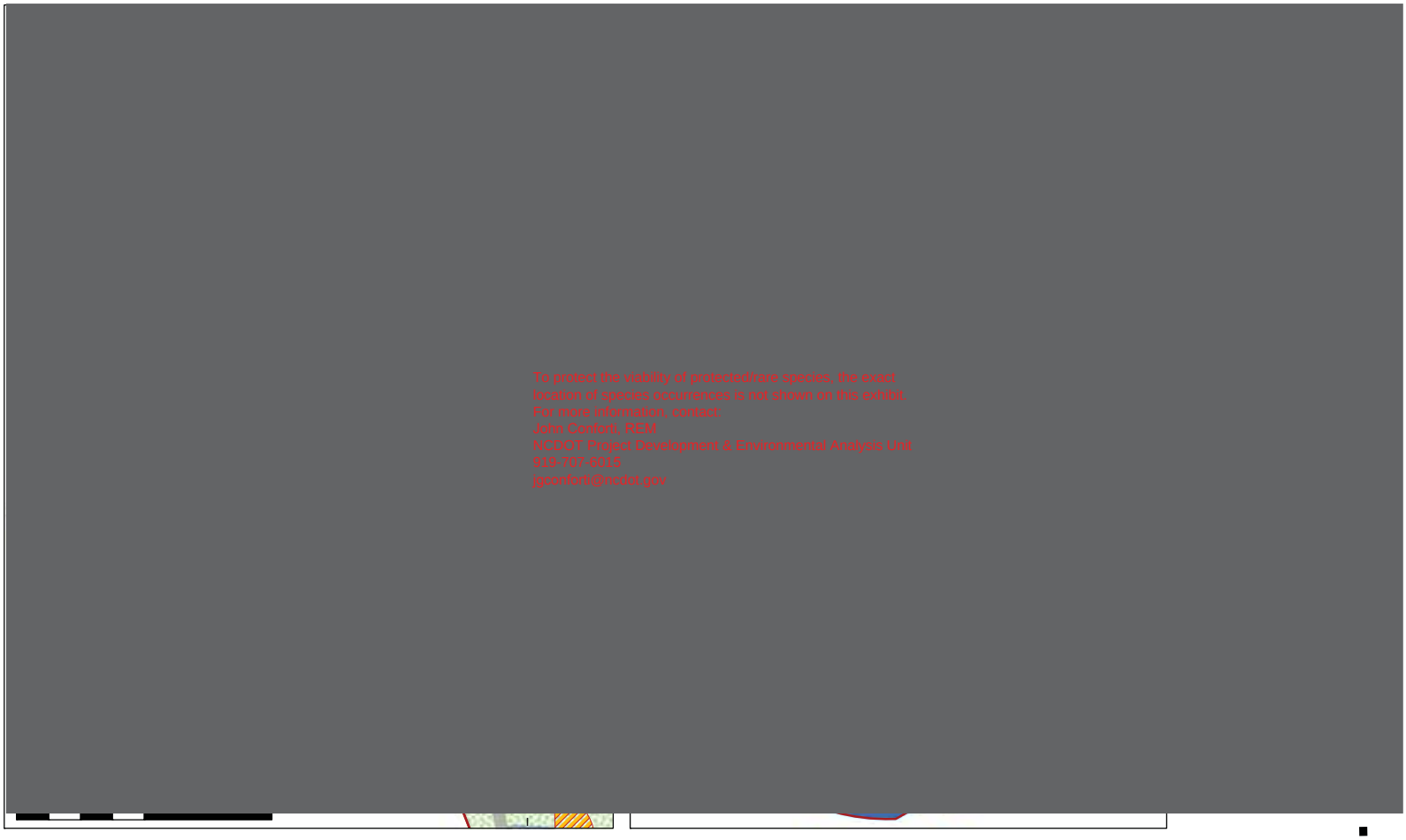

Figure 7. Foraging habitat for red-cockaded woodpecker (RCW) Croatan National Forest (CNF) Cluster 58 and project removals by the US Highway 70 Havelock Bypass (R-1015), Craven County, NC.

Table 9. Pre-project, project removals and post-project foraging habitat totals for the **0.25 mile radius** red-cockaded woodpecker (RCW) foraging habitat partition for Croatan National Forest (CNF) Cluster 58 using the **Standard for Managed Stability** guidelines (USFWS 2003), US Highway 70 Havelock Bypass project (R-1015), Craven County, North Carolina.

Stand	Forested Habitat (acres)	Stand Age (years)	4.0-9.9 inches dbh		10.0-13.9 inches dbh		14.0+ inches dbh		10.0+ inches dbh		Total Hwd BA ≥10 in. dbh	Total Stand BA (Pine + Hwds ≥10 in. dbh)	Pine Density ≥10 in. dbh	Hardwood Midstory Density	Hardwood Midstory Height	Suitable Habitat		Removals Suitable Habitat		Potentially Suitable Habitat		Removals Potentially Suitable Habitat		Future Potential Habitat		Removals Future Potential Habitat	
			Avg. Stems[1]	Avg. BA	Avg. Stems	Avg. BA	Avg. Stems	Avg. BA	Avg. Stems	Avg. BA						Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA
I	4.27	107	0.00	0.00	5.44	5.00	16.75	26.25	22.19	31.25	0.00	31.25	Sparse	Sparse	Low										4.21	131.56		
														Moderate	Low										0.06	1.88		
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**4.27**	**133.44**	**0.00**	**0.00**
K	69.26	83	12.52	2.78	2.64	2.22	29.29	47.78	31.93	50.00	0.00	50.00	Moderate	Sparse	Low	45.98	2,299.00											
														Sparse	Moderate	1.50	75.00											
														Moderate	Low	9.76	488.00											
														Moderate	Moderate					6.02	301.00							
														Dense	Low	5.16	258.00											
														Dense	Tall					0.84	42.00							
														Subtotal		**62.40**	**3,120.00**	**0.00**	**0.00**	**6.86**	**343.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
F	0.47	73	7.58	3.33	7.25	6.67	50.36	108.33	57.61	115.00	10.00	125.00	Dense	Moderate	Tall					0.47	54.05							
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.47**	**54.05**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
H	3.11	43	38.86	15.00	52.02	13.67	18.37	23.33	70.39	37.00	0.00	37.00	Sparse	Dense	Moderate										3.11	115.07		
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**3.11**	**115.07**	**0.00**	**0.00**
L	9.85	38	22.73	10.00	70.75	52.50	18.86	23.75	89.61	76.25	0.00	76.25	Dense	Moderate	Tall					9.85	751.06							
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**9.85**	**751.06**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
N	11.55	64	52.61	20.00	18.33	15.00	21.82	45.00	40.15	60.00	0.00	60.00	Moderate	Dense	Tall					11.55	693.00							
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**11.55**	**693.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
O	2.80	28	458.51	102.50	44.45	32.50	2.03	2.50	46.48	35.00	0.00	35.00	Sparse	Moderate	Moderate										2.80	98.00	0.03	1.05
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**2.80**	**98.00**	**0.03**	**1.05**
P	6.73	86	0.00	0.00	10.87	10.00	53.57	73.33	64.44	83.33	0.00	83.33	Dense	Dense	Moderate					6.73	560.81	0.15	12.50					
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**6.73**	**560.81**	**0.15**	**12.50**	**0.00**	**0.00**	**0.00**	**0.00**
Total	**108.04**															**62.40**	**3,120.00**	**0.00**	**0.00**	**35.46**	**2,401.92**	**0.15**	**12.50**	**10.18**	**346.51**	**0.03**	**1.05**

Unsuitable foraging habitat characteristics according to the SMS foraging habitat guidelines (USFWS 2003).

Dense pine stands with a BA of >70 ft^2/acre were counted as suitable only if the excess BA was in pines ≥14 inches dbh (USFWS pers. comm.).

[1]Average stems and BA are calculated per acre.

[2]S&P = Suitable and potentially suitable habitat.

Acreage	**Suitable**	**Potential**	**Future**	**Total-All**	**Total-S&P[2]**
Total Pre-Project	62.40	35.46	10.18	108.04	97.86
Total Removals	0.00	0.15	0.03	0.18	0.15
Total Post-Project	62.40	35.31	10.15	107.86	97.71
BA					
Total Pre-Project	3,120.00	2,401.92	346.51	5,868.43	5521.92
Total Removals	0.00	12.50	1.05	13.55	12.50
Total Post-Project	3,120.00	2,389.42	345.46	5,854.88	5,509.42

Stands

F 73 year old dense loblolly pine habitat.
H 43 year old moderately dense loblolly pine habitat.
I 107 year old sparse longleaf pine habitat.
K 83 year old moderately dense longleaf pine habitat.
L 38 year old dense loblolly pine habitat.
N 64 year old dense loblolly and longleaf pine habitat.
O 28 year old sparse loblolly and longleaf pine plantation.
P 86 year old dense longleaf pine habitat.

Table 10. Pre-project, project removals and post-project foraging habitat totals for the **0.50 mile radius** red-cockaded woodpecker (RCW) foraging habitat partition for Croatan National Forest (CNF) Cluster 58 using the **Standard for Managed Stability** guidelines (USFWS 2003), US Highway 70 Havelock Bypass project (R-1015), Craven County, North Carolina.

Stand	Forested Habitat (acres)	Stand Age (years)	4.0-9.9 inches dbh		10.0-13.9 inches dbh		14.0+ inches dbh		10.0+ inches dbh		Total Hwd BA ≥10 in. dbh	Total Stand BA (Pine + Hwds ≥10 in. dbh)	Pine Density ≥10 in. dbh	Hardwood Midstory Density	Hardwood Midstory Height	Suitable Habitat		Removals Suitable Habitat		Noncontiguous Habitat Suitable Habitat		Potentially Suitable Habitat		Removals Potentially Suitable Habitat		Future Potential Habitat		Removals Future Potential Habitat		Noncontiguous Habitat Future Potential Habitat	
			Avg. Stems[1]	Avg. BA	Avg. Stems	Avg. BA	Avg. Stems	Avg. BA	Avg. Stems	Avg. BA						Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA
I	5.34	107	0.00	0.00	5.44	5.00	16.75	26.25	22.19	31.25	0.00	31.25	Sparse	Sparse	Low										4.21	131.56				
														Moderate	Low										1.13	35.31				
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**5.34**	**166.88**	**0.00**	**0.00**	**0.00**	**0.00**
J	9.87	92	7.58	3.33	4.98	3.33	29.05	46.67	34.02	50.00	0.00	50.00	Moderate	Moderate	Moderate							4.68	234.00								
														Dense	Low	2.93	146.50														
														Dense	Moderate							2.26	113.00								
														Subtotal		**2.93**	**146.50**	**0.00**	**0.00**	**0.00**	**0.00**	**6.94**	**347.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
K	97.50	83	12.52	2.78	2.64	2.22	29.29	47.78	31.93	50.00	0.00	50.00	Moderate	Sparse	Low	59.68	2,984.00														
														Sparse	Moderate	5.63	281.50														
														Moderate	Low	17.71	885.50														
														Moderate	Moderate							6.02	301.00								
														Dense	Low	5.16	258.00														
														Dense	Tall							3.30	165.00								
														Subtotal		**88.18**	**4,409.00**	**0.00**	**0.00**	**0.00**	**0.00**	**9.32**	**466.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
F	3.12	73	7.58	3.33	7.25	6.67	50.36	108.33	57.61	115.00	10.00	125.00	Dense	Moderate	Tall							3.12	358.80								
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**3.12**	**358.80**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
H	12.04	43	38.86	15.00	52.02	13.67	18.37	23.33	70.39	37.00	0.00	37.00	Sparse	Dense	Moderate							12.04	445.48								
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**12.04**	**445.48**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
L	40.22	38	22.73	10.00	70.75	52.50	18.86	23.75	89.61	76.25	0.00	76.25	Dense	Moderate	Tall							31.89	2,431.61								
														Dense	Tall							8.33	635.16								
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**40.22**	**3,066.77**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
M	36.67	67	130.05	27.50	35.53	28.33	36.20	56.67	71.73	85.00	3.30	88.30	Dense	Dense	Moderate							33.75	2,868.75								
														Dense	Tall							2.92	248.20								
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**36.67**	**3,116.95**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
N	23.13	64	52.61	20.00	18.33	15.00	21.82	45.00	40.15	60.00	0.00	60.00	Moderate	Dense	Tall							23.13	1,387.80								
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**23.13**	**1,387.80**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
O	29.14	28	458.51	102.50	44.45	32.50	2.03	2.50	46.48	35.00	0.00	35.00	Sparse	Moderate	Moderate												29.14	1,019.90	7.40	259.00	0.64	22.40
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**29.14**	**1,019.90**	**7.40**	**259.00**	**0.64**	**22.40**
P	17.23	86	0.00	0.00	10.87	10.00	53.57	73.33	64.44	83.33	0.00	83.33	Dense	Sparse	Moderate	10.43	869.13	2.85	237.49	6.28	523.31										
														Dense	Moderate							6.80	566.64	0.23	19.17						
														Subtotal		**10.43**	**869.13**	**2.85**	**237.49**	**6.28**	**523.31**	**6.80**	**566.64**	**0.23**	**19.17**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Q	4.33	36	22.73	10.00	0.00	0.00	36.37	70.00	36.37	70.00	0.00	70.00	Moderate	Dense	Tall							4.33	303.10								
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**4.33**	**303.10**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Total	**278.58**															**101.54**	**5,424.63**	**2.85**	**237.49**	**6.28**	**523.31**	**142.57**	**10,058.54**	**0.23**	**19.17**	**34.48**	**1,186.78**	**7.40**	**259.00**	**0.64**	**22.40**

Unsuitable foraging habitat characteristics according to the SMS foraging habitat guidelines (USFWS 2003).

Dense pine stands with a BA of >70 ft²/acre were counted as suitable only if the excess BA was in pines ≥14 inches dbh (USFWS pers. comm.).

[1]Average stems and BA are calculated per acre.

[2]S&P = Suitable and potentially suitable habitat

Acreage	Suitable	Potential	Future	Total-All	Total-S&P[2]
Total Pre-Project	101.54	142.57	34.48	278.59	244.11
Total Removals	2.85	0.23	7.40	10.48	3.08
Non-Contiguous	6.28	0.00	0.64	6.92	6.28
Total Post-Project	92.41	142.34	26.44	261.19	234.75
BA					
Total Pre-Project	5,424.63	10,058.54	1,186.78	16,669.95	15,483.17
Total Removals	237.49	19.17	259.00	515.66	256.66
Non-Contiguous	523.31	0.00	22.40	545.71	523.31
Total Post-Project	4,663.83	10,039.37	905.38	15,608.58	14,703.20

Stands

F 73 year old dense loblolly pine habitat.
H 43 year old moderately dense loblolly pine habitat.
I 107 year old sparse longleaf pine habitat.
J 92 year old moderately dense longleaf and loblolly pine habitat.
K 83 year old moderately dense longleaf pine habitat.
L 38 year old dense loblolly pine habitat.
M 67 year old dense mixed pine habitat.
N 64 year old moderately dense loblolly and longleaf pine habitat.
O 28 year old sparse loblolly and longleaf pine plantation.
P 86 year old dense longleaf pine habitat.
Q 36 year old moderately dense loblolly pine habitat.

The impact area will remove 237.49 ft.^{2} of pine BA on 2.85 acres of suitable habitat, 19.17 ft.^{2} of pine BA on 0.23 acre of potentially suitable habitat and 259.00 ft.^{2} of pine BA on 7.40 acres of future potential habitat (Table 10). The impact area ranges between 220 and 250 ft. wide, making the remaining habitat on the eastern side of the partition noncontiguous. This will result in the removal of 523.31 ft.^{2} of pine BA on 6.28 acres of suitable habitat and 22.40 ft.^{2} of pine BA on 0.64 acre of future potential habitat (Table 10).

The post-project SMS foraging habitat totals for CNF 58 were 4,663.83 ft.^{2} of pine BA on 92.41 acres of suitable habitat, 10,039.37 ft.^{2} of pine BA on 142.34 acres of potentially suitable habitat and 905.38 ft.^{2} of pine BA on 26.44 acres of future potential habitat (Figure 7, Table 10). CNF 58 will meet the SMS requirements for the 0.50 mi. radius foraging partition post-project.

RSG, 0.50 mi. radius partition for CNF 58

Seven percent of the partition was located on low productivity soils, 11 % on medium productivity soils and the remaining 82% on high productivity soils The CNF needs to manage an average of 147.05 acres for RCW foraging habitat in order to meet the RSG (Table 11).

The pre-project foraging habitat totals for the 0.50 mi. radius RSG partition were 5,424.63 ft.^{2} of pine BA on 101.54 acres of suitable foraging habitat, 76,243.19 ft.^{2} of pine BA on 85.98 acres of potentially suitable habitat and 5,002.13 ft.^{2} of pine BA on 91.07 acres of future potential habitat (Figure 7, Table 11). CNF 58 meets the RSG requirements for the 0.50 mi. radius foraging partition pre-project assuming potentially suitable habitat is made suitable.

The impact area will remove 237.49 ft.^{2} of pine BA on 2.85 acres of suitable habitat, 19.17 ft.^{2} of pine BA on 0.23 acre of potentially suitable habitat and 259.00 ft.^{2} of pine BA on 7.40 acres of future potential habitat (Table 11). The impact area ranges between 220 and 250 ft. wide, making the remaining habitat on the eastern side of the partition noncontiguous. This will result in the removal of 523.31 ft.^{2} of pine BA on 6.28 acres of suitable habitat and 22.40 ft.^{2} of pine BA on 0.64 acre of future potential habitat (Table 11).

Table 11. Pre-project, project removals and post-project foraging habitat totals for the **0.50 mile radius** red-cockaded woodpecker (RCW) foraging habitat partition for Croatan National Forest (CNF) Cluster 58 using the **Recovery Standard Guidelines** (USFWS 2003), US Highway 70 Havelock Bypass project (R-1015), Craven County, North Carolina.

Stand	Forested Habitat (acres)	Stand Age (years)	4.0-9.9 inches dbh		10.0-13.9 inches dbh		14.0+ inches dbh		10.0+ inches dbh		Total Hwd BA ≥10 in. dbh	Total Stand BA (Pine + Hwds ≥10 in. dbh)	Pine Density ≥10 in. dbh	Hardwood Midstory Density	Hardwood Midstory Height	Suitable Habitat		Removals Suitable Habitat		Noncontiguous Habitat Suitable Habitat		Potentially Suitable Habitat		Removals Potentially Suitable Habitat		Future Potential Habitat		Removals Future Potential Habitat		Noncontiguous Habitat Future Potential Habitat	
			Avg. Stems[1]	Avg. BA	Avg. Stems	Avg. BA	Avg. Stems	Avg. BA	Avg. Stems	Avg. BA						Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA
I	5.34	107	0.00	0.00	5.44	5.00	16.75	26.25	22.19	31.25	0.00	31.25	Sparse	Sparse	Low												4.21	131.56				
														Moderate	Low												1.13	35.31				
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**5.34**	**166.88**	**0.00**	**0.00**	**0.00**	**0.00**
J	9.87	92	7.58	3.33	4.98	3.33	29.05	46.67	34.02	50.00	0.00	50.00	Moderate	Moderate	Moderate							4.68	234.00								
														Dense	Low	2.93	146.50														
														Dense	Moderate							2.26	113.00								
														Subtotal		**2.93**	**146.50**	**0.00**	**0.00**	**0.00**	**0.00**	**6.94**	**347.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
K	97.50	83	12.52	2.78	2.64	2.22	29.29	47.78	31.93	50.00	0.00	50.00	Moderate	Sparse	Low	59.68	2,984.00														
														Sparse	Moderate	5.63	281.50														
														Moderate	Low	17.71	885.50														
														Moderate	Moderate							6.02	301.00								
														Dense	Low	5.16	258.00														
														Dense	Tall							3.30	165.00								
														Subtotal		**88.18**	**4,409.00**	**0.00**	**0.00**	**0.00**	**0.00**	**9.32**	**466.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
F	3.12	73	7.58	3.33	7.25	6.67	50.36	108.33	57.61	115.00	10.00	125.00	Dense	Moderate	Tall							3.12	358.80								
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**3.12**	**358.80**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
H	12.04	43	38.86	15.00	52.02	13.67	18.37	23.33	70.39	37.00	0.00	37.00	Sparse	Dense	Moderate													12.04	445.48				
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**12.04**	**445.48**	**0.00**	**0.00**	**0.00**	**0.00**
L	40.22	38	22.73	10.00	70.75	52.50	18.86	23.75	89.61	76.25	0.00	76.25	Dense	Moderate	Tall													31.89	2,431.61				
														Dense	Tall													8.33	635.16				
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**40.22**	**3,066.77**	**0.00**	**0.00**	**0.00**	**0.00**
M	36.67	67	130.05	27.50	35.53	28.33	36.20	56.67	71.73	85.00	3.30	88.30	Dense	Dense	Moderate							33.75	2,868.75								
														Dense	Tall							2.92	248.20								
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**36.67**	**3,116.95**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
N	23.13	64	52.61	20.00	18.33	15.00	21.82	45.00	40.15	60.00	0.00	60.00	Moderate	Dense	Tall							23.13	1,387.80								
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**23.13**	**1,387.80**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
O	29.14	28	458.51	102.50	44.45	32.50	2.03	2.50	46.48	35.00	0.00	35.00	Sparse	Moderate	Moderate													29.14	1,019.90	7.40	259.00	0.64	22.40
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**29.14**	**1,019.90**	**7.40**	**259.00**	**0.64**	**22.40**
P	17.23	86	0.00	0.00	10.87	10.00	53.57	73.33	64.44	83.33	0.00	83.33	Dense	Sparse	Moderate	10.43	869.13	2.85	237.49	6.28	523.31										
														Dense	Moderate							6.80	566.64	0.23	19.17						
														Subtotal		**10.43**	**869.13**	**2.85**	**237.49**	**6.28**	**523.31**	**6.80**	**566.64**	**0.23**	**19.17**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Q	4.33	36	22.73	10.00	0.00	0.00	36.37	70.00	36.37	70.00	0.00	70.00	Moderate	Dense	Tall													4.33	303.10				
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**4.33**	**303.10**	**0.00**	**0.00**	**0.00**	**0.00**
Total	**278.58**															**101.54**	**5,424.63**	**2.85**	**237.49**	**6.28**	**523.31**	**85.98**	**6,243.19**	**0.23**	**19.17**	**91.07**	**5,002.13**	**7.40**	**259.00**	**0.64**	**22.40**

Unsuitable foraging habitat characteristics according to Recovery Standard foraging habitat guidelines (USFWS 2003).

[1]Average stems and BA are calculated per acre.

[2]S&P = Suitable and potentially suitable habitat.

Stands

F 73 year old dense loblolly pine habitat.

H 43 year old moderately dense loblolly pine habitat.

I 107 year old sparse longleaf pine habitat.

J 92 year old moderately dense longleaf and loblolly pine habitat.

K 83 year old moderately dense longleaf pine habitat.

L 38 year old dense loblolly pine habitat.

M 67 year old dense mixed pine habitat.

N 64 year old moderately dense loblolly and longleaf pine habitat.

O 28 year old sparse loblolly and longleaf pine plantation.

P 86 year old dense longleaf pine habitat.

Q 36 year old moderately dense loblolly pine habitat.

Acreage	Suitable	Potential	Future	Total-All	Total-S&P[2]
Total Pre-Project	101.54	85.98	91.07	278.59	187.52
Total Removals	2.85	0.23	7.40	10.48	3.08
Non-Contiguous	6.28	0.00	0.64	6.92	6.28
Total Post-Project	92.41	85.75	83.03	261.19	178.16
BA					
Total Pre-Project	5,424.63	6,243.19	5,002.13	16,669.95	11,667.82
Total Removals	237.49	19.17	259.00	515.66	256.66
Non-Contiguous	523.31	0.00	22.40	545.71	523.31
Total Post-Project	4,663.83	6,224.02	4,720.73	15,608.58	10,887.85

The post-project RSG foraging habitat totals for CNF 58 were 4,663.83 ft.^{2} of pine BA on 92.41 acres of suitable habitat, 6,224.02 ft.^{2} of pine BA on 85.75 acres of potentially suitable habitat and 4,720.73 ft.^{2} of pine BA on 83.03 acres of future potential habitat (Figure 7, Table 11). CNF 58 will meet the RSG requirements for the 0.50 mi. radius foraging partition post-project assuming potentially suitable habitat is made suitable.

6.6.4. Impacts to CNF 901

In 2011, JCA employees conducted morning follows within the CNF 901 partition. At that time, a solitary male from CNF 901 was seen flying north, crossing over East Prong Slocum Creek (Figure 8). Also, the CNF lists in their 2013 breeding season data that CNF 58 (located north of Slocum Creek) is captured by CNF 901 (R. Powell, USFS, pers. comm.). Due to the aforementioned data findings, pine-forested habitat north of East Prong Slocum Creek was included in pre-project foraging habitat totals.

SMS, 0.25 mi. radius partition for CNF 901

The pre-project foraging habitat totals for the 0.25 mi. radius SMS partition were 1,875.93 ft.^{2} of pine BA on 37.18 acres of suitable foraging habitat, 2,565.39 ft.^{2} of pine BA on 47.42 acres of potentially suitable habitat and 211.88 ft.^{2} of pine BA on 6.78 acres of future potential habitat (Figure 8, Table 12). CNF 901 meets the SMS requirements for the 0.25 mi. radius foraging partition pre-project assuming potentially suitable habitat is made suitable.

The impact area will remove 120.75 ft.^{2} of pine BA on 2.50 acres of suitable habitat, 360.23 ft.^{2} of pine BA on 7.45 acres of potentially suitable habitat and 31.25 ft.^{2} of pine BA on 1.00 acre of future potential habitat (Table 12). The impact area ranges between 270 and 330 ft. wide, making the remaining habitat on the eastern side of the partition noncontiguous. This will result in the removal of 468.08 ft^2 on 9.77 acres of suitable habitat and 129.86 ft^2 of pine BA on 2.17 acres of potentially suitable habitat (Table 12).

CNF 901 Stand Density and Height

Habitat Suitability using Standard for Managed Stability Guidelines

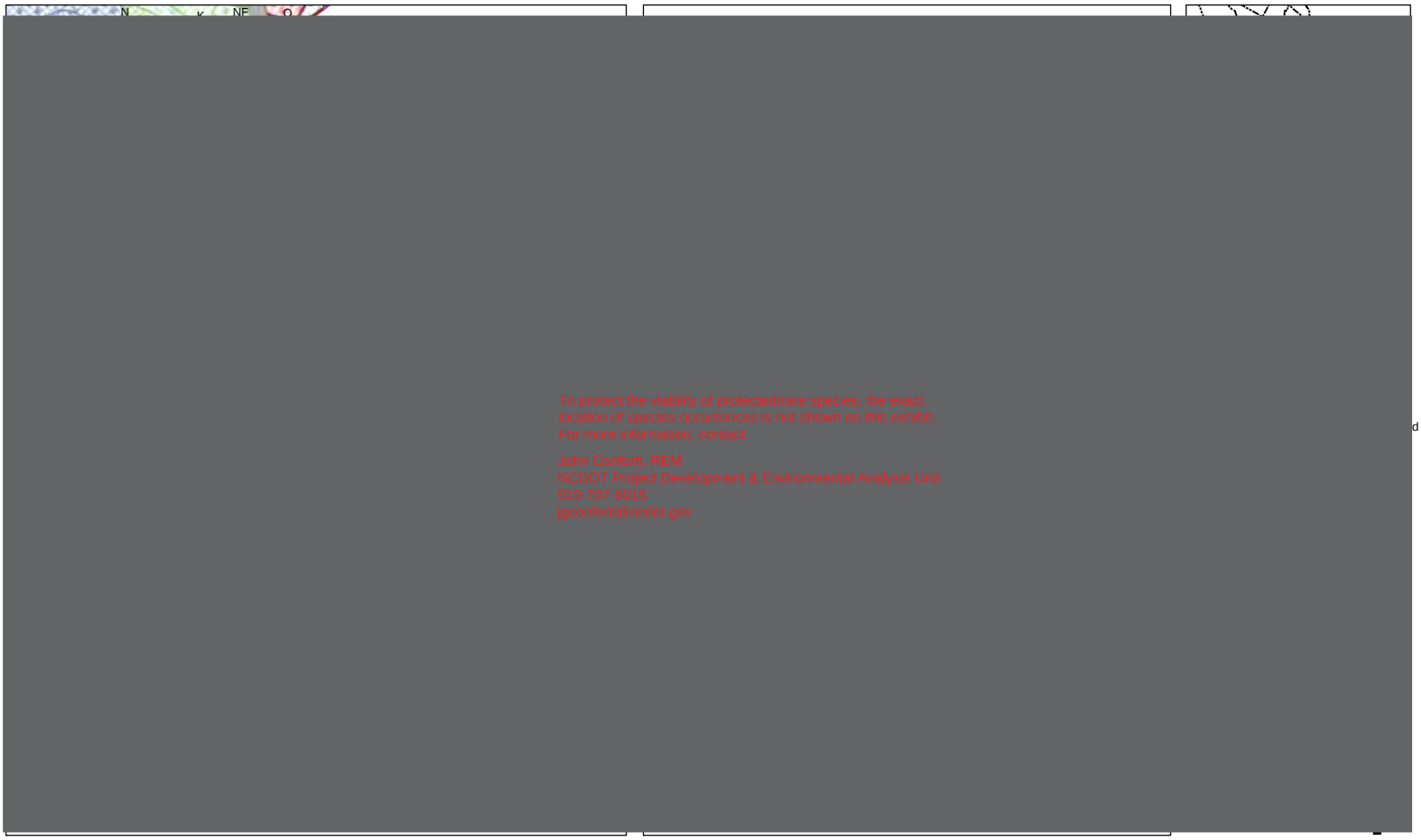

Figure 8. Foraging habitat for red-cockaded woodpecker (RCW) Croatan National Forest (CNF) Cluster 901 and project removals by the US Highway 70 Havelock Bypass project (R-1015), Craven County, NC.

Table 12. Pre-project, project removals and post-project foraging habitat totals for the **0.25 mile radius** red-cockaded woodpecker (RCW) foraging habitat partition for Croatan National Forest (CNF) Cluster **901** using the **Standard for Managed Stability** guidelines (USFWS 2003), US Highway 70 Havelock Bypass project (R-1015), Craven County, North Carolina.

Stand	Forested Habitat (acres)	Stand Age (years)	4.0-9.9 inches dbh		10.0-13.9 inches dbh		14.0+ inches dbh		10.0+ inches dbh		Total Hwd BA ≥10 in. dbh	Total Stand BA (Pine + Hwds ≥10 in. dbh)	Pine Density ≥10 in. dbh	Hardwood Midstory Density	Hardwood Midstory Height	Suitable Habitat		Removals Suitable Habitat		Noncontiguous Habitat Suitable Habitat		Potentially Suitable Habitat		Removals Potentially Suitable Habitat		Noncontiguous Habitat Potentially Suitable Habitat		Future Potential Habitat		Removals Future Potential Habitat	
			Avg. Stems[1]	Avg. BA	Avg. Stems	Avg. BA	Avg. Stems	Avg. BA	Avg. Stems	Avg. BA						Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA
A	6.78	76	0.00	0.00	0.00	0.00	18.55	31.25	18.55	31.25	0.00	31.25	Sparse	Sparse	Moderate												1.12	35.00	1.00	31.25
														Dense	Moderate												5.66	176.88		
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**6.78**	**211.88**	**1.00**	**31.25**
B	2.19	77	7.41	2.00	7.33	6.00	21.24	47.00	28.57	53.00	6.00	59.00	Moderate	Dense	Tall							2.19	116.07								
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**2.19**	**116.07**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
C	7.47	35	0.00	0.00	52.97	45.00	9.77	15.00	62.74	60.00	0.00	60.00	Moderate	Dense	Moderate							6.72	403.20								
														Dense	Tall							0.75	45.00								
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**7.47**	**448.20**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
D	41.68	86	1.89	0.83	2.72	2.50	31.58	49.17	34.30	51.67	0.00	51.67	Moderate	Sparse	Moderate	1.23	63.55														
														Moderate	Moderate							13.66	705.81								
														Dense	Low	23.94	1,236.98	0.26	13.43												
														Dense	Moderate							2.85	147.26								
														Subtotal		**25.17**	**1,300.53**	**0.26**	**13.43**	**0.00**	**0.00**	**16.51**	**853.07**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
E	29.50	75	0.00	0.00	0.91	0.83	26.42	47.08	27.33	47.91	0.00	47.91	Moderate	Moderate	Moderate							15.88	760.81	6.22	298.00	1.17	56.05				
														Dense	Low	12.01	575.40	2.24	107.32	9.77	468.08										
														Dense	Moderate							1.61	77.14	1.16	55.58	0.45	21.56				
														Subtotal		**12.01**	**575.40**	**2.24**	**107.32**	**9.77**	**468.08**	**17.49**	**837.95**	**7.38**	**353.58**	**1.62**	**77.61**	**0.00**	**0.00**	**0.00**	**0.00**
G	3.14	31	0.00	0.00	69.92	55.00	18.35	25.00	88.27	80.00	0.00	80.00	Dense	Dense	Moderate							3.14	251.20								
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**3.14**	**251.20**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
H	0.62	71	22.73	10.00	0.00	0.00	49.03	95.00	49.03	95.00	0.00	95.00	Dense	Dense	Tall							0.62	58.90	0.07	6.65	0.55	52.25				
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.62**	**58.90**	**0.07**	**6.65**	**0.55**	**52.25**	**0.00**	**0.00**	**0.00**	**0.00**
Total	**91.38**															**37.18**	**1,875.93**	**2.50**	**120.75**	**9.77**	**468.08**	**47.42**	**2,565.39**	**7.45**	**360.23**	**2.17**	**129.86**	**6.78**	**211.88**	**1.00**	**31.25**

Unsuitable foraging habitat characteristics according to the SMS foraging habitat guidelines (USFWS 2003).

Dense pine stands with a BA of > 70 ft^2/acre were counted as suitable only if the excess was in pines ≥14 inches dbh (USFWS pers. comm.).

[1]Average stems and BA are calculated per acre.

[2]S&P = Suitable and potentially suitable habitat.

Stands

A	76 year old thinned, sparse longleaf and loblolly pine habitat.	E	75 year old moderately dense mixed pine habitat.
B	77 year old transition, moderately dense mixed pine habitat.	G	31 year old dense, thinned loblolly pine plantation.
C	35 year old thinned loblolly pine plantation.	H	71 year old disturbed, dense mixed pine habitat.
D	86 year old moderately dense mixed pine habitat.		

Acreage	Suitable	Potential	Future	Total-All	Total-S&P[2]
Total Pre-Project	37.18	47.42	6.78	91.38	84.60
Total Removals	2.50	7.45	1.00	10.95	9.95
Total Noncontiguous	9.77	2.17	0.00	11.94	11.94
Total Post-Project	24.91	37.80	5.78	68.49	62.71
BA					
Total Pre-Project	1,875.93	2,565.39	211.88	4,653.20	4,441.32
Total Removals	120.75	360.23	31.25	512.23	480.98
Total Noncontiguous	468.08	129.86	0.00	597.94	597.94
Total Post-Project	1,287.10	2,075.30	180.63	3,543.03	3,362.40

The post-project SMS foraging habitat totals for CNF 901 were 1,287.10 ft.^{2} of pine BA on 24.91 acres of suitable habitat, 2,075.30 ft.^{2} of pine BA on 37.80 acres of potentially suitable habitat and 180.63 ft.^{2} of pine BA on 5.78 acres of future potential habitat (Figure 8, Table 12). CNF 901 will not meet the SMS requirements for the 0.25 mi. radius foraging habitat partition post-project assuming potentially suitable habitat is made suitable.

SMS, 0.50 mi. radius partition for CNF 901

The pre-project foraging habitat totals for the 0.50 mi. radius SMS partition were 2,708.87 ft.^{2} of pine BA on 54.52 acres of suitable foraging habitat, 7,050.23 ft.^{2} of pine BA on 116.74 acres of potentially suitable habitat and 240.00 ft.^{2} of pine BA on 7.68 acres of future potential habitat (Figure 8, Table 13). CNF 901 meets the SMS requirements for the 0.50 mi. radius foraging partition pre-project assuming potentially suitable habitat is made suitable.

The impact area will remove 120.75 ft.^{2} of pine BA on 2.50 acres of suitable habitat, 642.16 ft.^{2} of pine BA on 11.49 acres of potentially suitable habitat and 44.38 ft.^{2} of pine BA on 1.42 acres of future potential habitat (Table 13). The impact area ranges between 270 and 330 ft. wide, making the remaining habitat on the eastern side of the partition noncontiguous. This will result in the removal of 1,271.05 ft.^{2} of pine BA on 26.53 acres of suitable habitat, 889.38 ft.^{2} of pine BA on 12.00 acres of potentially suitable habitat and 10.31 ft.^{2} of pine BA on 0.33 acre of future potential habitat (Table 13). Approximately 15.5 acres of forested habitat within the CNF 901 partition, north of Slocum Creek and west of the impact area, was counted as contiguous due to observations by JCA employees who saw a solitary male in 2011 fly north over Slocum Creek and data provided by the USFS in 2013 that CNF 58 was captured by CNF 901.

The post-project SMS foraging habitat totals for CNF 901 were 1,317.07 ft.^{2} of pine BA on 25.49 acres of suitable habitat, 5,518.69 ft.^{2} of pine BA on 93.25 acres of potentially suitable habitat and 185.31 ft.^{2} of pine BA on 5.93 acres of future potential habitat (Figure 8, Table 13). CNF 901 will meet the SMS requirements for the 0.50 mi. radius foraging partition post-project assuming potentially suitable habitat is made suitable.

Table 13. Pre-project, project removals and post-project foraging habitat totals for the **0.5 mile radius** red-cockaded woodpecker (RCW) foraging habitat partition for Croatan National Forest (CNF) Cluster **901** using the **Standard for Managed Stability** (USFWS 2003), US Highway 70 Havelock Bypass (R-1015) project, Craven County, North Carolina.

Stand	Forested Habitat (acres)	Stand Age (years)	4.0-9.9 inches dbh		10.0-13.9 inches dbh		14.0+ inches dbh		10.0+ inches dbh		Total Hwd BA ≥10 in. dbh	Total Stand BA (Pine + Hwds ≥10 in. dbh)	Pine Density ≥10 in. dbh	Hardwood Midstory Density	Hardwood Midstory Height	Suitable Habitat		Removals Suitable Habitat		Non-contiguous Suitable Habitat		Potentially Suitable Habitat		Removals Potentially Suitable Habitat		Non-contiguous Potentially Suitable Habitat		Future Potential Habitat		Removals Future Potential Habitat		Non-contiguous Future Potential Habitat	
			Avg. Stems[1]	Avg. BA	Avg. Stems	Avg. BA	Avg. Stems	Avg. BA	Avg. Stems	Avg. BA						Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA
A	7.68	76	0.00	0.00	0.00	0.00	18.55	31.25	18.55	31.25	0.00	31.25	Sparse	Sparse	Moderate												2.02	63.13	1.42	44.38	0.33	10.31
														Dense	Moderate												5.66	176.88				
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**7.68**	**240.00**	**1.42**	**44.38**	**0.33**	**10.31**
B	14.77	77	7.41	2.00	7.33	6.00	21.24	47.00	28.57	53.00	6.00	59.00	Moderate	Dense	Tall							14.77	782.81										
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**14.77**	**782.81**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
C	34.70	35	0.00	0.00	52.97	45.00	9.77	15.00	62.74	60.00	0.00	60.00	Moderate	Dense	Moderate							28.52	1,711.20										
														Dense	Tall							6.18	370.80										
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**34.70**	**2,082.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
D	42.26	86	1.89	0.83	2.72	2.50	31.58	49.17	34.30	51.67	0.00	51.67	Moderate	Sparse	Moderate	1.23	63.55																
														Moderate	Moderate							13.66	705.81										
														Dense	Low	24.52	1,266.95	0.26	13.43														
														Dense	Moderate							2.85	147.26										
														Subtotal		**25.75**	**1,330.50**	**0.26**	**13.43**	**0.00**	**0.00**	**16.51**	**853.07**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
E	47.31	75	0.00	0.00	0.91	0.83	26.42	47.08	27.33	47.91	0.00	47.91	Moderate	Moderate	Moderate							16.13	772.79	6.23	298.48	1.39	66.59						
														Dense	Low	28.77	1,378.37	2.24	107.32	26.53	1,271.05												
														Dense	Moderate							1.61	77.14	1.16	55.58	0.45	21.56						
														Dense	Tall							0.80	38.33			0.80	38.33						
														Subtotal		**28.77**	**1,378.37**	**2.24**	**107.32**	**26.53**	**1,271.05**	**18.54**	**888.25**	**7.39**	**354.05**	**2.64**	**126.48**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
F[3]	12.43	85	0.00	0.00	5.43	5.00	33.95	60.00	39.38	65.00	6.67	71.67	Moderate	Dense	Tall							12.43	807.95	2.73	177.45	2.52	163.80						
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**12.43**	**807.95**	**2.73**	**177.45**	**2.52**	**163.80**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
G	7.65	31	0.00	0.00	69.92	55.00	18.35	25.00	88.27	80.00	0.00	80.00	Dense	Dense	Moderate							7.65	612.00										
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**7.65**	**612.00**	**0.00**	**0.00**			**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
H	3.53	71	22.73	10.00	0.00	0.00	49.03	95.00	49.03	95.00	0.00	95.00	Dense	Dense	Tall							3.53	335.35	0.07	6.65	3.46	328.70						
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**3.53**	**335.35**	**0.07**	**6.65**	**3.46**	**328.70**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
I	8.61	78	0.00	0.00	0.00	0.00	38.41	80.00	38.41	80.00	2.50	82.50	Dense	Dense	Tall							8.61	688.80	1.30	104.00	3.38	270.40						
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**8.61**	**688.80**	**1.30**	**104.00**	**3.38**	**270.40**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Total	**178.94**															**54.52**	**2,708.87**	**2.50**	**120.75**	**26.53**	**1,271.05**	**116.74**	**7,050.23**	**11.49**	**642.16**	**12.00**	**889.38**	**7.68**	**240.00**	**1.42**	**44.38**	**0.33**	**10.31**

Unsuitable foraging habitat characteristics according to the SMS foraging habitat guidelines (USFWS 2003).

Dense pine stands with a BA of >70 ft²/acre were counted as suitable only if the excess BA was in pines ≥14 inches dbh (USFWS pers. comm.).

[1] Average stems and BA are calculated per acre.

[2] S&P = Suitable and potentially suitable habitat.

[3] Pine-forested habitat north of East Prong Slocum Creek was considered contiguous due to observations by JCA and USFWS employees.

Stands

A 76 year old thinned, sparse longleaf and loblolly pine habitat.

B 77 year old transition, moderately dense mixed pine habitat.

C 35 year old thinned loblolly plantation.

D 86 year old moderately dense mixed pine habitat.

E 75 year old moderately dense mixed pine habitat.

F 85 year old moderately dense loblolly and longleaf pine habitat.

G 31 year old dense, thinned loblolly pine plantation.

H 71 year old disturbed, mixed pine habitat.

I 78 year old transition, dense loblolly and pond pine habitat.

Acreage	**Suitable**	**Potential**	**Future**	**Total-All**	**Total-S&P[2]**
Total Pre-Project	54.52	116.74	7.68	178.94	171.26
Total Removals	2.50	11.49	1.42	15.41	13.99
Total Noncontiguous	26.53	12.00	0.33	38.86	38.53
Total Post-Project	25.49	93.25	5.93	124.67	118.74
BA					
Total Pre-Project	2,708.87	7,050.23	240.00	9,999.10	9,759.10
Total Removals	120.75	642.16	44.38	807.29	762.91
Total Noncontiguous	1,271.05	889.38	10.31	2,170.74	2,160.43
Total Post-Project	1,317.07	5,518.69	185.31	7,021.07	6,835.76

RSG, 0.50 mi. radius partition for CNF 901

Twenty-seven percent of the partition was located on low productivity soils, with 15% on medium productivity soils and the remaining 58% on high productivity soils The CNF needs to manage an average of 172.14 acres for RCW foraging habitat in order to meet the RSG (Table 14).

The pre-project foraging habitat totals for the 0.50 mi. radius RSG partition were 2,708.87 $ft.^2$ of pine BA on 54.52 acres of suitable foraging habitat, 4,356.23 $ft.^2$ of pine BA on 74.39 acres of potentially suitable habitat and 2,934.00 $ft.^2$ of pine BA on 50.03 acres of future potential habitat (Figure 8, Table 14). The impact area ranges between 270 and 330 ft. wide, making the remaining habitat on the eastern side of the partition noncontiguous. This will result in the removal of 1,271.05 $ft.^2$ of pine BA on 26.53 acres of suitable habitat, 889.38 $ft.^2$ of pine BA on 12.00 acres of potentially suitable habitat and 10.31 $ft.^2$ of pine BA on 0.33 acre of future potential habitat (Table 14).

The impact area will remove 120.75 $ft.^2$ of pine BA on 2.50 acres of suitable habitat, 642.16 $ft.^2$ of pine BA on 11.49 acres of potentially suitable habitat and 44.38 $ft.^2$ of pine BA on 1.42 acres of future potential habitat (Table 14). The impact area is greater than 200 ft. wide, making the remaining habitat on the eastern side of the partition noncontiguous. This will result in the removal of 1,271.05 $ft.^2$ on 26.53 acres of suitable habitat, 889.38 $ft.^2$ of pine BA on 12.00 acres of potentially suitable habitat and 10.31 $ft.^2$ of pine BA on 0.33 acre of future potential habitat (Table 14). Approximately 15.5 acres of forested habitat within the CNF 901 partition, north of Slocum Creek and west of the impact area, was counted as contiguous due to observations by JCA employees who saw a solitary male in 2011 fly north over Slocum Creek and data provided by the USFS in 2013 that CNF 58 was captured by CNF 901.

The post-project RSG foraging habitat totals for CNF 901 were 1,317.07 $ft.^2$ of pine BA on 25.49 acres of suitable habitat, 2,824.69 $ft.^2$ of pine BA on 50.90 acres of potentially suitable habitat and 2,879.31 $ft.^2$ of pine BA on 48.28 acres of future potential habitat (Figure 8, Table 14). CNF 901 will not meet the RSG requirements for the 0.50 mi. radius foraging partition post-project.

Table 14. Pre-project, project removals and post-project foraging habitat totals for the **0.50 mile radius** red-cockaded woodpecker (RCW) foraging habitat partition for Croatan National Forest (CNF) Cluster **901** using the **Recovery Standard Guidelines** (USFWS 2003), US Highway 70 Havelock Bypass (R-1015) project, Craven County, North Carolina.

Stand	Forested Habitat (acres)	Stand Age (years)	4.0-9.9 inches dbh		10.0-13.9 inches dbh		14.0+ inches dbh		10.0+ inches dbh		Total Hwd BA ≥10 in. dbh	Total Stand BA (Pine + Hwds ≥10 in. dbh)	Pine Density ≥10 in. dbh	Hardwood Midstory Density	Hardwood Midstory Height	Suitable Habitat		Removals Suitable Habitat		Non-contiguous Suitable Habitat		Potentially Suitable Habitat		Removals Potentially Suitable Habitat		Non-contiguous Potentially Suitable Habitat		Future Potential Habitat		Removals Future Potential Habitat		Non-contiguous Future Potential Habitat	
			Avg. Stems[1]	Avg. BA	Avg. Stems	Avg. BA	Avg. Stems	Avg. BA	Avg. Stems	Avg. BA						Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA
A	7.68	76	0.00	0.00	0.00	0.00	18.55	31.25	18.55	31.25	0.00	31.25	Sparse	Sparse	Moderate												2.02	63.13	1.42	44.38	0.33	10.31
														Dense	Moderate												5.66	176.88				
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**7.68**	**240.00**	**1.42**	**44.38**	**0.33**	**10.31**
B	14.77	77	7.41	2.00	7.33	6.00	21.24	47.00	28.57	53.00	6.00	59.00	Moderate	Dense	Tall							14.77	782.81										
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**14.77**	**782.81**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
C	34.70	35	0.00	0.00	52.97	45.00	9.77	15.00	62.74	60.00	0.00	60.00	Moderate	Dense	Moderate												28.52	1,711.20				
														Dense	Tall												6.18	370.80				
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**34.70**	**2,082.00**	**0.00**	**0.00**	**0.00**	**0.00**
D	42.26	86	1.89	0.83	2.72	2.50	31.58	49.17	34.30	51.67	0.00	51.67	Moderate	Sparse	Moderate	1.23	63.55																
														Moderate	Moderate							13.66	705.81										
														Dense	Low	24.52	1,266.95	0.26	13.43														
														Dense	Moderate							2.85	147.26										
														Subtotal		**25.75**	**1,330.50**	**0.26**	**13.43**			**16.51**	**853.07**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
E	47.31	75	0.00	0.00	0.91	0.83	26.42	47.08	27.33	47.91	0.00	47.91	Moderate	Moderate	Moderate							16.13	772.79	6.23	298.48	1.39	66.59						
														Dense	Low	28.77	1,378.37	2.24	107.32	26.53	1,271.05												
														Dense	Moderate							1.61	77.14	1.16	55.58	0.45	21.56						
														Dense	Tall							0.80	38.33			0.80	38.33						
														Subtotal		**28.77**	**1,378.37**	**2.24**	**107.32**	**26.53**	**1,271.05**	**18.54**	**888.25**	**7.39**	**354.06**	**2.64**	**126.48**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
F[3]	12.43	85	0.00	0.00	5.43	5.00	33.95	60.00	39.38	65.00	6.67	71.67	Moderate	Dense	Tall							12.43	807.95	2.73	177.45	2.52	163.80						
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**12.43**	**807.95**	**2.73**	**177.45**	**2.52**	**163.80**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
G	7.65	31	0.00	0.00	69.92	55.00	18.35	25.00	88.27	80.00	0.00	80.00	Dense	Dense	Moderate												7.65	612.00				
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**7.65**	**612.00**	**0.00**	**0.00**	**0.00**	**0.00**
H	3.53	71	22.73	10.00	0.00	0.00	49.03	95.00	49.03	95.00	0.00	95.00	Dense	Dense	Tall							3.53	335.35	0.07	6.65	3.46	328.70						
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**3.53**	**335.35**	**0.07**	**6.65**	**3.46**	**328.70**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
I	8.61	78	0.00	0.00	0.00	0.00	38.41	80.00	38.41	80.00	2.50	82.50	Dense	Dense	Tall							8.61	688.80	1.30	104.00	3.38	270.40						
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**8.61**	**688.80**	**1.30**	**104.00**	**3.38**	**270.40**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Total	**178.94**															**54.52**	**2,708.87**	**2.50**	**120.75**	**26.53**	**1,271.05**	**74.39**	**4,356.23**	**11.49**	**642.16**	**12.00**	**889.38**	**50.03**	**2,934.00**	**1.42**	**44.38**	**0.33**	**10.31**

Unsuitable foraging habitat characteristics according to the Recovery Standard foraging habitat guidelines (USFWS 2003).

[1]Average stems and BA are calculated per acre.

[2]S&P = Suitable and potentially suitable habitat.

[3] Pine-forested habitat north of East Prong Slocum Creek was considered contiguous due to observatios by JCA and USFWS employees.

Stands

A 76 year old thinned, sparse longleaf and loblolly pine habitat.
B 77 year old transition, moderately dense mixed pine habitat.
C 35 year old thinned loblolly pine plantation.
D 86 year old moderately dense mixed pine habitat.
E 75 year old moderately dense mixed pine habitat.
F 85 year old moderately dense loblolly and longleaf pine habitat.
G 31 year old dense, thinned loblolly pine plantation.
H 71 year old disturbed, dense mixed pine habitat.
I 78 year old transition, dense loblolly and pond pine habitat.

Acreage	Suitable	Potential	Future	Total-All	Total-S&P[2]
Total Pre-Project	54.52	74.39	50.03	178.94	128.91
Total Removals	2.50	11.49	1.42	15.41	13.99
Total Noncontiguous	26.53	12.00	0.33	38.86	38.53
Total Post-Project	25.49	50.90	48.28	124.67	76.39
BA					
Total Pre-Project	2,708.87	4,356.23	2,934.00	9,999.10	7,065.10
Total Removals	120.75	642.16	44.38	807.29	762.91
Total Noncontiguous	1,271.05	889.38	10.31	2,170.74	2,160.43
Total Post-Project	1,317.07	2,824.69	2,879.31	7,021.07	4,141.76

6.6.5. Impacts to CNF 902

SMS, 0.25 mi. radius partition for CNF 902

The pre-project foraging habitat totals for the 0.25 mi. radius SMS partition were 3,987.53 $ft.^2$ of pine BA on 76.67 acres of suitable foraging habitat, 1,036.50 $ft.^2$ of pine BA on 11.34 acres of potentially suitable habitat and 169.35 $ft.^2$ of pine BA on 5.77 acres of future potential habitat (Figure 9, Table 15). There were no removals within the 0.25 mi. radius foraging partition. CNF 902 meets the SMS requirements for the 0.25 mi. radius foraging partition pre- and post-project.

SMS, 0.50 mi. radius partition for CNF 902

The pre-project foraging habitat totals for the 0.50 mi. radius SMS partition were 12,793.51 $ft.^2$ of pine BA on 240.85 acres of suitable foraging habitat, 2,732.53 $ft.^2$ of pine BA on 34.16 acres of potentially suitable habitat and 557.83 $ft.^2$ of pine BA on 19.59 acres of future potential habitat (Figure 9, Table 16). CNF 902 meets the SMS requirements for the 0.50 mi. radius foraging partition pre-project.

The impact area will remove 673.20 $ft.^2$ of pine BA on 10.83 acres of suitable habitat, 224.95 $ft.^2$ of pine BA on 4.09 acres of potentially suitable habitat and 24.60 $ft.^2$ of pine BA on 0.82 acre of future potential habitat (Table 16). The impact area ranges from 390 to 440 ft. wide, in large part due to the proposed approaches to the interchange at Lake Rd. just outside the cluster partition and grade separation over the Camp Lejeune railroad line. The corridor width makes the remaining habitat on the eastern side of the partition noncontiguous. This will result in the removal of 167.53 $ft.^2$ of pine BA on 3.04 acres of suitable habitat and 116.60 $ft.^2$ of pine BA on 2.12 acres of potentially suitable habitat (Table 16).

The post-project SMS foraging habitat totals were 11,952.78 $ft.^2$ of pine BA on 226.98 acres of suitable habitat, 2,390.98 $ft.^2$ of pine BA on 27.95 acres of potentially suitable habitat and 533.23 $ft.^2$ of pine BA on 18.77 acres of future potential habitat (Figure 9, Table 16). CNF 902 will meet the SMS requirements for the 0.50 mi. radius foraging partition post-project.

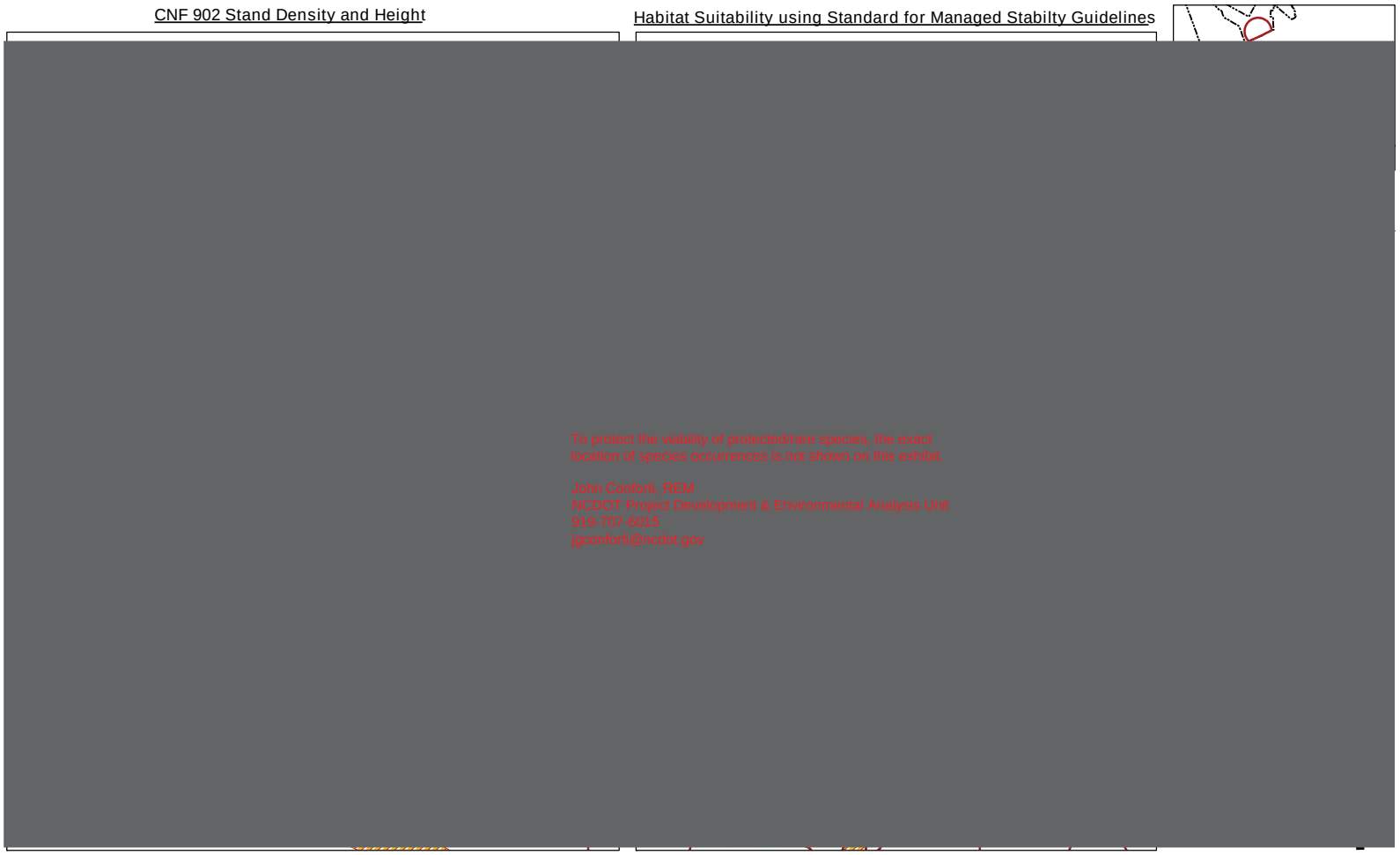

Figure 9. Foraging habitat for red-cockaded woodpecker (RCW) Croatan National Forest (CNF) Cluster 902 and project removals by the US Highway 70 Havelock Bypass (R-1015), Craven County, NC.

Table 15. Pre-project, project removals and post-project foraging habitat totals for the **0.25 mile radius** red-cockaded woodpecker (RCW) foraging habitat partition for Croatan National Forest (CNF) Cluster **902** using the **Standard for Managed Stability** guidelines (USFWS 2003), US Highway 70 Havelock Bypass (R-1015) project, Craven County, North Carolina.

Stand	Forested Habitat (acres)	Stand Age (years)	4.0-9.9 inches dbh		10.0-13.9 inches dbh		14.0+ inches dbh		10.0+ inches dbh		Total Hwd BA ≥10 in. dbh	Total Stand BA (Pine + Hwds ≥10 in. dbh)	Pine Density ≥10 in. dbh	Hardwood Midstory Density	Hardwood Midstory Height	Suitable Habitat		Removals Suitable Habitat		Potentially Suitable Habitat		Removals Potentially Suitable Habitat		Future Potential Habitat		Removals Future Potential Habitat	
			Avg. Stems[1]	Avg. BA	Avg. Stems	Avg. BA	Avg. Stems	Avg. BA	Avg. Stems	Avg. BA						Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA
A	1.50	77	0.00	0.00	0.00	0.00	15.21	27.50	15.21	27.50	0.00	27.50	Sparse	Sparse	Low										1.50	41.25		
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.50**	**41.25**	**0.00**	**0.00**
B	4.27	73	0.00	0.00	8.60	6.67	12.71	23.33	21.34	30.00	0.00	30.00	Sparse	Dense	Low										4.27	128.10		
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**4.27**	**128.10**	**0.00**	**0.00**
C	15.89	79	0.00	0.00	0.00	0.00	27.25	55.00	27.25	55.00	0.00	55.00	Moderate	Sparse	Low	5.65	310.75										
														Moderate	Low	4.55	250.25										
														Dense	Low	4.67	256.85										
														Dense	Moderate					1.02	56.10						
														Subtotal		**14.87**	**817.85**	**0.00**	**0.00**	**1.02**	**56.10**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
E	59.79	67	0.54	0.24	11.64	10.00	25.26	40.24	36.91	50.24	0.00	50.24	Moderate	Sparse	Low	2.65	133.14										
														Moderate	Low	10.10	507.42										
														Dense	Low	47.04	2363.29										
														Subtotal		**59.79**	**3003.85**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
F	10.32	70	16.50	6.00	15.48	12.00	47.26	83.00	62.74	95.00	0.00	95.00	Dense	Dense	Tall					10.32	980.40						
														Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**10.32**	**980.40**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
G	2.01	75	23.54	5.00	14.26	11.25	50.73	71.25	64.99	82.50	0.00	82.50	Dense	Dense	Low	2.01	165.83										
														Subtotal		**2.01**	**165.83**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Total	**93.78**															**76.67**	**3,987.53**	**0.00**	**0.00**	**11.34**	**1,036.50**	**0.00**	**0.00**	**5.77**	**169.35**	**0.00**	**0.00**

Unsuitable foraging habitat characteristics according to the SMS foraging habitat guidelines (USFWS 2003).

Dense pine stands with a BA of >70 ft^2/acre were counted as suitable only if the excess BA was in pines ≥14 inches dbh (USFWS pers. comm.).

[1]Average stems and BA are calculated per acre.

[2]S&P = Suitable and potentially suitable habitat.

Stands

A	77 year old sparse longleaf pine habitat.	E	67 year old moderately dense longleaf and loblolly pine habitat.
B	73 year old sparse longleaf, loblolly pine habitat.	G	70 year old dense loblolly pine habitat.
C	79 year old moderately dense longleaf and loblolly pine habitat.	H	75 year old longleaf and loblolly pine habitat.

Acreage	**Suitable**	**Potential**	**Future**	**Total-All**	**Total-S&P[2]**
Total Pre-Project	76.67	11.34	5.77	93.78	88.01
Total Removals	0.00	0.00	0.00	0.00	0.00
Total Post-Project	76.67	11.34	5.77	93.78	88.01
BA					
Total Pre-Project	3,987.53	1,036.50	169.35	5,193.38	5,024.03
Total Removals	0.00	0.00	0.00	0.00	0.00
Total Post-Project	3,987.53	1,036.50	169.35	5,193.38	5,024.03

Table 16. Pre-project, project removals and post-project foraging habitat totals for the **0.50 mile radius** red-cockaded woodpecker (RCW) foraging habitat partition for Croatan National Forest (CNF) Cluster **902** using the **Standard forManaged Stability** guidelines (USFWS 2003), US Highway 70 Havelock Bypass (R-1015) project, Craven County, North Carolina.

Stand	Forested Habitat (acres)	Stand Age (years)	4.0-9.9 inches dbh		10.0-13.9 inches dbh		14.0+ inches dbh		10.0+ inches dbh		Total Hwd BA ≥10 in. dbh	Total Stand BA (Pine + Hwds ≥10 in. dbh)	Pine Density ≥10 in. dbh	Hardwood Midstory Density	Hardwood Midstory Height	Suitable Habitat		Removals Suitable Habitat		Noncontiguous Habitat Suitable Habitat		Potentially Suitable Habitat		Removals Potentially Suitable Habitat		Noncontiguous Habitat Potentially Suitable Habitat		Future Potential Habitat		Removals Future Potential Habitat	
			Avg. Stems[1]	Avg. BA	Avg. Stems	Avg. BA	Avg. Stems	Avg. BA	Avg. Stems	Avg. BA						Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA
A	11.95	77	0.00	0.00	0.00	0.00	15.21	27.50	15.21	27.50	0.00	27.50	Sparse	Sparse	Low													1.50	41.25		
															Moderate	Low												1.60	44.00		
															Dense	Low												8.85	243.38		
															Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**11.95**	**328.63**	**0.00**	**0.00**
B	7.64	73	0.00	0.00	8.60	6.67	12.71	23.33	21.31	30.00	0.00	30.00	Sparse	Moderate	Tall													2.00	60.00		
															Dense	Low												5.64	169.20	0.82	24.60
															Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**7.64**	**229.20**	**0.82**	**24.60**
C	40.36	79	0.00	0.00	0.00	0.00	27.25	55.00	27.25	55.00	0.00	55.00	Moderate	Sparse	Low	5.65	310.75														
															Moderate	Low	5.53	304.15													
															Dense	Low	27.42	1,508.10													
															Dense	Moderate							1.76	96.80							
															Subtotal		**38.60**	**2,123.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.76**	**96.80**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
D	40.19	71	0.00	0.00	13.36	11.67	28.91	43.33	42.27	55.00	0.00	55.00	Moderate	Dense	Low	33.91	1,865.05	8.01	440.55	3.04	167.20										
															Dense	Tall							6.28	345.40	4.09	224.95	2.12	116.60			
															Subtotal		**33.91**	**1,865.05**	**8.01**	**440.55**	**3.04**	**167.20**	**6.28**	**345.40**	**4.09**	**224.95**	**2.12**	**116.60**	**0.00**	**0.00**	**0.00**	**0.00**
E	152.67	68	0.38	0.17	10.32	9.00	24.28	39.17	34.60	48.17	0.00	48.17	Moderate	Sparse	Low	2.65	127.65														
															Moderate	Low	22.15	1,066.97													
															Dense	Low	123.79	5,962.96													
															Dense	Tall							4.08	196.53							
															Subtotal		**148.59**	**7,157.58**	**0.00**	**0.00**	**0.00**	**0.00**	**4.08**	**196.53**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
F	23.52	70	16.50	6.00	15.48	12.00	47.26	83.00	62.74	95.00	0.00	95.00	Dense	Moderate	Low	1.48	140.60														
															Dense	Tall							22.04	2,093.80							
															Subtotal		**1.48**	**140.60**	**0.00**	**0.00**	**0.00**	**0.00**	**22.04**	**2,093.80**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
G	18.27	75	23.54	5.00	14.26	11.25	50.73	71.25	64.99	82.50	0.00	82.50	Dense	Dense	Low	18.27	1,507.28	2.82	232.65	0.004	0.33										
															Subtotal		**18.27**	**1,507.28**	**2.82**	**232.65**	**0.004**	**0.33**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Total	**294.60**															**240.85**	**12,793.51**	**10.83**	**673.20**	**3.04**	**167.53**	**34.16**	**2,732.53**	**4.09**	**224.95**	**2.12**	**116.60**	**19.59**	**557.83**	**0.82**	**24.60**

Unsuitable foraging habitat characteristics according to the modified SMS foraging habitat guidelines (USFWS 2003).

Dense pine stands with a BA of >70 ft^2/acre were counted as suitable only if the excess BA was in pines ≥14 inches dbh (USFWS pers. comm.).

[1]Average stems and BA are calculated per acre.

[2]S&P = Suitable and potentially suitable habitat.

Stands

A 77 year old sparse longleaf pine habitat.

B 73 year old sparse longleaf, loblolly pine habitat.

C 79 year old moderately dense longleaf and loblolly pine habitat.

D 71 year old moderately dense longleaf pine habitat.

E 68 year old moderately dense longleaf and loblolly pine habitat.

F 70 year old dense loblolly pine habitat.

G 75 year old longleaf and loblolly pine habitat.

Acreage	**Suitable**	**Potential**	**Future**	**Total-All**	**Total-S&P[2]**
Total Pre-Project	240.85	34.16	19.59	294.60	275.01
Total Removals	10.83	4.09	0.82	15.74	14.92
Total Noncontiguous	3.04	2.12	0.00	5.16	5.16
Total Post-Project	226.98	27.95	18.77	273.70	254.93
BA					
Total Pre-Project	12,793.51	2,732.53	557.83	16,083.87	15,526.04
Total Removals	673.20	224.95	24.60	922.75	898.15
Total Noncontiguous	167.53	116.60	0.00	284.13	284.13
Total Post-Project	11,952.78	2,390.98	533.23	14,876.99	14,343.76

RSG, 0.50 mi. radius partition for CNF 902

All of the partition was located on high productivity soils. The CNF needs to manage an average of 135 acres for RCW foraging habitat in order to meet the RSG (Table 17).

The pre-project foraging habitat totals for the 0.50 mi. radius RSG partition were 11,286.23 $ft.^2$ of pine BA on 222.58 acres of suitable foraging habitat, 4,239.81 $ft.^2$ of pine BA on 52.43 acres of potentially suitable habitat and 557.83 $ft.^2$ of pine BA on 19.59 acres of future potential habitat (Figure 9, Table 17). CNF 902 meets the RSG requirements for the 0.50 mi. radius foraging partition pre-project assuming potentially suitable habitat is made suitable.

The impact area will remove 440.55 $ft.^2$ of pine BA on 8.01 acres of suitable habitat, 457.60 $ft.^2$ of pine BA on 6.91 acres of potentially suitable habitat and 24.60 $ft.^2$ of pine BA on 0.82 acre of future potential habitat (Table 17). The impact area ranges from 390 to 440 ft. wide, in large part due to the proposed approaches to the interchange at Lake Rd. and grade separation over the Camp Lejeune railroad line. The corridor width makes the remaining habitat on the eastern side of the partition noncontiguous. This will result in the removal of 167.20 $ft.^2$ of pine BA on 3.04 acres of suitable habitat and 116.93 $ft.^2$ of pine BA on 2.12 acres of potentially suitable habitat (Table 17).

The post-project RSG foraging habitat totals were 10,678.48 $ft.^2$ of pine BA on 211.53 acres of suitable habitat, 3,665.28 $ft.^2$ of pine BA on 43.40 acres of potentially suitable habitat and 533.23 $ft.^2$ of pine BA on 18.77 acres of future potential habitat (Figure 9, Table 17). CNF 902 will meet the RSG requirements for the 0.50 mi. radius foraging partition post-project assuming potentially suitable habitat is made suitable.

6.6.6. Impacts to HMA 168: According to the 2002 CNF Land and Resource Management Plan (USFS 2002), HMA 168 was established to link CNF RCW subpopulations in order to promote genetic interchange between individual RCW clusters and to support population growth so that the CNF could meet its Recovery Goal. A recruitment site was planned for establishment in HMA 168 between 2007 and 2009, but no cavity trees existed in June 2013 (Figure 10). HMA 168 contains 438.54 acres of future potential habitat and has 5 hydric soil types (Table 18). Of these, 3 are high

Table 17. Pre-project, project removals and post-project foraging habitat totals for the **0.50 mile radius** red-cockaded woodpecker (RCW) foraging habitat partition for Croatan National Forest (CNF) Cluster **902** using the **Recovery Standard Guidelines** (USFWS 2003), US Highway 70 Havelock Bypass (R-1015) project, Craven County, North Carolina.

Stand	Forested Habitat (acres)	Stand Age (years)	4.0-9.9 inches dbh		10.0-13.9 inches dbh		14.0+ inches dbh		10.0+ inches dbh		Total Hwd BA ≥10 in. dbh	Total Stand BA (Pine + Hwds ≥10 in. dbh)	Pine Density ≥10 in. dbh	Hardwood Midstory Density	Hardwood Midstory Height	Suitable Habitat		Removals Suitable Habitat		Noncontiguous Habitat Suitable Habitat		Potentially Suitable Habitat		Removals Potentially Suitable Habitat		Noncontiguous Habitat Potentially Suitable Habitat		Future Potential Habitat		Removals Future Potential Habitat	
			Avg. Stems[1]	Avg. BA	Avg. Stems	Avg. BA	Avg. Stems	Avg. BA	Avg. Stems	Avg. BA						Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA	Acres	BA
A	11.95	77	0.00	0.00	0.00	0.00	15.21	27.50	15.21	27.50	0.00	27.50	Sparse	Sparse	Low													1.50	41.25		
															Moderate	Low												1.60	44.00		
															Dense	Low												8.85	243.38		
															Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**11.95**	**328.63**	**0.00**	**0.00**
B	7.64	73	0.00	0.00	8.60	6.67	12.71	23.33	21.34	30.00	0.00	30.00	Sparse	Moderate	Tall													2.00	60.00		
															Dense	Low												5.64	169.20	0.82	24.60
															Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**7.64**	**229.20**	**0.82**	**24.60**
C	40.36	79	0.00	0.00	0.00	0.00	27.25	55.00	27.25	55.00	0.00	55.00	Moderate	Sparse	Low	5.65	310.75														
															Moderate	Low	5.53	304.15													
															Dense	Low	27.42	1,508.10													
															Dense	Moderate							1.76	96.80							
															Subtotal		**38.60**	**2,123.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.76**	**96.80**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
D	40.19	71	0.00	0.00	13.36	11.67	28.91	43.33	42.27	55.00	0.00	55.00	Moderate	Dense	Low	33.91	1,865.05	8.01	440.55	3.04	167.20										
															Dense	Tall							6.28	345.40	4.09	224.95	2.12	116.60			
															Subtotal		**33.91**	**1,865.05**	**8.01**	**440.55**	**3.04**	**167.20**	**6.28**	**345.40**	**4.09**	**224.95**	**2.12**	**116.60**	**0.00**	**0.00**	**0.00**	**0.00**
E	152.67	68	0.38	0.17	10.32	9.00	24.28	39.17	34.60	48.17	0.00	48.17	Moderate	Sparse	Low	2.65	127.65														
															Moderate	Low	22.15	1,066.97													
															Dense	Low	123.79	5,962.96													
															Dense	Tall							4.08	196.53							
															Subtotal		**148.59**	**7,157.58**	**0.00**	**0.00**	**0.00**	**0.00**	**4.08**	**196.53**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
F	23.52	70	16.50	6.00	15.48	12.00	47.26	83.00	62.74	95.00	0.00	95.00	Dense	Moderate	Low	1.48	140.60														
															Dense	Tall							22.04	2,093.80							
															Subtotal		**1.48**	**140.60**	**0.00**	**0.00**	**0.00**	**0.00**	**22.04**	**2,093.80**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
G	18.27	75	23.54	5.00	14.26	11.25	50.73	71.25	64.99	82.50	0.00	82.50	Dense	Dense	Low								18.27	1,507.28	2.82	232.65	0.00	0.33				
															Subtotal		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**18.27**	**1,507.28**	**2.82**	**232.65**	**0.00**	**0.33**	**0.00**	**0.00**	**0.00**	**0.00**
Total	**294.60**															**222.58**	**11,286.23**	**8.01**	**440.55**	**3.04**	**167.20**	**52.43**	**4,239.81**	**6.91**	**457.60**	**2.12**	**116.93**	**19.59**	**557.83**	**0.82**	**24.60**

Unsuitable foraging habitat characteristics according to Recovery Standard foraging habitat guidelines (USFWS 2003).

[1]Average stems and BA are calculated per acre.

[2]S&P = Suitable and potentially suitable habitat.

Stands

A 77 year old sparse longleaf pine habitat.

B 73 year old sparse longleaf, loblolly pine habitat.

C 79 year old moderately dense longleaf and loblolly pine habitat.

D 71 year old moderately dense longleaf pine habitat.

E 67 year old moderately dense longleaf and loblolly pine habitat.

F 70 year old dense loblolly pine habitat.

G 75 year old longleaf and loblolly pine habitat.

Acreage	**Suitable**	**Potential**	**Future**	**Total-All**	**Total-S&P[2]**
Total Pre-Project	222.58	52.43	19.59	294.60	275.01
Total Removals	8.01	6.91	0.82	15.74	14.92
Total Noncontiguous	3.04	2.12	0.00	5.16	5.16
Total Post-Project	211.53	43.40	18.77	273.70	254.93
BA					
Total Pre-Project	11,286.23	4,239.81	557.83	16,083.87	15,526.04
Total Removals	440.55	457.60	24.60	922.75	898.15
Total Noncontiguous	167.20	116.93	0.00	284.13	284.13
Total Post-Project	10,678.48	3,665.28	533.23	14,876.99	14,343.76

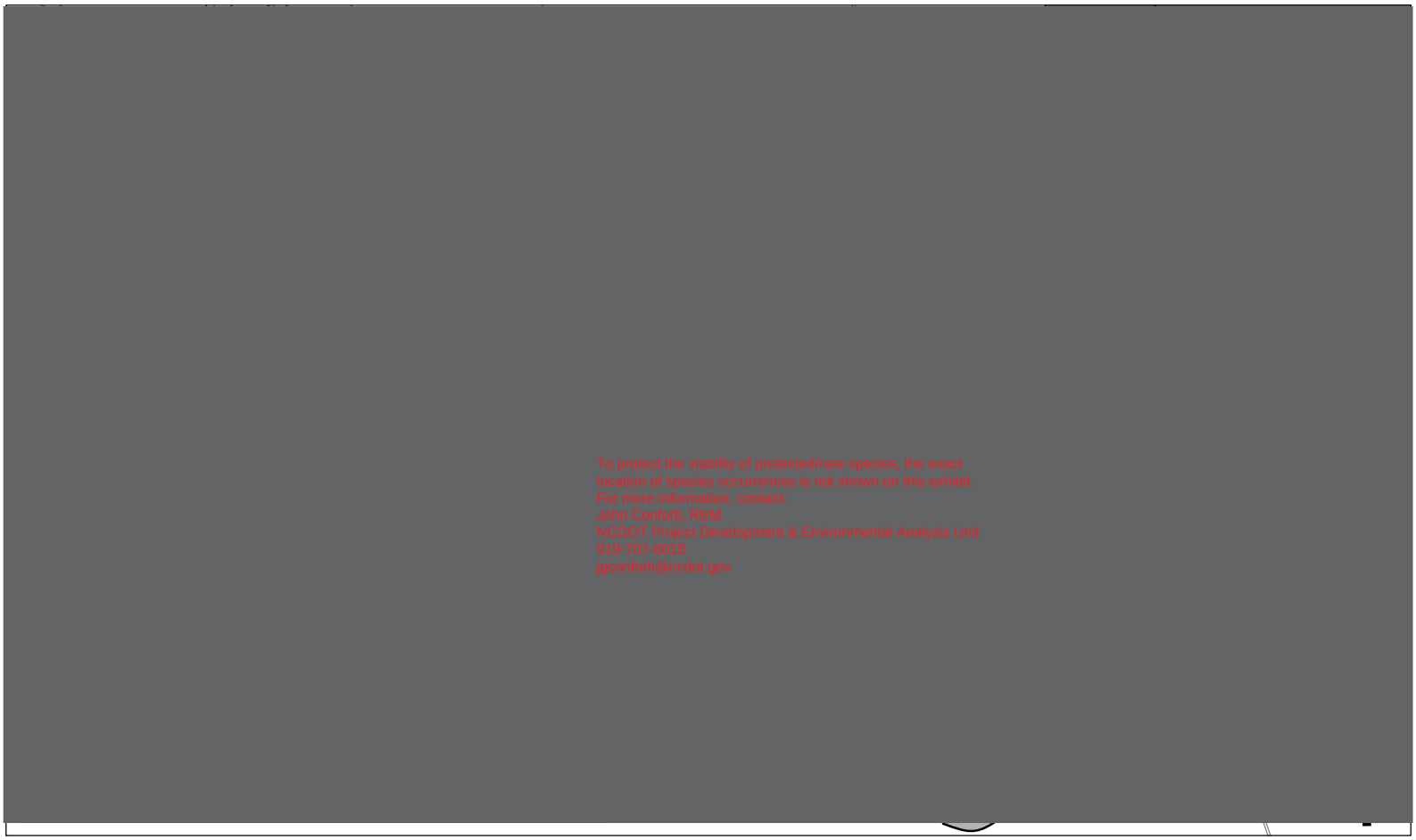

Figure 10. Croatan National Forest (CNF) red-cockaded woodpecker (*Picoides borealis*) (RCW) Habitat Management Areas (HMA) and project removals by the US Highway 70 Havelock Bypass project (R-1015), Craven and Carteret Counties, North Carolina.

Table 18. Pre-project, project removals and post-project future potential red-cockaded woodpecker foraging habitat totals for Habitat Management Areas (HMAs) 168, 169, 170 and 186 based on soil types (USDA 1989), US Highway 70 Havelock Bypass project (R-1015), Craven and Carteret Counties, North Carolina.

HMA	Soil Type	Total Acres	Site Index[1]	Productivity Rating	Pine Species	Removals (acres)	Post-project acreage
168	Ly	54.26	86	High	loblolly	0.26	54
	MM	2.94	n/a[2]	Low	-----	-----	2.94
	On	13.96	67	Medium	-----	-----	13.96
			73	Medium	pond pine		
	Pa[4]	71.07	98	High	loblolly	-----	71.07
	Ra[4]	296.31	94	High	loblolly	15.35	280.96
		438.54			**Total Removals**	**15.61**	**422.93**
						Resulting noncontiguous habitat[3] =	**44.26**
						Future potential pine forested habitat post-project =	**378.67**
169	Ly	20.01	86	High	loblolly	-----	20.01
	MM	0.01	n/a[2]	Low	-----	-----	0.01
	On	48.67	67	Medium	longleaf	0.82	47.85
	Ra[4]	174.78	94	High	loblolly	-----	174.78
		243.47			**Total Removals**	**0.82**	**242.65**
						Resulting noncontiguous habitat[3] =	**0.00**
						Future potential pine forested habitat post-project =	**242.65**
170	AuB	4.98	77	High	loblolly	-----	4.98
	GuA	7.7	n/a[2]	Low	-----	-----	7.7
	MM	9.21	n/a[2]	Low	-----	-----	9.21
	On	86.28	67	Medium	longleaf	9.35	76.93
			73	Medium	pond pine		
	Pa[4]	44.02	98	High	loblolly	3.71	40.31
	Ra[4]	233.6	94	High	loblolly	32.13	201.47
	To[4]	0.49	90	High	loblolly	-----	0.49
		386.28			**Total Removals**	**45.19**	**341.09**
						Resulting noncontiguous habitat[3] =	**137.06**
						Future potential pine forested habitat post-project =	**204.03**
186	CT	88.34	70	Medium	loblolly	-----	88.34
	Ln	20.00	58	Medium	longleaf	-----	20.00
	Mu	40.63	50	Low	loblolly	-----	40.63
			76	High	loblolly	-----	
	On	62.79	67	Medium	longleaf	-----	62.79
			73	Medium	pond pine	-----	
	Pa[4]	1.84	98	High	loblolly	-----	1.84
	Ra[4]	0.06	94	High	loblolly	-----	0.06
	To[4]	419.14	90	High	loblolly	1.71	417.43
		632.80			**Total Removals**	**1.71**	**631.09**
						Resulting noncontiguous habitat[3] =	**0.00**
						Future potential pine forested habitat post-project =	**631.09**

KEY: [1]High productivity soils have a site index greater than 75, medium productivity soils have a site index between 51 and 74 and low productivity soils have a site index ≤ 50.

[2]n/a = no pine site index available according to the Craven County Soil Survey (USDA 1989).

[3]Note = Non-contiguous habitat was habitat separated by >200 feet of non-habitat from other foraging stands (USFWS 2003). As a result, it was not considered available to RCWs and was subtracted from post-project habitat totals.

[4]Potential productivity is attainable only in areas that have been adequately drained, bedded or both (USDA 1989).

Soil Types:
AuB = Autryville loamy sand
CT = Croatan muck
GuA = Goldsboro-Urban land complex
LN = Leon sand
Ly = Lynchburg fine sandy loam
MM = Masontown mucky fine sandy loam and Muckalee sandy loam
Mu = Murville mucky sand
On = Onslow loamy sand
Pa = Pantego fine sandy loam
Ra = Rains fine sandy loam
To = Torhunta fine sandy loam

productivity soils with a site index greater than 75, 1 is a medium productivity soil with a site index of 67 and 1 is a low productivity soil with no pine index. All 5 soil types can support one or more of the following species: loblolly, longleaf and/or pond pine which can provide suitable RCW habitat in the future (Figure 10, Table 18).

One percent of the partition was located on low productivity soils, 3% on medium productivity soils and the remaining 96% on high productivity soils. In order to meet the RSG, the CNF should manage at least 121.40 acres for RCW foraging habitat (Figure 10 and Table 18).

HMA 168, Foraging Habitat Removals

The impact area will remove 15.61 acres of future potential RCW habitat. Sections of the impact area are greater than 200 ft. wide, making habitat on the eastern side of the partition noncontiguous. This will result in the removal of 44.26 acres of future potential habitat. The total post-project acreage was 378.67, all future potential habitat (Figure 10, Tables 18 and 19).

6.6.7. Impacts to HMA 169: HMA 169 was established to link CNF RCW subpopulations in order to promote genetic interchange between individual RCW clusters and to support population growth so that the CNF could meet its Recovery Goal (USFS 2002). One recruitment site is planned for establishment between 2053 and 2072; no cavity trees existed in June 2013 (Figure 10). HMA 169 contains 243.47 acres of future potential habitat and has 4 hydric soil types. Two of these are high productivity soils with a site index greater than 75, 1 is a medium productivity soil with a site index of 67 and 1 is a low productivity soil with no pine site index. All 4 soil types can support one of the following: loblolly, longleaf and/or pond pine which can provide suitable RCW habitat in the future (Table 18).

Twenty percent of the partition was located on medium productivity soils with the remainder on high productivity soils. In order to meet the RSG, the CNF should manage at least 126.00 acres for RCW foraging habitat (Figure 10,Table 19).

Table 19. Pre-project, project removals and post-project foraging habitat totals for red-cockaded woodpecker (RCW) habitat management areas (HMAs) on the Croatan National Forest impacted by the proposed US Highway 70 Havelock Bypass (R-1015), Craven and Carteret Counties, North Carolina.

	Pre-project Habitat[1]			Habitat Removals			Post-project Habitat					
Cluster	Suitable Acreage	Potentially Suitable Acreage[2]	Future Potential Acreage[3]	Suitable Acreage	Potentially Suitable Acreage	Future Potential Acreage	Suitable Acreage	Potentially Suitable Acreage	Future Potential Acreage	Resulting Non-contiguous Habitat	Total Post-project Acreage	Acreage Required per Partition[4]
HMA 168	0.00	0.00	438.54	0.00	0.00	15.61	0.00	0.00	422.93	44.26	**378.67**	136.92
HMA 169	0.00	0.00	243.47	0.00	0.00	0.82	0.00	0.00	242.65	0.00	**242.65**	143.00
HMA 170	0.00	0.00	386.28	0.00	0.00	45.19	0.00	0.00	341.09	137.06	**204.03**	148.97
HMA 186	0.00	0.00	632.80	0.00	0.00	1.71	0.00	0.00	631.09	0.00	**631.09**	151.94
TOTAL				**0.00**	**0.00**	**63.33**						

[1]Note- soils with no site index for pine were not included in pre-project habitat totals.

[2] Potentially Suitable Acreage = pine habitat that would meet RCW foraging habitat standards with forest manangment (ie., thinning, understory control).

[3] Future Potential Acreage = pine habitat that would meet RCW foraging habitat standards with time and management (ie., pine stands <30 years old).

[4] Acreage required is defined by the RCW Recovery Standard (USFWS 2003) and *Recommendations for revision of site index criteria for RCW foraging habitat guidelines,* Dr. J.H. Carter III, pers. comm., 23 July 2004.

HMA 169, Foraging Habitat Removals

The impact area will remove 0.62 acre of future potential RCW habitat. The total post-project acreage was 242.85, all future potential habitat (Figure 10, Tables 18 and 19).

6.6.8. Impacts to HMA 170: HMA 170 was established to link CNF RCW subpopulations in order to promote genetic interchange between individual RCW clusters and to support population growth so that the CNF could meet its Recovery Goal (USFS 2002). One recruitment site is planned for establishment between 2013 and 2022; no cavity trees existed in June 2013 (Figure 10). HMA 170 contains 386.28 acres and has 7 hydric soil types (Figure 10). Four are high productivity soils, 1 is on moderately productive soil and 2 are soils with low productivity (Table 18).

Five percent of the HMA was located on low productivity soils, 22% on medium productivity soils and the remaining 73% on high productivity soils. In order to meet the RSG, the CNF should manage at least 130.20 acres for RCW foraging habitat (Figure 10, Table 18).

HMA 170, Foraging Habitat Removals

The impact area will remove 45.19 acres of future potential habitat. Sections of the impact area are greater than 200 ft. wide, making sections of habitat on the eastern side of the partition noncontiguous. This will result in the removal of 137.06 acres of future potential habitat. The total post-project acreage was 204.03, all future potential habitat (Figure 10, Tables 18 and 19).

6.6.9. Impacts to HMA 186: HMA 186 was established to link CNF RCW subpopulations in order to promote genetic interchange between individual RCW clusters and to support population growth so that the CNF could meet its Recovery Goal (USFS 2002). One recruitment site is planned for establishment between 2053 and 2072; no cavity trees existed in June 2013 (Figure 10). HMA 186 contains 632.80 acres and has 7 hydric soil types (Figure 10, Table 19). Four are high productivity soils with a site index greater than 90, 3 are moderately productive soils with site indices ranging from 58 to 75

and 1 is a low productivity soil. All of these soils can support all or one of the following: loblolly, longleaf and/or pond pine which can provide suitable habitat for RCWs in the future.

Six percent of the HMA was located on low productivity soils, 24% on medium productivity soils and the remaining 70% on high productivity soils. In order to meet the RSG, the CNF should manage at least 132.30 acres for RCW foraging habitat (Figure 10, Table 18).

HMA 186, Foraging Habitat Removals

The impact area will remove 1.71 acres of future potential RCW habitat. The total post-project acreage will be 631.09, all future potential habitat (Figure 10, Tables 17 and 19).

6.7. FIVE LEVELS OF RCW ANALYSIS

6.7.1. Cluster Level Analyses

6.7.1.a. Cavity Trees

No RCW cavity trees will be directly impacted by the Bypass and all cavity trees will be greater than 200 ft. from the proposed impact area (Figure 3, Table 2). No clusters will be "taken" by cavity tree loss.

6.7.1.b. Foraging Habitat

The impact area will remove 41.63 acres of suitable, potentially suitable and future potential RCW foraging habitat from 5 RCW cluster partitions (CNF 12-44R, 144, 58, 901 and 902) on the CNF, ranging from 10.48 to 17.95 acres per partition (Tables 20, 21 and 22). Sections of the impact area are greater than 200 ft. wide, resulting in approximately 50.94 acres of suitable, potentially suitable and future potential RCW foraging habitat becoming noncontiguous.

Guidance issued by the USFWS (2005) defines the SMS as the "take" standard. The RSG, previously considered the management standard for Recovery Populations (USFWS 2003), is now considered the "desired future condition of RCW foraging habitat" (USFWS 2005) or as the management

Table 20. Pre- and post-project foraging habitat totals for red-cockaded woodpecker (RCW) **0.25 mile radius** foraging partitions using the **Standard for Managed Stability** (SMS) guidelines (USFWS 2003) for Croatan National Forest (CNF) RCW clusters impacted by the proposed US Highway 70 Havelock Bypass (R-1015), Craven County, North Carolina.

	Pre-project Habitat						Habitat Removals						Noncontiguous Habitat[3]						Post-project Habitat						Post-Project Suitable + Potentially Suitable Acreage	Minimum Acreage Required per Partition	Meets SMS ?[4]
	Suitable		Potentially Suitable		Future Potential		Suitable		Potentially Suitable		Future Potential		Suitable		Potentially Suitable		Future Potential Habitat		Suitable		Potentially Suitable		Future Potential				
Cluster	Acreage	BA	Acreage[1]	BA	Acreage[2]	BA	Acreage	BA	Acreage	BA	Acreage	BA	Acreage	BA	Acreage	BA	Acreage	BA	Acreage	BA	Acreage	BA	Acreage	BA			
CNF 12-44R	27.63	1,388.36	60.98	4,774.32	0.00	0.00	4.57	254.60	6.62	566.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.06	1,133.76	54.36	4,208.07	0.00	0.00	**77.42**	75	Yes
CNF 144	3.76	188.00	105.83	7,765.13	7.23	160.07	0.00	0.00	1.23	61.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.76	188.00	104.60	7,703.63	7.23	160.07	**108.36**	75	Yes
CNF 58	62.40	3,120.00	35.46	2,401.92	10.18	346.51	0.00	0.00	0.15	12.50	0.03	1.05	0.00	0.00	0.00	0.00	0.00	0.00	62.40	3,120.00	35.31	2,389.42	10.15	345.46	**97.71**	75	Yes
CNF 901	37.18	1,875.93	47.42	2,565.39	6.78	211.88	2.50	120.75	7.45	360.23	1.00	31.25	9.77	468.08	2.17	129.86	0.00	0.00	24.91	1,287.10	37.80	2,075.30	5.78	180.63	**62.71**	75	**No**
CNF 902	76.67	3,987.53	11.34	1,036.50	5.77	169.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	76.67	3,987.53	11.34	1,036.50	5.77	169.35	**88.01**	75	Yes
TOTAL							**7.07**	**375.35**	**15.45**	**1,000.48**	**1.03**	**32.30**	**9.77**	**468.08**	**2.17**	**129.86**	**0.00**	**0.00**									

Table 21. Pre- and post-project foraging habitat totals for red-cockaded woodpecker (RCW) **0.50 mile radius** foraging partitions using the **Standard for Managed Stability** (SMS) guidelines (USFWS 2003) for Croatan National Forest (CNF) RCW clusters impacted by the proposed US Highway 70 Havelock Bypass (R-1015), Craven County, North Carolina.

	Pre-project Habitat						Habitat Removals						Noncontiguous Habitat[3]						Post-project Habitat						Post-Project Suitable + Potentially Suitable Acreage	Minimum Acreage Required per Partition	Meets SMS?[4]
	Suitable		Potentially Suitable		Future Potential		Suitable		Potentially Suitable		Future Potential		Suitable		Potentially Suitable		Future Potential Habitat		Suitable		Potentially Suitable		Future Potential				
Cluster	Acreage	BA	Acreage[1]	BA	Acreage[2]	BA	Acreage	BA	Acreage	BA	Acreage	BA	Acreage	BA	Acreage	BA	Acreage	BA	Acreage	BA	Acreage	BA	Acreage	BA			
CNF 12-44R	74.69	3,493.83	151.57	12,152.41	0.00	0.00	8.88	471.43	9.07	764.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	65.81	3,022.40	142.50	11,387.74	0.00	0.00	**208.31**	75.00	Yes
CNF 144	45.31	2,265.50	289.34	22,599.85	20.13	445.68	1.68	84.00	13.04	894.53	0.00	0.00	0.00	0.00	14.91	981.30	0.00	0.00	43.63	2,181.50	261.39	20,724.02	20.13	445.68	**305.02**	75.00	Yes
CNF 58	101.54	5,424.63	142.57	10,058.54	34.48	1,186.78	2.85	237.49	0.23	19.17	7.40	259.00	6.28	523.31	0.00	0.00	0.64	22.40	92.41	4,663.83	142.34	10,039.37	26.44	905.38	**234.75**	75.00	Yes
CNF 901	54.52	2,708.87	116.74	7,050.23	7.68	240.00	2.50	120.75	11.49	642.16	1.42	44.38	26.53	1,271.05	12.00	889.38	0.33	10.31	25.49	1,317.07	93.25	5,518.69	5.93	185.31	**118.74**	75.00	Yes
CNF 902	240.85	12,793.51	34.16	2,732.53	19.59	557.83	10.83	673.20	4.09	224.95	0.82	24.60	3.04	167.53	2.12	116.60	0.00	0.00	226.98	11,952.78	27.95	2,390.98	18.77	533.23	**254.93**	75.00	Yes
TOTAL							**26.74**	**1,586.87**	**37.92**	**2,545.48**	**9.64**	**327.98**	**35.85**	**1,961.89**	**14.12**	**1,005.98**	**0.97**	**32.71**									

[1] Potentially Suitable Acreage = pine habitat that would meet RCW foraging habitat standards with forest manangment (ie., thinning, understory control).

[2] Future Potential Acreage = pine habitat that would meet RCW foraging habitat standards with time (ie., pine stands <30 years old).

[3] Habitat that is no longer contiguous to the rest of the partition because it is separated by >200 feet of non-foraging habitat.

[4] Meets SMS? = when combining the acreage of suitable and potentially suitable foraging habitat, the partition meets, or has the potential to meet, the SMS guidelines according to the revised RCW Recovery Plan (USFWS 2003).

Shading indicates that a cluster does not have enough combined suitable + potentially suitable habitat post-project.

Table 22. Pre- and post-project foraging habitat totals for red-cockaded woodpecker (RCW) **0.50 mile radius** foraging partitions using the **Recovery Standard Guidelines (RSG)** (USFWS 2003) for Croatan National Forest (CNF) RCW clusters impacted by the proposed US Highway 70 Havelock Bypass (R-1015), Craven County, North Carolina.

	Pre-project Habitat						Habitat Removals						Noncontiguous Habitat[3]						Post-project Habitat						Post-Project Suitable + Potentially Suitable Acreage	Average Acreage Required per Partition	Meets RSG?[4]
	Suitable		Potentially Suitable		Future Potential		Suitable		Potentially Suitable		Future Potential		Suitable		Potentially Suitable		Future Potential Habitat		Suitable		Potentially Suitable		Future Potential				
Cluster	Acreage	BA	Acreage[1]	BA	Acreage[2]	BA	Acreage	BA	Acreage	BA	Acreage	BA	Acreage	BA	Acreage	BA	Acreage	BA	Acreage	BA	Acreage	BA	Acreage	BA			
CNF 12-44R	74.69	3,493.83	146.81	11,866.81	4.76	285.60	8.88	471.43	9.07	764.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	65.81	3,022.40	137.74	11,102.14	4.76	285.60	**203.55**	136.67	Yes
CNF 144	5.89	294.50	268.12	19,325.48	80.77	5,691.05	1.68	84.00	6.61	338.33	6.43	556.20	0.00	0.00	8.71	445.00	6.20	536.30	4.21	210.50	252.80	18,542.15	68.14	4,598.55	**257.01**	128.79	Yes
CNF 58	101.54	5,424.63	85.98	6,243.19	91.07	5,002.13	2.85	237.49	0.23	19.17	7.40	259.00	6.28	523.31	0.00	0.00	0.64	22.40	92.41	4,663.83	85.75	6,224.02	83.03	4,720.73	**178.16**	128.63	Yes
CNF 901	54.52	2,708.87	74.39	4,356.23	50.03	2,934.00	2.50	120.75	11.49	642.16	1.42	44.38	26.53	1,271.05	12.00	889.38	0.33	10.31	25.49	1,317.07	50.90	2,824.69	48.28	2,879.31	**76.39**	146.16	**No**
CNF 902	222.58	11,286.23	52.43	4,239.81	19.59	557.83	8.01	440.55	6.91	457.60	0.82	24.60	3.04	167.20	2.12	116.93	0.00	0.00	211.53	10,678.48	43.40	3,665.28	18.77	533.23	**254.93**	120.00	Yes
TOTAL							**23.92**	**1,354.22**	**34.31**	**2,221.93**	**16.07**	**884.18**	**35.85**	**1,961.56**	**22.83**	**1,451.31**	**7.17**	**569.01**									

[1] Potentially Suitable Acreage = pine habitat that would meet RCW foraging habitat standards with forest manangment (ie., thinning, understory control).

[2] Future Potential Acreage = pine habitat that would meet RCW foraging habitat standards with time (ie., pine stands <60 years old).

[3] Habitat that is no longer contiguous to the rest of the partition because it is separated by >200 feet of non-foraging habitat.

[4] Meets RSG? = when combining the acreage of suitable and potentially suitable foraging habitat, the partition meets, or has the potential to meet, the RSG according to the RCW Recovery Plan (USFWS 2003).

Shading indicates that a cluster does not have enough combined suitable + potentially suitable habitat post-project.

standard for populations on federal land or certain other properties. No CNF RCW clusters are considered "taken" by the project according to the SMS guidelines **if** both suitable and potentially suitable foraging habitat is combined (Table 21). Potentially suitable habitat was counted towards the available foraging habitat because improving this habitat can be accomplished over the short-term through pine thinning and hardwood midstory removal/suppression. Future potential habitat was not included because this habitat will take years, perhaps decades to become suitable. Clusters CNF 58 and 902 are the only clusters that meet the SMS pre- and post-project with suitable foraging habitat alone (Table 21). The other 3 clusters (CNF 12-44R, 144 and 901) need hardwood midstory clearing and/or thinning of pines <10 inches dbh to increase the amount of suitable foraging habitat within their partitions and meet SMS requirements. However, this is a USFS management issue regardless of construction of the Bypass.

Using the SMS guidelines, the impact area would remove 17.95 acres (8%) of the existing suitable and potentially suitable habitat from the foraging partition associated with CNF Cluster 12-44R, 14.72 acres (4%) of suitable and potentially suitable habitat from CNF 144, 3.08 acres (1%) of suitable and potentially suitable habitat from CNF 58, 13.99 acres (8%) of suitable and potentially suitable habitat from CNF 901 and 14.92 acres (5%) of suitable and potentially suitable habitat from CNF 902. See "Results" for a cluster specific breakdown of removals.

Because the CNF is part of the Primary Core Recovery Population, the USFS is required to manage the RCW habitat according to the RSG (USFWS 2003). Using the RSG in its strictest sense, only 4 of the 5 RCW partitions (CNF 12-44R, 144, 58 and 902) will meet the requirements pre- and post-project (Table 23). CNF 901 does not meet the RSG requirements pre- or post-project and will not meet in the future due to non-contiguous habitat.

CNF 902 is the only cluster that meets the RSG using suitable habitat only (Table 22). All other clusters need hardwood midstory clearing and/or thinning of pines <10 inches dbh to increase the amount of suitable foraging habitat over the

short-term. The partitions will gain more pine habitat of suitable age (at least 60 years old) and size (≥14 inches dbh) with time. Without management, the potentially suitable foraging habitat has little chance of becoming suitable and therefore may never be available as quality foraging habitat.

Using the Recovery Standard guidelines, the impact area would remove 17.95 acres (8%) of the existing suitable and potentially suitable habitat from the foraging partition associated with CNF Cluster 12-44R, 8.29 acres (3%) of suitable and potentially suitable habitat from CNF 144, 3.08 acres (2%) of suitable and potentially suitable habitat from CNF 58, 13.99 acres (11%) of suitable and potentially suitable habitat from CNF 901 and 14.92 acres (5%) of suitable and potentially suitable habitat from CNF 902. See "Results" for a cluster specific breakdown of removals.

Table 23. Pre- and post-foraging habitat summary of red-cockaded woodpecker clusters impacted by the Havelock Bypass project (R-1015), Craven County, North Carolina.

Cluster	Pre-Project			Post-Project		
	Meets SMS, 0.25 mile radius partition	**Meets SMS, 0.50 mile radius partition**	**Meets RSG**	**Meets SMS, 0.25 mile radius partition**	**Meets SMS, 0.50 mile radius partition**	**Meets RSG**
CNF 12-44R	Yes	Yes	Yes	Yes	Yes	Yes
CNF 144	Yes	Yes	Yes	Yes	Yes	Yes
CNF 58	Yes	Yes	Yes	Yes	Yes	Yes
CNF 901	Yes	Yes	**No**	**No**	Yes	**No**
CNF 902	Yes	Yes	Yes	Yes	Yes	Yes

Yes = meets guidelines No = does not meet guidelines

The impact area will remove 63.33 acres of future potential RCW foraging habitat from 4 HMAs (HMA 168, 169, 170 and 186) on the CNF, ranging from 0.80 to 46 acres per partition. Some impact areas of the Bypass are greater than 200 ft. wide, resulting in approximately 181.32 acres of future potential RCW foraging habitat becoming noncontiguous (Tables 18 and 19).

The locations of the clusters that will be created within the HMAs are unknown, therefore foraging partitions could not be created and analyzed according to the SMS guidelines and 'take' cannot be assessed.

6.7.2. Group Level Analysis

The Group Level Analysis evaluates density effects to clusters directly impacted by the Bypass project, but not "taken" at the cluster level. None of the clusters were considered "taken" at the cluster-level, therefore group-level analysis is not required (Ralph Costa, email dated 27 August 2006).

6.7.3. Neighborhood Analysis

Foraging habitat loss and fragmentation can have direct effects on cluster activity, group size and reproduction at the cluster level. Additionally, by affecting habitat configuration at the landscape level, projects may affect the health and distribution of RCWs at the neighborhood scale (Figure 11).

"Fragmentation" is defined by the 2003 Recovery Plan as "habitat loss that results in isolated patches of remaining habitat" (USFWS 2003). Habitat fragmentation may adversely affect dispersal of individuals to adjacent or nearby groups and lessen the likelihood that breeding vacancies are filled (USFWS 2003). Demographic viability of groups, neighborhoods and populations is primarily dependent on the ability of group members to freely disperse and find breeding opportunities. If dispersal is limited or inhibited by a project, even if adequate foraging habitat remains post-project, group status, group size and reproduction may be affected. It is important that these neighborhood effects be assessed during the analysis of project impacts (USFWS 2003).

Because there were no cluster-level or group-level takes, the Neighborhood Analysis was not required (Will McDearman, USFWS, pers. comm.).

6.7.4. Population Level Analysis

The population level analysis considers the ability of the CNF to meet its RCW population goal (137-169 pbgs) post-project and to meet the RSG in each managed foraging partition. Each of the properties that make up the NC Coastal Plain Primary

Figure 11. Location of red-cockaded woodpecker (RCW) clusters and territories on the Croatan National Forest (CNF) near the Havelock Bypass project (R-1015) in Craven and Carteret Counties, North Carolina.

Core Population (CNF, HSGL and MCBCL) should be managed for maximum population size (goal) (Figure 4) (USFWS 2003). This includes providing and managing recruitment sites (clusters) in order to promote population growth.

During breeding season 2013, the USFS monitored 114 territories on the CNF, of which 67 had pbgs, 5 were captured, 2 contained solitary males and 40 were inactive. Growth of the individual populations should lead to increased dispersal between properties. Ideally these properties should be linked by habitat "bridges" in order to facilitate dispersal. There is evidence of dispersal between 2 of the 3 properties that make up the NC Coastal Plain Primary Core Population. In 2005, 4 RCWs from Camp Lejeune, 2 males and 2 females, were identified on the CNF (USFS dispersal data, unpub.) and between 1993 and 2005, 6 RCWs from the CNF were identified on Camp Lejeune (J.R. Walters, pers. comm.). Growth of the Camp Lejeune and CNF populations could further link these 2 populations and help promote recovery of this Primary Core Population. Since Camp Lejeune is located southwest of the CNF and the Bypass is on the eastern side of the CNF, it is unlikely that dispersal between these populations would be disrupted by the Bypass.

CNF Clusters 12-44R, 144, 58, 901 and 902 and 5 HMAs (132, 168, 169, 170 and 186) make up Subpopulation 3 (10 out of 172 RCW territories, 3,644 acres of 52,981 total acres or 6.9% of the total RCW habitat). Nine of the 10 territories that make up Subpopulation 3 will be directly impacted by the Havelock Bypass. Of the 10 territories, 5 have cavity trees in various stages of suitability. CNF 901 was the only active cluster during breeding season 2013. The Bypass will remove a total of 153.78 forested acres on the CNF, of which 112.15 acres are located outside of partitions and territories. The CNF is approximately 161,273.41 acres in size (including non-forested habitat).

Analysis of CNF RCW dispersal data conducted by JCA demonstrated the value of RCW groups in Subpopulation 3 to the overall genetic connectivity of the CNF and the use of the Subpopulation 3 area as a dispersal corridor. Increasing the number of RCW groups within this area will strengthen the links to other subpopulations on the CNF and increase the number of pbgs therein. Direct habitat removal resulting from the Bypass should not have an adverse impact on the RCW recruitment potential for the proposed future HMAs in the project area, which will have enough forested habitat to support

RCW recruitment clusters post-project. In addition, approximately 90% of the habitat set aside for the future HMAs south of the impacted clusters (Figure 11) would lie to the west of the Bypass and would remain contiguous to the rest of the CNF. Thus the USFS should be able to provide the necessary recruitment clusters to promote RCW growth and linkage between the RCW subpopulations on the CNF after the Bypass is constructed.

Conservation biologists define fragmentation as "the process whereby a large, continuous area of habitat is both reduced in area and divided into two or more fragments" (Wilcove et al. 1986; Schonewald-Cox and Buechner 1992; Reed et al. 1996). The term "fragmented habitat" is used rather broadly to include any breaks in habitat, regardless of size, in an otherwise contiguous stretch of forested habitat. Subpopulation 3 is isolated or fragmented from the other CNF subpopulations due to private property inholdings, unsuitable habitat and development. Fragmented habitat is not to be confused with "noncontiguous habitat" which refers only to breaks in RCW foraging habitat >200 ft. wide (USFWS 2003). Habitat gaps less than 200 ft. wide do not affect RCW dispersal (see discussion below). Unpublished USFS dispersal data shows that RCWs from the affected CNF clusters dispersed an average of 8.42 mi. to other active RCW clusters on the CNF in order to find breeding vacancies. RCW dispersal hinges directly on the quality, amount and distribution of habitat on the landscape. Thus large tracts of contiguous suitable habitat contribute to increases in the number of groups, group size and in the number of juveniles available to disperse. Territory isolation by fragmented habitat and/or reduction of group density decreases the likelihood of clusters being inhabited by potential breeding groups because dispersing females often fail to locate solitary males or find the territories substandard. This problem is a function of the number and spatial arrangement of active clusters. Home range follows and radio telemetry work conducted via Virginia Tech have indicated that female RCWs of any age are reluctant to cross openings between 492 and 2,132 ft., and will not cross openings of >2,132 ft. (Walters et. al. 2011). Male RCWs are not as affected by forest gaps (J.R. Walters, pers. comm.). The clearing for the Bypass itself is not expected to impede dispersal of RCWs from their natal territories. This conclusion is further supported by the fact that both the habitat corridor and Bypass corridor run on a north-south axis. Thus, dispersing RCWs could move north and south without having to cross the highway.

In addition, the highway corridor is too narrow to constitute a dispersal barrier. However, existing private lands inholdings do constitute a significant barrier for RCW dispersal. These habitat "gaps" range from ~2170 ft. to ~3350 ft. Most of these lands are used for silviculture and stands are harvested on a 30 year (or shorter) rotation and therefore provide no to limited RCW foraging or dispersal habitat (depending on stand age). This situation is an existing condition and is not a result of the Bypass project.

All project affected foraging partitions and HMAs have the necessary pine acreage to meet the RSG with the exception of CNF Cluster 901 (breeding group in 2013). This partition did not meet the RSG pre-project and post- project. Project removals totaled 13.99 acres of suitable and potentially suitable habitat, thus making an existing habitat deficiency worse. However, the Bypass project did not cause the pre-project habitat deficiency and if CNF 901 is ultimately not counted towards the CNF's population goal it would be because of the pre-existing lack of habitat capable of meeting the RSG.

6.7.5. Recovery Unit Level Analysis

The CNF is part of the Mid-Atlantic Coastal Plain Recovery Unit. This Recovery Unit includes the Coastal NC and Francis Marion National Forest Primary Core Populations, which are 2 of the 13 designated Primary Core Populations listed in the Recovery Plan (USFWS 2003). It also includes 1 Essential Support Population (Northeast NC/Southeast Virginia).

The CNF subpopulations do not affect the MCBCL subpopulation or the HSGL subpopulation west of MCBCL.

The Recovery Unit Level Analysis will be conducted by the USFWS during their review of the Biological Assessment.

7. DISCUSSION

7.1. NCDOT AND USFS ROAD CLOSURE AGREEMENT

The USFS sent comments to NCDOT, dated 20 July 2010, on the preliminary DEIS (NCDOT 2010). USFS stated that the proposed project will reduce the likelihood of successfully using prescribed burning as a management tool east of the preferred alternative due to smoke

management issues along the proposed highway (USFS 2010). In order to minimize fragmentation and impacts to the CNF prescribed fire program, NCDOT agreed to close the Bypass to facilitate prescribed burning in a joint agency meeting on 17 March 2011. Baseline conditions notwithstanding, if the NCDOT road closure enables the USFS to conduct prescribed burning necessary to restore and maintain suitable RCW habitat east of the Bypass, the potential for adverse effects will be reduced. Habitat quality is directly related to habitat management.

7.2. CWMB

NCDOT purchased a 4,035-acre tract of land approximately 3.6 mi. northwest of Havelock in Craven County for the purpose of developing a mitigation bank for wetland impacts and mitigating CNF lands affected by the project. The CWMB will eventually be transferred to the USFS to become part of the CNF and managed per the USFS CNF Land and Resources Management Plan (USFS 2002). Uplands and some adjacent wetland communities on the CWMB have the potential to support groups of RCWs (NCDOT 2012). Establishment of RCW clusters on the CWMB would support dispersal between, and connectivity of, RCW subpopulations on the CNF, thereby enhancing the CNF's ability to reach its RCW population goal. A report written by JCA to NCDOT stated that with proper management all pine stands on the CWMB could provide suitable foraging habitat with pockets of suitable nesting habitat and the potential for 4 RCW recruitment clusters (NCDOT 2012).

7.3. INDIRECT EFFECTS AND CUMULATIVE IMPACTS

Indirect effects as defined by the *Endangered Species Consultation Handbook* (USFWS 1998) are "effects that are caused by or will result from the proposed action and are later in time, but are still reasonably certain to occur." Indirect effects may result from traffic noise and development of some private properties along the highway corridor (such as at the Lake Rd. interchange). Such impacts could individually or collectively impact RCW dispersal to or from the area and inhibit unification of the CNF RCW population.

Based on RCW research conducted on the Fort Stewart Military Installation, woodpeckers did not flush from cavity trees when vehicles were greater than 164 ft. from nests (Delaney et al. 2009). The closest RCW cluster to the Havelock Bypass project is CNF 901 and

the nearest cavity tree is approximately 400 ft. away. Based on limited research and observations over the years, traffic noise is not likely to have an adverse effect.

Another possible indirect effect to RCWs as a result of the Bypass is mortality of RCWs attempting to cross the highway, particularly female RCWs because they are prone to foraging low on tree trunks which can result in them flying low across highways. RCWs have been found dead on roads in the NC Sandhills several times over the last 30 years and considering that most of these carcasses were located accidentally, highway related mortality for RCWs is undoubtedly underestimated (Sandhills Ecological Institute, unpublished data). Construction of the Bypass may present the possibility of an indirect effect from highway mortality based on the creation of a road where there was not a road before. However, such incidents cannot be predicted with certainty as to time and number.

Overall, these indirect effects are considered to be insignificant.

Cumulative impacts as defined by the *Endangered Species Consultation Handbook* (USFWS 1998) are "those effects of future State or private activities, not involving federal activities that are reasonably certain to occur within the action area of the federal action subject to consultation. Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time" (40 CFR 1508.7) (CFR 2011a). The Endangered Species Act defines cumulative impacts as "the effects of future State or private activities not involving federal activities that are reasonably certain to occur within the action area of an action subject to consultation" [50 CFR 402.02] (CFR 2011b). These actions may include development of private property in the vicinity of the Bypass and at the Lake Rd. interchange, construction of other roads and timber harvesting on private lands in the area. Together with existing fragmented habitat issues on private lands in the project area, such impacts could further hamper RCW dispersal to or from the area and inhibit unification of the CNF RCW population.

The land available for development is mainly located north and south of Havelock's city limits. In addition there are scattered areas of potential development throughout the City of Havelock and between the impact area and the existing US Hwy. 70 (NCDOT 2013). The southern terminus of the Bypass, approximately 2,500 ft. southeast of the City of Havelock boundary, could be developed. However, this area is shown as Least Suitable for development in the City of Havelock 2030 Comprehensive Plan (NCDOT 2011, Urban Resource Group 2009).

It is zoned as Highway Commercial and development would be dependent upon extensive new water and sewer infrastructure and portions of the CNF being acquired by a private developer.

A Bypass interchange is proposed between CNF Clusters 901 and 902 along SR 1756 (Lake Rd.) and measures approximately 1,365 ft. wide at its widest point (Figure 3). Habitat between CNF 901 and 902 is currently considered unsuitable for foraging habitat, but this does not mean the groups associated with these clusters are demographically isolated (Figure 3). CNF 901 had a solitary male in 2009 and a breeding pair of adults between 2010 and 2013. CNF 902 had a solitary male in 2006, 2010 and 2011. Private lands may provide dispersal habitat corridors between these clusters. Weyerhaeuser currently owns a pine plantation between CNF 901 and 902 that may provide a dispersal corridor. If the Bypass is constructed, land use is expected to transition to higher density residential and highway commercial uses northeast of the interchange as water and sewer service is extended as planned (NCDOT 2011). The area to the southwest of the interchange will remain primarily agricultural (NCDOT 2011).

The northern terminus of the Bypass is located north of Tucker Creek. If the proposed project is constructed, exposure will increase for properties in this area and a new land use node will be created (NCDOT 2011). As a result, land use would be expected to transition to higher density residential and highway commercial, particularly if sewer service is extended as planned north of Tucker Creek.

8. SUMMARY OF IMPACTS

No RCW cavity trees will be "taken" by the Havelock Bypass project and the design will not come within 200 ft. of any known RCW cavity trees.

The Bypass will remove 104.96 acres of RCW foraging habitat associated with 1 active RCW cluster (CNF 901), 4 inactive clusters (CNF 12-44R, 144, 58 and 902) and 4 HMAs (168, 169, 170 and 186), plus an additional 112.15 acres of forested habitat located on the CNF outside of the foraging partitions and HMAs.

Post-project, using both suitable and potentially suitable foraging habitat, all 5 impacted RCW clusters would have enough foraging habitat to meet the SMS guidelines. CNF Cluster 901 does not have enough acres of suitable and potentially suitable habitat to meet the RSG on CNF property pre- or post-project. All other impacted clusters meet the RSG when suitable and potentially suitable habitat on the CNF is combined.

Biological Conclusion **May Effect, Not Likely to AdverselyAffect**

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PHOTO APPENDIX

Havelock Bypass (R-1015)

January and May 2013

Photos by:
Alicia Jackson and Jeanette M. Sabo
Dr. J.H. Carter III & Associates, Inc.

Photo 1. Wet Pine Flatwoods within the foraing habitat partition for red-cockaded woodpecker CNF Cluster 12-44R, Craven County, North Carolina.

Photo 2. Mesic Pine Savanna within the cluster core for red-cockaded woodpecker CNF Cluster 58, Craven County, North Carolina.

Photo 3. Pond Pine Woodland within the foraging habitat partition for red-cockaded woodpecker CNF Cluster 144, Craven County, North Carolina.

Photo 4. Wet Pine Flatwoods within the cluster core for red-cockaded woodpecker CNF Cluster 901, Craven County, North Carolina.

Photo 5. Mesic Pine Savanna within the foraging habitat partition for red-cockaded woodpecker CNF Cluster 902, Craven County, North Carolina.

Dr. J.H. CARTER III & ASSOCIATES, Inc.
Environmental Consultants
515 Midland Road, Suite F.
Southern Pines, N.C. 28387
910-695-1043 / 910-695-3317 (fax)

12 August 2014

Gary Kauffman
160 Zillicoa Street, Suite A
Asheville, NC 28801

Subject: US Highway 70 Havelock Bypass project, Craven County, North Carolina (TIP No. R-1015)

Dear Mr. Kauffman:

The US Forest Service (USFS) requested that the NC Department of Transportation write a red-cockaded woodpecker (*Picoides borealis*) (RCW) territory analysis report for the US Highway 70 Havelock Bypass project (TIP R-1015) using USFS habitat and cluster status data. Dr. J.H. Carter III & Associates, Inc. (JCA) wrote the analysis report for the NCDOT based on Croatan National Forest habitat stand data and 2014 breeding season data provided by the USFS in July 2014. JCA made minor mathematical corrections and grammar clarifications to tables provided by the USFS and used historical cluster activity data collected by JCA to supplement information provided by the USFS. Please provide any comments to NCDOT.

Sincerely,

Jeanette M. Sabo
Wildlife Biologist
Dr. J.H. Carter III & Associates, Inc.

CROATAN NATIONAL FOREST
RED-COCKADED WOODPECKER TERRITORY ANALYSIS
US HIGHWAY 70 HAVELOCK BYPASS
CRAVEN COUNTY, NORTH CAROLINA

NCDOT TIP NUMBER R-1015

CROATAN RANGER DISTRICT
CROATAN NATIONAL FOREST
NATIONAL FORESTS IN NORTH CAROLINA

20 August 2014

LIST OF PREPARERS

This red-cockaded woodpecker analysis has been prepared by Dr. J.H. Carter III & Associates, Inc. with contractual assistance from NCDOT, for the USFS. The following individuals were primarily responsible for preparing and reviewing the analysis or for providing senior-level guidance and quality control during the development of this document.

Contributor	Title	Role
Dr. J.H. Carter III & Associates, Inc.		
Jeanette M. Sabo	Wildlife Biologist	Document Production
Dr. J.H. Carter III	Senior Ecologist	Technical Editing, Quality Control
NCDOT		
Rachelle Beauregard	Central Regional Manager	Technical Editing, Quality Control

CROATAN NATIONAL FOREST
RED-COCKADED WOODPECKER TERRITORY ANALYSIS
US HIGHWAY 70 HAVELOCK BYPASS
CRAVEN COUNTY, NORTH CAROLINA

Proposed Action

The Croatan National Forest (CNF) is located in the east-central Coastal Plain of North Carolina (NC) and is approximately 160,000 acres in size. The United States (US) Highway (Hwy.) 70 Havelock Bypass project consists of a 10-mile (mi.) median-divided facility with full control of access (access only at interchanges) around the western side of the City of Havelock and Marine Corp Air Station Cherry Point (MCAS) in Craven County, NC (Figure 1). The project begins on existing US Hwy. 70 just south of the Carteret/Craven County line. The proposed facility will divert to the west of the existing US Hwy. 70 alignment just north of the county line and extend northwards on new location. A new interchange with Lake Road (Rd.) (State Route (SR) 1756) will be constructed approximately 1.6 mi. west of existing US Hwy. 70 and the proposed Bypass will continue north on new location west of US Hwy. 70. There will be 3 grade separations across railroads and one grade separation over Sunset Rd. The proposed Bypass will eventually rejoin US Hwy. 70 approximately 1.7 mi. north of the Slocum Rd. intersection. Project construction is scheduled to begin in April 2017.

Much of the project area consists of pine-forested uplands and current or former forested wetlands that historically supported fire dependent longleaf (*Pinus palustris*) and pond pine (*P. serotina*) communities. Much of the habitat within the project area had been altered in the past by fire exclusion, logging and/or ditching.

Species Considered and Evaluated

The federally-endangered red-cockaded woodpecker (*Picoides borealis*) (RCW) occurs on the CNF and was evaluated in the following report.

Figure 1. Location of red-cockaded woodpecker (RCW) cavity trees and territories on the Croatan National Forest (CNF) impacted by the Havelock Bypass project (R-1015) in Craven and Carteret Counties, North Carolina.

Methodology

RCW distribution and cluster status data in the project corridor on the CNF were provided by the USFS. Vegetation classifications were based on either Field Sampled Vegetation (FSVeg) or Potential Natural Vegetation (PNV) provided by the USFS. FSVeg stores data about trees, fuels, down woody material, surface cover and understory vegetation. It is current as of June 2014 (G. Kauffman, USFS, pers. comm.). PNV on the CNF is defined as broad classes of vegetation derived from Frost's "Pre-settlement Vegetation and Natural Fire Regimes of the Croatan National Forest" (1996).

Tables 1-8, provided by the USFS, show pre-project habitat totals, project removals and post-project habitat totals using FSVeg for CNF RCW territories impacted by the Havelock Bypass. Project removals also included PNV modeling (USFS unpublished data). Only pine-dominated stands (habitats) were classified as RCW habitat. Dr. J.H. Carter III & Associates, Inc. (JCA) made minor mathematical corrections and grammar clarification to the USFS tables.

Discussion of Potential Effects

The RCW is endemic to mature, fire-maintained pine forests in the southeastern US, where it was historically common. Prime nesting habitat for RCWs includes open, mature southern pine forests dominated by longleaf, loblolly (*Pinus taeda*), pond, slash (*P. elliotti*) or other southern pine species greater than 60 years of age with little or no mid- or understory development. Pine flatwoods and pine-dominated savannas, which have been maintained by frequent fires, serve as ideal nesting and foraging habitat for RCWs. Potential foraging habitat is defined as open pine or pine/hardwood stands 30 years of age or older (USFWS 2003).

There are 7 RCW territories impacted by the Havelock Bypass project (CNF 58, 144, 901, 902, 168, 169 and 170). CNF territory 901 is active, CNF 58, 144 and 902 are inactive and CNF 168, 169 and 170 are future recruitment sites for RCW clusters (USFS unpublished data). USFS decided that there was no need to analyze CNF territory 186 (G. Kauffman, USFS, pers. comm.).

CNF Territory 58

CNF 58 is located within the Southwest Prong Flatwoods Natural Area designated by the NC Natural Heritage Program (NCNHP). This area was not designated by the USFS as a Special Interest Area in the 2002 CNF Management Plan (USFS 2002). This cluster was active between 1992 and 2007, was inactive in 2008 and 2009 and was found to be active in the fall of 2010 by JCA biologists. It has been inactive since 2011 (JCA 2013). There was no nesting activity during breeding season 2014 (Steven Maharrey, USFS, pers. comm.). In 2014, there were 19 trees with cavities in various stages of completion and suitability (USFS unpublished data) (Figure 1). No RCW cavity trees will be directly impacted by the Bypass and all cavity trees will be greater than 800 feet (ft.) from the proposed impact area.

The CNF 58 territory is approximately 452 acres: 291 acres of longleaf pine, 58 acres of loblolly pine, 70 acres of hardwood-pine, 24 acres of hardwood and 9 acres unknown (USFS unpublished data) (Table 1). Approximately 258 acres are longleaf pine > 60 years old and 146 acres have an open pine understory. Approximately 58 acres are loblolly pine between 30 and 60 years old.

Approximately 23 acres will be removed by the Bypass (Table 1) (NCDOT unpublished data). Approximately 22.5 acres are longleaf pine > 60 years old and 0.5 acre is hardwood-pine. Approximately 8 acres have an open longleaf pine understory. According to the PNV classification system, of the 23 acres to be removed, approximately 21 acres are future potential longleaf pine, 0.5 acre is mixed pine and 1.5 acres are pond pine (Table 1).

Post-project, the CNF 58 territory will contain approximately 429 acres with 268.5 acres of longleaf pine, 58 acres of loblolly pine, 69.5 acres of hardwood-pine, 24 acres of hardwood and 9 acres unknown (USFS unpublished data) (Table 1). Approximately 235.5 acres will be longleaf pine > 60 years old, of which, 138 acres will have an open pine understory. Approximately 58 acres will be 30-60 year old loblolly pine.

Table 1. Pre-project, project-removal and post-project foraging habitat totals for red-cockaded woodpecker Croatan National Forest (CNF) Territory 58 using US Forest Service data, US Highway 70 Bypass project (R-1015), Craven County, NC. Included is Potential Natural Vegetation (Gary Kauffman, USFS, pers. comm.) removed by the project.

CNF 58	Acres	Longleaf	Loblolly	Pond Pine	Hardwood - Pine	Hardwood	Unknown
Pre-Project Totals							
Total Acres	452	291	58	0	70	24	9
>60 yrs old (pine only)	258	258	0	0	70	24	?
Open pine understory	146	146	0	0	5	/	/
30-60 years old (pine only)	58	0	58	0	0	/	/
Open understory	0	0	0	0	0	/	/
Project Removals							
Total Acres	23	22.5	0	**0**	0.5	0	0
>60 yr old types	22.5	22.5	0	0	.5	0	?
Open pine understory	8	8	0	0	0	0	/
30-60 years old (pine only)	0	0	0	0	0	0	/
Potential Natural Vegetation Removed by Road – 23 acres							
	Total	**Longleaf pine**	**Mixed pine**	**Pond pine**	**Pocosin**	**Cypress**	
PNV	23	21	.5	1.5	0	0	
Post-Project Totals							
Total Acres	429	268.5	58	0	69.5	24	9
>60 yrs old (pine only)	235.5	235.5	0	0	69.5	24	?
Open pine understory	138	138	0	0	5	/	/
30-60 years old (pine only)	58	0	58	0	0	/	/
Open understory	0	0	0	0	0	/	/

Non-RCW habitat

CNF TERRITORY 144

CNF 144 was created in 2002 in accordance with the 2002 CNF Management Plan (USFS 2002). This cluster has 4 provisioned cavity trees, but has never been active (JCA 2013) (Figure 1). The cavity trees are more than 1,000 ft. from the impact area and no cavity trees will be removed by the project. It was not visited by the USFS during the 2014 breeding season (S. Maharrey, pers. comm.).

The CNF 144 territory is approximately 352 acres: 69 acres of longleaf pine, 194 acres of loblolly pine, 3 acres of pond pine and 86 acres of hardwood (USFS unpublished data) (Table 2). Approximately 239 acres support pine stands > 60 years old: 69 acres of longleaf pine, 167 acres of loblolly pine and 3 acres of pond pine. Stands on approximately 67 acres have an open pine understory: 50 acres of longleaf pine and 17 acres of loblolly pine.

Approximately 8.5 acres of pine stands > 60 years old will be removed by the Bypass: 4 acres of longleaf pine and 4.5 acres of loblolly pine (Table 2) (USFS unpublished data). According to the PNV classification system, of the 8.5 acres to be removed, approximately 3 acres are future potential longleaf pine, 3.5 acres are loblolly pine and 2 acres are pond pine (Table 2).

Post-project, the CNF 144 territory will contain approximately 343.5 acres: 65 acres of longleaf pine, 189.5 acres of loblolly pine, 3 acres of pond pine and 86 acres of hardwood (USFS unpublished data) (Table 2). Approximately 230.5 acres will be pine > 60 years old, of which 65 acres will be longleaf pine, 162.5 acres will be loblolly pine and 3 acres will be pond pine. Approximately 67 acres will have an open pine understory: 50 acres of longleaf pine and 17 acres of loblolly pine.

Table 2. Pre-project, project-removal and post-project foraging habitat totals for red-cockaded woodpecker Croatan National Forest (CNF) Territory 144 using US Forest Service data, US Highway 70 Bypass project (R-1015), Craven County, NC. Included is Potential Natural Vegetation (Gary Kauffman, USFS, pers. comm.) removed by the project.

CNF 144	Acres	Longleaf	Loblolly	Pond Pine	Hardwood - Pine	Hardwood
Pre-Project Totals						
Total Acres	352	69	194	3	0	86
> 60 yrs old (pine only)	239	69	167	3	0	?
Open pine understory	67	50	17	0	0	/
30-60 years old	0	0	0	0	0	/
Project Removals						
Total Acres	8.5	4	4.5	0	0	0
>60 yrs old (pine only)	8.5	4	4.5	0	0	0
Open pine understory	0	0	0	0	0	0
30-60 years old (pine only)	0	0	0	0	0	0
Potential Natural Vegetation Removed by Road – 8.5 acres						
	Total	**Longleaf pine**	**Mixed pine**	**Pond pine**	**Pocosin**	**Cypress**
PNV	8.5	3	3.5	2	0	0
Post-Project Totals						
Total Acres	343.5	65	189.5	3	0	86
>60 yrs old (pine only)	230.5	65	162.5	3	0	?
Open pine understory	67	50	17	0	0	/
30-60 years old (pine only)	0	0	0	0	0	/

Non-RCW habitat

CNF TERRITORY 901

CNF 901 was originally created in 1992 and refurbished with new provisioned cavities in the fall of 2002. In 2014, there were 9 trees with cavities in various stages of completion and suitability (USFS unpublished data) (Figure 1). Prior to 2005, the cluster contained no active cavity trees and had never been active, however, it has been periodically active since then (JCA 2013). No cavity trees will be removed by the Bypass, but the project's impact area will come within approximately 400 ft. of the southern-most cavity trees (#s 1081, 1082 and 1083). The USFS banded 2 RCW nestlings during the 2014 breeding season (S. Maharrey, pers. comm.).

The CNF 901 territory is approximately 186 acres: 59 acres of longleaf pine, 70 acres of loblolly pine and 57 acres of hardwood (USFS unpublished data) (Table 3). Approximately 84 acres support pine stands > 60 years old and have an open pine understory: 59 acres of longleaf pine and 25 acres of loblolly pine.

Approximately 10 acres will be removed by the Bypass: 6.5 acres of longleaf pine stands > 60 years old with an open pine understory and 3.5 acres of hardwood (USFS unpublished data) (Table 3). According to the PNV classification system, approximately 10 acres of future potential longleaf pine will be removed (Table 3).

Post-project, the CNF 901 territory will contain approximately 176 acres: 52.5 acres of longleaf pine, 70 acres of loblolly pine and 53.5 acres of hardwoods (USFS unpublished data) (Table 3). Approximately 77.5 acres will be pine > 60 years old with an open pine understory: 52.5 acres of longleaf pine and 25 acres of loblolly pine.

Table 3. Pre-project, project-removal and post-project foraging habitat totals for red-cockaded woodpecker Croatan National Forest (CNF) Territory 901 using US Forest Service data, US Highway 70 Bypass project (R-1015), Craven County, NC. Included is Potential Natural Vegetation (Gary Kauffman, USFS, pers. comm.) removed by the project.

CNF 901	Acres	Longleaf	Loblolly	Pond Pine	Hardwood - Pine	Hardwood
Pre-Project Totals						
Total Acres	186	59	70	0	0	57
>60 yrs old (pine only)	84	59	25	0	0	57
Open pine understory	84	59	25	0	0	/
30-60 years old (pine only)	0	0	0	0	0	/
Project Removals						
Total Acres	10	6.5	0	0	0	3.5
>60 yrs old (pine only)	6.5	6.5	0	0	0	3.5
Open pine understory	6.5	6.5	0	0	0	0
30-60 years old (pine only)	0	0	0	0	0	0
Potential Natural Vegetation Removed by Road – 10 acres						
	Total	**Longleaf pine**	**Mixed pine**	**Pond pine**	**Pocosin**	**Cypress**
PNV	10	10	0	0	0	0
Post-Project Totals						
Total Acres	176	52.5	70	0	0	53.5
>60 yrs old (pine only)	77.5	52.5	25	0	0	53.5
Open pine understory	77.5	52.5	25	0	0	/
30-60 years old (pine only)	0	0	0	0	0	/

Non-RCW habitat

CNF TERRITORY 902

CNF 902 was originally created in 1992 and refurbished with new cavities in the fall of 2002. The cluster was occupied by a solitary male in 1997, then became inactive until May 2006 when it was reactivated by another solitary male (JCA 2013). It was documented as active in the fall of 2010 and 2011 and inactive in 2012 and 2013 (JCA 2013). There was no nesting activity during the 2014 breeding season (Steven Maharrey, USFS, pers. comm.). In 2014, there were 10 trees with cavities in various stages of completion and suitability (USFS unpublished data) (Figure 1). No cavity trees will be removed as a result of the Bypass and all cavity trees will be at least 1,000 ft. or more from the impact area.

The CNF 902 territory is approximately 336 acres: 226 acres of longleaf pine, 30 acres of loblolly pine and 80 acres of hardwood-pine (USFS unpublished data) (Table 4). Approximately 248 acres support pine stands > 60 years old: 218 acres of longleaf pine and 30 acres of loblolly pine. Stands on approximately 215 acres have an open pine understory: 190 acres of longleaf pine and 25 acres of loblolly pine. Approximately 8 acres are longleaf pine between 30 and 60 years old, of which 6 acres contain an open pine understory.

Approximately 5.5 acres of longleaf pine > 60 years old with an open pine understory will be removed by the Bypass (USFS unpublished data) (Table 4). According to the PNV classification system, approximately 5.5 acres of future potential longleaf pine will be removed.

Post-project, the CNF 902 territory will contain approximately 330.5 acres: 220.5 acres of longleaf pine, 30 acres of loblolly pine and 80 acres of hardwood-pine (USFS unpublished data) (Table 4). Approximately 250.5 acres will be pine >60 years old: 220.5 acres of longleaf pine and 30 acres of loblolly pine. Approximately 209.5 acres will have an open pine understory: 184.5 acres of longleaf pine and 25 acres of loblolly pine. Approximately 8 acres will be longleaf pine between 30 and 60 years old, of which 6 acres will have an open pine understory.

Table 4. Pre-project, project-removal and post-project foraging habitat totals for red-cockaded woodpecker Croatan National Forest (CNF) Territory 902 using US Forest Service data, US Highway 70 Bypass project (R-1015), Craven County, NC. Included is Potential Natural Vegetation (Gary Kauffman, USFS, pers. comm.) removed by the project.

CNF 902	Acres	Longleaf	Loblolly	Pond Pine	Hardwood - Pine	Hardwood
Pre-Project Totals						
Total Acres	336	226	30	0	80	0
>60 yrs old (pine only)	248	218	30	0	80	0
Open pine understory	215	190	25	0	8	0
30-60 years old (pine only)	8	8	0	0	0	0
30-60 year old open pine understory	6	6	0	0	0	0
Project Removals						
Total Acres	5.5	5.5	0	0	0	0
>60 yrs old (pine only)	5.5	5.5	0	0	0	0
Open pine understory	5.5	5.5	0	0	0	0
30-60 years old (pine only)	0	0	0	0	0	0
Potential Natural Vegetation Removed by Road – 5.5 acres						
	Total	**Longleaf pine**	**Mixed pine**	**Pond pine**	**Pocosin**	**Cypress**
PNV	5.5	5.5	0	0	0	0
Post-Project Totals						
Total Acres	330.5	220.5	30	0	80	0
>60 yrs old (pine only)	250.5	220.5	30	0	80	0
Open pine understory	209.5	184.5	25	0	8	0
30-60 years old (pine only)	8	8	0	0	0	0
30-60 year old open pine understory	6	6	0	0	0	0

Non-RCW habitat

CNF TERRITORY 168

According to the 2002 Plan, HMA 168 will be established to link RCW subpopulations in order to promote genetic interchange between individual RCW groups and to support population growth so that the CNF can meet its Recovery Goal (USFS 2002). One recruitment site was planned for establishment between 2007 and 2009. No cavity trees existed in the site in 2014 (USFS unpublished data) (Figure 1).

The CNF 168 territory is approximately 467 acres: 125 acres of longleaf pine, 23 acres of loblolly pine, 96 acres of pond pine, 211 acres of hardwood-pine and 12 acres of hardwood (USFS unpublished data) (Table 5). Approximately 221 acres support pine stands > 60 years old: 125 acres of longleaf pine and 96 acres of pond pine. Approximately 60 acres have an open longleaf pine understory.

Approximately 27 acres will be removed by the Bypass: 14 acres of longleaf pine, 8.5 acres of pond pine and 4.5 acres of hardwood-pine (NCDOT unpublished data) (Table 5). Approximately 22.5 acres of pine > 60 years old will be removed: 14 acres of longleaf pine and 8.5 acres of pond pine (USFS unpublished data) (Table 5). Approximately 12 acres to be removed contain an open, longleaf pine understory. According to the PNV classification system, approximately 24.5 acres of future potential longleaf pine and 2.5 acres of pond pine will be removed by the Bypass (Table 5).

Post-project, the CNF 168 territory will contain approximately 440 acres: 111 acres of longleaf pine, 23 acres of loblolly pine, 87.5 acres of pond pine, 206.5 acres of hardwood-pine and 12 acres of hardwood (USFS unpublished data) (Table 5). Approximately 198.5 acres will support pine stands > 60 years old: 111 acres of longleaf pine and 87.5 acres of pond pine. Stands on approximately 48 acres will have an open longleaf pine understory.

Table 5. Pre-project, project-removal and post-project foraging habitat totals for red-cockaded woodpecker Croatan National Forest (CNF) Territory 168 using US Forest Service data, US Highway 70 Bypass project (R-1015), Craven County, NC. Included is Potential Natural Vegetation (Gary Kauffman, USFS, pers. comm.) removed by the project.

CNF 168	Total Acres	Longleaf	Loblolly	Pond Pine	Hardwood - Pine	Hardwood
Pre-Project Totals						
Total Acres	467	125	23	96	211	12
>60 yrs old (pine only)	221	125	0	96	211	12
Open pine understory	60	60	0	0	10	/
30-60 years old (pine only)	0	0	0	0	0	/
Project Removals						
Total Acres	27	14	0	8.5	4.5	0
>60 yrs old (pine only)	22.5	14	0	8.5	4.5	0
Open pine understory	12	12	0	0	0	0
30-60 years old (pine only)	0	0	0	0	0	0
Potential Natural Vegetation Removed by Road – 27 acres						
	Total	**Longleaf pine**	**Mixed pine**	**Pond pine**	**Pocosin**	**Cypress**
PNV	27	24.5	0	2.5	0	0
Post-Project Totals						
Total Acres	440	111	23	87.5	206.5	12
>60 yrs old (pine only)	198.5	111	0	87.5	206.5	12
Open pine understory	48	48	0	0	10	/
30-60 years old (pine only)	0	0	0	0	0	/

Non-RCW habitat

CNF TERRITORY 169

CNF 169 will be established to link RCW subpopulations in order to promote genetic interchange between individual RCW groups and to support population growth so that the CNF can meet its Recovery Goal (USFS 2002) (Figure 1). One recruitment site is planned for establishment between 2053 and 2072. No cavity trees existed in the site in 2014 (USFS unpublished data).

The CNF 169 territory is approximately 243 acres: 27 acres of loblolly pine, 188 acres of pond pine and 28 acres of hardwood-pine (USFS unpublished data) (Table 6). Approximately 188 acres are pond pine > 60 years old.

Approximately 1 acre of hardwood-pine will be removed by the Bypass (USFS unpublished data) (Table 6). According to the PNV classification system, approximately 1 acre of future potential pond pine will be removed by the Bypass (Table 6).

Post-project, the CNF 169 territory will be approximately 242 acres: 27 acres of loblolly pine, 188 acres of pond pine and 27 acres of hardwood-pine (USFS unpublished data) (Table 6). Approximately 188 acres will be pond pine > 60 years old.

CNF TERRITORY 170

CNF 170 will be established to link RCW subpopulations in order to promote genetic interchange between individual RCW groups and to support population growth so that the CNF can meet its Recovery Goal (USFS 2002) (Figure 1). One recruitment site is planned for establishment between 2053 and 2072. No cavity trees existed in the site in 2014 (USFS unpublished data).

The CNF 170 territory is approximately 386 acres, with 75 acres of longleaf pine, 125 acres of loblolly pine, 47 acres of pond pine, 41 acres of hardwood-pine, 88 acres of hardwood, 7 acres of unknown habitat and 3 acres of special use impact (USFS unpublished data) (Table 7). Approximately 220 acres support pine stands > 60 years old, of which 62 acres are longleaf pine,

Table 6. Pre-project, project-removal and post-project foraging habitat totals for red-cockaded woodpecker Croatan National Forest (CNF) Territory 169 using US Forest Service data, US Highway 70 Bypass project (R-1015), Craven County, NC. Included is Potential Natural Vegetation (Gary Kauffman, USFS, pers. comm.) removed by the project.

CNF 169	Acres	Longleaf	Loblolly	Pond Pine	Hardwood - Pine	Hardwood
Pre-Project Totals						
Total Acres	243	0	27	188	28	0
>60 yrs old (pine only)	188	0	0	188	28	0
Open pine understory	0	0	0	0	5	/
30-60 years old (pine only)	0	0	0	0	0	/
Project Removals						
Total Acres	1	0	0	0	1	0
>60 yrs old (pine only)	0	0	0	0	1	0
Open pine understory	0	0	0	0	0	0
30-60 years old (pine only)	0	0	0	0	0	0
Potential Natural Vegetation Removed by Road – 1 acre						
	Total	**Longleaf pine**	**Mixed pine**	**Pond pine**	**Pocosin**	**Cypress**
PNV	1	0	0	1	0	0
Post-Project Totals						
Total Acres	242	0	27	188	27	0
>60 yrs old (pine only)	188	0	0	188	27	0
Open pine understory	0	0	0	0	5	/
30-60 years old (pine only)	0	0	0	0	0	/

Non-RCW habitat

Table 7. Pre-project, project-removal and post-project foraging habitat totals for red-cockaded woodpecker Croatan National Forest (CNF) Territory 170 using US Forest Service data, US Highway 70 Bypass project (R-1015), Craven County, NC. Included is Potential Natural Vegetation (Gary Kauffman, USFS, pers. comm.) removed by the project.

CNF 170	Acres	Longleaf	Loblolly	Pond Pine	Hardwood - Pine	Hardwood	Unknown	Special use impact
Pre-Project Totals								
Total Acres	386	75	125	47	41	88	7	3
>60 yrs old (pine only)	220	62	111	47	41	88	/	0
Open pine understory	9	3	6	0	0	/	/	/
30-60 years old	0	0	0	0	0	/	/	/
Project Removals								
Total Acres	46	4.5	22.5	10.5	3.5	5		
>60 yrs old (pine only)	37.5	4.5	22.5	10.5	3.5	5	0	0
Open pine understory	0	0	0	0	0	0	0	0
30-60 years old (pine only)	0	0	0	0	0	0	0	0
Potential Natural Vegetation Removed by Road – 46 acres								
	Total	**Longleaf pine**	**Mixed pine**	**Pond pine**	**Pocosin**	**Cypress**		
PNV	46	10.5	31.5	3.5	0	.5		
Post-Project Totals								
Total Acres	340	70.5	102.5	36.5	37.5	83	7	3
>60 yrs old (pine only)	182.5	57.5	88.5	36.5	37.5	83	/	0
Open pine understory	9	3	6	0	0	/	/	/
30-60 years old (pine only)	0	0	0	0	0	/	/	/

Non-RCW habitat

111 acres are loblolly pine and 47 acres are pond pine. Approximately 9 acres have an open pine understory: 3 acres of longleaf pine and 6 acres of loblolly pine.

Approximately 46 acres will be removed by the Bypass: 4.5 acres of longleaf pine, 22.5 acres of loblolly pine, 10.5 acres of pond pine, 3.5 acres of hardwood-pine and 5 acres of hardwood. Approximately 37.5 acres of pine > 60 years old will be removed by the Bypass: 4.5 acres of longleaf pine, 22.5 acres of loblolly pine and 10.5 acres of pond pine (USFS unpublished data) (Table 7). According to the PNV classification system, approximately 46 acres of future potential habitat will be removed by the Bypass: 10.5 acres of longleaf, 31.5 acres of mixed pine, 3.5 acres of pond pine and 0.5 acre of cypress.

Post-project, the CNF 170 territory will be approximately 340 acres, with 70.5 acres of longleaf pine, 102.5 acres of loblolly pine, 36.5 acres of pond pine, 37.5 acres of hardwood-pine, 83 acres of hardwood, 7 acres of unknown habitat and 3 acres of special use impact (USFS unpublished data) (Table 7). Approximately 182.5 acres support pine stands > 60 years old, of which 57.5 acres are longleaf pine, 88.5 acres are loblolly pine and 36.5 acres are pond pine. Approximately 9 acres have an open pine understory: 3 acres of longleaf pine and 6 acres of loblolly pine.

DETERMINATION OF EFFECT

No RCW cavity trees will be “taken” by the Havelock Bypass project and the design will not come within 200 ft. of any known RCW cavity trees (Figure 1).

The Havelock Bypass project will remove approximately 121 acres of forested habitat from 7 RCW territories (Table 8). The Bypass may affect, but is not likely adversely affect, the RCW. The loss of habitat resulting from the Havelock Bypass' direct impact zone will not prohibit the CNF from managing within the individual territories for active clusters or recruitment clusters in the future.

Table 8. Foraging habitat removals for Croatan National Forest (CNF) red-cockaded woodpecker territories using US Forest Service data, US Highway 70 Bypass project (R-1015), Craven County, NC. Included is Potential Natural Vegetation (Gary Kauffman, USFS, pers. comm.) removed by the project.

Territories = 7	**Acres**	**Longleaf**	**Loblolly**	**Pond Pine**	**Hardwood - Pine**	**Hardwood**
Total Acres	**121**	57	27	19	9.5	8.5
>60 yrs old (pine only)	**103**	57	27	19	/	/
Open pine understory	**32**	32	0	0	/	/
30-60 years old (pine only)	**0**	0	0	0	/	/
Potential Natural Vegetation						
	Total	**Longleaf pine**	**Mixed pine**	**Pond pine**	**Pocosin**	**Cypress**
PNV	121	74.5	35.5	10.5	0	.5

Non-RCW habitat

Signed by:

_____ _____

Date

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RED-COCKADED WOODPECKER MANAGEMENT PLAN FOR THE CROATAN WETLAND MITIGATION BANK, CRAVEN COUNTY, NORTH CAROLINA

TIP No. R-1015

The North Carolina Department of Transportation
Division of Highways
Project Development and Environmental Analysis Unit
Natural Environment Section

8 November 2012

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RED-COCKADED WOODPECKER MANAGEMENT PLAN FOR THE CROATAN WETLAND MITIGATION BANK, CRAVEN COUNTY, NORTH CAROLINA

1. INTRODUCTION

The North Carolina Department of Transportation (NCDOT) is proposing that part of the Croatan Wetland Mitigation Bank (CWMB) near Havelock in Craven County, North Carolina (NC) be managed as upland compensation for impacts resulting from the United States (US) Highway 70 Bypass (Bypass) (R-1015) project. The CWMB is currently being proposed only for compensatory mitigation for wetland impacts resulting from this project. Uplands and some adjacent wetland communities on the CWMB have the potential to support groups of red-cockaded woodpeckers (*Picoides borealis*) (RCW). Establishment of RCW clusters on the CWMB would support dispersal between, and connectivity of, RCW subpopulations on the Croatan National Forest (CNF), thereby enhancing the CNF's ability to reach its RCW population goal. Four areas within the CWMB were identified in Dr. J. H. Carter III & Associates, Inc.'s (JCA) Final Red-cockaded Woodpecker (*Picoides borealis*) Mitigation Plan for the CWMB, Craven County, NC, as being potentially able to support RCWs once mitigation to restore natural vegetative communities was completed (NCDOT 2008b). The following report describes the CWMB, identifies potential RCW habitat and proposes short-term management guidance over the next 10 years for that habitat.

2. PROJECT SITE

The CWMB comprises approximately 4,034 acres in south-central Craven County in the extreme east-central NC Coastal Plain within the Neuse River Basin (Figure 1). Elevations on the site range from 20 to 39 feet above mean sea level and are generally flat. The CWMB is bordered to the north, west and east by the CNF and by a private wildlife club to the south (Figure 2a). Soils on the property were mostly hydric with non-hydric soils accounting for less than 1 percent (Figure 2b, Table 1).

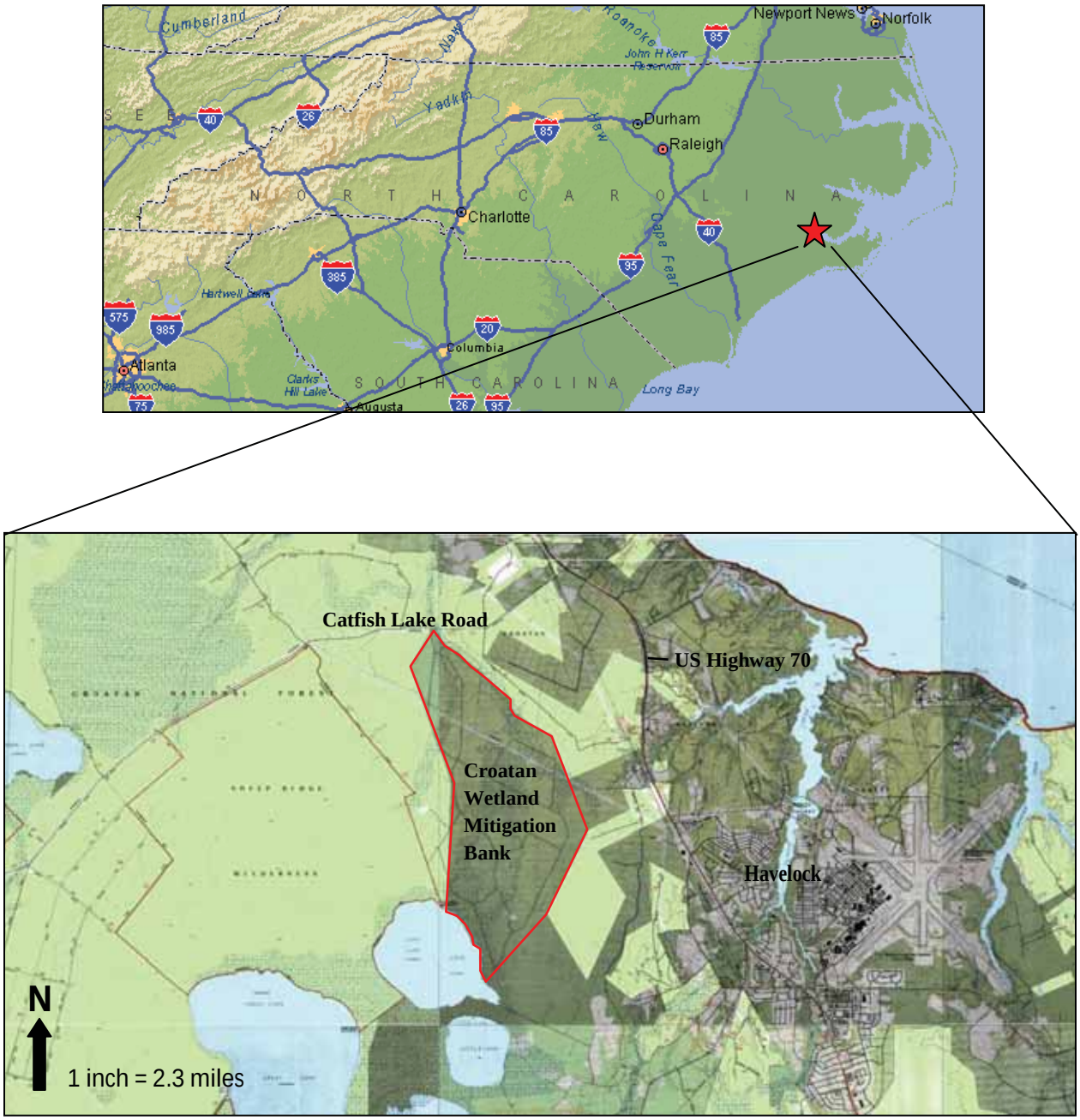

Figure 1. Location of the Croatan Wetland Mitigation Bank in Craven County, North Carolina.

Figure 2a. Location of the Croatan Wetland Mitigation Bank (CWMB) in Craven County, North Carolina.

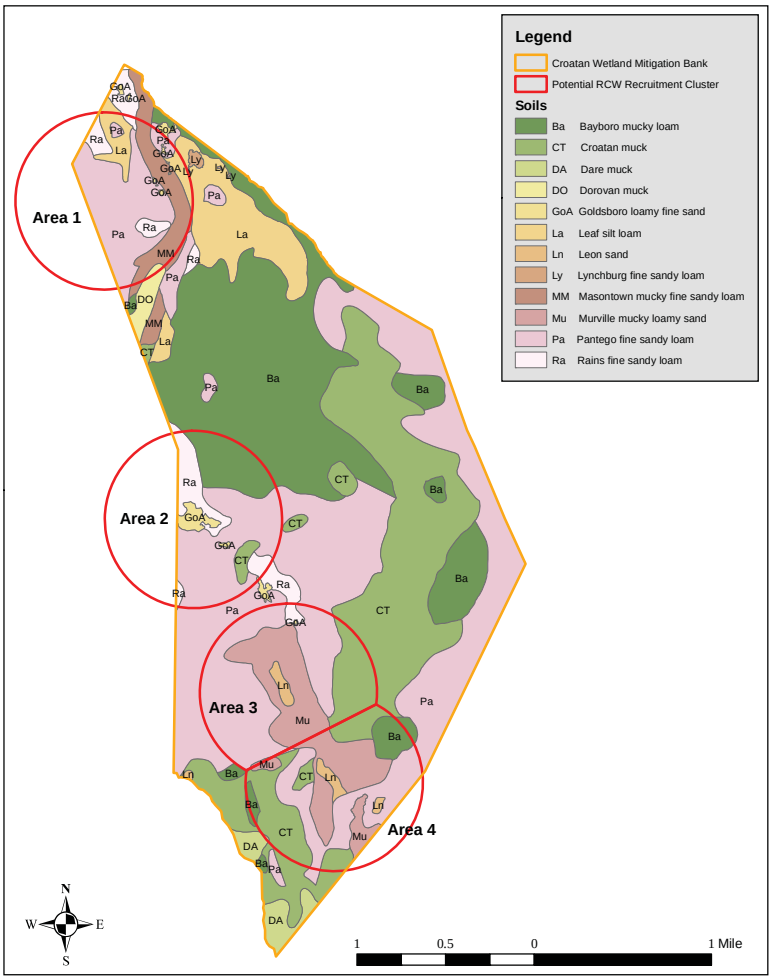

Figure 2b. Soil types found on the Croatan Wetland Mitigation Bank (CWMB) in Craven County, North Carolina. Data provided by Environmental Services, Inc.

Table 1. Soil types found on the Croatan Wetland Mitigation Bank in Craven County, North Carolina

Soil Name	Symbol	Hydric	Site Productivity*	Pine Species	Total Acreage	Forested Pine Acreage within Potential RCW Recruitment Site			
						1	2	3	4
Bayboro mucky loam	Ba	Yes	high	loblolly**	939.19		62.00		0.56
Croatan muck	CT	Yes	medium	-	842.23			0.27	
Dare muck	DA	Yes	medium	pond	48.06				
Dorovan muck	DO	Yes	medium	-	24.67				
Goldsboro loamy fine sand	GoA	No	high	loblolly	25.49	1.56	14.89	0.05	
Leaf silt loam	La	Yes	high	loblolly	222.28	35.65			
Leon sand	Ln	Yes	medium	loblolly longleaf	23.45			5.49	6.55
Lynchburg fine sandy loam	Ly	No	high	loblolly	4.80	0.00			
Masontown mucky fine sandy loam and Muckalee sandy loam	MM	Yes	high	loblolly	97.00	5.45			
Murville mucky loamy sand	Mu	Yes	medium	loblolly longleaf**	225.87			61.90	54.81
Pantego fine sandy loam	Pa	Yes	high	loblolly	1,459.05	75.32	40.82	46.92	54.81
Rains fine sandy loam	Ra	Yes	high	loblolly	122.54	3.49	42.62	4.34	
			Total Acreage		**4,034.63**	**121.47**	**160.32**	**118.97**	**116.72**
				High Productivity		121.47	160.32	51.31	55.37
				Medium Productivity		0.00	0.00	67.39	61.35

*Soil Indices data provided by the Natural Resources Conservation Service, 2009.

**Soil has pine species listed as a tree to manage, but no SI provided.

Intensive forest management has heavily degraded the natural communities historically found on the CWMB. Mitigation to restore these communities through selective planting and restoration of the natural hydrology was to be completed by Environmental Services, Inc. (ESI) in 2003 (NCDOT 2002). Because of this vegetative communities are in a state of transition and do not have defined boundaries. As a result defined pine stands may span more than one targeted vegetative community (pine stands are relatively uniform and community boundaries are currently vague).

The mitigation plan divided the CWMB into 8 vegetative communities historically found on the CWMB and targeted them for restoration. These communities were Coastal Plain Small Stream Swamp, Nonriverine Wet Hardwood Forest (NWHF) Type A and Type B, Nonriverine Swamp Forest (NSF), Bay Forest, Pond Pine Woodland (PPW), Wet Pine Flatwoods (WPF) and Mesic Pine Flatwoods (MPF) (Figure 3) (NCDOT 2002). Of these 4 were planted with pine species: MPF, PPW, WPF and NWHF Type B. Tree planting was conducted by ESI in February of 2001 (Phase I) and 2003 (Phase II) (Figure 4) (NCDOT 2002).

In June of 2012 a fire burned 21,331 acres of the CNF including portions of the CWMB (USFS 2012). Although intense enough to cause pine mortality in some areas, the fire has had the effect of reducing fuel loads and the density of mid- and understory hardwood species in the affected areas. This natural thinning has increased habitat suitability for pine species.

2.1 NONRIVERINE WET HARDWOOD FOREST TYPE B

Nonriverine Wet Hardwood Forest is dominated by hardwoods typical of bottomlands such as hydric oaks (*Quercus* spp.), sweetgum (*Liquidambar styraciflua)*, red maple (*Acer rubrum*), swamp tupelo (*Nyssa biflora*), tulip poplar (*Liriodendron tulipifera*) and American elm (*Ulmus americana).* The shrub layer is generally sparse to moderate and may include common spicebush (*Lindera benzoin*), wax myrtle (*Myrica cerifera*), highbush blueberry (*Vaccinium corymbosum*) and giant cane (*Arundinaria gigantea*). Netted-chain fern (*Woodwardia areolata)*, false nettle (*Boehmeria cylindrica*) and sedges (*Carex* spp.) occurred in the herb layer. NWHF is associated with Bayboro, Leaf and Pantego soils on the property (Figure 2b).

NWHF occupies the majority of the central CWMB and does not typically contain a pine component though it can sustain pine species (Figure 3). This community was divided into Types A and B and suitable areas of Type B were targeted for pond pine (*Pinus serotina*)

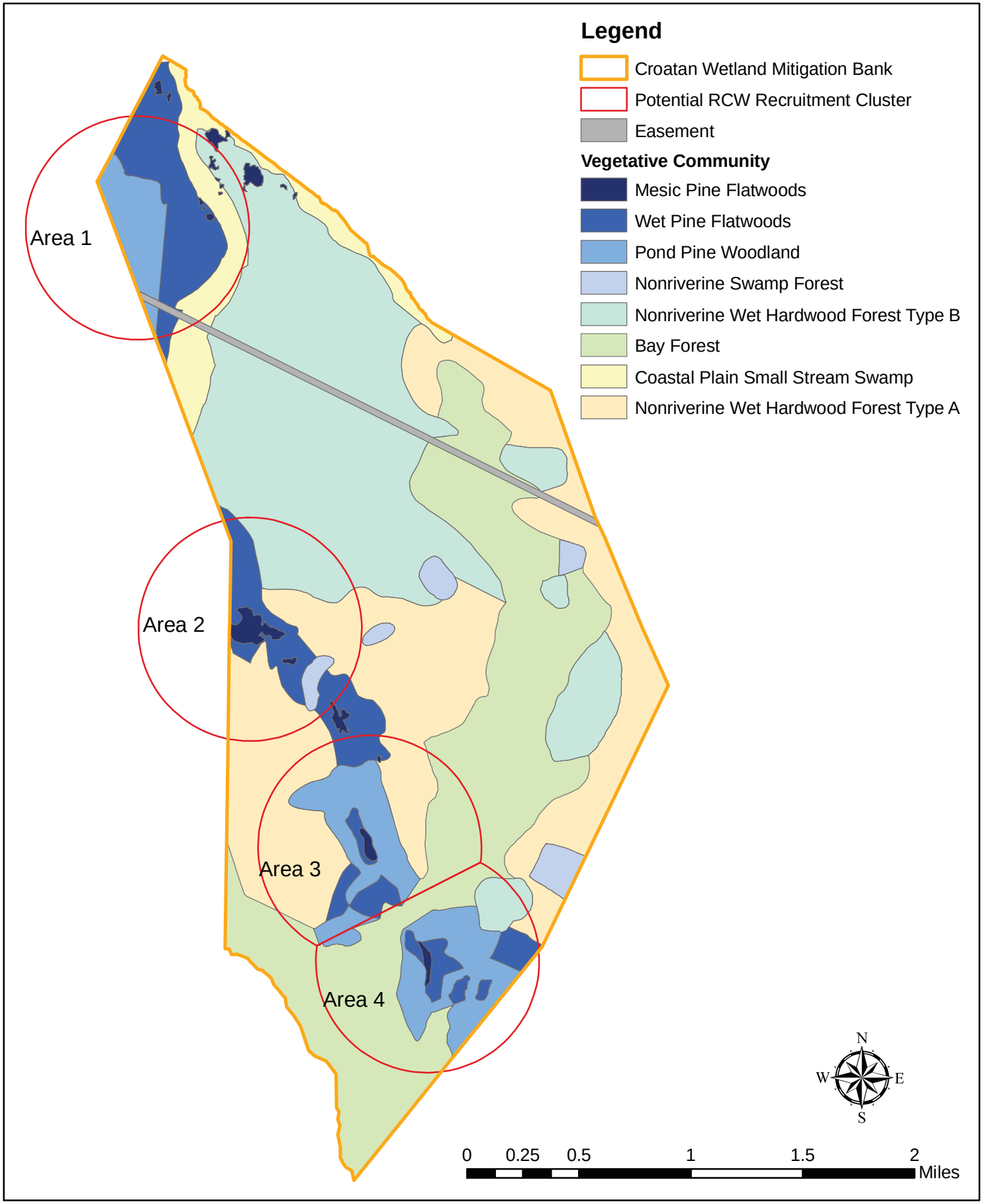

Figure 3. Natural vegetative communities targeted for restoration under the planting plan implemented by Environmental Services, Inc., with possible red-cockaded woodpecker (RCW) recruitment areas of the Croatan Wetland Mitigation Bank in Craven County, North Carolina.

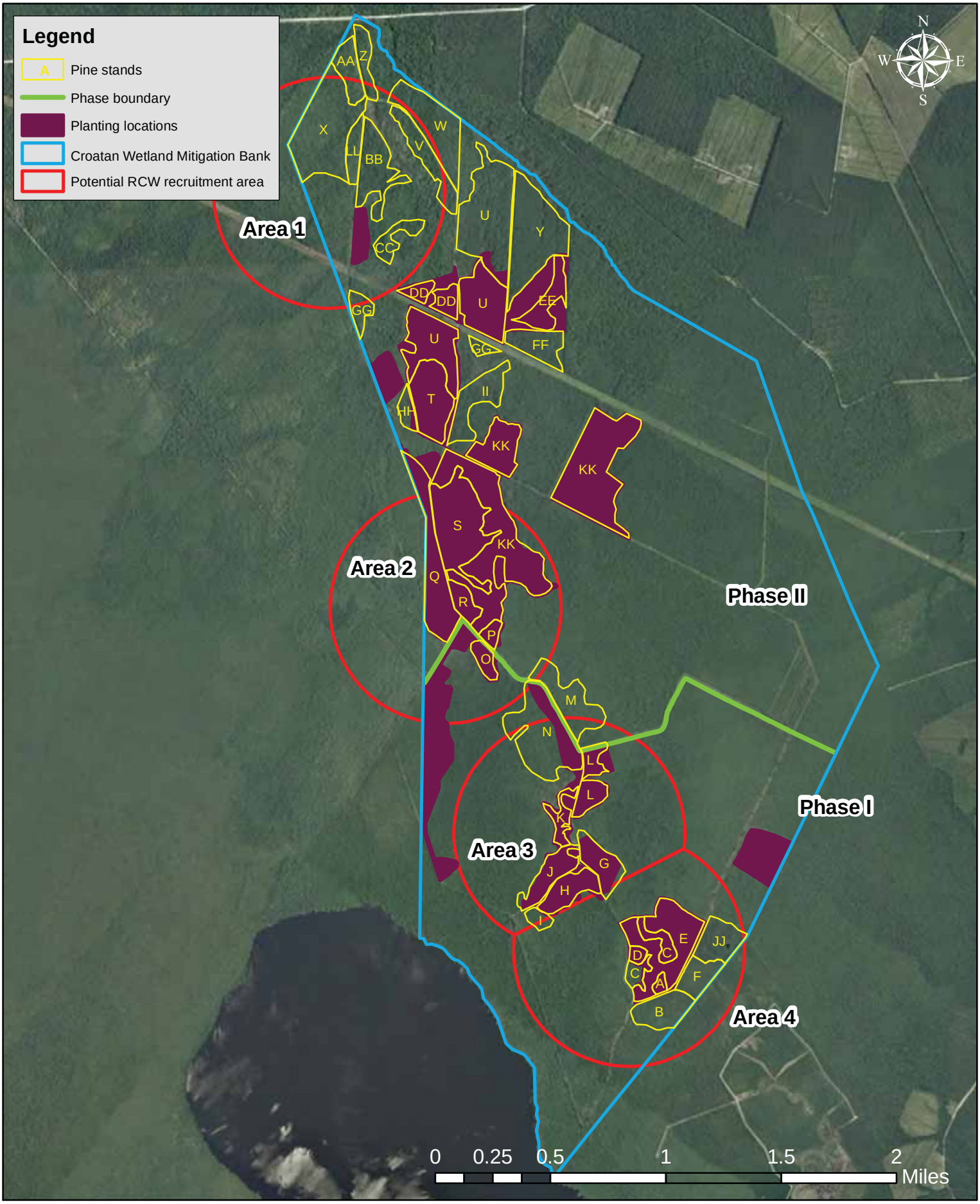

Figure 4. Pine stand locations within mitigation planting areas on the Croatan Wetland Mitigation Bank (CWMB) in Craven County, North Carolina.

planting to augment future RCW habitat (NCDOT 2002). Approximately 342.1 acres in NWHF Type B were planted during Phase II (2003) with hydric oaks and pond pine (Stands S, T, U, DD, EE, HH and KK) (Figure 4) (NCDOT 2002, ESI 2007). Seven additional stands that were not planted (Stands E, V, W, Y, FF, GG and II) contain the NWHF vegetative community.

2.2 POND PINE WOODLAND

Pond Pine Woodland has an open to nearly closed canopy of pond pine, sometimes co-dominant with loblolly bay (*Gordonia lasianthus*) and occasionally including red maple, Atlantic white cedar (*Chamaecyparis thyoides*) and loblolly pine (*Pinus taeda*). The shrub layer is tall and very dense, except when recently burned, and includes dangleberry (*Gaylussacia frondosa*), inkberry (*Ilex glabra*), sweet pepperbush (*Clethra alnifolia*), ti-ti (*Cyrilla racemiflora*), sweet gallberry (*Ilex coriacea*), fetterbush (*Lyonia lucida)*, swamp red bay (*Persea palustris*) and sweetbay (*Magnolia virginiana*). Switch cane (*Arundinaria tecta*) is also common and occasionally dominant in the shrub layer. Herbs are generally sparse under woody cover, but occasional netted chain-fern, Virginia chain-fern (*Woodwardia virginica*) and clumps of sphagnum mosses (*Sphagnum* spp.) occur. PPW is associated with Leon and Murville soils on the property (Figure 2b).

Restoration of PPW occurred during Phase I (2001) in patches running northwest from the southeast corner of the CWMB and in a patch in the northwest corner (Figure 3). Approximately 89.3 acres were planted with loblolly and pond pines (Stands A, D, H, J, K, N and O) in February 2001 including some areas targeted for restoration to WPF (Stands A, D and O) (Figure 4) (NCDOT 2002, ESI 2007). Ten additional stands that were not planted (Stands B, C, E, F, G, I, X, Z, JJ and LL) contain the PPW vegetative community.

2.3 WET PINE FLATWOODS

Wet Pine Flatwoods (WPF) has a canopy of longleaf pine (*Pinus palustris)*, sometimes mixed with loblolly or pond pines. The low shrub layer often contains inkberry, dangleberry, switch cane, sweet pepperbush, fetterbush, staggerbush (*Lyonia mariana*), sweetbay and swamp red bay. Carolina wiregrass (*Aristida stricta*) generally dominates the herbaceous layer along

with a rich assemblage of herbs and occasional bracken fern (*Pteridium aquilinum*). WPF is associated with Leon, Pantego and Rains soils on the property (Figure 2b).

Restoration of WPF occurred during Phases I and II in areas adjacent to PPW (Figure 3). Approximately 117.2 acres were planted with loblolly, longleaf and pond pines (portions of Stands E, G, H, J, K, L, N, Q, R and S) (Figure 4) (NCDOT 2002, ESI 2007). Fourteen additional stands that were not planted (Stands A, C, D, F, M, O, P, X, Z, AA, BB, CC, GG and JJ) contain the WPF vegetative community.

2.4 MESIC PINE FLATWOODS

Mesic Pine Flatwoods (MPF) consists of an open to closed canopy of longleaf pine. The understory is open in recently burned areas and denser in unburned areas. Dominant understory species include oaks, hickories (*Carya* spp.) and sweetgum. A low shrub layer is often present and includes inkberry, staggerbush and dangleberry. The herbaceous layer is dominated by Carolina wiregrass with patches of bracken fern. This community is associated with Goldsboro and Lynchburg soils on the property, which occur in small scattered pockets surrounded by larger areas of hydric soils (Figure 2b).

MPF is the smallest community being restored and is found only on non-hydric soils in central and northwestern parts of the CWMB (Figure 3). Approximately 3.3 acres were scheduled for planting with longleaf pine during Phase I (2001) (NCDOT 2002, ESI 2007). Portions of 13 stands (Stands C, D, K, N, P, Q, R, U, V, W, Z, AA and BB) contain the MPF vegetative community.

3. CURRENT SITE CONDITIONS

The property was visited in July and September of 2012 in order to better determine RCW habitat suitability. During the visits, pine habitat boundaries were determined and data was collected at points in each stand (Figure 4). An aerial survey was conducted during the September 2012 visit to better determine pine stand boundaries. Data locations were documented with a global positioning system (GPS) unit, photographs, written habitat descriptions and foraging habitat plot data (if suitable pines were present).

Pines were aged at all stands visited on the ground. Data taken in stands that were within mitigation planting limits consistently aged older (14-17 years old) than the expected 10-12 years

old if one-year-old pine saplings were planted. This may be due to aging residual trees that were not cut down during drum chopping or rapid growth of the saplings causing "false rings" to develop. Mild winters and a long growing season may account for rapid growth.

Although habitats onsite are is in a transitionary state, the current overstory and planting survival is assumed to be indicative of future vegetation composition. Therefore this plan only identifies and proposes management for those stands that currently meet minimum pine basal area guidelines for RCW foraging habitat. Stands that do not meet this minimum characteristic are assumed to contain some aspect of their environment (too wet or unsuitable soil characteristics) that prevent minimum pine density from being achieved and will therefore never be suitable according to the Standard for Managed Stability (SMS) and the Recovery Standard Guidelines (RSG) in the revised RCW Recovery Plan (USFWS 2003).

3.1 STAND COMPOSITION

The CWMB currently contains 38 pine stands, totaling 1,041.69 acres, with sufficient pine density for future RCW foraging habitat. Of these, only 6 stands (D, Q, R, S, Z and AA) contain longleaf pine which is sparse and dominated by pond and/or loblolly pines (Figure 4, Table 2). Stands D, Q, R and S contain planted longleaf at various stages of development while Stands Z and AA contain mature longleaf (Figure 4, Table 2).

Fifteen stands (A, D, E, G, H, J, K, L, P, Q, R, S, T, DD and KK) are within areas that were drum chopped, treated with herbicide and selectively planted with pine species (loblolly, pond and/or longleaf pines) between 2000 and 2003 (NCDOT 2002) (Figure 4). Ten of these stands (A, D, G, H, J, K, P, Q, DD and KK) contain pines aged 10-15 and 5 (E, L, R, S and T) have pines 16-17 years old (Table 2).

Three stands (N, O and EE) are uneven-aged stands containing significant pine regeneration under an overstory of mature pines (Table 2). Stand W is also an uneven-aged stand with a mix of pines aged 27 and 41. Three stands (U, Y and JJ) are dense pond or loblolly regeneration 15-25 years old that were planted pre-mitigation (Table 2).

Two stands (B and V) are between 26 and 30 years old, while 7 (I, M, BB, FF, GG, HH and II) are between 40-50 years old (Table 2). The remaining 4 stands (Stands C, F, X, CC) are over 50 years old (Table 2).

Table 2. Pine stand characteristics found on the Croatan Wetland Mitigation Bank in Craven County, North Carolina.

Stand	Acreage	Pine Species	Stage of Longleaf Pine Development	Average Pine Age	Planted	Suitable Pine Age for RCW Foraging	Suitable Pine Age for RCW Nesting	Midstory	
								Density	Height
A	2.49	Loblolly		15	Yes	2032	2087	S	M
B	19.70	Loblolly		26		2021	2076	D	T
C	13.55	Pond		70	Yes	Yes	2032	D	T
D	3.09	Loblolly, Longleaf	Grass	10	Yes	2037	2092	-	-
E	43.82	Pond		16	Yes	2031	2086	-	-
F	13.35	Pond		62		Yes	2040	D	M
G	17.49	Loblolly, Pond		14	Yes	2033	2088	D	T
H	17.09	Loblolly, Pond		10-15	Yes	2032-37	2087-92	D	M
I	4.76	Loblolly		48		Yes	2054	D	T
J	17.43	Loblolly		14	Yes	2033	2088	D	M
K	8.23	Loblolly, Pond		14	Yes	2033	2088	M	M
L	16.88	Loblolly, Pond		16	Yes	2031	2086	M	T
M	27.53	Loblolly		46		Yes	2056	D	T
N	52.93	Loblolly		54/7*	Yes	Yes	2048	D	T
O	7.15	Loblolly		63/12*	Yes	Yes	2039	D	T
P	4.51	Loblolly		15	Yes	2032	2087	D	T
Q	39.50	Loblolly, Pond, Longleaf	Candle	12	Yes	2035	2090	-	-
R	9.18	Loblolly, Pond, Longleaf	Grass	16	Yes	2031	2086	M	M
S	50.71	Loblolly, Pond, Longleaf	Grass	16	Yes	2031	2086	D	T
T	30.91	Pond		17	Yes	2030	2085	D	T
U	60.89	Pond		26	Yes	2021	2076	D	T
V	21.14	Loblolly		30		2017	2072	D	T
W	37.33	Loblolly		41/27*		Yes	2061	D	T
X	59.59	Pond		50-70		Yes	2032-52	D	T
Y	53.28	Loblolly		20-25	Yes	2022-27	2077-82	D	T
Z	10.70	Loblolly, Pond, Longleaf	Mature	47		Yes	2055	D	T
AA	14.44	Loblolly, Pond, Longleaf	Mature	64		Yes	2038	D	T
BB	28.22	Loblolly, Pond		40-50		Yes	2052-62	D	T
CC	10.10	Loblolly, Pond		50+		Yes	2052+	D	T
DD	12.89	Loblolly, Pond		10-15	Yes	2032-37	2087-92	D	T
EE	15.64	Loblolly		40-50	Yes	Yes	2052-62	D	T
FF	17.68	Loblolly		40-50		Yes	2052-62	D	T
GG	11.03	Loblolly, Pond		40-50		Yes	2052-62	D	T
HH	6.09	Pond		40-50		Yes	2052-62	D	T
II	23.16	Loblolly		40-50		Yes	2052-62	D	T
JJ	18.31	Loblolly, Pond		15-20		2027-32	2082-87	D	T
KK	231.65	Loblolly, Pond		10-15	Yes	2032-37	2087-92	S	M
LL	9.28	Loblolly, Pond		20-30		2017-27	2072-82	D	T

* Uneven age stands - two dominant ages are provided

3.2 SOILS

Soil data for the CWMB was provided by ESI. Soils were analyzed based on a recommendation submitted to the USFWS to amend the site index (SI) parameters to include 3 categories of site productivity (Dr. J.H. Carter III, pers. comm.). Soils with a SI greater than 75 for the dominant pine species were considered high productivity, a SI from 51-75 for the dominant pine species was considered medium productivity and a SI of 50 or below was considered low productivity.

The hydric soils on site were Bayboro mucky loam (Ba) (939.19 acres), Croatan muck (CT) (842.23 acres), Dare muck (DA) (48.06 acres), Dorovan muck (DO) (24.67 acres), Leaf silt loam (La) (222.28 acres), Leon sand (Ln) (23.45 acres), Masontown mucky fine sandy loam and Muckalee sandy loam (MM) (97.00 acres), Murville mucky loamy sand (Mu) (225.87 acres), Pantego fine sandy loam (Pa) (1459.05 acres) and Rains fine sandy loam (Ra) (122.54 acres) (USDA 2012) (Figure 2b, Table 1). Non-hydric soils included Goldsboro loamy fine sand (GoA) (25.49 acres) and Lynchburg fine sandy loam (Ly) (4.80 acres) (USDA 2012) (Figure 2b, Table 1).

Ba, CT and DO soils do not have a SI for pine species and DA only has a SI for pond pine (SI 55) (Table 1) (USDA 2012). The following soils have SI only for loblolly pine: GoA (SI 88), La (SI 90), Ly (SI 86), MM (SI 97), Mu (SI 70), Pa (SI 91) and Ra (SI 94) (Table 1) (USDA 2012). Ln has a SI for both loblolly (SI 75) and longleaf (SI 70) pines (USDA 2012). The Natural Resources Conservation Service (NRCS) lists loblolly and longleaf pines as a tree to manage on Ba and Mu soils, respectively, but does not include a SI. This indicates that these pine species are capable of growing on these soils, but that the NRCS has not yet determine their SI or potential productivity.

4. RCW HABITAT

Prime RCW nesting habitat includes a minimum of 10 acres of open, mature southern pine forests dominated by longleaf, loblolly, pond, slash (*Pinus elliottii)* or other southern pine species greater than 90 years of age with little or no mid- or understory development (USFWS 2003). Pine flatwoods and pine-dominated savannas, which have been maintained by frequent natural fires, serve as ideal nesting and foraging habitat for RCWs. Foraging habitat is

comprised of open pine or pine/mixed hardwood stands 30 years of age or older (USFWS 2003).

4.1 GUIDELINES FOR FORAGING HABITAT

Because the CNF is part of a Primary Core Recovery Population, the RSG are applicable (USFWS 2003). The RSG requires a minimum of 120 acres of good quality foraging habitat in areas with high site productivity as defined above, or 200-300 acres of good quality foraging habitat in areas of low productivity. Good quality foraging habitat is defined as follows (USFWS 2003):

1. There should be a minimum of 18 pine stems ≥ 14 inches diameter at breast height (dbh) per acre that are ≥ 60 years old. The minimum basal area (BA) for these pines should be 20 square feet (ft^2) / acre.
2. The BA for pines from 10-14 inches dbh should be from 0-40 ft^2 / acre.
3. The BA of pines <10 inches dbh should be below 10 ft^2 / acre and below 20 stems/ acre.
4. The minimum BA for categories 1 and 2 above should be 40 ft^2 / acre.
5. Groundcovers of native bunchgrass and/or other native, fire-tolerant, fire-dependent herbs total 40 percent or more of ground and midstory plants and are dense enough to carry growing season fire at least once every 5 years.
6. No hardwood midstory exists, or if present, is sparse and less than 7 feet in height.
7. Canopy hardwoods are absent or less than 10 percent of the number of canopy trees in longleaf forests and less than 30 percent of the number of canopy trees in loblolly and shortleaf forests.
8. All habitat is within 0.5 mile of the center of the cluster.
9. Foraging habitat is not separated by more than 200 feet of non-foraging habitat.
10. Clusters must be at least 10 acres in size.

4.2 POTENTIAL SUITABLE RCW HABITAT ON THE CWMB

Four potential RCW recruitment clusters (Areas 1-4) were proposed by JCA in a RCW

mitigation plan for the CWMB (Figure 3) (NCDOT 2008b). These areas were recommended based on projected pine dominance in targeted MPF, WPF, PPW and NWHF vegetative communities (NCDOT 2008b).

Area 1 contains a total of 292.36 acres on the CWMB including 135.66 acres of pine stands with 121.47 acres on high productivity soils (Tables 1 and 3). These 121.47 acres are enough to meet the minimum RSG requirements of 120 acres of good quality foraging habitat in areas with high site productivity for a RCW foraging partition.

Area 2 contains a total of 310.72 acres on the CWMB including 160.34 acres of pine stands with 160.32 acres on high productivity soils (Tables 1 and 3). These 160.32 acres are enough to meet the minimum RSG requirements of 120 acres of good quality foraging habitat in areas with high site productivity for a RCW foraging partition.

Area 3 contains a total of 423.19 acres on the CWMB including 118.97 acres of pine stands with 51.31 acres on high productivity soils (Tables 1 and 3). These 51.31 acres are **not** enough to meet the minimum RSG requirements of 120 acres of good quality foraging habitat in areas with high site productivity for a RCW foraging partition.

Area 4 contains a total of 380.36 acres on the CWMB including 117.35 acres of pine stands with 55.37 acres on high productivity soils (Tables 1 and 3). These 55.37 acres are **not** enough to meet the minimum RSG requirements of 120 acres of good quality foraging habitat in areas with high site productivity for a RCW foraging partition.

Areas 2, 3 and 4 were planted with longleaf pine and Area 4 contains stands with mature longleaf pine (Table 2). Lack of initial survival of longleaf pine plantings in Area 3 is likely due to a lack of management and competition from hardwood midstory species (Appendix) as there is no obvious difference in soils or projected vegetative community when compared to nearby stands (Q, R, S) with surviving planted longleaf. Additional planting of longleaf pine in this area is recommended.

It should be noted that pine stands developing on hydric soils on the CWMB may never meet the SMS and RSG guidelines because of midstory density and height. This is particularly true for pine stands on NWHF and PPW sites. However, observations throughout the Outer Coastal Plain of NC have documented RCWs foraging and nesting in wet pine stands with dense, tall midstories, so such stands should not be dismissed as providing RCW habitat.

Table 3. Acerage within 4 proposed 0.5 mile radius red-cockaded woodpecker foraging habitat partitions on the Croatan Wetland Mitigation Bank in Craven County, North Carolina.

Stand	Pine Species	Average Pine Age	Total Acreage	Acreage within Potential RCW Recruitment Site			
				1	2	3	4
A	Loblolly	15	2.49				2.49
B	Loblolly	26	19.70				19.70
C	Pond	70	13.55				13.58
D	Loblolly, Longleaf	10	3.09				3.08
E	Pond	16	43.82				43.86
F	Pond	62	13.35				13.66
G	Loblolly, Pond	14	17.49			16.34	1.15
H	Loblolly, Pond	10-15	17.09			17.02	0.06
I	Loblolly	48	4.76			3.11	1.65
J	Loblolly	14	17.43			17.43	
K	Loblolly, Pond	14	8.23			8.23	
L	Loblolly, Pond	16	16.88			16.88	
M	Loblolly	46	27.53		2.18	5.28	
N	Loblolly	54/7*	52.93		0.72	34.67	
O	Loblolly	63/12*	7.15		7.15		
P	Loblolly	15	4.51		4.51		
Q	Loblolly, Pond, Longleaf	12	39.50		32.42		
R	Loblolly, Pond, Longleaf	16	9.18		9.15		
S	Loblolly, Pond, Longleaf	16	50.71		43.82		
T	Pond	17	30.91				
U	Pond	26	60.89				
V	Loblolly	30	21.14	16.22			
W	Loblolly	27/41*	37.33	4.41			
X	Pond	50-70	59.59	57.93			
Y	Loblolly	20-25	53.28				
Z	Loblolly, Pond, Longleaf	47	10.70	2.12			
AA	Loblolly, Pond, Longleaf	64	14.44	4.74			
BB	Loblolly, Pond	40-50	28.22	28.22			
CC	Loblolly, Pond	50+	10.10	10.10			
DD	Loblolly, Pond	10-15	12.89				
EE	Loblolly	40-50	15.64				
FF	Loblolly	40-50	17.68				
GG	Loblolly, Pond	40-50	11.03	2.38			
HH	Pond	40-50	6.09				
II	Loblolly	40-50	23.16				
JJ	Loblolly, Pond	15-20	18.31				18.13
KK	Loblolly, Pond	10-15	231.65		60.39		
LL	Loblolly, Pond	20-30	9.28	9.54			
		Total	**1,041.69**	**135.66**	**160.34**	**118.97**	**117.35**

* Mixed age stands - two dominant ages are provided

5. MANAGEMENT GOALS

The management goal for RCWs at CWMB is to create and maintain an open pine forest with minimal understory and midstory growth, particularly in clusters. Therefore, understory and midstory suppression is a priority throughout all areas being managed for the RCW on the CWMB. The reintroduction of fire is the recommended method of controlling the midstory and hardwood species. The restoration of longleaf pine stands is a management goal on the CNF and can be accomplished in select areas on the CWMB. Wet pine sites will support stands of loblolly or pond pines.

5.1 OVERSTORY MANAGEMENT

On select sites, management should produce an open, self-perpetuating, longleaf pine forest with scattered individual and clumps of old trees interspersed within a multiaged forest generally represented by even-aged patches. Additional planting of longleaf pine in Stands D, Q, R, S, Z and AA in addition to replanting in Stands E, G, H, J, K and N, together with loblolly pine suppression or removal, will be necessary to ensure longleaf pine dominance. On wetter sites, stands of loblolly or pond pines will be established and maintained.

Most overstory hardwoods will be removed and stumps can be treated with an approved systemic herbicide certified for use in wetlands. The retention of occasional non-pine species, particularly swamp black gum (*Nyssa sylvatica*), as well as an occasional loblolly bay, sweetbay, oak species, bald cypress or Atlantic white cedar, is permissible in foraging habitat and within RCW clusters, but generally the non-pine component in the stand will not be allowed to exceed 10 percent of the canopy basal area.

5.2 MIDSTORY MANAGEMENT

Understory and midstory suppression is a priority to promote open pine forests. The goal for midstory management is to maintain as much open bole on pine trees as possible in order to allow for RCW cavity sites and foraging. Another goal is to manage the forest for sufficient pine regeneration in the future.

Mechanical suppression of midstory vegetation through mowing, shearing, chopping or crushing is relatively inexpensive when compared to hand clearing of large areas. This type of clearing creates a compressed and highly combustible fuel source that, if ignited, could lead to a catastrophic fire. Cutting overstory and midstory hardwoods as part of pine thinning operations would be the most cost effective means of initially controlling the midstory. Stumps may be treated with an approved systemic herbicide certified for use in wetlands in order to reduce sprouting. However, the use of herbicides on the scale necessary to suppress the midstory on large acreages of RCW habitat could be cost prohibitive. Conducting a controlled burn is the preferred method of midstory management as it will eliminate debris resulting from management operations and help bring the remaining hardwood midstory under control.

5.3 REINTRODUCTION OF FIRE

The reintroduction of fire throughout the habitat to be managed for RCWs is an economically feasible and natural way to control the hardwood midstory over time and reduce competition from off-site pines species (loblolly). Fire may be difficult to implement due to decades of fire exclusion and suppression which have allowed unnaturally high fuel loads to accumulate in most stands. However, fuel loads were reduced in areas that recently burned in the wildfire mentioned above. Some areas may be too wet to burn at frequencies and intensities needed for controlling the midstory. Without reintroduction of fire at a landscape level, the ability to enhance and maintain RCW habitat is limited. Without fire, pine dominated communities will shift towards hardwood dominance as pines are cut or die.

A burn schedule should be initiated with burns every 2-3 years during the growing season (March through July) in order to simulate natural processes and achieve the maximum control of the midstory. If for whatever reason, the burn does not adequately control the regenerating midstory, another prescribed burn should be implemented as soon as possible.

5.4 SCHEDULING

Timber harvesting or other habitat management activities, with the exception of prescribed burning, will not be conducted in active clusters during the RCW breeding season (April through July). If an experienced RCW biologist determines that the proposed activity,

exclusive of timber harvesting, will have no effect on the RCW, and the USFWS concurs, the activity may be conducted at any time.

6. MANAGEMENT RECOMMENDATIONS

No management was performed following the mitigation plantings to aid pine, specifically longleaf pine, regeneration. As a result, planted longleaf saplings observed were sparse and in danger of being outcompeted by other pine species and stands supporting other pine species were too dense. Management for all pine species should follow the plan set forth below in order to optimize pine growth and development of RCW foraging and nesting habitat.

Year 1

1. Thin existing pine stands to RSG characteristics where commercially feasible.
2. Conduct a prescribed burn.
3. Plant additional longleaf pines in Stands D, Q, R, S, Z and AA in addition to replanting in Stands E, G, H, J, K and N.

Year 3-10

4. Begin prescribed burning every 2-3 years during the growing season (March-July). Heavy fuel loads may require a winter burn prior to shifting to a growing season burning regime.

Year 10

5. Thin if necessary.

Pines should be thinned and the midstory eliminated to the RSG characteristics listed above. The density of pine thinning should be varied in mature pine stands (Stands C, F, I, M, N, O, W, X, Z, AA, BB, CC, EE, FF, GG, HH and II) in order to promote uneven-aged stand characteristics and natural regeneration (Table 2). The goal of thinning in the remaining stands (Stands A, B, D, E, G, H, J, K, L P, Q, R, S, T, U, V, Y, DD, JJ, KK and LL) is to optimize pine growth (Table 2). A prescribed burn should be conducted following thinning to eliminate accumulated debris from thinning activities and to help control the remaining hardwood midstory.

Additional longleaf pines should be planted in Stands D, Q, R, S, Z and AA with replanting in Stands E, G, H, J, K and N. Loblolly pine saplings in these stands should be removed prior to longleaf planting.

Prescribed burning should be initiated with burns occurring every 2-3 years during the growing season (March through July) with an initial winter burn if fuel loads are heavy. Areas affected by the June fire (Stands K, J, N, Q, T and V) will not require a winter burn. Prescribed burning should continue throughout management of the property. Regular prescribed burning may be sufficient to promote and maintain desired midstory characteristics. On wetter sites, regular prescribed burning may not be possible. In these areas prescribed burning should be conducted when practical.

After approximately 10 years pine density should be reviewed to determine if further thinning is necessary. If necessary, thinning should be carried out to comply with the above RSG characteristics. Patch clear-cuts of varying sizes should be done to create gaps for pine regeneration.

7. SUMMARY

If managed properly all pine stands on the CWMB will provide suitable RCW foraging habitat with pockets of suitable nesting habitat. Mature longleaf pine stands are a key component of RCW habitat and a management goal on the CNF (USDA 2002). Restoration of longleaf as a dominant species is possible in Stands D, Q, R, S, Z and AA where longleaf pines are established; restoration may be achieved in Stands E, G, H, J, K and N if longleaf is replanted.

The reintroduction of fire is key to the successful management of RCW foraging habitat and the successful establishment of longleaf pine on this property. Fire will provide all pine species a competitive advantage over hardwood species while still promoting the growth of desirable herbaceous species. In areas with longleaf pine, regular prescribed burning will give longleaf the competitive advantage over other pine species while still controlling hardwood species. Burning wetter areas when practicable is not likely to provide enough control of hardwood species to meet RSG standards, but will still aid pine growth and promote habitat characteristics suitable to RCW foraging.

There are currently 17 stands (Stands C, F, I, M, N, O, W, X, Z, AA, BB, CC, EE, FF, GG, HH and II) consisting of 353.25 acres containing pines of suitable age for RCW foraging (Table 2). If the proposed management plan is followed these acres would be suitable now for RCW foraging habitat. Two of these stands (Stands Z and AA) contain mature, sparse longleaf pines that will be suitable for nesting habitat in 43 (2055) and 26 (2038) years (respectively) (Table 2).

The majority of the remaining pine stands (Stands A, D, E, G, H, J, K, L, P, Q, R, S, T, U, Y, DD and KK) are planted and consist of 620.04 acres range from 10 (Stand D) to 26 years old (Stand U) (Table 2). These stands will be suitable for RCW foraging habitat between 9 years (2021) and 25 years (2037) and nesting habitat between 64 years (2076) and 80 years (2092) (see Table 2 for exact ages of suitability for each stand) (Table 2).

Stands that were not planted and are not of suitable age for RCW foraging (Stands B, V, JJ and LL) consist of 68.43 acres between 15-30 years old. These stands will be suitable for RCW foraging habitat between 5 years (2017) and 20 years (2032) and nesting habitat between 60 years (2072) and 75 years (2087) (see Table 2 for exact ages of suitability for each stand) (Table 2).

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Appendix A

Photo Appendix of Stands

I. Mesic Pine Flatwoods (MPF) targeted vegetative community containing burned, planted pine stand with longleaf, loblolly and pond pines. Longleaf pine survival was aided by a wildfire that swept through the area in June 2012. Midstory is dominated by pine regeneration with no hardwoods present. Groundcover is dominated by grasses.

II. Wet Pine Flatwood (WPF) targeted vegetative community with unburned, planted longleaf, loblolly and pond pines. Longleaf pines are being overtopped by other pine species and encroaching hardwoods.

III. Pond Pine Woodland (PPW) targeted vegetative community containing an unburned planted pine stand. Longleaf pines did not survive, likely due to dense hardwood encroachment.

IV. PPW targeted vegetative community containing a mature, sparse pine stand with a dense understory. The midstory is sparse.

V. Nonriverine Wet Hardwood Forest (NWHF) targeted vegetative community dominated by uneven-aged loblolly pines. The midstory is moderately dense and the understory is sparse. The herbaceous layer is limited to a few grasses and occasional moss.

BIOLOGICAL EVALUATION REPORT

FOR THE

US 70 HAVELOCK BYPASS (R-1015)

CROATAN RANGER DISTRICT
CROATAN NATIONAL FOREST

CRAVEN AND CARTERET COUNTIES

NORTH CAROLINA

July 16, 2014

Contact Person:
Mary Frazer
North Carolina Department of Transportation
Natural Environment Section
Biological Surveys Group

1598 Mail Service Center
Raleigh, NC 27699
919.707.6119
mefrazer@ncdot.gov

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List of Attachments

1	December 2005	Havelock Bypass Environmental Survey – Nocturnal Lepidoptera
2	December 2005	Survey and Assessment for PETS (Animal) Species, Havelock Bypass, R-1015
3	May 2006	Results of Bat Surveys Conducted in the Vicinity of the Proposed Havelock Bypass
4	May 2008	Preliminary Habitat and PETS Species Evaluation for the Croatan Wetland Mitigation Bank
5	June 2009	2008 USFS PETS Species Surveys and Mitigative Measures Evaluation for the US 70 Havelock Bypass on the Croatan National Forest
6	July 2010	US 70 Havelock Bypass (R-1015) Task Order #8 (Rough-leaved Loosestrife Survey Update)
7	December 2012	Summary of Evaluation for Spring-flowering Goldenrod (*Solidago verna*)
8	January 2013	Summary of Revised USFS Rare Species Surveys Evaluation
9	August 2013	Summary of Evaluation for Mudbank Crowngrass (*Paspalum dissectum*)
10	August 2013	Summary of Evaluation for Summer Species: LeConte's Thistle (*Cirsium lecontei*), Short-bristled Beaksedge (*Rhynchospora breviseta*), and Yellow Fringeless Orchid (*Platanthera integra*)
11	October 2013	Non-native Invasive Species Analysis
12	November 2013	Summary of Evaluation for Bryophyte Species: Two liverworts (*Lejeunea bermudiana* and *Plagiochila ludoviciana*) and Florida Peatmoss (*Sphagnum cribrosum*)
13	June 2014	Summary of Evaluation for Awned Mountain-mint (*Pycnanthemum setosum*)

1.0 INTRODUCTION

The North Carolina Department of Transportation (NCDOT) is proposing to construct a United States Highway 70 (US 70) Bypass around the southwest side of the City of Havelock in Craven and Carteret Counties, North Carolina (see Figure 1, Appendix F). The project is commonly referred to as the US 70 Havelock Bypass and is identified by the NCDOT as Transportation Improvement Project (TIP) Number R-1015. On 10 April 2012, the Federal Highways Administration (FHWA) and the Section 404/National Environmental Policy Act (NEPA) Merger Process Team confirmed Alternative 3 as the Least Environmentally Damaging Practicable Alternative (LEDPA) for the US 70 Havelock Bypass. The proposed US 70 Havelock Bypass would cross National Forest System (NFS) lands in the Croatan National Forest (CNF).

This Biological Evaluation (BE) assesses the potential effects to rare species on NFS lands from the proposed construction and maintenance of the US 70 Havelock Bypass by the NCDOT. There are three objectives of this BE: 1) to ensure that Forest Service approval of the proposed NCDOT actions does not contribute to loss of viability of any native or desired non-native plant or animal species; 2) to include concerns for sensitive species and locally rare species within the planning process, thereby reducing potential negative effects to these species; and 3) to ensure that activities will not cause a species to move towards federal listing.

This BE conforms with legal requirements set forth in Section 7(a)(2) of the Endangered Species Act (19 U.S.C. 1536), and the direction given in Forest Service Manual (FSM) 2671.44, 2672.41, and 2673.42. As part of the National Environmental Policy Act (NEPA) decision making process, this evaluation provides information in sufficient detail to determine how proposed actions may affect rare species. Determinations of effects on each species are based on best available information.

1.1 Project Area

The proposed US 70 Havelock Bypass would be an approximately 10-mile, multi-lane, median-divided facility with full control of access (access only at interchanges) around the southwest side of the City of Havelock (Figure 1). The southern terminus would be located at existing US 70 just south of the Craven/Carteret County line. The proposed facility would divert to the west of the existing US 70 alignment just north of the county line and extend in a generally northwestwardly direction on new location to rejoin US 70 approximately 1.7 miles north of the Slocum Road intersection. A new interchange with Lake Road [State Road (SR) 1756] would be constructed approximately 1.6 miles west of existing US 70. There would be three grade separations across railroads and one grade separation over Sunset Road.

The evaluation area for this BE includes NFS lands within the study area for Alternative 3 (referred to as the Alt. 3 study area) and NFS lands within the area encompassed between the Alt. 3 study area and existing US 70.

- Boundaries for NFS lands were provided by the United States Forest Service (USFS) for use in this evaluation. Only rare species occurrences or portions of rare species occurrences on NFS lands are of concern for the viability determination for NFS lands on the CNF.

- Direct impacts are presented for the Alt. 3 study area based on the tree clearing limits (slope stake limits plus 15 feet) plus an additional 25 feet. The area of NFS lands included for direct impact consideration covers approximately 295.4 acres.
- Potential indirect impacts were evaluated for rare species occurrence areas located on NFS lands between Alt. 3 and existing US 70 based on consideration that different post-project habitat management techniques may be required by USFS for areas isolated from larger, contiguous NFS lands by the project. The area of NFS lands included for indirect impact consideration covers approximately 1,239 acres.
- Cumulative impacts are considered for identified actions on NFS lands that could also affect the rare species impacted by the US 70 Havelock Bypass. Because the USFS concern for these species is for maintaining continued viability on NFS lands in the CNF, actions off NFS lands were not considered for determining whether an action will affect the viability of these species on NFS lands. Actions proposed on NFS lands are subject to independent review by USFS to assess potential effects to the continued viability of these species on NFS lands in the CNF. The following projects on NFS lands were identified as having potential impacts to USFS rare species also present within the Alt. 3 study area and therefore having the potential to contribute to cumulative impacts:
    - NCDOT US 17 Improvements (R-2514B, C, and D); NFS lands in Jones County.
    - Duke Energy Progress (DEP) Havelock-Morehead Wildwood 115kV North Line Overhead Ground Wire Replacement project; NFS lands in Carteret and Craven Counties.
    - North Carolina Wildlife Resources Commission (NCWRC) Wildlife Habitat Improvement Project; Little Road savanna location, Craven County (project completed in 2003).
    - Atlantic and East Carolina Railroad, potential future widening from a single track to multiple tracks.
    - USFS Forest Management Projects, various actions including habitat improvements and timber thinning.
    - Craven County Waste Transfer Facility at Hickman Hill Closure; no USFS rare species were identified in association with this facility.
    - US 70 Slocum Road Cherry Point Gate Improvements (R-5516); this project will not affect NFS lands based on most current project description.

1.2 Habitat Evaluation

Habitats were visited within the Alt. 3 study area at the onset of the rare species evaluations in 2003 and 2004 for the purposes of documentation of various habitat characteristics in the field. Controlled burning is conducted by USFS throughout much of this portion of CNF and influences the communities present. Habitats differ based on soil, hydrology, and topographic changes. Nine major habitat types were identified in the evaluation area. These include Pine Flatwoods, Pine/Hardwood Forest, Streamhead Pocosin, Swamp Forest, Small Pond, Powerline Corridor, Pine Plantation, Successional/Ruderal Habitat, and Rural/Urban Modifications. Five habitat types are further divided by characteristics of hydrology or vegetation. Pine Flatwoods is the most abundant habitat type within the Alt. 3 study area and includes areas denoted as either mesic or hydric. Streamhead Pocosin is divided into tree-dominated and shrub-dominated areas based on canopy coverage. Swamp Forest has been grouped into three distinct regimes with respect to hydrologic conditions and stream characteristics: large stream, small stream, and

ponded/depressional. Powerline Corridor and Pine Plantation habitats are divided into mesic and hydric areas. One habitat type, Rural/Urban Modifications, is used to include all obvious human-maintained landscape modifications including roadsides, lawns, and other landscaped areas. Habitats sustaining regular disturbance are included under Successional/Ruderal Habitat. Detailed descriptions of the habitats present are provided in Appendix A. Vegetation community mapping is provided in Figures 2a – 2d in Appendix F.

2.0 SPECIES CONSIDERED AND EVALUATED

All USFS rare species that occur or could occur on the CNF were considered in this BE including: federally Proposed, Endangered, or Threatened (PET) species, Regional Forester's Sensitive (S) species, and Locally Rare (LR) species. The database of Element Occurrence (EO) records maintained by the North Carolina Natural Heritage Program (NCNHP) (as updated through April 2014), U.S. Fish and Wildlife Service (USFWS) lists of Endangered and Threatened species in the project counties, individual species Recovery Plans, records provided to or by USFS biologists, and scientific literature were reviewed to determine areas of known populations of rare species within the proposed project area. These databases and literature include survey information collected by private individuals, USFS personnel, and other federal and state agencies. Federally listed threatened and endangered species with known occurrence on the CNF include the Red-cockaded Woodpecker (*Picoides borealis*) and the Rough-leaved Loosestrife (*Lysimachia asperulaefolia*).

3.0 SITE SURVEYS AND DISCUSSION OF POTENTIAL EFFECTS

3.1 Site Surveys

3.1.1 Survey of Potential Habitat for Rare Species

To supplement existing information available at the onset of the evaluation for the project study area, surveys and evaluations were completed by a combination of ESI and NCDOT biologists between 2004 and 2013. Initial habitat assessments, including field evaluations for USFS rare plant species were conducted in 2003-2004 for the species listed at that time. The field surveys conducted in 2003-2004 included a floristic inventory that documented several new plant species records for the CNF. Targeted surveys for USFS listed rare plants, terrestrial wildlife, and aquatic wildlife species were undertaken in 2003-2005. Additional surveys for selected species have been undertaken in subsequent years. A summary of site surveys and evaluations undertaken by NCDOT is provided below. Copies of referenced survey reports are provided as attachments to this BE.

- 2003
    - Habitat evaluation for 1000-foot wide study corridor 3.
    - Field surveys for spring flowering USFS rare plant species for study corridor 3.
    - Habitat evaluations and field surveys for USFS rare butterfly species for study corridors 1, 2, and 3.

- 2004
    - Habitat evaluation for 1000-foot wide study corridors 1 and 2.
    - Field surveys for spring flowering USFS rare plant species for study corridors 1 and 2.
- 2005
    - Field surveys for USFS rare plant species for 1000-foot wide study corridors 1, 2, and 3.
    - Habitat evaluations and field surveys for USFS rare bird species for study corridors 1, 2, and 3 (see Attachment 2).
    - Habitat evaluations and field surveys USFS rare butterfly and moth species for study corridors 1, 2, and 3 (see Attachments 1 and 2). Additional butterfly surveys were conducted by NCNHP on CNF, mostly in savanna and powerline habitats.
    - Habitat evaluations and field surveys for USFS rare fish species for study corridors 1, 2, and 3 (see Attachment 2).
    - Habitat evaluations and field surveys for USFS rare mollusk and crustacean species for study corridors 1, 2, and 3.
    - Habitat evaluations and field surveys for USFS rare reptile and amphibian species and Eastern Woodrat (*Neotoma floridana*) for study corridors 1, 2, and 3 (see Attachment 2).
    - Habitat evaluations and field surveys for USFS rare bat surveys for study corridors 1, 2, and 3 (see Attachment 3).
- 2008/2009
    - Field surveys for select USFS rare plant species identified by the USFS within portions of the Croatan National Forest outside study corridors 1, 2, and 3.
    - Habitat evaluation and field surveys for USFS rare plant and animal species for the NCDOT Croatan Mitigation Bank (CMB), formerly known as the Croatan Wetland Mitigation Bank (see Attachment 4). Bat surveys continued annually until 2010.
    - GIS-based habitat evaluation for newly listed USFS rare plant and animal species for study corridors 1, 2, and 3 and indirect impact areas.
    - Updated direct and indirect impact analysis for USFS rare plant and animal species (see Attachment 5).
    - Field surveys for USFS rare butterfly species within portions of the CNF outside study corridors 1, 2, and 3.
- 2010
    - Field surveys for Rough-leaved Loosestrife for the Alt. 3 study area and alternatives identified within study corridors 1 and 2 (Alt.1 and Alt.2). Surveys conducted both on and off NFS lands (see Attachment 6).
    - Seed collection for Spring-flowering Goldenrod (*Solidago verna*) was undertaken at the request of the USFS for occupied sites within the Alt. 3 study area.
- 2011
    - GIS-based habitat evaluation for newly listed USFS rare plant and animal species within the Alt. 3 evaluation areas.
    - Direct and indirect impact analysis for USFS rare plant and animal species.

- Seed collection for Spring-flowering Goldenrod was undertaken at the request of the USFS for occupied sites within the Alt. 3 study area.

- 2012
  - Field surveys for select USFS rare plant species identified by the USFS within the Alt. 3 study area (see Attachments 7, 9, and 10).
  - Field surveys and evaluation of known occurrences for select USFS rare plant species identified by the USFS within portions of the CNF outside the Alt. 3 study area (see Attachments 10 and 12).
  - GIS-based habitat evaluation for newly listed USFS rare plant and animal species within the Alt. 3 evaluation area.
  - Seed collection for Spring-flowering Goldenrod was undertaken at the request of the USFS for occupied sites within the Alt. 3 study area.
- 2013
  - Updated direct and indirect impact analysis for USFS rare plant and animal species (see Attachment 8).
  - Field surveys within the Alt. 3 study area for non-native invasive species (NNIS) of plants identified as concerns for CNF by USFS (see Attachment 11).
  - Field surveys to locate new occurrences and evaluation of known occurrences for select USFS rare plant species (bryophytes) within portions of the Croatan National Forest outside the Alt. 3 evaluation area (see Attachment 12).
  - Seed collection for Spring-flowering Goldenrod and LeConte's Thistle (*Cirsium lecontei*) was undertaken at the request of the USFS for occupied sites within the Alt. 3 study area.
- 2014
  - Field survey and evaluation for Awned Mountain-mint (*Pycnanthemum setosum*), a USFS rare plant species recently documented within the Alt. 3 study area (see Attachment 13).
  - Seed collection for Spring-flowering Goldenrod, LeConte's Thistle, and Awned Mountain-mint are being undertaken at the request of the USFS for occupied sites within the Alt. 3 study area.

3.1.2 Surveys for Non-native Invasive Plant Species

In order to address a concern that construction of the proposed project could result in indirect effects to USFS rare species as the result of the introduction and/or expansion of non-native invasive species (NNIS) of plants, the Alt. 3 study area was evaluated for the presence of known infestations of NNIS and potential effects evaluated. See Attachment 11 for the complete report.

Non-native invasive plant species surveys on NFS lands in the Alt. 3 study area were conducted in September 2013 to delineate infestations of species listed by USFS as warranting management consideration. Most of the NNIS infestations occurred in areas identified as Rural/Urban Modifications habitat, with some species or occurrences also present in adjacent habitats. Non-native invasive plant species of concern to USFS that were identified as present in the Alt. 3 study area were Sericea Lespedeza (*Lespedeza cuneata*), Bicolor Lespedeza (*Lespedeza bicolor*), Mimosa (*Albizia julibrissin*), Chinese Privet (*Ligustrum sinense*), Multiflora Rose (*Rosa multiflora*), Japanese Honeysuckle (*Lonicera japonica*), Johnson Grass (*Sorghum halapense*),

English Ivy (*Hedera helix* var. *helix*), Chinese Wisteria (*Wisteria sinensis*), and Brazilian Vervain (*Verbena brasiliensis*).

The proposed action will construct US 70 Havelock Bypass Alt. 3 on new location across NFS lands. The areas disturbed by road construction as well as the future road shoulders and maintained right-of-way (ROW) of the completed project could serve as potential areas for spread of NNIS on NFS lands. Without intervention, these NNIS are expected to increase in some portions of the evaluation area. It is expected that with no control efforts along the existing road shoulders and other existing disturbed habitats the infestations will continue to spread within these areas and potentially into adjacent natural areas.

3.2 Plant Species

There are 107 plant species on the most recent (October 2013) list of rare plant species maintained by the USFS for the CNF. Of these 107 rare plant species, 35 species were dropped from further consideration because no suitable habitat is present within or in close proximity to the evaluation area. The species dropped from further consideration due to absence of suitable habitats are summarized below by habitat types.

No Maritime Forests or Ocean Beaches were identified in the evaluation area. No CNF-listed federally Endangered, Threatened, or Proposed plant species are restricted to these habitats and none were eliminated from further consideration due to the lack of these habitats within the evaluation area. The following Sensitive plant species were eliminated from further consideration due to a lack of these habitats within the evaluation area: a Liverwort (*Lejeunea dimorphophylla*), a Liverwort (*Metzgeria unicigera*), Large-seed Pellitory (*Parietaria praetermissa*), Coastal Goldenrod (*Solidago villosicarpa*), and Sunrise Lichen (*Teloschistes flavicans*). The following Locally Rare plant species were eliminated from further consideration due to a lack of these habitats within the evaluation area: Spreading Sandwort (*Arenaria lanuginosa* var. *lanuginosa*) and Coastal Virgin's-bower (*Clematis catesbyana*).

No Tidal Swamps or Freshwater/Brackish Marshes were identified in the evaluation area. The following federally Endangered, Threatened, or Proposed plant species was eliminated from further consideration due to the lack of these habitats: Sensitive Jointvetch (*Aeschynome virginica*). The following Sensitive plant species were eliminated from further consideration due to a lack of these habitats: Long's Bittercress (*Cardamine longii*), a Liverwort (*Frullania donnellii*), and Godfrey's Sandwort (*Minuartia godfreyi*). The following Locally Rare plant species were eliminated from further consideration due to a lack of these habitats: Twig-rush (*Cladium mariscoides*), Littlespike Spikerush (*Eleocharis parvula*), Beaked Spikerush (*Eleocharis rostellata*), Terrell Grass (*Elymus virginicus* var. *halophilus*), and Winged Seedbox (*Ludwigia alata*).

No marl outcrops, other habitats with exposed marl, or Basic Mesic Forest were identified in the evaluation area. No CNF-listed federally Endangered, Threatened, or Proposed plant species are restricted to these habitats and none were eliminated from further consideration due to the lack of these habitats within the evaluation area. The following Sensitive plant species were eliminated from further consideration due to a lack of these habitats within the evaluation area: Carolina Spleenwort (*Asplenium heteroresiliens)*, a Liverwort (*Cylindrocolea rhizantha*), Quillwort

(*Isoetes microvela*), and Piedmont Meadowrue (*Thalictrum macrostylum*). The following Locally Rare plant species were eliminated from further consideration due to a lack of these habitats within the evaluation area: Tennessee Bladder-fern (*Cystopteris tennesseensis*) and Bluff Oak (*Quercus austrina*).

No Cypress Savannas, Carolina Bays, or Limesink Ponds were identified in the evaluation area. No CNF-listed federally Endangered, Threatened, or Proposed plant species are restricted to these habitats and none were eliminated from further consideration due to the lack of these habitats within the evaluation area. The following Sensitive plant species were eliminated from further consideration due to a lack of these habitats within the evaluation area: Hirst's Panic Grass (*Dichanthelium hirstii*), Loose Watermilfoil (*Myriophyllum laxum*), Awned Meadow-beauty (*Rhexia aristosa*), Coastal Beaksedge (*Rhynchospora pleiantha*), and Chapman's Arrowhead (*Sagittaria chapmanii*). The following Locally Rare plant species were eliminated from further consideration due to a lack of these habitats within the evaluation area: Robbin's Spikerush (*Eleocharis robbinsii*), Flaxleaf Seedbox (*Ludwigia linifolia*), Northern White Beaksedge (*Rhynchospora alba*), Harper's Beaksedge (*Rhynchospora harperi*), and Southern Beaksedge (*Rhynchospora microcarpa*).

No Sandhills or Pine Barrens habitat was identified in the evaluation area. No CNF-listed federally Endangered, Threatened, or Proposed plant species are restricted to these habitats and none were eliminated from further consideration due to the lack of these habitats within the evaluation area. The following Sensitive plant species was eliminated from further consideration due to a lack of these habitats within the evaluation area: Southern Bogbutton (*Lachnocaulon beyrichianum*). The following Locally Rare plant species was eliminated from further consideration due to a lack of these habitats within the evaluation area: Showy Aster (*Eurybia spectabilis*).

Potentially suitable habitat or previously reported NCNHP or USFS records were identified in the evaluation area for 72 USFS rare plant species as noted in the table in Appendix B. The field surveys conducted in 2003-2004 included a floristic inventory that documented several new plant species records for the CNF. Additional surveys have been undertaken in subsequent years for selected species. Surveys conducted from 2003-2013 in combination with records available from NCNHP and the USFS resulted in documentation or confirmation of the presence within the evaluation area of 21 USFS rare plant species currently on the USFS rare plant list for the CNF. The botanical surveys did not identify the presence of 51 of the USFS rare plant species currently on the USFS rare plant list for which potential habitat had been identified in the Alt. 3 study area. Site survey results and/or NCNHP/USFS records for USFS rare plant species are presented on Figures 3a – 3d in Appendix F.

A summary of the evaluation for all 72 species with potentially suitable habitat identified or previously reported NCNHP records within the evaluation area is presented below.

- **Branched Gerardia** (*Agalinis virgata*) (LR) is found in savanna and depression pond habitats. Potentially suitable habitat was identified in the evaluation area. No Branched Gerardia plants were observed within the evaluation area during site surveys. The nearest known occurrence is approximately 3.4 miles from the Alt. 3 study area. Based on

apparent absence of this species, it is determined that the proposed project will have no impact on Branched Gerardia.

- **Tall Bentgrass** (*Agrostis altissima*) (LR) is found in wet savanna habitats. Potentially suitable habitat was identified in the evaluation area. No Tall Bentgrass plants were observed within the evaluation area during site surveys. The nearest known occurrence is approximately 11 miles from the Alt. 3 study area. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Tall Bentgrass.

- **Bog Bluestem** (*Andropogon mohrii*) (LR) is found in wet savanna habitats. Potentially suitable habitat was identified in the evaluation area. No Bog Bluestem plants were observed within the Alt. 3 study area; however, one occurrence of this species has been documented in powerline corridor habitat located within the area being considered for indirect impacts in the evaluation area (Figure 3b). Including this occurrence, there are six known occurrences of Bog Bluestem on NFS lands in the CNF.

  Based on the apparent absence of this species in the Alt. 3 study area, there will be no direct impacts. No changes in management of the powerline ROW by mowing are expected to result from project implementation, reducing the concerns for indirect impacts. However, the ability for the USFS to conduct periodic prescribed burns in these powerline areas will need to be continued. Potential indirect impacts that could result from construction or maintenance activities can be minimized through conservation commitments made by NCDOT, including allowing for the closure of the highway to allow the USFS to conduct periodic prescribed burns and implementation of measures proposed for controlling the spread of NNIS plant species along the ROW across NFS lands. With implementation of the mitigation measures agreed to between NCDOT and USFS to minimize potential for indirect impacts, it is determined that the proposed project will have no impact on Bog Bluestem. Cumulative impacts identified consisted of the Duke Energy Progress (DEP) overhead ground wire (also known as static wire) replacement project, which may impact individuals of this species, but was determined to not likely result in viability concerns across the CNF.

- **Ovateleaf Cacalia** (*Arnoglossum ovatum*) (LR) is found in wet savanna habitats. Potentially suitable habitat was identified in the evaluation area. No Ovateleaf Cacalia plants were observed within the evaluation area during site surveys. The nearest known occurrence is approximately 33 miles from the Alt. 3 study area. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Ovateleaf Cacalia.

- **Stalked Milkwort** (*Asclepias pedicellata*) (LR) is found in dry savanna and moist flatwood habitats. Potentially suitable habitat was identified in the evaluation area. No Stalked Milkweed plants were observed within the evaluation area during site surveys. The nearest known occurrence is approximately 5 miles from the Alt. 3 study area. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Stalked Milkweed.

- **Many-flower Grass Pink** (*Calopogon multiflorus*) (S) is found in savanna and sandhill habitats. Potentially suitable habitat was identified in the evaluation area. No Many-flowered Grass Pink plants were observed within the evaluation area during site surveys. The nearest known occurrence is approximately 7 miles from the Alt. 3 study area. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Many-flowered Grass Pink.

- **Savanna Campylopus** (*Campylopus carolinae*) (S) is a moss found in savanna habitats. The nearest known occurrence is approximately 29 miles from the Alt. 3 study area. Potentially suitable habitat was identified in the evaluation area. No Savanna Campylopus plants were observed within the evaluation area during site surveys. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Savanna Campylopus.

- **Widow Sedge** (*Carex basiantha*) (LR) is found in mesic forests, bottomland, and lower slope habitats over calcareous rocks and sediments. Potentially suitable habitat was identified in the evaluation area. No Widow Sedge plants were observed within the evaluation area during site surveys. The nearest known occurrence is approximately 12 miles from the Alt. 3 study area. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Widow Sedge.

- **Calcium-fleeing Sedge** (*Carex calcifugens*) (LR) is found in rich bluff forest and evergreen maritime forest habitats. Potentially suitable habitat was identified in the evaluation area. No Calcium-fleeing Sedge plants were observed within the evaluation area during site surveys. The nearest known occurrence is approximately 18 miles from the Alt. 3 study area. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Calcium-fleeing Sedge.

- **Emmon's Sedge** (*Carex emmonsii*) (LR) is found in dry, sandy woodland habitats. Potentially suitable habitat was identified in the evaluation area. No Emmon's Sedge plants were observed within the evaluation area during site surveys. The nearest known occurrence is approximately 12 miles from the Alt. 3 study area. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Emmon's Sedge.

- **Hop-like Sedge** (*Carex lupuliformis*) (LR) is found in wet forest, swamp, and riverbank habitats, and around ponds. Potentially suitable habitat was identified in the evaluation area. No Hop-like Sedge plants were observed within the evaluation area during site surveys. The nearest known occurrence is approximately 12 miles from the Alt. 3 study area. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Hop-like Sedge.

- **LeConte's Thistle** (*Cirsium lecontei*) (LR) is found in savanna habitats. Potentially suitable habitat was identified in the evaluation area. Surveys completed in 2012 and 2013 within all known Element Occurrences (EOs) on the CNF confirmed the continued presence of LeConte's Thistle in five EOs (12, 17, 24, 26, and 32) and indicated this

species may occur in an additional two EOs (27 and 29) where they were last observed in 2004 and 2005 (see Attachment 10). These seven areas collectively had 216 plants dispersed across 24.8 acres of occupied or potentially occupied habitat documented on NFS lands in the CNF.

- Alt. 3 directly affects EO 26 (Figure 3c) and EO 29 (Figure 3a). EO 26 is composed of two discrete sites that are dispersed across 8.5 acres; one site will not be affected but approximately 1.7 acres of the other site will be directly affected. Individual LeConte's Thistle plants observed within this affected site occur to the north and south of the area to be directly impacted but no plants were observed within the direct impact area. EO 29 is composed of three discrete sites that in total were dispersed across 0.2 acre and Alt. 3 will impact the EO in its entirety. No individuals of LeConte's Thistle were observed within this EO during the 2012 survey. However, 31 individuals of this species were observed in 2005 and because this species may be biennial, this occurrence may comprise individuals that flower in alternate years.
- An additional 13.4 acres of reported occurrence are in areas subject to indirect impact consideration for Alt. 3 including an additional 6.0 acres of EO 26 (Figure 3c). The entire 5.9 acres of EO 24 are in an area subject to indirect impact consideration (Figure 3b). The 2013 survey documented more than 50 individual plants in the area of EO 26 that may be subject to indirect impacts and 99 individual plants in the area of EO 24 that may be subject to indirect impacts (Biotics GIS Database 2014). These individual plants were observed within the powerline ROW which is currently being managed by a combination of mowing by the utility company operating the lines within the ROW and periodic prescribed burns conducted by the USFS. No changes in management of the powerline ROW by mowing are expected to result from project implementation, reducing the concerns for indirect impacts. However, the ability for the USFS to conduct periodic prescribed burns in these powerline areas will need to be continued.

The US 70 Havelock Bypass (R-1015) Alt. 3 will result in unavoidable direct impacts to LeConte's Thistle habitat and has the potential for indirect impacts. Alt. 3 directly affects approximately 1.9 acres of two mapped LeConte's Thistle EOs, but no individual plants were observed during the 2012 survey in the habitat area directly impacted. However, because this species may be a biennial and part of the population may be difficult to detect during non-flowering years, direct impacts may be assumed based on presence of plants of this species elsewhere within the mapped EOs and presence of suitable habitat within the portion of the EOs in the direct impact area. An additional 13.4 acres and more than 150 individual plants observed during the 2013 survey are located in areas subject to indirect impact consideration. The area subject to consideration for indirect impacts represents a relatively large percentage of the population and areal extent of LeConte's Thistle recently documented as extant or potentially extant on NFS lands in the CNF. These three populations with either indirect or direct impacts represent the three highest quality LeConte's thistle populations documented in the CNF. The project is not expected to result in changes that would prevent the utility company from continued mowing to maintain the powerline ROW.

Mitigation measures are needed to reduce the threat for a loss of viability for LeConte's Thistle on NFS lands in within the CNF. Implementation of mitigation measures agreed to between NCDOT and USFS, such as temporarily closing the bypass to allow for prescribed burns, and implementation of measures proposed for controlling the spread of NNIS plant species along the ROW across NFS lands would minimize viability concerns resulting from indirect impacts. In addition, NCDOT has agreed to collect seeds from viable EOs for use in supplementing existing EOs where suitable habitat occurs but numbers of individuals are low or individuals have not been recently documented. Seed collection was initiated for Leconte's Thistle in 2013.

The proposed project may impact individuals of LeConte's Thistle, but with implementation of these mitigation measures agreed to between NCDOT and USFS, it is determined that the proposed project is not likely to cause a loss of viability for LeConte's Thistle on NFS lands in the CNF.

Cumulative impacts identified consisted of the DEP overhead ground wire replacement project, which may impact individuals of this species, but was determined to not likely result in viability concerns across the CNF. No cumulative impacts from other USFS or NCDOT projects on NFS lands on the CNF have been identified.

- **Small Coastal Spreading Pogonia** (*Cleistesiopsis oricamporum*) (S), formerly known as *Cleistes bifaria* which was recently split into two separate taxa, is found in savannas and dry meadow habitats. Potentially suitable habitat was identified in the evaluation area. One occurrence of Small Coastal Spreading Pogonia is present within the Alt. 3 study area (Figure 3a) and two additional occurrences are present in the area being considered for potential indirect effects (Figure 3b-3c). Including these three occurrences, there are seven known occurrences of Small Coastal Spreading Pogonia on NFS lands in the CNF.

  One occurrence of this species has direct impacts. The two occurrences in the indirect impact area are located in fire-maintained habitats. The ability for the USFS to conduct periodic prescribed burns in these powerline areas will need to be continued. Potential indirect impacts that could result from construction or maintenance activities can be minimized through conservation commitments made by NCDOT, including allowing for the closure of the highway to allow the USFS to conduct periodic prescribed burns and implementation of measures proposed for controlling the spread of NNIS plant species along the ROW across NFS lands. The proposed project may impact individuals of Small Coastal Spreading Pogonia, but with implementation of these mitigation measures agreed to between NCDOT and USFS, it is determined that the proposed project is not likely to cause a loss of viability for Small Coastal Spreading Pogonia on NFS lands in the CNF. Cumulative impacts identified consisted of the DEP overhead ground wire replacement project, which may impact individuals of this species, but was determined to not likely result in viability concerns across the CNF.

- **Spring Coral-root** (*Corallorhiza wisteriana*) (LR) is found in moist forest habitats. Potentially suitable habitat was identified in the evaluation area. No Spring Coral-root

plants were observed within the evaluation area during site surveys. The nearest known occurrence is approximately 19 miles from the Alt. 3 study area. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Spring Coral-root.

- **Beadle's Coreopsis** (*Coreopsis helianthoides*) (LR) is found in swamp forest, swamp edge, and bog habitats. Potentially suitable habitat was identified in the evaluation area. No Beadle's Coreopsis plants were observed within the evaluation area during site surveys. The nearest known occurrence is approximately 13 miles from the Alt. 3 study area. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Beadle's Coreopsis.

- **Carolina Sunrose** (*Crocanthemum carolinianum*) (LR) is found in sandhill, pineland, and dry savanna habitats. Potentially suitable habitat was identified in the evaluation area. No Carolina Sunrose plants were observed within the evaluation area during site surveys. The nearest known occurrence is approximately 9 miles from the Alt. 3 study area. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Carolina Sunrose.

- **Spindle-fruited Witch Grass** (*Dichanthelium fusiforme*) (LR) is found in dry to moist sand of open pine and pine/oak wood habitats and clearings. Potentially suitable habitat was identified in the evaluation area. No Spindle-fruited Witch Grass plants were observed within the evaluation area during site surveys. The nearest known occurrence is approximately 19 miles from the Alt. 3 study area. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Spindle-fruited Witch Grass.

- **Hidden-flowered Witch Grass** (*Dichanthelium* sp. 9) (LR) is found in pocosin, wet meadow, and ditchline habitats. Potentially suitable habitat was identified in the evaluation area. No Hidden-flowered Witch Grass plants were observed within the evaluation area during site surveys. The nearest known occurrence is approximately 10 miles from the Alt. 3 study area. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Hidden-flowered Witch Grass.

- **Eaton's Witch Grass** (*Dichanthelium spretum*) (LR) is found in wet sand, peaty bog, and savanna habitats. Potentially suitable habitat was identified in the evaluation area. No Eaton's Witch Grass plants were observed within the Alt. 3 study area, however, one occurrence of this species is present in a powerline ROW located within the area being considered for indirect impacts in the evaluation area (Figure 3b). Including this occurrence there are two known occurrences of Eaton's Witch Grass on NFS lands in the CNF.

  Based on the apparent absence of this species in the Alt. 3 study area, there will be no direct impacts. No changes in management of the powerline ROW by mowing are expected to result from project implementation, reducing the concerns for indirect

impacts. However, the ability for the USFS to conduct periodic prescribed burns in these powerline areas will need to be continued. Potential indirect impacts that could result from construction or maintenance activities can be minimized through conservation commitments made by NCDOT, including allowing for the closure of the highway to allow the USFS to conduct periodic prescribed burns and implementation of measures proposed for controlling the spread of NNIS plant species along the ROW across NFS lands. With implementation of these mitigation measures agreed to between NCDOT and USFS to minimize potential for indirect impacts, it is determined that the proposed project will have no impact on Eaton's Witch-grass.

- **Venus Flytrap** (*Dionaea muscipula*) (S) is found in savanna, seepage bog, and pocosin edge habitats with little competition. Potentially suitable habitat was identified in the evaluation area. No Venus Flytrap plants were observed within the evaluation area during site surveys. The nearest known occurrence is approximately 4.5 miles from the Alt. 3 study area. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Venus Flytrap.

- **Seven-angled Pipewort** (*Eriocaulon aquaticum*) (LR) is found in pond and lake habitats. Potentially suitable habitat was identified in the evaluation area. No Seven-angled Pipewort plants were observed within the evaluation area during site surveys. The nearest known occurrence is approximately 2.7 miles from the Alt. 3 study area. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Seven-angled Pipewort.

- **Hall's Pocket Moss** (*Fissidens hallii*) (S) is found on wet soil or bark of tree bases in cypress-gum swamp habitat and also on rotting logs and stumps. Potentially suitable habitat was identified in the evaluation area. No Hall's Pocket Moss plants were observed within the evaluation area during site surveys. The nearest known occurrence is approximately 12 miles from the Alt. 3 study area. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Hall's Pocket Moss.

- **Comfortroot** (*Hibiscus aculeatus*) (LR) is found in pine savanna habitats and dry sandy or loamy soils of maritime forest edges. Potentially suitable habitat was identified in the evaluation area. No Comfortroot plants were observed within the evaluation area during site surveys. The nearest known occurrence is approximately 4 miles from the Alt. 3 study area. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Comfortroot.

- **Catchfly Cutgrass** (*Leersia lenticularis*) (LR) is found in floodplain forest and swamp habitats. Potentially suitable habitat was identified in the evaluation area. No Catchfly Cutgrass plants were observed within the evaluation area during site surveys. The nearest known occurrence is approximately 16 miles from the Alt. 3 study area. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Catchfly Cutgrass.

- **A liverwort** (*Lejeunea bermudiana*) (LR) is found on the bark on trees along the edges of swamp habitats. Potentially suitable habitat was identified in the evaluation area. *Lejeunea bermudiana* has been confirmed as present in seven watersheds on NFS lands in the CNF during surveys conducted in 2012 and 2013 (see Attachment 12). Alternative 3 directly affects two watersheds that include EOs for this species.
    - Within the Tucker Creek watershed, Alternative 3 directly affects EO 8 in its entirety, including the new confirmed sample locations documented in 2013 (Figure 3d). The occurrences in this watershed have been impacted by recent forest management activities (thinning) resulting in increased light penetration, but because the Havelock Bypass project would result in presumed loss of this population, the forest management activities would not contribute to significant adverse cumulative effects.
    - Within the Southwest Prong Slocum Creek watershed, Alternative 3 directly affects a portion of the population (Figure 3b). The portion of the population represented by EO 4 could be directly affected by removal of one tree with confirmed occurrence, as well as other trees not sampled within the ROW clearing limits that could potentially harbor this species. The documented distribution of this species within this watershed extends approximately 3,000 feet upstream and 3,400 feet downstream of the potential impact to EO 4 associated with Alt. 3; however, the distribution of this species within this watershed is limited to suitable trees in appropriate hydrologic zones and is likely discontinuous. The portions of the population within this watershed represented by EOs 5 and 6 are not directly affected. Direct impacts from the proposed project could result in loss of a portion of this population, but is not expected to result in a complete loss of the population in the Southwest Prong Slocum Creek watershed.
    - Within the Southwest Prong Slocum Creek watershed, Alternative 3 may result in indirect effects to a portion of the population (Figure 3b). Indirect effects from clearing of forest canopy in the ROW may be expected to extend up to 250 feet outside the ROW, which could result in effects to additional occupied habitat within the portion of the population represented by EO 4, including the two new confirmed sample locations documented in 2012. The portions of the population represented by EOs 5 and 6 are outside the zone considered for potential indirect effects from increased light penetration.

  The US 70 Havelock Bypass (R-1015) Alternative 3 will result in unavoidable direct impacts to *Lejeunea bermudiana* and additional areas occupied by *L. bermudiana* are subject to consideration for indirect impacts. The direct impacts for Alternative 3 may lead to a loss of the population in Tucker Creek and a portion of the population in Southwest Prong Slocum Creek.

  Because the loss of one of two populations and partial loss of the second population known prior to 2012 on NFS lands in the CNF resulting from the US 70 Havelock Bypass project could lead to viability concerns, mitigation measures were required to reduce the threat for a loss of viability for *Lejeunea bermudiana* on NFS lands in the CNF. Because this species is cryptic and not widely studied or easily documented, the identification of

new populations of this species in secure locations elsewhere on NFS lands is considered by the USFS to be an important mitigation measure. Five new populations of *L. bermudiana* have been identified in 2012-2013 on behalf of USFS by NCDOT on NFS lands in the CNF. These newly discovered occurrences are located in stream systems well outside the area affected by the US 70 Havelock Bypass project (see Attachment 12 for details).

Implementation of additional mitigation measures agreed to between NCDOT and USFS, including implementation of measures proposed for controlling the spread of NNIS plant species on NFS lands, particularly for Chinese Privet, would minimize potential for loss of the remaining portion of the Southwest Prong Slocum Creek from indirect impacts.

With the identification of five new populations by NCDOT on NFS lands in the CNF in watersheds not subject to effects by the US 70 Havelock Bypass project and the implementation of the additional mitigation measures to minimize potential for indirect effects to the remaining portion of the population in Southwest Prong Slocum Creek, the US 70 Havelock Bypass (R-1015) Alternative 3 project may result in loss of one population (Tucker Creek) and partial loss of one population (Southwest Prong Slocum Creek), but is not likely to cause a loss of viability for *Lejeunea bermudiana* on NFS lands in the CNF.

- **Pondspice** (*Litsea aestivalis*) (S) is found on the margins of limesink ponds and Carolina bays. Potentially suitable habitat was identified in the evaluation area. No Pondspice plants were observed within the evaluation area during site surveys. The nearest known occurrence is approximately 4 miles from the Alt. 3 study area. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Pondspice.

- **Boykin's Lobelia** (*Lobelia boykinii*) (S) is found in cypress pond and depression meadow habitats. Potentially suitable habitat was identified in the evaluation area. No Boykin's Lobelia plants were observed within the evaluation area during site surveys. The nearest known occurrence is approximately 21 miles from the Alt. 3 study area. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Boykin's Lobelia.

- **Raven's Seedbox** (*Ludwigia ravenii*) (S) is found in savanna, swamp, marsh, and wet open area habitats. Potentially suitable habitat was identified in the evaluation area. No Raven's Seedbox plants were observed within the evaluation area during site surveys. The nearest known occurrence is an historic occurrence documented approximately 0.6 mile from the Alt. 3 study area. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Raven's Seedbox.

- **Globe-fruit seedbox** (*Ludwigia sphaerocarpa*) (LR) is found in boggy areas, pools, ditches, river marshes, interdune swales, and pond shores. Potentially suitable habitat was identified in the evaluation area. No Globe-fruit Seedbox plants were observed within the evaluation area during site surveys. The nearest known occurrence is

approximately 4.7 miles from the Alt. 3 study area. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Globe-fruit Seedbox.

- **Rough-leaved Loosestrife** (*Lysimachia asperulaefolia*) (E) is a federally Endangered species found in pocosin/savanna ecotone habitat. Potentially suitable habitat was identified in the evaluation area. Surveys targeting Rough-leaved Loosestrife were conducted for NFS lands in July 2004 and again for the entire project study area (NFS lands as well as non-NFS lands) in June 2010. No rough-leaved loosestrife plants were observed within the evaluation area during site surveys. The nearest known occurrence is approximately 4.5 miles from the Alt. 3 study area. This location off Little Road in a Carolina Vegetation Survey (CVS) plot was recorded in 1991 and not updated since that initial survey. Gary Kauffman relocated the CVS plot and searched for Rough-leaved Loosestrife in 2010 and 2011. No individuals were located nor did the habitat appear as clearly defined as other occupied sites in the southern portion of the CNF. Based on the absence of individuals and potentially suitable habitat in the previously documented occurrence in the CVS plot in Craven County, and the apparent absence of this species based on surveys in the Alt. 3 study area in 2004 and 2010, it is determined that the proposed project will have No Effect to Rough-leaved Loosestrife.

- **Loomis's Loosestrife** (*Lysimachia loomisii*) (S) is found in moist to wet savanna and pocosin ecotone habitats. Potentially suitable habitat was identified in the evaluation area. This species is not tracked by NCNHP. This species is considered to be secure on the CNF with more than 50 known occurrences (personal communication, Gary Kauffman, USFS). Loomis's loosestrife has been recommended to be removed from USFS Region 8 Sensitive plant list. This list is scheduled to be updated in 2014. Incidental observations of this species within the Powerline Corridors, wet Pine Flatwoods, and open areas within the Streamhead Pocosins during the 2003-2004 field surveys indicate that this species is relatively common and is presumed present in suitable habitat within the Alt. 3 study area and the areas being considered for potential indirect effects.

  This species was observed in areas with direct impacts. The occurrences in the indirect impact area are located in fire-maintained habitats. The ability for the USFS to conduct periodic prescribed burns in these powerline areas will need to be continued. Potential indirect impacts that could result from construction or maintenance activities can be minimized through conservation commitments made by NCDOT, including allowing for the closure of the highway to allow the USFS to conduct periodic prescribed burns and implementation of measures proposed for controlling the spread of NNIS plant species along the ROW across NFS lands. The proposed project may impact individuals of Loomis's Loosestrife, but with implementation of these mitigation measures agreed to between NCDOT and USFS, it is determined that the proposed project is not likely to cause a loss of viability for Loomis's Loosestrife on NFS lands in the CNF. In addition, surveys on the CMB identified several occurrences of this species on the property. Contingent upon USFS release of ROW for the Havelock Bypass, the transfer of the

CMB property to USFS would provide an additional mitigation measure by adding these occurrences to NFS lands on the CNF.

Cumulative impacts identified consisted of the DEP overhead ground wire replacement project, which may impact individuals of this species, but was determined to not likely result in viability concerns across the CNF.

- **Carolina Birds-in-a-nest** (*Macbridea caroliniana*) (S) is found in blackwater swamp and savanna habitats. Potentially suitable habitat was identified in the evaluation area. No Carolina Birds-in-a-nest plants were observed within the evaluation area during site surveys. The nearest known occurrence is located in Pender County. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Carolina Birds-in-a-nest.

- **Florida Adder's Mouth** (*Malaxis spicata*) (LR) is found in maritime swamp forest habitats, and in calcareous but mucky swamp, spring-fed swamp, and wet hammock habitats. Potentially suitable habitat was identified in the evaluation area. No Florida Adder's Mouth plants were observed within the Alt. 3 study area. However, one occurrence of this species is present in the area being considered for indirect impacts in the evaluation area, in the vicinity of Southwest Prong Slocum Creek (Figure 3b). The occurrence in the vicinity of Southwest Prong Slocum Creek is located in a swamp forest greater than 250 feet from the Alt. 3 study area. Including this occurrence, there are six known occurrences of Florida Adder's Mouth on NFS lands in the CNF.

  Based on the apparent absence of this species in the Alt. 3 study area, there will be no direct impacts. No changes in management to the swamp forest habitat are expected to result from project implementation, reducing concerns for indirect impacts. Potential indirect impacts that could result from construction or maintenance activities can be minimized through conservation commitments made by NCDOT, including implementation of measures proposed for controlling the spread of NNIS plant species along the ROW across NFS lands. With implementation of these mitigation measures agreed to between NCDOT and USFS to minimize potential for indirect impacts, it is determined that the proposed project will have no impact on Florida Adder's Mouth.

- **Narrowleaf Cowlily** (*Nuphar sagittifolia*) (S) is found in blackwater streams, rivers, and lakes in swift, sluggish, or stagnant water, extending downstream into freshwater tidal areas. Potentially suitable habitat was identified in the evaluation area. No Narrowleaf Cowlily plants were observed within the evaluation area during site surveys. The nearest known occurrence is located in Jones County. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Narrowleaf Cowlily.

- **Shortleaf Basket Grass** (*Oplismenus hirtellus* spp. *setarius*) (LR) is found in hammocks, maritime forests, shell middens, and moist forest habitats. Potentially suitable habitat was identified in the evaluation area. No Shortleaf Basket Grass plants were observed within the evaluation area during site surveys. The nearest known occurrence is approximately 12 miles from the Alt. 3 study area. Based on apparent absence of this

species, it is determined that the proposed project will have no impact on Shortleaf Basket Grass.

- **Piedmont Cowbane** (*Oxypolis ternata*) (S), formerly referred to as *Oxypolis denticulata*, is found in pine savannas and sandhill seeps. Potentially suitable habitat was identified in the evaluation area. Two occurrences of Piedmont Cowbane were identified within the Alt. 3 study area (Figure 3c) and two additional occurrences identified as present in the area being considered for potential indirect effects (Figure 3b). The NC Natural Heritage Program (NCNHP) previously tracked this species but found the species to be so common it was downgraded to the watch list in the mid 1990's (Misty Franklin, former NCNHP botanist, personal communication 2010). It has been documented within 17 NC counties including all three containing the CNF (Gadd and Finnegan 2012). The species has recently been dropped from the NC watch list (Gadd and Finnegan 2012). It is unknown how many records of this species occur in the CNF but it is not inconceivable 40-50 separate sites occur (personal communication, Gary Kauffman). For these reasons the species has been recommended to be removed from USFS Region 8 Sensitive plant list. This list is scheduled to be updated in 2014.

  Two occurrences of this species are subject to direct impacts. The occurrences in the indirect impact area are located in fire-maintained habitats. The ability for the USFS to conduct periodic prescribed burns in these powerline areas will need to be continued. Potential indirect impacts that could result from construction or maintenance activities can be minimized through conservation commitments made by NCDOT, including allowing for the closure of the highway to allow the USFS to conduct periodic prescribed burns and implementation of measures proposed for controlling the spread of NNIS plant species along the ROW across NFS lands. The proposed project may impact individuals of Piedmont Cowbane, but with implementation of these mitigation measures agreed to between NCDOT and USFS, it is determined that the proposed project is not likely to cause a loss of viability for Piedmont Cowbane on NFS lands in the CNF. Cumulative impacts identified consisted of the DEP overhead ground wire replacement project, which may impact individuals of this species, but was determined to not likely result in viability concerns across the CNF.

- **Carolina Grass-of-parnassus** (*Parnassia caroliniana*) (S) is found in wet pine or cypress savanna (typically shallowly underlain by coquina limestone) and sandhill seepage bog habitats. Potentially suitable habitat was identified in the evaluation area. No Carolina Grass-of-parnassus plants were observed within the evaluation area during site surveys. The nearest known occurrence is located near the Onslow/Pender County border. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Carolina Grass-of-parnassus.

- **Mudbank Crown Grass** (*Paspalum dissectum*) (LR) is found on mudbank, open wet area, and wet ditch habitats. Potentially suitable habitat was identified in the evaluation area. This evaluation indicated that Mudbank Crown Grass is present in four discrete sites delineated on NFS lands, including one that is mostly on private lands and marginally extends onto NFS lands as depicted on Figure 3c (see also Attachment 9 for

detailed assessment). A total of 1,079 individual Mudbank Crown Grass plants were estimated as present on NFS lands during the 2012 survey within these sites. These four sites collectively cover 5.9 acres of occupied habitat documented on NFS lands in the CNF.

- Alt. 3 directly affects EO 7. EO 7 consists of two sites that total 3.9 acres. Alt. 3 will directly impact approximately 1.7 acres of the total 1.9 acres within the site identified as 7a of this EO. All seven culms observed within Site 7a are in the area that will be directly impacted. Alt. 3 avoids direct impacts to the other 1,072 estimated culms in the site identified as 7b within this EO.
- Approximately 4.2 acres of occupied habitat on NFS lands are in areas subject to indirect impact consideration for Alt. 3 including an additional 2.2 acres of EO 7. This includes Sites 7b (part of EO 7) and EO 12 in their entirety, and approximately 7% of EO 13. The 2012 survey estimated that approximately 1,072 culms are present on NFS lands that may be subject to indirect impacts. These culms were observed within the powerline ROW which is currently being managed by a combination of mowing by the utility company operating the lines within the ROW and periodic prescribed burns conducted by the USFS.

The US 70 Havelock Bypass (R-1015) Alt. 3 will result in unavoidable direct impacts to Mudbank Crown Grass and has the potential for indirect impacts. Alt. 3 directly affects approximately 1.7 acres and 7 culms of Mudbank Crown Grass identified within one occupied habitat site. An additional 4.2 acres and 1,072 culms estimated during the 2012 survey are located on NFS lands in areas subject to indirect impact consideration. Cumulative impacts identified for this species consisted of the DEP overhead ground wire replacement project, which may impact individuals of this species, but was determined to not likely result in viability concerns across the CNF. No additional cumulative impacts from other USFS or NCDOT projects on NFS lands on the CNF have been identified.

Based on the limited direct impact to this species for Alt. 3, the direct impacts are not likely to result in a loss of viability on NFS lands within the CNF. The area subject to consideration for indirect impacts represents the remainder of the population and areal extent of Mudbank Crown Grass known to occur on NFS lands in the CNF. No changes in management of the powerline ROW by mowing are expected to result from project implementation, reducing the concerns for indirect impacts. However, the ability for the USFS to conduct periodic prescribed burns in these powerline areas will need to be continued. Potential indirect impacts that could result from construction or maintenance activities can be minimized through conservation commitments made by NCDOT, including allowing for the closure of the highway to allow the USFS to conduct periodic prescribed burns and implementation of measures proposed for controlling the spread of NNIS plant species along the ROW across NFS lands.

The proposed project may impact individuals of Mudbank Crown Grass, but with implementation of these mitigation measures agreed to between NCDOT and USFS, it is determined that the proposed project is not likely to cause a loss of viability for Mudbank Crown Grass on NFS lands in the CNF.

- **Hairy Smartweed** (*Persicaria hirsuta*) (LR) is found in limesink pond, clay-lined Carolina bay, and blackwater stream edge habitats. Potentially suitable habitat was identified in the evaluation area. No Hairy Smartweed plants were observed within the evaluation area during site surveys. The nearest known occurrence is approximately 9 miles from the Alt. 3 study area. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Hairy Smartweed.

- **Small Butterwort** (*Pinguicula pumila*) (LR) is found in savanna habitats. Potentially suitable habitat was identified in the evaluation area. No Small Butterwort plants were observed within the evaluation area during site surveys. The nearest known occurrence is approximately 5 miles from the Alt. 3 study area. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Small Butterwort.

- **A Liverwort** (*Plagiochila ludoviciana*) (LR) is found on bark or moist rock in swamp habitats and mountain gorges. *Plagiochila ludoviciana* has been documented from three watersheds on NFS lands within the CNF during surveys conducted in 2012 and 2013 (see Attachment 12). In each watershed it was found in similar habitat and often on the same trees documented as having *Lejeunea bermudiana* present. Within the Tucker Creek watershed, Alt. 3 directly affects the known occurrence in its entirety (Figure 3d). This occurrence is located on a tree that has been damaged by a recent lightning strike and is sloughing off large areas of bark, with the tree expected to succumb to the lightning damage. However, this species may occur on other suitable, unsampled trees present in the direct impact area. Occupied habitat in the form of mature hardwood trees within the Southwest Prong Slocum Creek watershed is in an area that is subject to consideration for indirect effects by Alternative 3 (Figure 3b). Patches of this species were observed on tree trunks within the area under consideration for indirect effects.

  The US 70 Havelock Bypass (R-1015) Alternative 3 will result in unavoidable direct impacts to *Plagiochila ludoviciana* and an additional area occupied by *P. ludoviciana* is subject to consideration for indirect impacts. The direct impacts for Alternative 3 may lead to a loss of the population in Tucker Creek. The occurrence in this watershed also has been impacted by recent forest management activities (thinning) resulting in increased light penetration, but because the Havelock Bypass project would result in presumed loss of this population, the forest management activities would not contribute to significant adverse cumulative effects. Alternative 3 may result in indirect effects to the population in Southwest Prong Slocum Creek. No significant adverse cumulative impacts from other projects were identified.

  No changes in management to the swamp forest habitat are expected to result from project implementation, reducing concerns for indirect impacts. Potential indirect impacts that could result from construction or maintenance activities can be minimized through conservation commitments made by NCDOT, including implementation of measures proposed for controlling the spread of NNIS plant species along the ROW across NFS lands. The identification of new populations of this species in secure

locations on NFS lands is an important mitigation measure and one new population of *Plagiochila ludoviciana* has already been identified on behalf of USFS by NCDOT on NFS lands in the CNF in a watershed unaffected by the US 70 Havelock Bypass project. This new, unaffected occurrence was documented in 2013 in the Pettiford Creek watershed in association with *Lejeunea bermudiana*. Based on co-occurrences of *P. ludoviciana* with *L. bermudiana* at sites where *P. ludoviciana* has been documented so far, it is likely that *P. ludoviciana* may also be found in association with *L. bermudiana* at other sites in the CNF where *L. bermudiana* was documented in 2012-2013.

The proposed project may impact individuals of *Plagiochila ludoviciana*, but with implementation of these mitigation measures agreed to between NCDOT and USFS, it is determined that the proposed project is not likely to cause a loss of viability for *Plagiochila ludoviciana* on NFS lands in the CNF.

- **A Liverwort** (*Plagiochila miradorensis miradorensis*) (LR) is found on bark in maritime forest and swamp habitats. Potentially suitable habitat was identified in the evaluation area. No *P. m. miradorensis* plants were documented within the evaluation area during site surveys. The nearest known occurrence is approximately 10 miles from the Alt. 3 study area. Based on apparent absence of this species, it is determined that the proposed project will have no impact on *P. m. miradorensis*.

- **Pineland Plantain** (*Plantago sparsiflora*) (S) is found in wet savanna habitats over calcareous substrates and human created microhabitats adjacent to these sites, such as fire-plow lines, shallow ditches, and mowed powerline rights-of-way. Potentially suitable habitat was identified in the evaluation area. No Pineland Plantain plants were observed within the evaluation area during site surveys. The nearest known occurrence is located near the Onslow/Pender County border. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Pineland Plantain.

- **Yellow Fringeless Orchid** (*Platanthera integra*) (S) is found in savanna habitats. Potentially suitable habitat was identified in the evaluation area. No Yellow Fringeless Orchid plants were observed within the Alt. 3 study area, however, one occurrence of this species is present in a powerline ROW located within the area being considered for indirect impacts in the evaluation area (Figure 3b, see also Attachment 10 for detailed assessment). Including this occurrence, there are seven known occurrences on NFS lands in the CNF, but USFS reports that one roadside occurrence is apparently extirpated and one other has been greatly reduced in population size from recent disturbance in a savanna.

  Based on the apparent absence of this species in the Alt. 3 study area, there will be no direct impacts. No changes in management of the powerline ROW by mowing are expected to result from project implementation, reducing the concerns for indirect impacts. However, the ability for the USFS to conduct periodic prescribed burns in these powerline areas will need to be continued. Potential indirect impacts that could result from construction or maintenance activities can be minimized through conservation

commitments made by NCDOT, including allowing for the closure of the highway to allow the USFS to conduct periodic prescribed burns and implementation of measures proposed for controlling the spread of NNIS plant species along the ROW across NFS lands. With implementation of these mitigation measures agreed to between NCDOT and USFS to minimize potential for indirect impacts, it is determined that the proposed project will have no impact on Yellow Fringeless Orchid.

Cumulative impacts considered include a wildlife habitat improvement project completed in the summer of 2003 in the Little Road savanna population (EO 7), which resulted in a loss of habitat and individuals of this species within EO 7. Mitigation measures at the site have since restored the habitat but the number of individuals has been low (approximately 10) compared to earlier counts that were as high as 200 individuals. Other cumulative impacts identified for this species consisted of the DEP overhead ground wire replacement project, which may impact individuals of this species, but was determined to not likely result in viability concerns across the CNF.

- **Snowy Orchid** (*Platanthera nivea*) (LR) is found in wet savanna habitats. Potentially suitable habitat was identified in the evaluation area. No Snowy Orchid plants were observed within the Alt. 3 study area; however, one occurrence of this species is present in a powerline ROW within the evaluation area being considered for indirect impacts (Figure 3c). This is the only known occurrence of Snowy Orchid on NFS lands in the CNF.

  Based on the apparent absence of this species in the Alt. 3 study area, there will be no direct impacts. No changes in management of the powerline ROW by mowing are expected to result from project implementation, reducing the concerns for indirect impacts. However, the ability for the USFS to conduct periodic prescribed burns in these powerline areas will need to be continued. Potential indirect impacts that could result from construction or maintenance activities can be minimized through conservation commitments made by NCDOT, including allowing for the closure of the highway to allow the USFS to conduct periodic prescribed burns and implementation of measures proposed for controlling the spread of NNIS plant species along the ROW across NFS lands. With implementation of these mitigation measures agreed to between NCDOT and USFS to minimize potential for indirect impacts, it is determined that the proposed project will have no impact on Snowy Orchid. Cumulative impacts identified for this species consisted of the DEP overhead ground wire replacement project, which may impact individuals of this species, but was determined to not likely result in viability concerns across the CNF.

- **Hooker's Milkwort** (*Polygala hookerii*) (LR) is found in savanna habitats. Potentially suitable habitat was identified in the evaluation area. No Hooker's Milkwort plants were observed within the Alt. 3 study area; however, one occurrence of this species is present in a powerline ROW located within the evaluation area being considered for indirect impacts (Figure 3b). Including this occurrence, there are nine known occurrences of Hooker's Milkwort on NFS lands in the CNF.

Based on the apparent absence of this species in the Alt. 3 study area, there will be no direct impacts. No changes in management of the powerline ROW by mowing are expected to result from project implementation, reducing the concerns for indirect impacts. However, the ability for the USFS to conduct periodic prescribed burns in these powerline areas will need to be continued. Potential indirect impacts that could result from construction or maintenance activities can be minimized through conservation commitments made by NCDOT, including allowing for the closure of the highway to allow the USFS to conduct periodic prescribed burns and implementation of measures proposed for controlling the spread of NNIS plant species along the ROW across NFS lands. With implementation of these mitigation measures agreed to between NCDOT and USFS to minimize potential for indirect impacts, it is determined that the proposed project will have no impact on Hooker's Milkwort. Cumulative impacts identified for this species consisted of the DEP overhead ground wire replacement project, which may impact individuals of this species, but was determined to not likely result in viability concerns across the CNF.

- **Shadow-witch** (*Ponthieva racemosa*) (LR) is found in blackwater forest and swamp habitats over calcareous rock (marl). Potentially suitable habitat was identified within the evaluation area. No Shadow-witch plants were observed within the Alt. 3 study area during site surveys. One occurrence of this species is located in an area being considered for potential indirect effects (Figure 3b). This occurrence is mapped as covering approximately 14.7 acres and includes an estimated 800 individual plants. During field reviews on 22 July 2008 and 6 May 2009 the highest concentration of individuals within this occurrence was observed in the northeast corner of this occurrence adjacent to Greenfield Heights Blvd. This is greater than 250 feet from the Alt. 3 study area. Including this occurrence, this species is known from nine occurrences documented on NFS lands in the CNF.

  Based on the apparent absence of this species in the Alt. 3 study area, there will be no direct impacts. No changes in management to the swamp forest habitat are expected to result from project implementation, reducing concerns for indirect impacts. Potential indirect impacts that could result from construction or maintenance activities can be minimized through conservation commitments made by NCDOT, including implementation of measures proposed for controlling the spread of NNIS plant species along the ROW across NFS lands. With implementation of these mitigation measures agreed to between NCDOT and USFS to minimize potential for indirect impacts, it is determined that the proposed project will have no impact on Shadow-witch.

- **Awned Mountain-mint** (*Pycnanthemum setosum*) (LR) may be found in damp to wet fields, clearings, and forest borders in sandy soils, often associated with blackwater swamps. Potentially suitable habitat was identified in the evaluation area. One occurrence of this species has been recently reported as present in a powerline ROW that is crossed by the Alt. 3 study area (Figure 3d). This occurrence (EO5), originally documented in July 2012, was assessed in June 2014 resulting in documentation of approximately 4,300 individual plants dispersed across five discrete sites totaling 2.18 acres extending farther along the powerline ROW (see Attachment 13 for detailed

evaluation). This EO represents one of two EOs for Awned Mountain-mint reported on NFS lands in the CNF, with the other EO (EO 3) located in the Holston Creek Natural Area approximately 15 miles from the Alt. 3 study area. EO 3 was reported as approximately 0-1% cover within a 400 square meter Carolina Vegetation Survey Plot, but recent surveys have failed to relocate this species within this EO (personal communication, Gary Kauffman).

- Alt. 3 directly affects a portion of EO 5. Approximately 0.52 acre of EO 5 will be directly impacted, resulting in direct impacts to approximately 500 individual plants.
- Approximately 0.10 acre of EO 5 containing an estimated 50 individual plants is located in an area subject to indirect impact consideration for Alt. 3. These plants were observed within the powerline ROW which is currently being managed by a combination of mowing by the utility company operating the lines within the ROW and periodic prescribed burns by the USFS. No changes in management of the powerline ROW by mowing are expected to result from project implementation, reducing the concerns for indirect impacts.
- The remaining portion of EO 5, comprising approximately 3,750 individual plants dispersed over 1.56 acres, is located outside the areas identified as subject to direct or indirect impacts from Alt. 3.

The US 70 Havelock Bypass (R-1015) Alt. 3 will result in unavoidable direct impacts to Awned Mountain-mint and has the potential for indirect impacts. No cumulative impacts from other USFS or NCDOT projects on NFS lands on the CNF have been identified.

Mitigation measures are needed to reduce the threat for a loss of viability for Awned Mountain-mint on NFS lands within the CNF. Conservation measures agreed to between NCDOT and USFS include closure of the highway to allow the USFS to conduct periodic prescribed burns and implementation of measures for controlling the spread of NNIS plant species on NFS lands. In addition, NCDOT has agreed to collect seeds from the impact areas for establishing new populations on NFS lands in areas identified as potentially suitable based on favorable soil and hydrology conditions.

The proposed project may impact individuals of Awned Mountain-mint, but with implementation of these mitigation measures agreed to between NCDOT and USFS, it is determined that the proposed project is not likely to cause a loss of viability for Awned Mountain-mint on NFS lands in the CNF.

- **Dwarf Live Oak** (*Quercus minima*) (LR) is found in Pine Flatwood and Coastal Fringe Sandhill communities. Potentially suitable habitat was identified in the evaluation area. No Dwarf Live Oak trees were observed within the evaluation area during site surveys. The nearest known occurrence is approximately 9.4 miles from the Alt. 3 study area. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Dwarf Live Oak.

- **Short-bristled Beaksedge** (*Rhynchospora galeana*) (S), formerly known as *Rhynchospora breviseta*, is found in wet savanna habitats and may colonize disturbed

areas and roadsides. Potentially suitable habitat was identified in the evaluation area. No Short-bristled Beaksedge plants were observed within Alt. 3 study area during site surveys. One EO (27) had been depicted in the NCNHP database as extending into the Alt. 3 study area, but a review of the original record information submitted to NCNHP and discussion with NCNHP indicated that this extension was an error in interpretation (see Attachment 10). Based on survey results and the anticipated correction to NCNHP files for this August 2005 record, no Short-bristled Beaksedge plants have been documented in the Alt. 3 study area and no direct impacts to Short-bristled Beaksedge are expected to occur. Approximately 44.2 acres of EO 27 (100% of the corrected occurrence) are in an area subject to indirect impact consideration for Alt. 3 (Figure 3b). This EO contains an estimated 850 individual Short-bristled Beaksedge plants, the largest known population on NFS lands in the CNF. Including this occurrence, there are seven known occurrences of Short-bristled Beaksedge on NFS lands in the CNF, although one obscure record has not been observed for more than 50 years.

Based on the apparent absence of this species in the Alt. 3 study area, there will be no direct impacts. No changes in management of the powerline ROW by mowing are expected to result from project implementation, reducing the concerns for indirect impacts. However, the ability for the USFS to conduct periodic prescribed burns in these powerline areas will need to be continued. Potential indirect impacts that could result from construction or maintenance activities can be minimized through conservation commitments made by NCDOT, including allowing for the closure of the highway to allow the USFS to conduct periodic prescribed burns and implementation of measures proposed for controlling the spread of NNIS plant species on NFS lands. With implementation of these mitigation measures agreed to between NCDOT and USFS to minimize potential for indirect impacts, it is determined that the proposed project will have no impact on Short-bristled Beaksedge. Cumulative impacts identified for this species consisted of the DEP overhead ground wire replacement project, which may impact individuals of this species, but was determined to not likely result in viability concerns across the CNF.

- **Southern White Beaksedge** (*Rhynchospora macra*) (S) is found in Sphagnum bogs, frequently-burned Streamhead Pocosins, and Sandhill Seepage Bogs. Potentially suitable habitat was identified in the evaluation area. No Southern White Beaksedge plants were observed within the evaluation area during site surveys. The nearest known occurrence is approximately 5 miles from the Alt. 3 study area. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Southern White Beaksedge.

- **Thorne's Beaksedge** (*Rhynchospora thornei*) (S) is found in wet savanna habitats. Potentially suitable habitat was identified in the evaluation area. No Thorne's Beaksedge plants were observed within the evaluation area during site surveys. The nearest known occurrence is located in western Onslow County. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Thorne's Beaksedge.

- **Grassleaf Arrowhead** (*Sagittaria weatherbiana*) (S) is found in fresh to brackish marsh, streambank, and pineland pool habitats. Potentially suitable habitat was identified in the evaluation area. No Grassleaf Arrowhead plants were observed within the evaluation area during site surveys. The nearest known occurrence is approximately 16 miles from the Alt. 3 study area. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Grassleaf Arrowhead.

- **Canby's Bulrush** (*Schoenoplectus etuberculatus*) (LR) is found in beaver pond and peaty small depression pond habitats, and in flowing blackwater stream habitats. Potentially suitable habitat was identified in the evaluation area. No Canby's Bulrush plants were observed within the evaluation area during site surveys. The nearest known occurrence is approximately 2.5 miles from the Alt. 3 study area. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Canby's Bulrush.

- **Drooping Bulrush** (*Scirpus lineatus*) (LR) is found in swamp forest habitats over coquina limestone. Potentially suitable habitat was identified in the evaluation area. No Drooping Bulrush plants were observed within the evaluation area during site surveys. The nearest known occurrence is approximately 0.5 mile from the Alt. 3 study area. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Drooping Bulrush.

- **Baldwin's Nutrush** (*Scleria baldwinii*) (LR) is found in wet savanna habitats associated with Longleaf Pine (*Pinus palustris*), Pond Pine (*Pinus serotina*), and Pond Cypress. (*Taxodium ascendens*). Potentially suitable habitat was identified in the evaluation area. No Baldwin's Nutrush plants were observed within the evaluation area during site surveys. The nearest known occurrence is approximately 9 miles from the Alt. 3 study area. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Baldwin's Nutrush.

- **Leavenworth's Goldenrod** (*Solidago leavenworthii*) (LR) is found in savanna, clay-based Carolina bay, peaty seep, and pocosin border habitats. Potentially suitable habitat was identified in the evaluation area. No Leavenworth's Goldenrod plants were observed within the evaluation area during site surveys. The nearest known occurrence is approximately 8 miles from the Alt. 3 study area. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Leavenworth's Goldenrod.

- **Carolina Goldenrod** (*Solidago pulchra*) (S) is found in savanna habitats. Potentially suitable habitat was identified in the evaluation area. No Carolina Goldenrod plants were observed within the Alt. 3 study area during site surveys. One occurrence is located in an area subject to consideration for potential indirect effects (Figure 3b). Including this occurrence, there are 38 known occurrences of Carolina Goldenrod on NFS lands in the CNF.

Based on the apparent absence of this species in the Alt. 3 study area, there will be no direct impacts. No changes in management of the powerline ROW by mowing are expected to result from project implementation, reducing the concerns for indirect impacts. However, the ability for the USFS to conduct periodic prescribed burns in these powerline areas will need to be continued. Potential indirect impacts that could result from construction or maintenance activities can be minimized through conservation commitments made by NCDOT, including allowing for the closure of the highway to allow the USFS to conduct periodic prescribed burns and implementation of measures proposed for controlling the spread of NNIS plant species on NFS lands. With implementation of these mitigation measures agreed to between NCDOT and USFS to minimize potential for indirect impacts, it is determined that the proposed project will have no impact on Carolina Goldenrod. In addition, this species has been recommended to be removed from the USFS Region 8 sensitive plant list since it has been found to be locally abundant in the southern portion of the CNF and it responds to prescribed fire management (personal communication, Gary Kauffman).

- **Twisted-leaf Goldenrod** (*Solidago tortifolia*) (LR) is found in dry savanna and moist pine flatwood habitats. Potentially suitable habitat was identified in the evaluation area. No Twisted-leaf Goldenrod plants were observed within the evaluation area during site surveys. The nearest known occurrence is approximately 13 miles from the Alt. 3 study area. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Twisted-leaf Goldenrod.

- **Spring-flowering Goldenrod** (*Solidago verna*) (S) is found in moist pine savanna habitats as well as lower slopes in sandhills and road sides in pineland habitats. Potentially suitable habitat was identified in the evaluation area and surveys confirmed this species is present in the Alt. 3 study area and the area being considered for potential indirect effects (Figure 3a-d, see Attachment 7 for detailed evaluation).
    - Alternative 3 directly affects 23.51 acres of occupied habitat on NFS lands and estimated 11,419 individual Spring-flowering Goldenrod plants.
    - An additional 63.53 acres of occupied habitat is in areas that may be indirectly affected by Alternative 3 that include an estimated 43,415 individual Spring-flowering Goldenrod plants.

  The US 70 Havelock Bypass (R-1015) Alt. 3 will result in unavoidable direct impacts to Spring-flowering Goldenrod and additional areas occupied by spring-flowering goldenrod may be subject to indirect impacts. Cumulative impacts associated with US 17 (R-2514B, C, and D) will directly impact another large population on NFS lands. The two largest spring-flowering goldenrod populations within the Croatan NF may be potentially impacted by the two road projects. Cumulative impacts associated with the DEP overhead ground wire replacement project may impact individuals of this species, but the project was determined to not likely result in viability concerns across the CNF. The direct impacts for Alternative 3 are not likely to result in a loss of viability on NFS lands within the CNF, but with the inclusion of indirect and cumulative impacts, Alt. 3 would contribute to an impact to a significant portion of the overall population on the

CNF, particularly for the population within the evaluation area, that may result in viability concern on NFS lands within the CNF.

Mitigation measures are needed to reduce the threat for a loss of viability for Spring-flowering Goldenrod on NFS lands within the CNF. Conservation measures agreed to between NCDOT and USFS include closure of the highway to allow the USFS to conduct periodic prescribed burns and implementation of measures for controlling the spread of NNIS plant species on NFS lands. In addition, NCDOT has also agreed to collect seeds from Spring-flowering Goldenrod from the impact areas for establishing new populations on NFS lands in areas identified as potentially suitable based on favorable soil and hydrology conditions. Seed collection was initiated for Spring-flowering Goldenrod from the Alt. 3 study area in 2010.

The proposed project may impact individuals of Spring-flowering Goldenrod, but with implementation of the mitigation measures agreed to between NCDOT and USFS, it is determined that the proposed project is not likely to cause a loss of viability for Spring-flowering Goldenrod on NFS lands in the CNF.

- **Florida Peatmoss** (*Sphagnum cribrosum*) (S) is found in blackwater stream and ditch habitats. Potentially suitable habitat was identified in the evaluation area. There are 11 documented occurrences of Florida Peatmoss on NFS lands in the CNF that represent 6 populations (Gary Kauffman personal communication, 2013). One of these populations occurs in the evaluation area and consists of three individual sites with documented presence of Florida Peatmoss (see Attachment 12). One of the three sites (Site #1) is in the Alt. 3 study area and subject to consideration for direct impacts as well as indirect impacts. A second Florida Peatmoss site (Site #2) is located in a depression in a maintained powerline ROW outside the area of potential direct impact, but within the area for consideration for indirect impacts. A third Florida Peatmoss site in the project vicinity is located in a depression in a maintained powerline ROW approximately 600 feet south of the Alt. 3 study area and is outside the area considered for direct or indirect effects (Figure 3a).
    - Alternative 3 directly affects a portion of one occurrence of Florida Peatmoss (Site #1). Approximately 0.03 acre of Florida Peatmoss Site #1 is located in approximately 466 feet of a ditch adjacent to the Railroad where the Alt. 3 study area crosses the ditch and railroad with a bridge. An additional 0.11 acre of this occurrence is located upstream of the Alt. 3 study area will not be affected by Alternative 3 (Figure 3a).
    - Two occurrences are located in areas subject to consideration for potential indirect impacts associated with Alternative 3. This species was confirmed present in these occurrences; individual plant counts are not practicable for bryophyte species and total population was not determined.
        - Approximately 0.04 acre of Florida Peatmoss Site #1 is located in an area for consideration of potential indirect effects by Alternative 3. Potential indirect effects include shading from associated with the bridge crossing (Figure 3a).

- An additional occurrence (Florida Peatmoss Site #2) is located in another area subject to consideration for indirect impacts by Alternative 3. Florida Peatmoss Site #2 is not anticipated to be affected by Alternative 3 due to its distance (approximately 3,300 feet east) from the Alt. 3 study area, with no changes in management of the powerline ROW in which it occurs expected to occur (figure 3b).

The US 70 Havelock Bypass (R-1015) Alt. 3 will result in unavoidable direct impacts to Florida peatmoss as a result of the proposed bridging of the railroad ditch where this species occurs in the Alt. 3 study area (Florida Peatmoss Site #1 on Figure 3). The portion of this occurrence in the ditch downstream from the proposed ROW is subject to consideration for indirect impacts. The documented extent of this occurrence on NFS lands was substantially expanded by the NCDOT survey in 2012. With the new documentation that the majority of this occurrence extends a considerable distance farther upstream of Alt. 3, only approximately 0.03 acre of the 0.21-acre known extent for Florida Peatmoss Site #1 is being directly impacted and approximately 0.04 acre of this occurrence is in the ditch downstream of the ROW and subject to consideration for indirect impacts. Cumulative impacts associated with the potential future widening of the Atlantic and East Carolina Railroad from a single track to multiple tracks may occur at Florida Peatmoss Site #1 if railway construction alters the ditches adjacent to the railway. Potential affects to Florida Peatmoss will need to be evaluated as part of the planning process for the railway project, should it occur. Currently the rail expansion is not reasonably foreseeable. No cumulative impacts from the DEP project, USFS, or NCDOT projects on NFS lands in the CNF have been identified for this occurrence of for any of the other five known populations on NFS lands in the CNF.

The project is not expected to result in changes that would prevent the utility company and/or railroad from continued mowing to maintain the ROW in which these occurrences are found, reducing the threat for indirect impacts. Other potential indirect impacts that could result from construction or maintenance activities can be minimized through conservation commitments made by NCDOT, including implementation of measures proposed for controlling the spread of NNIS plant species on NFS lands. The proposed project may impact individuals of Florida Peatmoss, but with implementation of mitigation measures agreed to between NCDOT and USFS, it is determined that the proposed project is not likely to cause a loss of viability for Florida Peatmoss on NFS lands in the CNF.

One new occurrence of Florida Peatmoss was identified on the CMB as part of a previous evaluation by NCDOT in 2007. Contingent upon USFS release of ROW for the Havelock Bypass, the transfer of the CMB property to USFS would provide an additional mitigation measure by adding this occurrence to NFS lands on the CNF. In addition, this species has been recommended to be removed from the USFS Region 8 sensitive plant list based on more potential habitat in the CNF (personal communication, Gary Kauffman).

- **Fitzgerald's Peatmoss** (*Sphagnum fitzgeraldii*) (S) is found in pocosin and savanna habitats. Potentially suitable habitat was identified in the evaluation area. This species has been recently relocated by USFS in some historical sites as well as new sites across the CNF and is likely more common than previously determined. One occurrence of this species is located in the Alt. 3 study area and will be directly affected (Figure 3a). Areal extent and population estimates are not available for this occurrence. This species is considered to be secure on the CNF. Including this occurrence, there are eleven known occurrences Fitzgerald's Peatmoss on NFS lands in the CNF. This species has been recommended to be removed from the USFS Region 8 sensitive plant list based on more potential habitat in the CNF (personal communication, Gary Kauffman).

  One occurrence of this species has direct impacts. No changes in management of the powerline ROW by mowing are expected to result from project implementation, reducing the concerns for indirect impacts. However, the ability for the USFS to conduct periodic prescribed burns in these powerline areas will need to be continued. Potential indirect impacts that could result from construction or maintenance activities can be minimized through conservation commitments made by NCDOT, including allowing for the closure of the highway to allow the USFS to conduct periodic prescribed burns and implementation of measures proposed for controlling the spread of NNIS plant species on NFS lands. The proposed project may impact individuals of Fitzgerald's Peatmoss, but with implementation of mitigation measures agreed to between NCDOT and USFS, it is determined that the proposed project is not likely to cause a loss of viability for Fitzgerald's Peatmoss on NFS lands in the CNF.

- **Giant Peatmoss** (*Sphagnum torreyanum*) (LR) is found in beaver ponds and old mill ponds habitats on blackwater creeks. Potentially suitable habitat was identified in the evaluation area. No Giant Peatmoss plants were observed within the evaluation area during site surveys. The nearest known occurrence is approximately 6 miles from the Alt. 3 study area. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Giant Peatmoss.

- **Eaton's Ladies'-tresses** (*Spiranthes eatonii*) (LR) is found in wet savanna habitats. Potentially suitable habitat was identified in the evaluation area. No Eaton's Ladies'-tresses plants were observed within the Alt. 3 study area, however, one occurrence of this species is present in a powerline ROW located within the area being considered for indirect impacts (Figure 3b). This is the only known occurrence of Eaton's Ladies'-tresses on NFS lands in the CNF.

  Based on the apparent absence of this species in the Alt. 3 study area, there will be no direct impacts. No changes in management of the powerline ROW by mowing are expected to result from project implementation, reducing the concerns for indirect impacts. However, the ability for the USFS to conduct periodic prescribed burns in these powerline areas will need to be continued. Potential indirect impacts that could result from construction or maintenance activities can be minimized through conservation commitments made by NCDOT, including allowing for the closure of the highway to allow the USFS to conduct periodic prescribed burns and implementation of measures

proposed for controlling the spread of NNIS plant species on NFS lands. With implementation of these mitigation measures agreed to between NCDOT and USFS to minimize potential for indirect impacts, it is determined that the proposed project will have no impact on Eaton's Ladies'-tresses.

- **Giant Spiral-orchid** (*Spiranthes longilabris*) (S) is found in savanna habitats. Potentially suitable habitat was identified in the evaluation area. No Giant Spiral-orchid plants were observed within the evaluation area during site surveys. The nearest known occurrence is approximately 11 miles from the Alt. 3 study area. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Giant Spiral-orchid.

- **Carolina Dropseed** (*Sporobolus pinetoreum*) (S) is found in wet savanna habitats, savanna-pocosin ecotones, sandhill-pocosin ecotones, and extending upslope into mesic flatwoods or loamy or clayey shelves in fall-line sandhills habitats. Potentially suitable habitat was identified in the evaluation area. No Carolina Dropseed plants were observed within the evaluation area during site surveys. The nearest known occurrence is in Jones County. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Carolina Dropseed.

- **Pickering's Dawnflower** (*Stylisma pickeringii* var. *pickeringii*) (LR) is found in sandhill habitats, usually in the driest, most barren, deep-sand areas. Potentially suitable habitat was identified in the evaluation area. No Pickering's Dawnflower plants were observed within the evaluation area during site surveys. The nearest known occurrence is approximately 11 miles from the Alt. 3 study area. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Pickering's Dawnflower.

- **Carolina Asphodel** (*Tofieldia glabra*) (S) is found in wet pine savanna, sandhill seep, and savanna-pocosin ecotone habitats. Potentially suitable habitat was identified in the evaluation area. This species is not tracked by NCNHP, but is considered to be secure on the CNF with more than 50 known occurrences (personal communication, Gary Kauffman, USFS). No Carolina Asphodel plants were observed within the evaluation area during site surveys. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Carolina Asphodel.

- **Chapman's Redtop** (*Tridens chapmanii*) (LR) is found on loamy sands of disturbed Longleaf Pine woodland and roadside habitats. Potentially suitable habitat was identified in the evaluation area. No Chapman's Redtop plants were observed within the evaluation area during site surveys. The nearest known occurrence is approximately 3.3 miles from the Alt. 3 study area. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Chapman's Redtop.

- **Florida Yellow-eyed Grass** (*Xyris floridana*) (LR) is found in savanna, wet pine flatwood, and ditch habitats. Potentially suitable habitat was identified in the evaluation area. No Florida Yellow-eyed Grass plants were observed within the evaluation area

during site surveys. The nearest known occurrence is approximately 20 miles from the Alt. 3 study area. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Florida Yellow-eyed Grass.

- An Unnamed **Yellow-eyed Grass** (*Xyris stricta*) (LR) is found in savanna, depression ponds, depressional meadow, and ditch habitats. Potentially suitable habitat was identified in the evaluation area. No plants of this species were observed within the evaluation area during site surveys. The nearest known occurrence is approximately 5 miles from the Alt. 3 study area. Based on apparent absence of this species, it is determined that the proposed project will have no impact on this species.

3.3 Summary of Plant Species

There are 107 plant species on the most recent (October 2013) list of rare plant species maintained by the USFS for the CNF. Of these 107 rare plant species, 35 species were dropped from further consideration because no suitable habitat is present within or in close proximity to the evaluation area. Potentially suitable habitat or previously reported NCNHP or USFS records were identified in the evaluation area for 72 USFS rare plant species. Surveys conducted from 2003-2013 within the evaluation area in combination with records available from NCNHP and the USFS resulted in documentation or confirmation of the presence of 21 USFS rare plant species within the evaluation area. Surveys did not document the presence of the remaining 51 USFS rare plant species within the evaluation area. Based on the apparent absence of these 51 species, it is determined that the proposed project will have no impact on these 51 species and these species are dropped from further consideration.

The proposed project will have no effect on Rough-leaved Loosestrife, the only federal endangered, threatened, or proposed plant species that potentially could occur but surveys did not document the presence of this species in the evaluation area.

For sensitive plant species, with implementation of mitigation measures agreed to between NCDOT and USFS to minimize potential for indirect impacts, it was determined that the project would not impact Yellow Fringeless Orchid, Hooker's Milkwort, Short-bristled Beaksedge, or Carolina Goldenrod. For sensitive plant species, the project may impact individuals of Small Spreading Pogonia, Loomis's Loosestrife, Piedmont Cowbane, Spring-flowering Goldenrod, Florida Peatmoss, and Fitzgerald's Peatmoss, but with implementation of mitigation measures agreed to between NCDOT and USFS, it was determined the project is not likely to result in viability concerns for any of the species across the CNF.

For locally rare plant species, with implementation of mitigation measures agreed to between NCDOT and USFS to minimize potential for indirect impacts, it was determined that the project would not impact Bog Bluestem, Eaton's Witch Grass, Florida Adder's mouth, Snowy Orchid, Shadow-witch, or Eaton's Ladies'-tresses. For locally rare plant species, the project may impact individuals of LeConte's Thistle, Mudbank Crowngrass, Awned Mountain-mint, and two liverworts (*Lejeunea bermudiana* and *Plagochila lucoviciana*), but with implementation of mitigation measures agreed to between NCDOT and USFS, it was determined the project is not likely to result in viability concerns for any of the species across the CNF.

3.4 Terrestrial and Aquatic Animal Species

There are 92 animal species on the most recent (August 2013) list of rare animal species provided by the USFS for the CNF. Of these 92 rare animal species, 56 species were dropped from further consideration because no suitable habitat is present within or in close proximity to the evaluation area.

Two species from the USFS list of rare animal species were eliminated from consideration since they are considered to be extirpated from North Carolina. The following federally Endangered, Threatened or Proposed animal species were eliminated from further consideration due to extirpation: Eastern Cougar (*Puma concolor cougar*) and Bachman's Warbler (*Vermivora bachmanii*). No Sensitive or Locally Rare animal species were identified as extirpated from the State and none were eliminated from further evaluation due to extirpation.

Several species were eliminated from consideration since the Croatan National Forest would be considered extralimital to known ranges and these species have not been documented in Carteret, Craven or Jones Counties. The following federally Endangered, Threatened, or Proposed animal species were eliminated from further consideration due to extralimital range: Red Wolf (*Canis rufus*) (experimental population reintroduced into North Carolina not documented as ranging south of Beaufort County) and Kirtland's Warbler (*Dendroica kirtlandii*). No Sensitive animal species were eliminated from further consideration due to extralimital range. The following Locally Rare animal species were eliminated from further consideration due to extralimital range: an undescribed Shrew (*Sorex* sp. 1), Dwarf Salamander (*Eurycea quadridigitata*), Wood Frog (coastal plain population) (*Rana sylvatica* pop. 3), a Noctuid Moth (*Melanapamea mixta*), a Mayfly (*Baetisca obesa*), a Noctuid Moth (*Bleptina sangamonia*), a Noctuid Moth (*Gabara* sp. 1), Blackwater Ancylid (*Ferrisia hendersoni*), Least Brook Lamprey (*Lampetra aepytera*), and Grooved fingernail Clam (*Sphaerium simile*).

No maritime forests, maritime thickets, dunes, ocean beach, or marine habits were identified in the evaluation area. The following federally Endangered, Threatened, or Proposed plant species were eliminated from further consideration due to the lack of these habitats within the evaluation area: West Indian Manatee (*Trichechus manatus*), Piping Plover (*Charadrius melodus*), Roseate Tern (*Sterna dougallii*), Loggerhead Seaturtle (*Caretta caretta*), Green Seaturtle (*Chelonia mydas*), Leatherback Seaturtle (*Dermochelys imbricata*), Hawksbill Seaturtle (*Eretmochelys imbricata*), and Kemp's Ridley Seaturtle (*Lepidochelys kempii*). No Sensitive animal species are restricted to these habitats and none were eliminated from further consideration due to a lack of these habitats. The following Locally Rare animal species were eliminated from further consideration due to a lack of these habitats within the evaluation area: Buxton Woods White-footed Mouse (*Peromyscus leucopus buxtoni*), Pungo White-footed Mouse (*Peromyscus leucopus eastii*), Gull-billed Tern (*Gelochelidon nilotica*), Caspian Tern (*Hydropogne caspia*), Peregrine Falcon (*Falco peregrinus*), Eastern Painted Bunting (*Passerina ciris ciris*), Glossy Ibis (*Plegadis falcinellus*), Outer Banks Kingsnake (*Lampropeltis getula sticticeps*), an undescribed Skipper (*Atrytonopsis* sp.), a Noctuid Moth (*Faronta aleada*), and Giant Swallowtail (*Papilio cresphontes*).

No large or medium sized river habitats were identified in the evaluation area. The following federally Endangered, Threatened, or Proposed plant species were eliminated from further

consideration due to the lack of these habitats within the evaluation area: Shortnose Sturgeon (*Acipenser brevirostrum*) and Atlantic Sturgeon (*Acipenser oxrhynchus*). The following Sensitive animal species was eliminated from further consideration due to a lack of these habitats within the evaluation area: Carolina Madtom (*Noturus furiusus*). No Locally Rare animal species are restricted to these habitats and none were eliminated from further consideration due to a lack of these habitats within the evaluation area.

No tidal swamps or freshwater/brackish marshes were identified in the evaluation area. The following federally Endangered, Threatened, or Proposed animal species were eliminated from further consideration due to the lack of these habitats within the evaluation area: Wood Stork (*Mycteria americana*). The following Sensitive animal species was eliminated from further consideration due to a lack of these habitats within the evaluation area: Carolina Salt Marsh Snake (*Nerodia sipedon williamengelsi*). The following Locally Rare animal species were eliminated from further consideration due to a lack of these habitats within the evaluation area: American Bittern (*Botaurus lentiginosus*), Northern Harrier (*Circus cyaneus*), Black-necked Stilt (*Himantopus mexicanus*), Black Rail (*Laterallus jamaicensis*), Purple Gallinule (*Porphyrio martinica*), Northern Diamondback Terrapin (*Malaclemys terrapin terrapin*), Marsh Killifish (*Fundulus confluentus*), and Spotfin Killifish (*Fundulus luciae*).

Streams in the evaluation area were determined to be too acidic to support suitable habitat for several species. No CNF-listed federally Endangered, Threatened, or Proposed animal species were eliminated from further consideration due to the acidic nature of stream habitats in the evaluation area. The following Sensitive animal species was eliminated from further consideration due acidic nature of stream habitats in the evaluation area: Green Floater (*Lasmigona subviridis*). The following Locally Rare animal species were eliminated from further consideration due to acidic nature of stream habitats within the evaluation area: Pod Lance (*Elliptio folliculata*), Chameleon Lampmussel (*Lampsilis* sp. 2), Tidewater Mucket (*Leptodea ochracea*), and Creeper (*Strophitus undulata*). In addition, NCDOT surveys for mollusks in evaluation area streams did not document the presence of any freshwater mussel fauna.

No lakes were identified in the evaluation area. No CNF-listed federally Endangered, Threatened, or Proposed plant species are restricted to these habitats and none were eliminated from consideration due to the lack of this habitat. No Sensitive animal species are restricted to these habitats and none were eliminated from further consideration due to a lack of this habitat. The following Locally Rare animal species was eliminated from further consideration due to a lack of this habitat within the evaluation area: Double-crested Cormorant (*Phalacrocorax auritus*).

No Sandhills or Pine Barrens were identified in the evaluation area. No CNF-listed federally Endangered, Threatened, or Proposed plant species are restricted to these habitats and none were eliminated from consideration due to the lack of these habitats. The following Sensitive plant species were eliminated from consideration due to a lack of these habitats within the evaluation area: Dotted Skipper (*Hesperia attalus slossonae*). The following Locally Rare plant species were eliminated from consideration due to a lack of these habitats within the evaluation area:

Eastern Tiger Salamander (*Ambystoma tigrinum*), Eastern Coral Snake (*Micrurus fulvius*), and Buchholz's Gray (*Hypomecis buchholzaria*).

Potentially suitable habitat was identified in the evaluation area for 34 USFS rare terrestrial and 2 rare aquatic wildlife species as noted in the table in Appendix C. NCNHP and USFS records indicate that only a few of these species have been documented within the evaluation area or in close proximity. Animal surveys that included light trapping for moths, mist netting and acoustic monitoring for bats, and surveys for terrestrial and aquatic species were conducted in 2005. Surveys conducted in 2005 in combination with records available through April 2014 from NCNHP and the USFS resulted in documentation or confirmation, or presumed presence of 15 USFS rare animal species within the evaluation area. Red-cockaded Woodpecker (*Picoides borealis*) (RCW) was evaluated in a separate Biological Assessment by NCDOT and is not evaluated in this BE. A summary of the evaluation for all 36 species with potentially suitable habitat identified within the evaluation area is presented below. Site survey results and/or NCNHP/USFS records for USFS rare animal species are presented on Figures 3a – 3d in Appendix F.

A USFWS proposal for listing the Northern Long-eared Bat (*Myotis septentrionalis*) as an Endangered species was published in the Federal Register in October 2013. A listing determination will be made on or before April 2, 2015. As of July7, 2014, this species is not included in the USFWS's list of protected species for Craven County. The nearest verified records are from New Hanover, Washingotn, and Wake Counties (USFWS 2014). NCDOT is working closely with the USFWS and USFS to determine how this proposed listing may impact NCDOT projects. NCDOT will continue to coordinate with USFWS and USFS to determine if this project will incur potential effects to the Northern Long-eared Bat, and how to address these potential effects, if necessary.

3.4.1 Mammals

- **Star-nosed Mole** (*Condylurus cristata*) (LR) is a burrowing mammal occupying moist meadow, bog, swamp, and bottomland habitats within its disjunct coastal plain population in the state. The nearest known occurrence is approximately 7.3 miles west of the Alt. 3 study area, based on a road-kill record from the CNF. This species was not encountered or found during the surveys, therefore, there is no impact on the Star-nosed Mole.

- **Rafinesque's Big-eared Bat** (*Corynorhinus rafinesquii macrotis*) (LR) roosts in hollow trees, old buildings, and beneath bridges, usually near water. Potentially suitable habitat was identified in the evaluation area in the vicinity of Southwest Prong Slocum Creek. NCNHP records indicate one occurrence of this species within Craven County. This NCNHP occurrence of this species is includes portions of the evaluation area. NCNHP has designated the accuracy of this occurrence as very low. A very low accuracy occurrence characterization is described by NHP as one with less than 5 percent of the area occupied. NCNHP records indicate that this occurrence is based on an observation of this species at an unspecified location in Craven County. There are approximately 9.4 acres of potentially occupied habitat identified within the Alt. 3 study area. Mist netting

and acoustic surveys conducted in the summer of 2005 did not identify the presence of Rafinesque's Big-eared Bat in the evaluation area (Attachment 3).

No direct impacts are anticipated. If individuals of this species are present, indirect impacts may result from road construction, which would fragment the bottomland habitat and could decrease the likelihood that individuals of this species could safely fly across the road to suitable habitat on the opposite side. Based on the widespread availability of similar habitats on NFS lands adjacent to the proposed project, the proposed project would not significantly affect the availability of suitable habitat in the evaluation area.

One new occurrence of Rafinesque's Big-eared Bat was identified on the CMB as part of a survey by NCDOT in 2008 (Figure 4). Contingent upon USFS release of ROW for the Havelock Bypass, transfer of this tract to the USFS from NCDOT would add this occurrence to NFS lands on the CNF and would help ensure this species is viable on the CNF.

- **Northern Yellow Bat** (*Lasiurus intermedius*) (LR) roosts in Spanish moss and other thick vegetation near water, often in Longleaf Pine habitats. Potentially suitable habitat was identified in the evaluation area in the vicinity of Southwest Prong Slocum Creek. There are no known records for this species in or near the evaluation area and the species is not known to be present in the CNF, but potentially suitable habitat is present in some portions of the evaluation area. Mist netting and acoustic surveys conducted in the summer of 2005 did not identify the presence of Northern Yellow Bat in the evaluation area (Attachment 3). The nearest known occurrences are in Brunswick and New Hanover Counties. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Northern Yellow Bat.

- **Southeastern Myotis** (*Myotis austroriparius*) (LR) roosts in buildings and hollow trees and forages near water. Potentially suitable habitat was identified in the evaluation area in the vicinity of Southwest Prong Slocum Creek. Mist netting and acoustic surveys conducted in the summer of 2005 identified the presence of Southeastern Myotis in the evaluation area (Figure 3b, Attachment 3).

  Based on the mobility of this species, no direct impacts from project construction are anticipated. Indirect impacts may result from road construction, which would fragment the bottomland habitat and could decrease the likelihood that individuals of this species could safely fly across the road to suitable habitat on the opposite side. Based on the widespread availability of similar habitats on NFS lands adjacent to the proposed project, the proposed project would not significantly affect the overall availability of suitable habitat in the evaluation area.

  One new occurrence of Southeastern Myotis was identified on the CMB as part of a survey by NCDOT in 2008 (Figure 4). Contingent upon USFS release of ROW for the Havelock Bypass, transfer of this tract to the USFS from NCDOT would add this occurrence to NFS lands on the CNF and would help ensure this species is viable on the CNF.

- **Eastern Woodrat** (coastal plain population) (*Neotoma floridana floridana*) (LR) is found in lowland forests with a Dwarf Palmetto (*Sabal minor*) understory. NCNHP has a 1991 record of Eastern Woodrat located 16 miles from the study area; this is the closest record. Potentially suitable habitat was identified in the evaluation area near the western end of Gray Road between Alt. 3 and Alt 2. Surveys for conspicuous nests were conducted in April 2005 in areas of potentially suitable habitat in the evaluation area and no woodrat nests or Eastern Woodrats were observed, therefore there is no impact to the Eastern Woodrat.

3.4.2 Birds

- **Eastern Henslow's Sparrow** (*Ammodramus henslowii susurrans*) (LR) breeding habitat can be described as relatively large, open fields and other similarly open habitat with tall, dense grass and little or no woody vegetation. Typical winter habitat consists of extensive, open, moist to wet Pine Flatwoods (Pine Savanna) or other similarly open, moist to wet areas having dense herbaceous cover, such as some abandoned fields and clearcuts. Powerline corridors adjacent to Pine Flatwoods may be important as winter habitat. Nesting habitat is not present within the Alt. 3 study area. There is only one reported breeding season record for this species in the CNF, from 1985 at a site approximately 6.5 miles from the Alt. 3 study area. Potentially suitable wintering habitat is present in the evaluation area within some of the Powerline Corridors and contiguous Pine Flatwoods. Three individuals were observed within the Alt. 3 study area during 1999 and an additional individual was observed in the Alt. 3 study area in 2005, all in the winter season (John Fussell, personal communication, 2005). The only other reported site where this species has been documented as overwintering on the CNF is located approximately 6.5 miles from the Alt. 3 study area. Although no breeding evidence has been documented in the evaluation area, individuals of this species may be present during winter.

  Based on the absence of suitable breeding habitat, the proposed project will not impact breeding sites or breeding individuals of this species. The proposed project may impact individuals of Eastern Henslow's Sparrow through fragmentation of wintering habitat and through decreased likelihood that individuals of this species could safely fly across the road to suitable habitat on the opposite side. Potential loss of individuals through road-crossing mortality is anticipated to be relatively low based on the widespread availability of suitable habitat remaining in the evaluation area. The proposed project would not significantly affect the overall availability of suitable wintering habitat in the evaluation area. Potential indirect impacts to Eastern Henslow's sparrow wintering habitat that could result from construction or maintenance activities can be minimized through conservation measures previously proposed by NCDOT, such as temporarily closing the bypass to allow for prescribed burns and implementation of measures proposed for controlling the spread of NNIS plant species on NFS lands, which would maintain the quality of the wintering habitat. Because there will be no impacts to breeding individuals or breeding habitat, with implementation of these habitat conservation measures agreed to between NCDOT and USFS to maintain the quality of adjacent wintering habitat, it is

determined that the proposed project is not likely to cause a loss of viability for Eastern Henslow's Sparrow on NFS lands in the CNF.

- **Black-throated Green Warbler** (coastal plain population) (*Dendroica virens waynei*) (LR) is a disjunct race found in eastern North Carolina in spring and summer as a nesting species in forested wetland habitats that occur on interstream flats or in the uppermost portions of streams. This species is associated with hardwoods, especially when a component of mature conifers is present, including White Cedar (*Thuja occidentalis*), Baldcypress (*Taxodium* spp.), or Pines (*Pinus* spp.). Potentially suitable nesting habitat is present in the evaluation area. One NCNHP mapped occurrence of this species is located within the Alt. 3 study area (Figure 3a). This occurrence represents the identification of three singing male birds in this general location. Including this occurrence, this species is known from seven occurrences documented as EOs in NCNHP records for NFS lands in the CNF.

  Based on the mobility of this species, no direct impacts from project construction are anticipated. The proposed project may impact individuals of Black-throated Green Warbler through habitat fragmentation and through decreased likelihood that individuals of this species could safely fly across the road to suitable habitat on the opposite side. Potential loss of individuals through road-crossing mortality is anticipated to be relatively low based on the widespread availability of suitable habitat remaining in the evaluation area. The proposed project would not significantly affect the overall availability of suitable habitat in the evaluation area. Potential indirect impacts to Black-throated Green Warbler nesting habitat that could result from construction or maintenance activities can be minimized through conservation measures previously proposed by NCDOT, such as implementation of measures proposed for controlling the spread of NNIS plant species on NFS lands, which would maintain the quality of the nesting habitat. Based on the number of occurrences on CNF and the implementation of these habitat conservation measures agreed to between NCDOT and USFS to maintain the quality of adjacent nesting habitat, it is determined that the proposed project is not likely to cause a loss of viability for Black-throated Green Warbler on NFS lands in the CNF.

  One new occurrence of Black-throated Green Warbler was identified on the CMB, consisting of several males singing on territory throughout the Non-riverine Swamp Forest/Bay Forest community on the tract. Contingent upon USFS release of ROW for the Havelock Bypass, transfer of this tract to the USFS from NCDOT would add this occurrence to NFS lands on the CNF and would help ensure this species is viable on the CNF.

- **Bald Eagle** (*Haliaeetus leucocephalus*) (S) typically inhabits mature conifer forests close to clean bodies of water populated with fish, most often rivers, estuaries, coasts or large lakes and nests are typically built in the tops of very tall conifers located near water. Biologists from Dr. J. H. Carter III & Associates, Inc. surveyed each of the three detailed study corridors and a 660-foot radius around the corridors for bald eagle nests by helicopter in January 2011. To ensure 100 percent visual coverage, the corridors were flown using a grid system (both north/south and east/west). Transects were oriented

depending on the prevailing wind and spaced 250 to 500 feet apart depending on stand density. No eagle nests were found during the aerial surveys. However, one sub-adult bald eagle was observed flying outside of the 660-foot radius survey area north of the Bypass study corridors. Eagle monitoring data provided by the North Carolina Wildlife Resources Commission listed 12 nests in Craven County and two in Carteret County in 2010. Two of these 14 nests are located in the vicinity of the project. One nest is located approximately 1.5 miles east of the project study corridor on the Cherry Point Marine Corps Air Station and the other nest is approximately 3.5 miles northwest of the project site near East Prong Brice Creek on CNF property. None of the known nests are located within the 660-foot radius around the survey corridors. Additionally, construction activities for the proposed Havelock Bypass will not occur within 330 feet of, or be visible from, any known nest trees. Based on apparent absence of nest sites, communal roost sites, or foraging areas for this species, it is determined that the proposed project will have no impact on Bald Eagle.

- **Bachman's Sparrow** (*Peucaea aestivalis*) (LR), formerly known as *Ammodramus aestivalis*, is a bird that occupies open pine woodland habitats with grassy cover. Potentially suitable habitat is present in the evaluation area. Two NCNHP documented occurrences of this species are present within the evaluation area, and additional occurrences have been documented in the vicinity (Figures 3b and 3c; see also Attachment 2). These occurrences represent the identification of solitary singing birds in each location, which would be assumed to be males singing on territory. Additional suitable habitat areas associated with these occurrences are located within the area being considered for potential indirect impacts. Continued use of fire and mowing for habitat management is important in maintaining open habitat for this species and allowing individuals displaced by project construction to disperse into unoccupied suitable habitat. Including these occurrences in and adjacent to the evaluation area, this species is known from 18 occurrences documented as EOs in NCNHP records for NFS lands in the CNF.

  Based on the mobility of this species, no direct impacts from project construction are anticipated. The proposed project may impact individuals of Bachman's Sparrow through habitat fragmentation and through decreased likelihood that individuals of this species could safely fly across the road to suitable habitat on the opposite side. Potential loss of individuals through road-crossing mortality is anticipated to be relatively low based on the widespread availability of suitable habitat remaining in the evaluation area. The proposed project would not significantly affect the overall availability of suitable habitat in the evaluation area. Potential indirect impacts to Bachman's Sparrow habitat that could result from construction or maintenance activities can be minimized through conservation measures previously proposed by NCDOT, such as temporarily closing the bypass to allow for prescribed burns and implementation of measures proposed for controlling the spread of NNIS plant species on NFS lands. Based on the number of occurrences on CNF and the implementation of habitat conservation measures agreed to between NCDOT and USFS, it is determined that the proposed project is not likely to cause a loss of viability for Bachman's Sparrow on NFS lands in the CNF.

- **Red-cockaded Woodpecker** (*Picoides borealis*) (RCW) (E) is a federally endangered species with known occurrences on the CNF. The proposed US 70 Havelock Bypass would pass through foraging habitat partitions for five RCW clusters and four habitat management areas (HMA) proposed by USFS for future RCW recruitment clusters. Foraging data for this species was updated by Dr. J.H. Carter III & Associates, Inc. (JCA) in 2013. Potential effects for this species were evaluated in a separate Biological Assessment that was submitted to the USFS on November 12, 2013. The biological conclusion for this species was "May Affect, Not Likely to Adversely Affect."

3.4.3 Reptiles and Amphibians

- **American Alligator** (*Alligator mississippiensis*) [T(S/A)] is widespread across the CNF and is known from 4 occurrences that represent watersheds. Potentially suitable habitat may be found in flooded areas within the evaluation area. Surveys were conducted in March – April 2005 in the bottomland swamps along the various tributaries of Slocum Creek. No nighttime surveys were conducted. Alligators have been observed in the CNF (NCNHP data; Dennis Foster, personal communication, 2005). Alligators can be assumed to be present in any of the larger creeks or swamps with the Alt. 3 study area, especially the Southwest Prong Slocum Creek and East Prong Slocum Creek. Both creeks would be impacted by Alt. 3. Individuals present in the proposed ROW would be expected to move out of the area during construction activities, but there is the potential for direct mortality of individuals. Based on the widespread availability of similar habitats on NFS lands adjacent to the proposed project, the proposed project would not significantly affect the availability of suitable habitat in the evaluation area. If individuals of this species are present, indirect effects may result from road construction.

  Potential indirect impacts will be minimized through use of wildlife fencing and bridges. Wildlife fencing will prevent individuals from crossing the new roadway. Bridges will provide a few areas for wildlife passage. The proposed project may impact individuals of American Alligator during construction if individuals are present. American Alligator has been documented as relatively common on the CMB property, with documentation of successful reproduction occurring on the site. Contingent upon USFS release of ROW for the Havelock Bypass, transfer of the CMB lands to USFS would add this reproducing population segment to NFS lands. It is determined that the proposed project is not likely to cause a loss of viability for American Alligator on NFS lands in the CNF.

- **Eastern Diamondback Rattlesnake** (*Crotalus adamanteus*) (LR) may inhabit pine flatwood and savanna habitats similar to those adjacent to portions of the project ROW. This species is secretive and generally found far from human activity, utilizing stump holes, burrows of other animals, hollow logs, and brush piles. The nearest known occurrence is a 1991 record approximately 3.5 miles from the Alt. 3 study area. Potentially suitable habitat for this species is present within the evaluation area. Surveys conducted in 2005 indicate that this species is not likely present within the evaluation area. Since the species was not observed during multiple surveys it is considered to be absent and there are no impacts to the Eastern Diamondback Rattlesnake. This species is not further analyzed.

- **Southern Hognose Snake** (*Heterodon simus*) (LR) is found in sandy woodland habitats, particularly pine-oak sandhill habitats. One occurrence of this species is potentially located in the evaluation area. This is an historic occurrence that NCNHP has designated as low in accuracy. A low accuracy occurrence characterization is described by NHP as one with between 5% and 20% of the mapped EO area occupied. While typical sandhills habitat is not present in the evaluation area, the dryer phases of the open mesic pinelands in the evaluation area provide potentially suitable habitat for this species. Surveys conducted in 2005 indicate that this species is not likely present within the evaluation area. This species is known from four occurrences documented on NFS lands in the CNF. Because the North Carolina Museum of Natural Sciences (NCMNS) has records from north, east, and southwest of the Alt. 3 study area, it is possible that the southern hognose snake may be present. There are 113.8 acres of potentially occupied habitat within the Alt. 3 study area. These areas of potentially occupied habitat are predominately characterized as mesic Pine Flatwoods, mesic Pine Plantations, and mesic Powerline Corridors. However, these communities may be considered to provide low probability of occurrence compared to the dry pine-oak woodlands that this species typically inhabits. Based on the widespread availability of similar habitats on NFS lands adjacent to the proposed project, the proposed project would not significantly affect the availability of suitable habitat in the evaluation area.

  The proposed project may impact individuals of Southern Hognose Snake. If individuals of this species are present, the proposed project may impact individuals of Southern Hognose Snake through habitat fragmentation and through decreased likelihood that individuals of this species could safely crawl across the road to suitable habitat on the opposite side. Potential loss of individuals through road-crossing mortality is anticipated to be relatively low based on the widespread availability of suitable habitat remaining in the evaluation area. The proposed project would not significantly affect the overall availability of suitable habitat in the evaluation area. Potential indirect impacts to Southern Hognose Snake habitat that could result from construction or maintenance activities can be minimized through conservation measures previously proposed by NCDOT, such as temporarily closing the bypass to allow for prescribed burns and implementation of measures proposed for controlling the spread of NNIS plant species on NFS lands, which would maintain the quality of the adjacent habitat. With implementation of these habitat conservation mitigation measures agreed to between NCDOT and USFS, it is determined that the proposed project is not likely to cause a loss of viability for Southern Hognose Snake on NFS lands in the CNF.

- **Mimic Glass Lizard** (*Ophisaurus mimicus*) (S) is found in pine flatwood, savanna, and pine-oak sandhill habitats. This species is known from two occurrences documented on NFS lands in the CNF. While typical sandhills habitat is not present in the evaluation area the dryer phases of the open mesic pinelands in the evaluation area provide potentially suitable habitat for this species. The nearest known occurrence is approximately 4.4 miles from the Alt. 3 study area. The species was not observed during specific surveys for it and its presence is unlikely, therefore there are no impacts to the Mimic Glass Lizard. This species is not further analyzed.

- **Carolina Gopher Frog** (*Rana capito*) (S) breeds in temporary fish-free pools and forages in sandy woodland habitats, especially pine-oak sandhill habitats. While typical sandhills habitat is not present in the evaluation area, the dryer phases of the open mesic pinelands in the evaluation area were evaluated as potentially suitable habitat for this species. These areas of potentially occupied habitat are predominately characterized as mesic Pine Flatwoods, mesic Pine Plantations, and mesic Powerline Corridors. However, these communities may be considered to provide low probability of occurrence compared to the dry pine-oak woodlands that this species typically inhabits. The nearest known occurrence is approximately 3 miles from the Alt. 3 study area. The species was not observed during specific surveys for it and its presence is unlikely due to the lack of habitat, therefore there are no impacts to the Carolina Gopher Frog. This species is not further analyzed.

- **Glossy Crayfish Snake** (*Regina rigida*) (LR) is found in marsh, cypress pond, and other wetland habitats. There are four occurrences documented on the CNF, the closest approximately 0.4 mile from the Alt. 3 study area. Potentially suitable habitat is present in the evaluation area. The species was not observed during site specific surveys for it and its presence is unlikely, therefore there are no impacts to the Glossy Crayfish Snake. This species is not further analyzed.

- **Black Swamp Snak**e (*Seminatrix pygaea*) (LR) inhabits lush vegetation of ponds, ditches, and sluggish streams where it feeds on small frogs, tadpoles, salamanders, small fish, and worms. There are two occurrences documented on the CNF, the closest approximately 1 mile from the Alt. 3 study area. Potentially suitable habitat is present in the evaluation area. The species was not observed during specific surveys for it and its presence is unlikely, therefore there are no impacts to the Black Swamp Snake. This species is not further analyzed.

3.4.4 Insects

- **Cypress Daggermoth** (*Acronicta perblanda*) (LR) is a moth that inhabits cypress swamp habitats. Moth surveys conducted in 2005 did not document the presence of this species in the Alt. 3 study area (see Attachment 1). The nearest known occurrence is from an unspecified location in Carteret County. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Cypress Daggermoth.

- A **Daggermoth** (*Acronicta sinescripta*) (LR) is a moth that inhabits savanna and flatwood habitats. Moth surveys conducted in 2005 did not document the presence of this species in the Alt. 3 study area (see Attachment 1). The nearest known occurrence is located in Pender County. Based on apparent absence of this species, it is determined that the proposed project will have no impact on *A. sinescripta*.

- **A Dart Moth** (*Agrotis carolina*) (LR) is a moth that inhabits flatwood habitats containing Pyxie Moss (*Pyxidanthera barbulata*). Potentially suitable habitat is present in the evaluation area in the form of Pine Flatwoods, however, the host plant for this species, Pyxie Moss, was not observed to be present. Moth surveys conducted in 2005 did not document the presence of this moth in the Alt. 3 study area (see Attachment 1). The

nearest known occurrence is approximately 7 miles from the Alt. 3 study area. Based on apparent absence of this species, it is determined that the proposed project will have no impact on *A. carolina*.

- **Dusky Roadside Skipper** (*Amblyscirtes alternata*) (LR) is a skipper that inhabits open grassy pine flatwood and savanna habitats. Potentially suitable habitat is present in the evaluation area. Surveys by NCDOT in 2003 and NCNHP in 2005 did not document the presence of this species in the Alt. 3 study area (see Attachment 2). However, this species has been documented in the indirect impact evaluation area, which represents the only known occurrence (two sites) of this species on NFS lands in the CNF (Figure 3b).

  Based on presence within the indirect impact evaluation area and suitability of habitat for this species identified in the Alt. 3 study area, Dusky Roadside Skipper is presumed present in the Alt. 3 study area and the proposed project may have direct impacts to an undetermined number of adults and/or larvae. The proposed project may impact individuals through habitat fragmentation and through decreased likelihood that individuals of this species could safely fly across the road to suitable habitat on the opposite side. Direct loss of individuals from construction or maintenance activities and potential loss of individuals from road-crossing mortality may impact a relatively low percentage of the individuals that may be present in the evaluation area based on the widespread availability of suitable habitat remaining in the evaluation area. The proposed project would not significantly affect the overall availability of suitable habitat in the evaluation area. Potential indirect impacts to Dusky Roadside Skipper habitat that could result from construction or maintenance activities can be minimized through conservation measures previously proposed by NCDOT, such as temporarily closing the bypass to allow for prescribed burns and implementation of measures proposed for controlling the spread of NNIS plant species on NFS lands, which would maintain the quality of the adjacent habitat. With implementation of these habitat conservation mitigation measures agreed to between NCDOT and USFS, it is determined that the proposed project is not likely to cause a loss of viability for Dusky Roadside Skipper on NFS lands in the CNF.

- A **Tiger Moth** (*Apantensis* sp. 1 nr. *carlotta*) (LR) is a moth that inhabits savanna and sandhill seep habitats. Moth surveys conducted in 2005 did not document the presence of this species in the Alt. 3 study area (Attachment 1). The nearest known occurrence is approximately 9.2 miles from the Alt. 3 study area. Based on apparent absence of this species, it is determined that the proposed project will have no impact on *Apantensis* sp.1 nr. *carlotta*.

- **Arogos Skipper** (*Atrytone arogos arogos*) (S) is a skipper that inhabits mesic to boggy savanna habitats as well as mesic and hydric powerline corridors where its host plant species, Pinebarren Sand-reedgrass (*Calamovilfa brevipilis*), is present. Potentially suitable habitat is present in the evaluation area. While surveys did not document the presence of this species in the evaluation area they did identify the presence of its host plant species, Pinebarren Sand-reedgrass, within powerline corridors in the vicinity of the Alt. 3 study area and the area being considered for potential indirect impacts (Figures 2a,

2b, 2c). The closest and only known occurrence of Arogos Skipper from the CNF is approximately 6.6 miles from the Alt. 3 study area, although this population may no longer be extant due to impacts from a wildfire (personal communication, Gary Kauffman).

Although not documented from NCNHP or USFS records or during NCDOT surveys in the direct or indirect impact areas, Arogos Skipper has been presumed present in the Alt. 3 study area based on the suitability of habitat and presence of the host plant species. The proposed project will have direct impacts to powerline corridor habitat containing dispersed individuals of the host plant species, which in turn could result in impact to an undetermined number of adults and/or larvae. The host plant for this species, Pinebarrren Sand-reedgrass, has been reported in at least five powerline corridors in and near the evaluation area (John Fussell, personal communication, 2005) (see Attachment 2). In addition to presence in powerline corridor habitat in the direct and indirect impact areas, Pinebarren Sand-reedgrass is also more widespread in the vicinity of the Alt. 3 study area in powerline corridors that will not be affected by the project. The proposed project may impact Arogos skippers, if present, through habitat fragmentation and through decreased likelihood that individuals of this species could safely fly across the road to suitable habitat on the opposite side. Direct loss of individuals from construction or maintenance activities and potential loss of individuals from road-crossing mortality may impact a relatively low percentage of the individuals presumed present in the evaluation area based on the widespread availability of suitable habitat remaining in the evaluation area post-project. Since the distribution of the host plant in the vicinity of Alt. 3 extends along powerline corridors well outside of the direct and indirect impact areas, the proposed project would not significantly affect the overall availability of suitable habitat in the evaluation area. Potential indirect impacts to Arogos Skipper habitat that could result from construction or maintenance activities can be minimized through conservation measures previously proposed by NCDOT, such as temporarily closing the bypass to allow for prescribed burns and implementation of measures proposed for controlling the spread of NNIS plant species on NFS lands, which would maintain the quality of the adjacent habitat. With implementation of these habitat conservation mitigation measures agreed to between NCDOT and USFS, it is determined that the proposed project is not likely to cause a loss of viability for Arogos Skipper on NFS lands in the CNF.

- **Little Metalmark** (*Calephelis virginiensis*) (LR) is butterfly that inhabits grassy field, savanna, and marsh habitat. Potentially suitable habitat is present in the evaluation area. Surveys by NCDOT in 2003 and NCNHP in 2005 did not document the presence of this species in the Alt. 3 study area, but the surveys did document this species within the area being evaluated for indirect impacts as well as another powerline in the immediate vicinity (within 600 feet to the south of the Alt. 3 study area) (Figures 3b and 3c, respectively; see also Attachment 2). Including these occurrences, this species is known from seven occurrences documented on NFS lands in the CNF.

  Based on presence within the indirect impact evaluation area and suitability of habitat for this species identified in the Alt. 3 study area, Little Metalmark is presumed present in the Alt. 3 study area and the proposed project may have direct impacts to an

undetermined number of adults and/or larvae. The proposed project may impact individuals through habitat fragmentation and through decreased likelihood that individuals of this species could safely fly across the road to suitable habitat on the opposite side. Direct loss of individuals from construction or maintenance activities and potential loss of individuals from road-crossing mortality may impact a relatively low percentage of the individuals that may be present in the evaluation area based on the widespread availability of suitable habitat remaining in the evaluation area. The proposed project would not significantly affect the overall availability of suitable habitat in the evaluation area. Potential indirect impacts to Little Metalmark habitat that could result from construction or maintenance activities can be minimized through conservation measures previously proposed by NCDOT, such as temporarily closing the bypass to allow for prescribed burns and implementation of measures proposed for controlling the spread of NNIS plant species on NFS lands, which would maintain the quality of the adjacent habitat. With implementation of these habitat conservation mitigation measures agreed to between NCDOT and USFS, it is determined that the proposed project is not likely to cause a loss of viability for Little Metalmark on NFS lands in the CNF.

- **Frosted Elfin** (*Callophrys irus*) (LR) is a butterfly that inhabits grassy opening or burn scars in pine barren and savanna habitats, as well as powerline ROW habitats. Surveys did not locate the presence of this species. There are no documented occurrences of this species on the CNF. The nearest known occurrence is approximately 17.5 miles from the Alt. 3 study area. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Frosted Elfin.

- **Dismal Swamp Stink Bug** (*Chlorochroa dismalia*) (LR) is an insect that inhabits canebrake habitats. There is only one occurrence of this species on the CNF, which is located approximately 4 miles from the Alt. 3 study area. This species has not been documented from the evaluation area on NFS lands. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Dismal Swamp Stink Bug.

- A **Prominent Moth** (*Datana robusta*) (LR) is a moth that inhabits savanna, flatwood, and sandhill habitats. Moth surveys conducted in 2005 did not document the presence of this species in the Alt. 3 study area. The nearest known occurrence is located in Onslow County. Based on apparent absence of this species, it is determined that the proposed project will have no impact on *D. robusta*.

- **Berry's Skipper** (*Euphyes berryi*) (LR) is a skipper that inhabits wet prairie, marsh, and savanna habitats containing pitcher plants. Potentially suitable habitat is present in the evaluation area. While surveys did not document the presence of this species in the Alt. 3 study area, it has been documented in the indirect impact evaluation area and it is likely present in suitable habitat in the Alt. 3 study area (Figure 3c; see also Attachment 2). The occurrence within the indirect impact evaluation area represents one of three known occurrences of this species on NFS lands in the CNF.

Based on presence within the indirect impact evaluation area and suitability of habitat and presence of host species for this species identified in the Alt. 3 study area, Berry's Skipper is presumed present in the Alt. 3 study area and the proposed project may have direct impacts to an undetermined number of adults and/or larvae. The proposed project may impact individuals through habitat fragmentation and through decreased likelihood that individuals of this species could safely fly across the road to suitable habitat on the opposite side. Direct loss of individuals from construction or maintenance activities and potential loss of individuals from road-crossing mortality may impact a relatively low percentage of the individuals that may be present in the evaluation area based on the widespread availability of suitable habitat remaining in the evaluation area. The proposed project would not significantly affect the overall availability of suitable habitat in the evaluation area. Potential indirect impacts to Berry's Skipper habitat that could result from construction or maintenance activities can be minimized through conservation measures previously proposed by NCDOT, such as temporarily closing the bypass to allow for prescribed burns and implementation of measures proposed for controlling the spread of NNIS plant species on NFS lands, which would maintain the quality of the adjacent habitat. With implementation of these habitat conservation mitigation measures agreed to between NCDOT and USFS, it is determined that the proposed project is not likely to cause a loss of viability for Berry's Skipper on NFS lands in the CNF.

- **Two-spotted Skipper** (*Euphyes bimacula*) (LR) is a skipper that inhabits wet savanna and bog habitats, and sedge areas near wet woods. Potentially suitable habitat is present in the evaluation area. While surveys did not document the presence of this species in the evaluation area, it is likely present in suitable habitat (see Attachment 2). There are two occurrences known from the CNF and the nearest known occurrence is from a powerline corridor approximately 3.3 miles from the Alt. 3 study area.

  Based on the suitability of habitat within the Alt. 3 study area, Two-spotted Skipper is presumed present in the Alt. 3 study area and the proposed project may have direct impacts to an undetermined number of adults and/or larvae. The proposed project may impact individuals, if present, through habitat fragmentation and through decreased likelihood that individuals of this species could safely fly across the road to suitable habitat on the opposite side. Direct loss of individuals from construction or maintenance activities and potential loss of individuals from road-crossing mortality may impact a relatively low percentage of the individuals that may be present in the evaluation area based on the widespread availability of suitable habitat remaining in the evaluation area. The proposed project would not significantly affect the overall availability of suitable habitat in the evaluation area. Potential indirect impacts to Two-spotted Skipper habitat that could result from construction or maintenance activities can be minimized through conservation measures previously proposed by NCDOT, such as temporarily closing the bypass to allow for prescribed burns and implementation of measures proposed for controlling the spread of NNIS plant species on NFS lands, which would maintain the quality of the adjacent habitat. With implementation of these habitat conservation mitigation measures agreed to between NCDOT and USFS, it is determined that the proposed project is not likely to cause a loss of viability for Two-spotted Skipper on NFS lands in the CNF.

- **Duke's Skipper** (*Euphyes dukesi dukesi*) (S) is a skipper that inhabits ecotones between brackish or freshwater marshes with swamp habitats, as well as sedge patches in forested swamps. Larval host species have been identified as sedges (*Carex* spp.). Potentially suitable habitat is present in the evaluation area. While surveys did not document the presence of this species in the evaluation area, it may be present in suitable habitat. There are two occurrences known from the CNF and the nearest known occurrence is approximately 4.5 miles from the Alt. 3 study area.

  Based on the suitability of habitat and presence of potential host species for this species identified in the Alt. 3 study area, Duke's Skipper is presumed present in the Alt. 3 study area and the proposed project may have direct impacts to an undetermined number of adults and/or larvae. The proposed project may impact individuals, if present, through habitat fragmentation and through decreased likelihood that individuals of this species could safely fly across the road to suitable habitat on the opposite side. Direct loss of individuals from construction or maintenance activities and potential loss of individuals from road-crossing mortality may impact a relatively low percentage of the individuals that may be present in the evaluation area based on the widespread availability of suitable habitat remaining in the evaluation area. The proposed project would not significantly affect the overall availability of suitable habitat in the evaluation area. Potential indirect impacts to Duke's Skipper habitat that could result from construction or maintenance activities can be minimized through conservation measures previously proposed by NCDOT, such as temporarily closing the bypass to allow for prescribed burns and implementation of measures proposed for controlling the spread of NNIS plant species on NFS lands, which would maintain the quality of the adjacent habitat. With implementation of these habitat conservation mitigation measures agreed to between NCDOT and USFS, it is determined that the proposed project is not likely to cause a loss of viability for Duke's Skipper on NFS lands in the CNF.

- **Venus Flytrap Cutworm Moth** (*Hemipachnobia subporphyrea*) (S) is moth that inhabits savanna habitats containing Venus Flytraps. While potentially suitable habitat in the form of pine savannas is present in the evaluation area, no Venus Flytraps were observed. The nearest known occurrence is approximately 7 miles from the Alt. 3 study area. Surveys indicate that this species is not likely present within the evaluation area. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Venus Flytrap Cutworm Moth.

- **Anointed Sallow Moth** (*Pyreferra ceromatica*) (LR) is a moth that inhabits flatwood and pocosin habitats, as well as ecotones between mesic woodland and bottomland habitats. Moth surveys were not conducted during the flight period for this species, but habitat evaluation determined that suitable host plant species are present and this species is likely to occur in the Alt. 3 study area (see Attachment 1). The closest and only known occurrence from the CNF is approximately 6.4 miles from the Alt. 3 study area. This species has been collected where Witch Hazel (*Hamamelis virginiana*) occurs near small streams with Dwarf Palmetto nearby. Such habitat occurs in the Alt. 3 study area on both sides of Southwest Prong Slocum Creek.

Based on suitability of habitat and presence of host species for this species identified in the Alt. 3 study area, Anointed Sallow Moth is presumed present in the Alt. 3 study area and the proposed project may have direct impacts to an undetermined number of adults and/or larvae. The proposed project may impact individuals, if present, through habitat fragmentation and through decreased likelihood that individuals of this species could safely fly across the road to suitable habitat on the opposite side. Direct loss of individuals from construction or maintenance activities and potential loss of individuals from road-crossing mortality may impact a relatively low percentage of the individuals that may be present in the evaluation area based on the widespread availability of suitable habitat remaining in the evaluation area. The proposed project would not significantly affect the overall availability of suitable habitat in the evaluation area. Potential indirect impacts to Anointed Sallow Moth habitat that could result from construction or maintenance activities can be minimized through conservation measures previously proposed by NCDOT, such as temporarily closing the bypass to allow for prescribed burns and implementation of measures proposed for controlling the spread of NNIS plant species on NFS lands, which would maintain the quality of the adjacent habitat. With implementation of these habitat conservation mitigation measures agreed to between NCDOT and USFS, it is determined that the proposed project is not likely to cause a loss of viability for Anointed Sallow Moth on NFS lands in the CNF.

- **Carter's Noctuid Moth** (*Spartiniphaga carterae*) (S) is a moth that inhabits savanna and sandhill habitats containing Pinebarren Sand-reedgrass. The nearest known occurrence is approximately 8 miles from the Alt. 3 study area. Surveys indicate that this species is not likely present within the evaluation area. Based on apparent absence of this species, it is determined that the proposed project will have no impact on Carter's Noctuid Moth.

- A **gray moth** (*Tornos cinctarius*) (LR) is a moth that inhabits savanna and sandhill habitats. The nearest known occurrence is located in Pender County. Moth surveys conducted in 2005 did not document the presence of this species in the Alt. 3 study area. Based on apparent absence of this species, it is determined that the proposed project will have no impact on *T. cinctarius*.

3.4.5 Freshwater Fish, Mollusks, and Crustaceans

- **Graceful Clam Shrimp** (*Lynceus gracilicornis*) (LR) is a small crustacean that occupies temporary water features, primarily ephemeral pools. The best habitat for this species was determined to be in ponds located off FSR 613 in the Southwest Prong Flatwoods Natural Area, which would be affected by Alt. 3. No individuals of this species were found in visual searches or substrate samples collected surveys conducted for this species in ephemeral and semi-permanent ponds in June 2005 (see Attachment 2). NCNHP records indicate that Graceful Clam Shrimp has been found within five miles of the Alt. 3 study area on the other side of Havelock in the year 2000. Due to the ephemeral nature of the species' habitat, the nauplii hatch as soon as the pond they inhabit fills; the eggs rest in the substrate during the dry season. There is only one generation of the clam shrimp per wet season, so sampling for adults can be problematic. Due to the presence of the species within five miles of the project area, and due to the difficulty in timing the

sampling event when adults are present, graceful clam shrimp could be present in ephemeral ponds in the project vicinity. This species is probably more common than is currently known by the scientific community because of its ephemeral nature and the lack of data (Barbara Taylor, personal communication, 2005). The proposed project may result in loss of potential habitat, but would not impact any known occurrences of Graceful Clam Shrimp.

- **Bridle Shiner** (*Notropis bifrenatus*) (LR) is a fish that has been documented from streams near the lower Neuse River. The nearest known occurrence is a 1978 record from Tucker Creek approximately 0.8 mile downstream from the Alt. 3 study area. Fish communities were sampled using nets and backpack electroshockers in two streams in April 2005, Southwest Prong Slocum Creek and East Prong Slocum Creek (see Attachment 2). A total of 12 fish species were found, but Bridle Shiner was not documented as present. Based on the apparent absence of this species in the fish surveys conducted, it is assumed that bridle shiner is not present in the study area and Alt. 3 will have no impact on Bridle Shiner.

3.5 Summary of Terrestrial and Aquatic Animal Species

There are 92 animal species on the most recent (August 2013) list of rare animal species provided by the USFS for the CNF. Of these 92 rare animal species, 56 species were dropped from further consideration because no suitable habitat is present within or in close proximity to the evaluation area. Potentially suitable habitat or previously reported NCNHP or USFS records were identified in the evaluation area for 34 USFS rare terrestrial and 2 rare aquatic wildlife species. Surveys conducted in 2005 in combination with records available through April 2014 from NCNHP and the USFS resulted in documentation or confirmation, or presumed presence of 15 USFS rare animal species within the evaluation area. Surveys did not document the presence of the remaining 21 rare animal species within the evaluation area. Based on the apparent absence of these remaining 21 species, it is determined that the proposed project will have no impact on these 21 species and these species are dropped from further consideration.

Red-cockaded Woodpecker (RCW), the only federal Endangered, Threatened, or Proposed animal species for which potential habitat was identified or individuals confirmed present, was evaluated in a separate Biological Assessment by NCDOT and is not evaluated in this BE. Copies were sent to USFS staff on November 12, 2013. American Alligator, a species federally listed as Threatened due to Similarity of Appearance, does not require consultation with U.S. Fish and Wildlife. The project may impact individuals of American Alligator but is not likely to result in viability concerns for this species across the CNF.

The proposed project may impact one Sensitive animal species, Duke's Skipper. For Locally Rare animal species, the project may impact individuals of Rafinesque's Big-eared Bat, Southeastern Myotis, Eastern Henslow's Sparrow, Black-throated Green Warbler, Bachman's Sparrow, Southern Hognose Snake, Dusky Roadside Skipper, Arogos Skipper, Little Metalmark, Berry's Skipper, Two-spotted Skipper, and Anointed Sallow Moth, but with implementation of conservation commitments agreed to by NCDOT, it was determined the project is not likely to result in viability concerns for any of the species across the CNF.

4.0 DETERMINATION OF EFFECT

The proposed US 70 Havelock Bypass (R-1015) project will have no effect on Rough-leaved Loosestrife or any other federally listed Endangered, Threatened, or Proposed plant species. Red-cockaded Woodpecker (RCW), the only federal Endangered, Threatened, or Proposed animal species for which potential habitat was identified or individuals confirmed present, was evaluated in a separate Biological Assessment by NCDOT that was already sent to USFS. The biological conclusion was "May Affect, Not Likely to Adversely Affect." American Alligator, a species federally listed as Threatened due to Similarity of Appearance [T(S/A)], does not require consultation with U.S. Fish and Wildlife. The project may impact individuals of American alligator but is not likely to result in viability concerns for this species across the CNF.

Ten Regional Forester's Sensitive plant species have been recently or previously been located within the proposed activity area. Of these, the project may impact individuals of Small Coastal Spreading Pogonia, Loomis's Loosestrife, Piedmont Cowbane, Spring-flowering Goldenrod, Florida Peatmoss, and Fitzgerald's Peatmoss, but with implementation of mitigation measures agreed to between NCDOT and USFS, it was determined the project is not likely to result in viability concerns for any of the species across the CNF. These mitigation measures (see Section 5.0) include allowing for the closure of the highway to allow the USFS to conduct periodic prescribed burns and implementation of measures proposed for controlling the spread of NNIS plant species on NFS lands; in addition, seed collection will be undertaken for Spring-flowering Goldenrod. For Yellow Fringeless Orchid, Hooker's Milkwort, Short-bristled Beaksedge, and Carolina Goldenrod, with implementation of the mitigation measures agreed to between NCDOT and USFS to minimize potential for indirect impacts, it was determined that the project would not impact these species or result in viability concerns for any of the species across the CNF. These mitigation measures (see Section 5.0) include allowing for the closure of the highway to allow the USFS to conduct periodic prescribed burns and implementation of measures proposed for controlling the spread of NNIS plant species on NFS lands. The proposed project will not impact any other Sensitive plant species.

One Regional Forester's Sensitive animal has recently or previously been located within the proposed activity area, or is presumed present. The proposed project may impact individuals of Duke's Skipper, which is presumed present, but with implementation of mitigation measures agreed to between NCDOT and USFS, it was determined the project is not likely to result in viability concerns for this species across the CNF. These mitigation measures (see Section 5.0) include allowing for the closure of the highway to allow the USFS to conduct periodic prescribed burns and implementation of measures proposed for controlling the spread of NNIS plant species on NFS lands. The proposed project will not impact any other Sensitive animal species.

Eleven CNF Locally Rare plant species have been recently or previously been located within the proposed activity area. Of these, the project may impact individuals of LeConte's Thistle, Mudbank Crowngrass, Awned Mountain-mint and two liverworts (*Lejeunea bermudiana* and *Plagochila lucoviciana*), but with implementation of mitigation measures agreed to between NCDOT and USFS, it was determined the project is not likely to result in viability concerns for any of the species across the CNF. These mitigation measures (see Section 5.0) include allowing

for the closure of the highway to allow the USFS to conduct periodic prescribed burns and implementation of measures proposed for controlling the spread of NNIS plant species on NFS lands; in addition, seed collection will be undertaken for LeConte's Thistle. For Bog Bluestem, Eaton's Witch Grass, Florida Adder's Mouth, Snowy Orchid, Shadow-witch, and Eaton's Ladies'-tresses, with implementation of mitigation measures agreed to between NCDOT and USFS to minimize potential for indirect impacts, it was determined that the project would not impact these species or result in viability concerns for any of the species across the CNF. These mitigation measures (see Section 5.0) include allowing for the closure of the highway to allow the USFS to conduct periodic prescribed burns and implementation of measures proposed for controlling the spread of NNIS plant species on NFS lands. The proposed project will not impact any other Locally Rare plant species.

Twelve CNF Locally Rare animal species have recently or previously been located within the proposed activity area, or are presumed present. The project may impact individuals of Rafinesque's Big-eared Bat, Southeastern Myotis, Eastern Henslow's Sparrow, Black-throated Green Warbler, Bachman's Sparrow, Southern Hognose Snake, Dusky Roadside Skipper, Arogos Skipper, Little Metalmark, Berry's Skipper, Two-spotted Skipper, and Anointed Sallow Moth, but with implementation of mitigation measures agreed to between NCDOT and USFS, it was determined the project is not likely to result in viability concerns for any of the species across the CNF. For the species requiring open habitats or habitats free of NNIS shrub encroachment (the sparrow, snake, butterfly, skipper, and moth species), implementation of habitat conservation measures previously proposed by NCDOT, such as temporarily closing the bypass to allow for prescribed burns and implementation of measures proposed for controlling the spread of NNIS plant species on NFS lands, would provide appropriate mitigation to maintain the quality of adjacent habitats for these species. Contingent upon USFS release of ROW for the Havelock Bypass, transfer of the CMB tract to the USFS from NCDOT would add occurrences of the two bat species and the warbler species to NFS lands on the CNF and would help ensure these species are viable on the CNF. The proposed project will not impact any other Locally Rare animal species.

5.0 MITIGATION MEASURES

Through consultation with USFS, NCDOT has agreed to provide appropriate mitigation measures to offset direct and indirect impacts associated with the US 70 Havelock Bypass. Proposed mitigation measures include measures to facilitate prescribed burns on fragmented NFS lands, manage herbicide use for right-of-way (ROW) maintenance, and manage non-native invasive plant species. For selected USFS rare species of particular concern that may be directly or indirectly impacted, work was done to identify new populations that are on protected lands not impacted by the project or that can be protected. Seed collection has been determined to be an appropriate mitigation measure for three plant species, Spring-flowering Goldenrod, LeConte's Thistle, and Awned Mountain-mint; collected seeds would be used to help establish new populations in suitable areas or bolster existing populations.

5.1 Mitigation Measures to Minimize Indirect Impacts

Alt. 3 would fragment NFS lands that are currently being managed using periodic prescribed burns. Fragmentation may affect the use of prescribed burning as a management tool on NFS lands. The USFS has previously stated that the US 70 Havelock Bypass will need to be closed in order to maintain prescribed burning for NFS lands between the US 70 Havelock Bypass and existing US 70. NCDOT has agreed to close the US 70 Havelock Bypass under general conditions outlined with USFS to accommodate prescribed burning.

Implementation of mitigation measures agreed to between NCDOT and USFS would minimize viability concerns that could result from indirect impacts. These mitigation measures include:

- Allow for the temporary closure of the bypass to allow the USFS to conduct periodic prescribed burns;
- Prior to construction, NCDOT will coordinate with the USFS to identify occurrences of USFS rare plant species near the project construction limits and put up protective orange fencing to be removed after completion of construction;
- Avoid placing staging areas within 250 feet of USFS rare plant species occurrences, where practicable;
- Avoid placing heavy equipment within powerline corridors outside of the proposed slope stakes without prior approval from the USFS;
- Avoid use of broadcast sprays for herbicides and pesticides on NFS lands;
- Minimize the use of herbicides and pesticides; and
- NCDOT Division 2 forces will work with USFS staff on a periodic basis to control the presence of priority species of non-native plants along the Havelock bypass easement on CNF. NCDOT will also work on adjacent NCDOT ROW to prevent the encroachment of priority non-natives on to CNF. In turn, USFS will work cooperatively with NCDOT to identify and effectively control prioritized non-native invasive plant species.

In coordination with the USFS, NCDOT has developed mitigation measures to minimize the spread of NNIS plant species on NFS lands within the CNF associated with the construction and maintenance of the US 70 Havelock Bypass.

- To prevent the spread of non-native invasive plant species on NFS lands, NCDOT will require contractors to pressure wash all off-road equipment, including cranes, graders, pans, excavators, and loaders, prior to being brought in the CNF construction areas.
- To control the spread of non-native invasive plant species on NFS lands, NCDOT, in coordination with the USFS, will locate and flag areas of non-native invasive plant species within the study area for Alt, 3 of the US 70 Havelock Bypass. If any of these areas are within areas of proposed fill, those areas will be cleared and grubbed, and the material disposed of outside the limits of the CNF. If non-native invasive plant species are located in areas of proposed cuts then the material and actual thickness of root mat or other defined amount will be disposed of outside the limits of the CNF.
- In consultation with the USFS, seed mixes of native grasses and forbs or non-aggressive, non-natives will be used on NFS lands for erosion control and revegetation.
- NCDOT will utilize rolled matting or weed-free mulch for erosion control and revegetation on NFS lands.
- NCDOT will coordinate with the USFS on a landscaping plan for NFS lands. The plan will detail appropriate native seeding mixes for erosion control and site specific control

methods for invasive species, including a suite of acceptable herbicides for the corridor and adjacent natural habitats. The plan will also outline a plan for ongoing coordination between NCDOT and USFS personnel to maintain vegetation diversity and ensure no long-term impacts to rare species along the bypass corridor.

With the implementation of the mitigation measures developed by NCDOT, in coordination with the USFS, the threat of spread of NNIS plants on NFS lands associated with the construction and maintenance of the US 70 Havelock Bypass is expected to be minimal.

5.2 Mitigation through Increasing Number of Occurrences under Protection

NCDOT has initiated efforts to begin mitigating the potential impacts to USFS rare species through efforts to identify new populations of USFS rare species on NFS lands and other areas within the CNF that can be protected.

5.2.1 Croatan Mitigation Bank

In 2008 NCDOT conducted a preliminary habitat and USFS rare species evaluation of the Croatan Mitigation Bank (CMB), an in-holding located within the boundaries of the CNF to assess the potential for current use by, and as potential mitigation for USFS rare species (see Attachment 4). NCDOT purchased the 4,035-acre tract of land for the purpose of developing a mitigation bank for wetland impacts and mitigating NFS lands affected by the project. Contingent upon USFS release of ROW for the Havelock Bypass, the CMB property will be transferred to the USFS to become part of the CNF and managed by USFS.

The topography of the CMB is essentially flat with minimal slope to the north that is more prominent at the northern end of the site. A few very low ridges generally parallel the main access road maintained through the site. Soils on the CMB can be divided into two basic classes, loamy soils with substantial amounts of clay in their lower horizons and organic soils with profiles formed in accumulations of decayed plant material. Soil series mapped for the CMB include: Bayboro, Croatan, Dare, Dorovan, Goldsboro, Leaf, Leon, Lynchburg, Masontown, Muckalee, Murville, Pantego, and Rains. Thirteen general vegetative communities were identified on the CMB including: Swamp Forest (small stream), Pine Flatwoods (hydric, mesic, transitional), Successional/Ruderal Habitat (grass-sedge, shrub-scrub), Powerline Corridor (hydric), Non-riverine Wet Hardwood Forest, Non-riverine Swamp/Bay Forest, Lake Ridge Pine Forest, Pond, Hydric Pine Plantation, Hydric Pine Savanna, Upland Hardwood Forest, Pine/Hardwood Forest, Rural/Urban Modifications.

Six USFS rare species with potential direct affects associated with the proposed project have been documented on the CMB. These species are Florida Peatmoss, Loomis's Loosestrife, Rafinesque's Big-eared Bat, Southeastern Myotis, Black-throated Green Warbler, and American Alligator. Bald Eagle has been observed on the CMB, but nesting of this species has not been confirmed.

5.2.2 Documentation of New Occurrences on NFS Lands

During the 2008 growing season, surveys were undertaken on NFS lands within portions of the CNF not affected by the US 70 Havelock Bypass project to attempt to identify additional occurrences of specific USFS rare species of concern not previously documented by USFS or in

NCNHP records. Non-targeted USFS rare species identified during the course of the surveys were also documented. Also at the request of USFS, known occurrences of several potentially affected USFS rare species were also reviewed to determine if they continued to exist. Specific areas surveyed within the CNF for new occurrences of USFS rare species were selected based on a combination of ecological factors including: soil type, vegetative community type, frequency of fire management, hydrology, slope aspect, forest age, and known occurrences of other rare species.

During the course of these 2008 surveys two new occurrences of Fitzgerald's Peatmoss, one new occurrence of Hooker's Milkwort, one new occurrence of Spoonflower (*Peltandra sagittifolia*), one new occurrence of Shadow-witch, one new occurrence of Venus Flytrap, and three new occurrences of Piedmont Cowbane were identified. Additional occurrences of Twining Screwstem (*Bartonia paniculata paniculata*) and a Bird Dropping Moth (*Lithacodia* sp.), species that have since been removed from the USFS rare species list for the CNF, were also identified during these surveys.

During 2012 and 2013, surveys were undertaken within portions of the CNF not directly affected by the US 70 Havelock Bypass project to attempt to identify additional occurrences of *Lejeunea bermudiana*, a cryptic species with limited number of known occurrences. Specific areas surveyed within the CNF were selected based on a combination of ecological factors including: soil type, vegetative community type, frequency of fire management, hydrology, slope aspect, forest age, and known occurrences of other rare species. Non-targeted USFS rare species identified during the course of the surveys were also documented. During the course of these 2012 - 2013 surveys new occurrences of *L. bermudiana* were documented from five watersheds not impacted by the US 70 Havelock Bypass. Two new occurrences of another liverwort, *Plagiochila ludoviciana* were also identified in association with two of the new *L. bermudiana* occurrences, and this species is likely also present in association with *L. bermudiana* within each of the other three new watersheds.

5.2.3 Seed Collection

As mitigation to offset direct impacts for LeConte's Thistle, NCDOT has agreed to collect seeds from viable EOs for use in supplementing existing EOs where suitable habitat occurs but numbers of individuals are low or individuals have not been recently documented. NCDOT has also agreed to collect seeds from Spring-flowering Goldenrod and Awned Mountain-mint from the impact areas for establishing new populations on NFS lands in areas identified as potentially suitable based on favorable soil and hydrology conditions. Seed collection was initiated in the Alt. 3 study area for LeConte's Thistle in 2013 and for Spring-flowering Goldenrod in 2010. Seed collection for Awned Mountain-mint will be initiated in 2014.

Several areas have been identified as potentially suitable for establishment of new Spring-flowering Goldenrod sites (see Attachment 7), and where existing LeConte's Thistle sites may be able to be augmented through sowing of seeds collected from the impact areas (see Attachment 10). NCDOT has initiated efforts to identify potentially suitable sites for establishing new Awned Mountain-mint populations from seeds collected from the impact areas and will coordinate with USFS for concurrence with site selection. For sites ultimately selected for sowing seeds for establishing or supplementing rare plant populations, the preference is to utilize

sites with sparser understory under a regular burning regime that are appropriate to the species as to habitat and soils. Periodic burning would be the preferable maintenance tool. If initial site preparation or manipulation is required, such as clearing or scarifying the soil initially to enhance seed germination, the site would be surveyed to ensure that no existing rare plant populations would be impacted by these actions. Prior to site construction, NCDOT will arrange for test germination of samples of the collected seeds for each species to check viability.

6.0 TRIBAL COORDINATION WITH TUSCARORA NATION

The Havelock Bypass study area contains an identified archaeological site that may have relevance to the Tuscarora Nation. Through the Federal Highway Administration, coordination has been initiated which requests a Tuscarora Nation review of the proposed project and the preferred alternative. The coordination letter is affixed to this Biological Evaluation (Appendix E). The referenced Archaeological Surveys are available electronically upon request.

7.0 LIST OF PREPARERS

Mary Frazer, NCDOT Natural Environment Section; Project Coordination, Document Preparation, Botanical and Animal Surveys
Matt Smith, Environmental Services, Inc.; Document Preparation, Botanical Surveys
Kevin Markham, Environmental Services, Inc.; Document Preparation, Botanical Surveys

Contributors:
Katie Talavera, Environmental Services, Inc.; GIS Analysis, Graphics
David DuMond, Environmental Services, Inc.; Habitat Characterizations, Botanical Surveys
Mary K. Clark, Moonlight Environmental Consulting; Bat Surveys
J. Bolling "Bo" Sullivan, Beaufort, NC; Moth Surveys
Mike Sanderson, NCDOT Natural Environment Section; Bird Surveys
Dennis Herman, NCDOT Natural Environment Section; Reptile and Amphibian Surveys, Eastern Woodrat Survey
Logan Williams, NCDOT Natural Environment Section, retired; Butterfly Surveys
Neil Medlin, NCDOT Natural Environment Section; Fish Surveys
Jay Mays, NCDOT Natural Environment Section; Crustacean and Mollusk Surveys
Dr. J.H. Carter III & Associates; Bald Eagle Surveys, Red-cockaded Woodpecker Surveys

_____ Date: _____
Gary Kauffman
Botanist/Ecologist, U.S. Forest Service
National Forest in North Carolina

APPENDIX A

Habitat Descriptions

Habitat Descriptions for Alternative 3

Habitats were visited within the Alt. 3 study area at the onset of the rare species evaluations in 2003 and 2004 for the purposes of documentation of various habitat characteristics in the field. Nine major habitat types were identified in the evaluation area. These include Pine Flatwoods, Pine/Hardwood Forest, Streamhead Pocosin, Swamp Forest, Small Pond, Powerline Corridor, Pine Plantation, Successional/Ruderal Habitat, and Rural/Urban Modifications. Five habitat types are further divided by characteristics of hydrology or vegetation. Pine Flatwoods is the most abundant habitat type within the Alt. 3 study area and includes area denoted as mesic and hydric. Streamhead Pocosin is divided into tree-dominated and shrub-dominated areas based on canopy coverage. Swamp Forest has been grouped into three distinct regimes with respect to hydrologic conditions and stream characteristics; large stream, small stream, and ponded/depressional. Powerline Corridor and Pine Plantation habitats are divided into mesic and hydric areas. One habitat type, Rural/Urban Modifications, is used to include all obvious human-maintained landscape modifications including roads, residential areas, businesses, etc. Habitats sustaining regular disturbance are included under Successional/Ruderal Habitat. Vegetation community mapping is provided in Figures 2a – 2d in Appendix F.

Common and scientific names of vascular plants used in this text generally follow Kartesz and Meacham (1999), Weakley (2012), or other names in more common usage. Scientific names of liverworts follow Hicks (1992), and scientific names of mosses follow Crum and Anderson (1981).

Pine Flatwoods

Pine Flatwoods is the most abundant habitat type within the Alt. 3 study area. Mesic, or moist and hydric, or wet, variations have been mapped (identified respectively as Mesic PFm and Hydric PFh on Figures 2a – 2d). Mesic Pine Flatwoods occupies approximately 98.3 acres and hydric Pine Flatwoods approximately 48.7 acres on NFS lands within the area that may be directly impacted. Pine Flatwoods develop naturally when landscapes in this region are exposed to regular fire. In the CNF the burning cycle is more systematically and evenly applied than under natural conditions. Under completely natural conditions fires would be more random and the effects would be more discontinuous. More severe fires would be expected to result under natural conditions, and the resulting seres would be considerably different than those that currently exist in the project area. Naturally, the landscape would support more of a heterogeneous mosaic of forest seres. Not only frequency, but also severity of fires governs the density of vegetation through pine flatwoods. The difference between mesic and hydric Pine Flatwoods variations is the greater tendency for the hydric form to hold moisture for longer periods of time during and following precipitation. Hydric Pine Flatwoods are not permanently wet, but may be wet in those winter seasons experiencing normal or above normal rainfall.

Soils of the region are characteristically loamy with substantial B2t horizons below loamy sand or sometimes sandy loam A horizons. These soils are Ultisols. The E-horizons of the mesic soils are well developed with chromas above 2. Goldsboro and Norfolk series are common mapping units for these soils in Palaeudult Great Groups (USDA 1989). Higher clay contents exist in B-horizons of the hydric form of pine flatwoods subsoils. Sola with more clay normally hold or perch water for longer periods at their surfaces and are generally placed in the Paleaquult

Great Group. The Rains series is a frequently applied soils mapping unit of the wetter forms where E-horizons have a low chroma (2 or below). Wetter and drier inclusions are typically found in many flatwoods areas and the moisture variations can influence canopy and understory changes including changes in shrub and herb layer species contents.

On slopes above swamp forests, seepage from ground water discharge over time has created narrow wetland terraces that are underlain by sands heavily coated with black organic matter. Below the black sands are often spodic fragipans that perch and promote lateral movement of water to down-slope areas in the floodplain. The wetland conditions may be lost up-slope or merge with those of the floodplain. These small shelves of hydric soil have not been mapped (USDA 1989), but are here considered Alaquods. As with most seepage of this nature in the coastal plain such areas can change through time depending on up-slope land use.

Increased runoff promoted by ditching and plowed firebreaks has reduced the amount of water that enters the solum in some Pine Flatwoods habitats. Soil indicators in many areas have apparently developed in profiles wetter than those that currently exist. The extent to which these landscape modifications continue to affect change is not known.

Pine Flatwoods are dominated by two or sometimes three strata or vegetation layers. The upper-most layer or canopy is composed primarily of pine. Longleaf Pine (*Pinus palustris*) is prevalent in dryer areas or mesic sites while Loblolly Pine (*Pinus taeda*) and/or Pond Pine (*Pinus serotina*) are most abundant in wetter or hydric areas. Under a regime of intermittent fire a single layer of two to five foot high shrubby vegetation composed of tree and shrub species is common in the mesic and hydric variations of this type. Occasional young trees may extend above the shrub stratum. Within the habitats examined pine stems are usually within the 14 to 20 inch diameter classes, but stands of younger trees can be found, particularly paralleling utility corridors. The pine canopies are not usually dense, due to thinning, and provide only a characteristic 20 to 25 percent cover over the forest floor. Shrub covers are much higher and approach 100 percent in some thick areas, but most usually do not exceed 60 to 70 percent cover. Herbaceous species generally provide scattered, sparse cover except in a few areas where high light levels reach the forest floor.

The single most abundant shrub species in mesic areas is Blue Huckleberry (*Gaylussacia frondosa*). Sweet-gum (*Liquidambar styraciflua*) is the most abundant tree species present below the pine canopy, but this species may be represented by only shrub or sapling-sized individuals. Other woody species frequently present in mesic areas include Horsesugar (*Symplocos tinctoria*), Southern Bayberry (*Morella cerifera*), Swamp Bay (*Persea palustris*), and Small Black Blueberry (*Vaccinium tenellum*). Evening Trumpet-flower (*Gelsemium sempervirens*) is a frequent woody vine that grows by twining through young trees and scrambling across the ground.

Openings in shrubs make sunlight more available and provide habitat for a variety of herbaceous species. In addition, this is prime habitat for a species of particular interest, Spring-flowering Goldenrod (*Solidago verna*) which is quite abundant throughout this habitat type and even occurs in the more hydric variations of this habitat. Northern Bracken Fern (*Pteridium aquilinum* var. *pseudocaudatum*) and Pineland Three-awn or Wire-grass (*Aristida stricta*) are

abundant and provide thick cover in some areas. Additional, but rarely dominant species represented are Round-leaf Thoroughwort (*Eupatorium rotundifolium*), Spiked Hoary-pea (*Tephrosia spicata*) and Narrow-leaf Silk-grass (*Pityopsis graminifolia* var. *tenuifolia*).

Hydric variations of pine flatwoods are characterized by an intermittent to nearly continuous shrub stratum frequently dominated by Giant Cane (*Arundinaria gigantea* ssp. *tecta*). While Sweet-gum is frequent in these habitats, Red Maple (*Acer rubrum*) is somewhat more abundant. Wetter versions of this habitat are similar to streamhead pocosins and may have some of the same species in common. Southern Blueberry (*Vaccinium formosum*), Evergreen Bayberry (*Morella caroliniensis*), Black Blueberry (*Vaccinium fuscatum*), Swamp Bay, Southern Bayberry, Horsesugar, and Shinyleaf (*Lyonia lucida*) are often present. Herbaceous species include Cinnamon Fern (*Osmunda cinnamomea*) and Virginia Chain-fern (*Woodwardia virginica*) that are favored by scattered openings in the thick shrub cover.

Narrow seepage shelves along slopes above swamp forests at the edges of mesic Pine Flatwoods habitats are characterized by the clonal stands of Coastal Doghobble (*Leucothoe axillaris*). Stands of this species may remain visible for years following modification of the conditions that allowed them to establish. Loblolly Pine is a regular canopy associate. Other species that can be found are Cinnamon Fern, American Holly (*Ilex opaca*) and Tulip Poplar (*Liriodendron tulipifera*).

Bryophyte species are sparse through the mesic portions of this habitat. Wetter stages with fallen logs and hardwood tree bases may support mixed species dominated by the leafy liverwort *Odontoschisma prostratum* and the moss *Leucobryum albidum*. Depressions holding water for extended periods of time may support small mounds of sphagnum (usually *Sphagnum palustre* or *S. affine* but also possibly *S. perichetiale*). These are never extensive or abundant and are widely scattered unless associated with plowed firebreaks where moisture is perched over subsoil clays. Bryophyte cover in mesic habitats is sparse to non-existent especially under heavy leaf litter. Increased cover by bryophytes was observed in some hydric stands.

Natural modifications in Pine Flatwoods habitats accompany topographic variation. Topographic variation is found along slopes of natural drainage lines, for example, Southwest Prong Slocum Creek. Changes accompanying topographic breaks are marked by an increase in occurrence of broadleaf deciduous tree species in the forest canopy or subcanopy. As the slope breaks from mesic Pine Flatwoods, Longleaf Pine may be partially replaced in the canopy by Loblolly Pine, White Oak (*Quercus alba*), Southern Red Oak (*Quercus falcata*), hickory (*Carya* spp.) and Water Oak (*Quercus nigra*). Sourwood (*Oxydendrum arboreum*) and Flowering Dogwood (*Cornus florida*) are regular constituents of a subcanopy well drained sandy slopes. Red Maple and Sweet-gum often become more abundant on moist slopes, as well. Lower along the slope soils may become moister from seepage or sandier as fine particulates are leached from the soil and moved further down the slope. Tulip Poplar and Swamp Chestnut Oak (*Quercus michauxii*) are often important in the canopy while American Holly becomes a characteristic subcanopy species. Near the base of the slope, swamp forest species increase in importance as soil moisture increases and as textures become more loamy or mucky.

Pine/Hardwood Forest

As indicated above, Pine/Hardwood Forests may develop along stream slopes. Pine/Hardwood Forest (identified as PH on Figures 2a – 2d) occupies approximately 21.1 acres on NFS lands within the area that may be directly impacted. This forest type is also one of the intermediate results of fire exclusion from otherwise natural forest systems. In mature pine forests protected from fire, particularly mature loblolly pine forests, hardwood forest species tend to invade as soils become coarser and as light levels are reduced at the forest floor. Reduced light levels offer a competitive advantage to broadleaf deciduous or hardwood species. At intermediate seral stages hardwoods may grow into a subcanopy stratum. Eventually, as pines mature, senesce, and die, hardwoods replace them in the canopy. This process of natural succession is often truncated in natural systems where fire is experienced. Pine forests may be the temporary result. Additional disturbances can further confuse successional stages and promote further diversity in forest variation. Mesic and hydric variations in Pine/Hardwood Forests were not recognized during mapping due in part to the subtle successional and hydrologic factors present in these communities that are difficult to discern from aerial photography.

Additionally, Pine/Hardwood Forest variations were not recognized because aerial photographic resources were inadequate without intensive ground truthing. As a result many variations of this type along slopes have been included with Pine Flatwoods. In some areas, somewhat more extensive pine canopy covers are broken by hardwood occurrences. Examination of these areas in the field indicates that while pines appear to be functioning as a canopy, high hardwoods, though not quite as tall as the pines, were functioning in the lower canopy as well. In such situations, photographic signatures returned only pine in the canopy. From a strictly aerial photographic view, pine-hardwood canopy mixing was not readily visible unless pines were more widely spaced.

Soils supporting Pine/Hardwood Forests are often coarser than those that support Pine Flatwoods. Differences not practically applicable as map units at the level of countywide surveys occur largely as inclusions and are not specifically defined (USDA 1989). For instance, along slopes where sola are widely variable, several soil types may occur across a relatively short distance. They have developed in response to variations in gravity, moisture content or seepage, organic matter content, and other soil forming factors. In one example, a Torhunta-like soil with an umbric epipedon and a deep A horizon forms a large inclusion in an area mapped as Rains in the southwestern intersection of the railroad and Duke Energy Progress power line south of Creek Road (USDA 1989). The latter example is of a hydric Pine/Hardwood Forest.

Pine/Hardwood Forests are present in a wide range of landscape conditions. Successional trends across these habitats are not always clear, as indicated by the wetland example in the last paragraph. In one area there was a visible trend toward pine standing stock with greater diameters where hardwoods were present in the canopy. Combined cover by the canopy species (hardwood and pine) exceeded 50 percent in some areas. The successional sere was older. As in Pine Flatwoods, shrub strata were relatively dense with covers up to 60 percent. Covers were low for herbaceous plants. Bryophytic species were largely corticolous because of the presence of hardwood bark substrates. However, bryophytes were also favored on rotten wood and soil with the naturally increased moisture under multiple canopy layers. Fire, still a management factor in such habitats, was responsible for thinner litter layers and additional stand diversity.

In the above area post mature Loblolly Pine was the dominant tall canopy species, while a well-developed lower canopy of hardwood consists primarily of Water Oak, Sweet-gum, Red Maple, and large Swamp Bay. Horsesugar makes up the bulk of the subcanopy stratum along with younger individuals of canopy species. Swamp Titi (*Cyrilla racemiflora*) and Large Gallberry (*Ilex coriacea*) constitute a high shrub layer along with younger individuals of canopy and subcanopy species.

Bluff areas along Southwest Prong Slocum Creek are marked by the occurrence of a greater percentage of hardwood species in the canopy and replacement of Longleaf Pine by Loblolly Pine. One outstanding parcel along the south side of the creek at the eastern boundary of the Alt. 3 study area has been partially separated from the mainland by stream dissection. The top of the resulting knoll rises 10 to 15 feet above the elevation of the surrounding swamp to about the height of the adjacent upland flatwoods landscape. With minimal connection to the main portion of the upland landscape, seepage characteristics have been lost. Soils were deep Arenic Hapludults, possibly of Conetoe series with a shallow sandy A-horizon and a deep, dry, loamy sand B-horizon that extended almost 60 inches below the surface.

A mix of hardwood species joins loblolly pine in the canopies of the above pine/hardwood parcels. Tulip Poplar, hickory, White Oak, Southern Red Oak, an occasional Northern Red Oak (*Quercus rubra*), Water Oak, and Sweet-gum are included among the canopy dominants. Longleaf Pine is absent from these parcels, but present in the nearby adjacent landscapes. A subcanopy is composed of younger individuals of the canopy species as well as Flowering Dogwood and Sourwood. In other more mesic areas such as the bluff along the north side of Southwest Prong Slocum Creek, American Beech (*Fagus grandifolia*) grows on the low slopes and ridges just above the wet floodplain along with a typical subcanopy species American Hornbeam (*Carpinus caroliniana*). Shrub species included Small-flower Pawpaw (*Asimina parviflora*), Silky-camellia (*Stewartia malacodendron*), Swamp Bay and several species of woody vines including Muscadine (*Vitis rotundifolia*) and Virginia-creeper (*Parthenocissus quinquefolia*) on the sandy knoll. Partridge-berry (*Mitchella repens*) and Variable Rosette Grass (*Dichanthelium commutatum*) were the most abundant herbaceous species, though these were only scattered.

Additional exemplary areas of Pine/Hardwood Forest were found. Two areas were found along the ridge paralleling the east and west sides of the East Prong Slocum Creek. Several areas were found along the upland slopes of Tucker Creek west and south of the Craven County Transfer Facility (recycling facility adjacent to the old landfill site along US 70).

Streamhead Pocosin

Significant Streamhead Pocosin habitats occur largely in the southern portions of Alt. 3 study area. These are located near the western and eastern sides of East Prong Slocum Creek and in the proposed southern interchange with US 70. Scattered pocosin habitat also occurs along the west side of Creek Road just south of Havelock and west of East Prong Slocum Creek. These habitats consist of a high, dense shrub stratum under a scattered canopy of Pond Pine, occasionally Loblolly Pine, and Loblolly Bay (*Gordonia lasianthus*). Areas with a relatively continuous canopy are identified as tree dominated (identified as SPt on Figures 2a – 2d). Areas

containing only widely scattered trees in the canopy are identified as shrub dominated (identified as SPs on Figures 2a – 2d). Most of the pocosin habitat seen in the project area exists at the heads of streams or in upper stream divides where runoff is slow. That is, they occur in areas above discernable stream dissection. Tree-dominated Streamhead Pocosin occupies approximately 9.0 acres and shrub-dominated Streamhead Pocosin approximately 1.3 acres on NFS lands in the area that may be directly impacted.

Most of the Streamhead Pocosin occurs within soil map units identified as Pantego (Umbric Palaeaquult), Croatan (Terric Medisaprist), Onslow (Spodic Palaeudult), and Rains (Typic Palaequult) (USDA 1989). Croatan and Pantego soils are likely the most important pocosin soils of the area. Pantego soils were identified in the strip of pocosin east of US 70 at the southeast edge of the proposed interchange. An umbric epipedon of about 20 inches with a strong argillic horizon below were the characteristic parts of the pedon sampled and identified. Croatan soils were not sampled at the time of the fieldwork since they were significantly flooded. Croatan soils are Histisols and appear to be more directly associated with the open shrub dominated pocosin in the northeastern portion of the proposed southern interchange.

A single soil sample taken in the small power line corridor passing through pocosin (and other) habitat west of Creek Road indicated the presence of a different kind of habitat in the area. Textures of horizons examined along the power line were very sandy except at the very top. More loamy horizons may exist elsewhere. The water table was close to the surface, but precipitation had been abnormally high during the immediate time period. The soil may have been a Psammaquent. This is unusual in an area that is otherwise dominated by loamy soils and may indicate areas of sand fill or possible the course of an old stream bed. Pocosin habitats with and without a tree canopy in this area possess boggy surfaces and frequently are dissected by plowed firebreaks that create many small openings potentially favorable to growth of a variety of wet savanna plants.

Pond Pine is the dominant canopy species of most pocosin habitat. Occasional Loblolly Pine and Longleaf Pine may be present depending to some extent on variance in soil characteristics. A thick stratum of shrubs is typical of most areas. The shrub layers contain varying mixtures of several species of shrubs including Shinyleaf, Swamp Titi, Carolina-laurel (*Kalmia carolina*), Swamp Doghobble (*Leucothoe racemosa*), Southern Blueberry, Honeycup (*Zenobia pulverulenta*), Inkberry (*Ilex glabra*), Horsesugar, and Large Gallberry. Red Maple, Loblolly Bay, and Swamp Bay occur as trees or younger individuals. Swamp Tupelo (*Nyssa biflora*) and Pond Cypress (*Taxodium ascendens)* may be found in somewhat lower areas that experience nearly permanent standing water. Laurel-leaf Greenbrier (*Smilax laurifolia*) is an abundant woody vine that adds significantly to the thickness of these habitats.

Shrub cover in most pocosin habitats approaches or exceeds 80 percent, while the canopy may have only 20 to 30 percent cover. Controlled burning may be responsible for reducing shrub cover in scattered areas, but that management practice has not been used to create any significant wet savannas. Pines dominating the canopy may exceed 18 inches in diameter, but most are within the 12 to 16 inch classes. In a few areas canopy trees are considerably smaller. Some areas are more open where the shrub stratum is intermittently broken such as the habitats west of Creek Road. These open areas support a wider variety of herbaceous species than do the more

shaded systems. Two species commonly found throughout these habitats are Cinnamon Fern and Virginia Chain-fern. Many other species are regular constituents of more open phases of pocosins. Bryophytes are most visible in open habitats and include several species of *Sphagnum* as well as *Aulacomnium palustre*. In more shaded areas a variety of both mosses and leafy liverwort species can be found on decaying wood and tree bases.

Swamp Forest

Swamp Forest is typically subject to saturated soils and/or standing water for most of the year. These forests have been grouped under three distinct regimes with respect to hydrologic conditions. Swamp Forests occur along large streams such as East Prong Slocum Creek, and Southwest Prong Slocum Creek (identified as SFl on Figures 2a – 2d). Larger streams often have been impounded by beaver (*Castor canadensis*) activity. Swamp Forests occur along small streams (identified as SFs on Figures 2a – 2d) that are generally free-flowing and possibly intermittent tributaries of a larger stream. Swamp Forests occur, as well, in depressions or ponds scattered through head water areas of small or large streams (identified as SFp on Figures 2a – 2d). During dry weather these depressions may be isolated from tributary streams. Some are permanently isolated. Swamp Forest along large streams occupies approximately 9.4 acres, along small streams approximately 12.9 acres, and in ponds approximately 20.0 acres on NFS lands within the area that may be directly impacted.

Soils of large stream Swamp Forests are mapped as a generalized mixture of Masontown (Cumulic Humaquept) and Muckalee (Typic Fluvaquent) (USDA 1989). Some of these map units may contain unmapped inclusions of soils with partial parent material origins in weathered and secondarily deposited basic or circum-neutral (marl or limestone) sediments. These alluvial/colluvial soils occur along slow-moving blackwater streams and may extend into some ponds in the headwaters of Wolf Pit Branch at the eastern edge of the Alt. 3 study area. Soils in other Swamp Forests along small streams and in ponds have not been specifically mapped. Some of these areas are more generally covered by such map units as Lenoir and Rains, both of which are Palaeaquults. Leaf has been used to map a few of the small streams of the region and it is a Typic Albaquult. Matrix landscapes containing scattered Swamp Forest ponds are not necessarily wetlands.

Soils in small streams and Swamp Forest ponds were sampled in selected areas. Sola in small streams show results of mixing with sands and organic silts thoroughly intermixed or sandwiched between lenses of sand or organic sediments that contain larger organic debris including bits of bark, wood and small plant stems or small logs. Soils of Swamp Forest ponds had mineral sola, were loamy and similar to the soils of the surrounding landscape, except they were hydric. Several inches of water logged litter (leaves, branches) and organic silt usually covered the bottoms of the Swamp Forest ponds. Below the organic debris an A-horizon darkened by deposition of organics could be found several inches into the mineral soil. Below the A-horizon the C-Horizon was usually gray fine sandy clay loam or sandy clay loam. In Swamp Forest ponds with a shorter hydroperiod, horizons could be better developed, displaying A, E, and B-horizon differentiation.

Canopy cover in Swamp Forest was highly variable. Generally, canopy coverage across more open large stream Swamp Forests was intermittent, primarily because of landscape drowning due

to beaver activity. Small streams and inner edges of large stream Swamp Forests were usually quite well shaded with up to 60 or 70 percent cover by largely deciduous trees with a small percent contributed by pine. Cover by shrubs and herbs were usually low in small stream floodplains and ponded areas, but high along large streams particularly in areas flooded by beaver activity. Standing large trees nearest the main channels of large stream Swamp Forest were typically dead. Away from the deeper portions of the swamp, larger trees could be found that were in the 20 to 24 inch diameter classes. Along small stream channels, tree stems usually matched in size those of adjacent upland areas. Stems in ponded Swamp Forest were quite variable and ranged from 8 inches to 16 inches in diameter.

Tree species commonly represented in large stream Swamp Forest are Green Ash (*Fraxinus pennsylvanica*), Southern Bald-cypress (*Taxodium distichum*), Sweet-gum, Red Maple, Swamp Tupelo, and Willow Oak (*Quercus phellos*). The subcanopy contained younger individuals of the canopy species. Linear beaver dams add a dynamic elevation continuum from below ambient water levels to well above. Fallen dead trees provide additional habitat diversity for a time and ultimately assist in the accumulation of sediment and detritus in areas impounded by beaver activity. Living plant stems provide additional flow reduction and diversion as the floodplain builds and spreads laterally.

Shrub and herb strata along large streams within the corridor have a species diversity that is accentuated and controlled largely by the course of beaver activity. A wide variety of species occur over the three-dimensional mosaic of beaver-influenced Swamp Forest in large streams. Swamp-loosestrife (*Decodon verticillatus*), Eastern Poison-ivy (*Toxicodendron radicans*), Woodvamp (*Decumaria barbara*), Horsebrier (*Smilax rotundifolia*), Giant Plume Grass (*Saccharum giganteum*), Swamp Bay, Lizard's-tail (*Saururus cernuus*), Virginia Blueflag (*Iris virginica*), Virginia Sweetspire (*Itea virginica*), Swamp Doghobble, and Swamp Rose (*Rosa palustris*) are but a few of the species found within or along edges of beaver-influenced Swamp Forest.

Included in large stream Swamp Forest habitat are those areas that are adjacent and slightly above regular water flow, but still within the floodplain. These areas may be flooded during periods of heavy precipitation but otherwise remain saturated to within several inches of the surface of the soil. An example of such an area occurs along the western edges of Southwest Prong Slocum Creek within the Alt. 3 study area. This forest contains Loblolly Pine along with Red Maple, Southern Bald-cypress, and other canopy species of the more open Swamp Forest. Along with many of the shrub and herb species characteristic of more open areas, Cinnamon Fern, Virginia Chain-fern, Royal Fern (*Osmunda regalis* var. *spectabilis*), Netted Chain-fern (*Woodwardia areolata*), which often marks the zone of transition between wetland and upland habitats, Small-spike False Nettle (*Boehmeria cylindrica*), and Southern Wood Fern (*Dryopteris ludoviciana*) may occur.

Small stream Swamp Forests are narrow linear features that support at least an intermittent flow and are well shaded by a combination of pine and deciduous tree species. In some areas they differ little from hydric Pine Flatwoods except for a larger proportion of hardwood species in the canopies. The most well developed examples were found in the southern portion of the northern interchange area of the Alt. 3 study area with US 70 in upper branches of Tucker Creek including

Daniels Branch and along an unnamed tributary of Southwest Prong Slocum Creek between the creek and Gray Road. Other habitats of this type are scattered in mesic flatwoods forest east of Lake Road and west of Sunset Road. Some are scarcely more than 20 feet in width, while others are over 100 feet wide. Customary canopy constituents are Loblolly Pine, Red Maple, Swamp Tupelo, and Sweet-gum. Pond Pine is occasionally present. Shrub species present are influenced by the nature of the surrounding habitat and usually consist of varying combinations of Southern Bayberry, Giant Cane, Swamp Bay, Southern Blueberry, Shinyleaf, Large Gallberry, Inkberry, and Horsesugar. Netted Chain-fern and Cinnamon fern are among the most abundant herbs.

Ponded Swamp Forest habitat occurs in depressions that can be perennially isolated or those that contribute to outflow during precipitation events. Those areas that are perennially isolated have a limited habitat diversity, and support a single mixed species stand typically consisting of Swamp Tupelo, Pond Cypress, and Red Maple. Swamp Bay and Sweet-bay (*Magnolia virginiana*) may also be present. Shrub and herb constituents are usually limited to the peripheries of these ponds.

Another type of ponded Swamp Forest is subject to through-flow and is found in hydric Pine flatwoods or Streamhead Pocosin habitats. These are shallow depressions that fill during precipitation events. Upon filling, there may be a partial flow reversal either above or below the soil surface so that there is a slow redistribution of moisture away from the location of the hydrologic head. A forest canopy and/or a thick shrub stratum usually shade these basin-like depressions. In some habitats they are more open to direct light as a result of a partial thinning of the forest canopy. The largest such habitats seen are in the proposed southern interchange portion of Alt. 3 study area west of US 70.

Vegetation adjacent to the second example of ponded swamp forest is intermediate between hydric Pine Flatwoods and Streamhead Pocosin. The habitat is broken by an irregularly interconnected system of pools up to two feet deep and short channels bordered by narrow ridges supporting trees and shrubs. Largely Loblolly Pine with or without Pond Pine forms the highest canopy with deciduous species including Red Maple, Swamp Tupelo, Sweet-gum, and scattered Pond Cypress below. Swamp Bay and Sweet-bay are characteristic subcanopy trees. Southern Bayberry and Shinyleaf grow on ridges and in clumps often over hanging water. Younger individuals of subcanopy species are generously present. Other species present depend on the character of the surrounding vegetation and whether it is more similar to hydric Pine Flatwoods or Streamhead Pocosin. Cinnamon Fern and Virginia Chain-fern are typically present.

Cover by bryophyte species was variable between different types of swamp forest. In ponded Swamp Forest corticolous bryophytes occupied the surfaces of tree bases and fallen logs. These include, among others, *Odontoschisma prostratum, Pallavicinia lyellii,* and *Leucobryum albidum, Leucolejeunea clypeata,* and *Sematophyllum adnatum*. In small stream Swamp Forest and more shaded edges of Swamp Forests along large streams, corticolous species were also very abundant with a greater number leafy liverworts and large mosses in soil at the upper edges of floodplains such as *Mnium cuspidatum* and *Climacium americanum*. In addition to the above corticolous species in Swamp Forest ponds others were seen on exposed roots and tree bases in swamp forest along major streams. These included *Metzgeria furcata*, *Entodon macropodus,*

Schwetschkeopsis fabronia, and *Steercleus serrulatus*. In more perennial streams, aquatic species were also present. North of Gray Road the stream contained *Fontinalis sullivantii*. The genus *Fissidens* was also represented. Swamp Forests are rich habitats for bryophytes. Bryophytes were not regularly noted in the main channels of large stream Swamp Forests, but were abundant well away from areas exposed to frequent flooding in the floodplains, particularly along all portions of Southwest Prong of Slocum Creek.

Small Pond

Small Ponds are habitat features that are isolated by mesic flatwoods from any natural drainage system. Several areas of such ponds were found during the course of the field work. One area was in the mesic Pine Flatwoods within the Alt. 3 study area. Small Ponds (identified as P on Figures 2a – 2d) occupy approximately 0.2 acre on NFS lands within the area that may be directly impacted. The flatwoods ponds were essentially without canopy species except for the presence of a stem of Swamp Tupelo in one and a stem of Loblolly Pine in the other in the deepest parts of the depressions. Both were only ephemerally wet and only one supported wetland vegetation. Soils in one pond were marginally hydric but fully hydric in the other. Inkberry, Giant Cane, Wand Panic Grass (*Panicum virgatum*), and Cypress Rosette Grass (*Dichanthelium dichotomum*) were additional species present.

Powerline Corridor

Sections of the Alt. 3 study area includes portions of maintained Powerline Corridor north of Sunset Road, along FR 638, and across the end of Pine Grove Road (FR 156). A small fragment of Powerline Corridor occurs in the project area east of Creek Road (FR 604) nearest the railroad. Portions of Powerline Corridor habitats designated as mesic (identified as PCm on Figures 2a – 2d) do not normally support standing water for significant periods of time. Powerline Corridor habitats designated as hydric (identified as PCh on Figures 2a – 2d) are subject to prolonged periods of standing water normally during winter, spring, and sometimes early summer. Vegetation along these corridors is mowed on a frequent basis. Mesic Powerline Corridor habitat occupies approximately 6.0 acres and hydric Powerline Corridor habitat approximately 1.9 acres on NFS lands within the area that may be directly impacted.

Soils along the Powerline Corridors reflect those in adjacent flatwoods and other habitats. Rains, Onslow, and Lenoir mapping units have been used to cover the majority of the soils variation in these areas. Leaf is used occasionally. As with other soils in the study area, these are loam to clay loam soils with substantial argillic horizons, particularly in the B-Horizon. The most characteristic differences between mesic and hydric soils are the colors of the E-Horizon. Mesic E-Horizons have a chroma of 2 or greater, while hydric E-Horizons have chromas usually less than 2. Chromas of the upper B-Horizons are generally 1or lower in hydric areas.

Plant species of mesic areas include Inkberry, Giant Cane, Loblolly Pine, Small Black Blueberry, Narrow-leaf Silk-grass, Pineland Three-awn, Broom-sedge (*Andropogon virginicus*), Spring-flowering Goldenrod, and Hair-awn Muhly (*Muhlenbergia capillaris* var. *trichopodes*). Plants in hydric Powerline Corridors are, among many others, Slender Goldentop (*Euthamia caroliniana*), Giant Cane, Inkberry, Broom Rosette Grass (*Dichanthelium scoparium*), Woolly Rosette Grass (*Dichanthelium scabriusculum*), rushes (*Juncus* spp.), sedges (*Carex* spp.), beak rushes (*Rhynchospora* spp.), Blue-flower Butterwort (*Pinguicula caerulea*), Yellow Pitcherplant

(*Sarracenia flava*), Purple Pitcherplant (*Sarracenia purpurea*), and Little Floating Bladderwort (*Utricularia radiata*). The most common bryophytes are several species of *Sphagnum* as well as *Aulacomnium palustre*. Where Powerline Corridors are crossed by ponds or small streams they may be submerged for a substantial portion of the year.

One area deviating from the regional range of variation was found west of Creek Road (FR 604) and east of the bluff at East Prong Slocum Creek in the vicinity of a small Powerline Corridor crossing that is designated as Powerline Corridor, hydric (PCh) (Figure 2a). This small Powerline Corridor crossing exhibits characteristics of a wet Pine Savanna, whereas much of the adjacent area is designated as Streamhead Pocosin and somewhat resembles pocosin habitats supported over Typic or Aeric Alaquods in Leon or Murville soils.

Pine Plantation

Pine Plantations occur within various sections of the Alt. 3 study area (Figures 2a – 2d). Soils within these habitats have been heavily disturbed either by bedding for pine silviculture or by the importation of soil material, as in the case of the old landfill. The bedding process in plantation areas turns furrow slices of soil material, usually the A-Horizon and part of the E-Horizon, to something of an upside-down position over an adjacent linear strip of undisturbed soil. This process changes the character of the soil and surface drainage, but creates a ridge that better supports pine seedlings, particularly in areas that tend to be wet. Otherwise, soils are similar to those found in the area in general. Soils at the Pine Plantation on the old landfill site are visibly mixed fill material with no natural horizons present. Mesic Pine Plantation (identified as PPm on Figures 2a – 2d) occupies approximately 9.5 acres and hydric Pine Plantation (identified as PPh on Figures 2a – 2d) approximately 5.5 acres on NFS lands within the area that may be directly impacted.

In the case of the old landfill site, pine was planted in loamy soil material brought in from some other site to cap the landfill (Figure 2d). The dominant plant is young Loblolly Pine planted in rows. A scattered subcanopy of Sweet-gum has begun to grow between the rows and southern bayberry is scattered. Meadow Rye grass (*Lolium pratense*), Sericea Lespedeza, and Slender wood-oats (*Chasmanthium laxum*) have either volunteered or were spread at the time of capping.

A very small segment of hydric Pine Plantation at the side of Creek Road consists of very closely planted young Loblolly Pine planted on bedded rows (Figure 2a). Saw-tooth Blackberry (*Rubus argutus*) is residual from early growth following site preparation. Loblolly Pine and Longleaf Pine occur at the large Pine Plantation along FR 638 north of Sunset Road (Figure 2b). The plantation is largely mesic, though unmapped sections of it in the western half are somewhat wetter than the eastern half. Sweet-gum is the major deciduous tree species present, though yet very young. Horsesugar, Huckleberry, Southern Bayberry, and Swamp Bay are the customary shrubs. Herbaceous species commonly represented are Northern Bracken Fern, Spring-flowering goldenrod, Broom-sedge, and Virginia Chain-fern occur throughout.

Successional/Ruderal Habitat

Natural communities in which natural soil/vegetation relationships have been modified for human use and then abandoned are considered successional. Abandoned agricultural fields, borrow pits, sand mines are examples. Ruderal habitats may exist where soil material is

maintained in a constant state of disturbance. Successional/Ruderal Habitat (identified as SR on Figure 2d) occupies approximately 1.2 acres on NFS lands within the area that may be directly impacted.

Rural/Urban Modifications

Rural/Urban Modifications habitats (identified as M on Figures 2a – 2d) include all those landscape features in the Alt. 3 study area within CNF that are currently functioning features within the human infrastructure. Examples are transportation corridors, ditches, transportation corridor shoulders, and recycle or transfer facilities. These features are a part of the overall habitat complex of the project corridor, albeit a part with minimal non-human functional importance. These areas provide habitat for a wide assortment of weedy, non-native plant species as well as native flora and also provide corridors for their movement and redistribution. Rural/Urban Modifications habitat occupies approximately 50.4 acres of NFS lands within the area that may be directly impacted. See Section 3.1.2 for a list of non-native invasive plant species (NNIS).

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APPENDIX B

USFS Rare Plant Species
on the Croatan National Forest

(October 2013 List)

Table B-1. Proposed, Endangered, Threatened, Sensitive, and Locally Rare Plant Species on the Croatan National Forest.

Species No.	Scientific Name	Common Name	USFS Status [a]	Habitat Type	Potentially Suitable Habitat Identified in Evaluation Area
1	*Aeschynomene virginica*	Sensitive Jointvetch	T	Tidally influenced marshes and creeks and ditches	No
2	*Agalinis virgata*	Branched Gerardia	LR	Savannas and depression ponds	Yes
3	*Agrostis altissima*	Tall Bentgrass	LR	Wet savannas	Yes
4	*Andropogon mohrii*	Bog Bluestem	LR	Wet savannas	Yes
5	*Arenaria lanuginosa* var. *lanuginosa*	Spreading Sandwort	LR	Maritime grasslands and forests, sandy sites	No
6	*Arnoglossum ovatum*	Ovateleaf Cacalia	LR	Wet savannas	Yes
7	*Asclepias pedicellata*	Stalked Milkweed	LR	Dry savanna and moist flatwoods	Yes
8	*Asplenium heteroresiliens*	Carolina Spleenwort	S	Marl, coquina limestone outcrops	No
9	*Calopogon multiflorus*	Many-flower Grass Pink	S	Savannas and sandhills	Yes
10	*Campylopus carolinae*	Savanna Campylopus	S	Savanna	Yes
11	*Cardamine longii*	Long's Bittercress	S	Tidal marshes, tidal cypress-gum forests	No
12	*Carex basiantha*	Widow Sedge	LR	Marl, mesic forests and bottomlands over calcareous rocks	Yes
13	*Carex calcifugens*	Calcium-fleeing Sedge	LR	Evergreen maritime forest, calcareous bluff forest	Yes
14	*Carex emmonsii*	Emmon's Sedge	LR	Dry, sandy woodlands	Yes
15	*Carex lupuliformis*	Hop-like Sedge	LR	Mesic bottomlands, especially in calcareous or mafic areas	Yes
16	*Cirsium lecontei*	LeConte's Thistle	LR	Savannas	Yes
17	*Cladium mariscoides*	Twig-rush	LR	Bog marshes, brackish fens, sandhill seeps	No
18	*Cleistesiopsis oricamporum (=Cleistes bifaria)*	Small coastal Spreading Pogonia	S	Savannas, dry meadows	Yes
19	*Clematis catesbyana*	Coastal Virgin's-bower	LR	Dunes, maritime forest edge, dolomite	No
20	*Corallorhiza wisteriana*	Spring Coral-root	LR	Moist to dry nutrient-rich forests, especially over limestone, mafic rocks or shell-rich sands	Yes
21	*Coreopsis helianthoides*	Beadle's Coreopsis	LR	Swamp, peaty wetlands	Yes
22	*Crocanthemum carolinianum*	Carolina Cunrose	LR	Sandhills pinelands and dry savannas	Yes
23	*Cylindrocolea rhizantha*	A Liverwort	S	Marl outcrops	No
24	*Cystopteris tennesseensis*	Tennessee Bladder-fern	LR	Marl, calcareous rock outcrops	No
25	*Dichanthelium fusiforme*	Spindle-fruited Witch Grass	LR	Sandy pine or pine-oak forests	Yes
26	*Dichanthelium hirstii*	Hirst's Panic Grass	S	Cypress savannas	No
27	*Dichanthelium* sp. *9*	Hidden-flowered Witch Grass	LR	Pocosins, wet meadows, ditchlines	Yes
28	*Dichanthelium spretum*	Eaton's Witch Grass	LR	Wet sands and peaty bogs, savannas	Yes

Species No.	Scientific Name	Common Name	USFS Status [a]	Habitat Type	Potentially Suitable Habitat Identified in Evaluation Area
29	*Dionaea muscipula*	Venus Flytrap	S	Savannas, seepage bogs, pocosin edges with little competition	Yes
30	*Eleocharis parvula*	Littlespike Spikerush	LR	Tidal brackish and freshwater marshes	No
31	*Eleocharis robbinsii*	Robbin's Spikerush	LR	Ponds, lakes, Carolina bays	No
32	*Eleocharis rostellata*	Beaked Spikerush	LR	Tidal brackish and freshwater marshes	No
33	*Elymus virginicus* var. *halophilus*	Terrell Grass	LR	Brackish marsh, maritime forest	No
34	*Eriocaulon aquaticum*	Seven-angled Pipewort	LR	Pond or lake margins	Yes
35	*Eurybia spectabilis*	Showy Aster	LR	Pine barrens, woodland borders	No
36	*Fissidens hallii*	Hall's Pocket Moss	S	On bark in cypress-gum swamps	Yes
37	*Frullania donnellii*	A Liverwort	S	Ilex bark in marshes	No
38	*Hibiscus aculeatus*	Comfortroot	LR	Bay forests, sand ridges, roadsides	Yes
39	*Isoetes microvela*	Quillwort	S	Emergent or calcareous riverbanks	No
40	*Lachnocaulon beyrichianum*	Southern Bogbutton	S	Sandhills	No
41	*Leersia lenticularis*	Catchfly Cutgrass	LR	Low moist woods	Yes
42	*Lejeunea bermudiana*	A Liverwort	LR	On marl outcrops and on decaying logs in blackwater swamps	Yes
43	*Lejeunea dimorphophylla*	A Liverwort	S	On bark in maritime forests	No
44	*Litsea aestivalis*	Pondspice	S	Limesink ponds and other pools	Yes
45	*Lobelia boykinii*	Boykin's Lobelia	S	Depression ponds, meadows, clay-based cypress savannas	Yes
46	*Ludwigia alata*	Winged Seedbox	LR	Freshwater to brackish marshes	No
47	*Ludwigia linifolia*	Flaxleaf Seedbox	LR	Limesink ponds	No
48	*Ludwigia ravenii*	Raven's Seedbox	S	Savannas, swamps, marshes, wet open areas	Yes
49	*Ludwigia sphaerocarpa*	Globe-fruit Seedbox	LR	Bogs, pools, and lakeshores	Yes
50	*Lysimachia asperulaefolia*	Rough-leaved Loosestrife	E	Pocosin/savanna ecotones	Yes
51	*Lysimachia loomisii*	Loomis's Loosestrife	S	Moist to wet savannas and pocosin ecotones	Yes
52	*Macbridea caroliniana*	Carolina Birds-in-a-nest (Carolina Bogmint)	S	Blackwater swamps, savannas	Yes
53	*Malaxis spicata*	Florida Adder's Mouth	LR	Maritime swamp forest, calcareous mucky outer coastal plain swamps	Yes
54	*Metzgeria unicigera*	A LIverwort	S	On bark in maritime forests	No
55	*Minuartia godfreyi*	Godfrey's Sandwort	S	Tidal freshwater marshes	No
56	*Myriophyllum laxum*	Loose Watermilfoil	S	Limesink ponds, natural lakes	No
57	*Nuphar sagittifolia*	Narrowleaf Cowlily	S	Blackwater streams, rivers, and lakes	Yes
58	*Oplismenus hirtellus* ssp. *setarius*	Shortleaf Basket Grass	LR	Maritime forests, bottomlands	Yes
59	*Oxypolis ternata (=O. denticulata)*	Piedmont Cowbane	S	Pine savannas, sandhill seeps	Yes
60	*Parietaria praetermissa*	Large-seed Pellitory	S	Shell middens, disturbed sites, maritime forest	No

Species No.	Scientific Name	Common Name	USFS Status [a]	Habitat Type	Potentially Suitable Habitat Identified in Evaluation Area
61	*Parnassia caroliniana*	Carolina Grass-of-parnassus	S	Wet calcareous savannas	Yes
62	*Paspalum dissectum*	Mudbank Crown Grass	LR	Mudbanks, open wet areas, wet ditches	Yes
63	*Peltandra sagittifolia*	Spoonflower	LR	Pocosins, wet peat-dominated sites	Yes
64	*Persicaria hirsuta*	Hairy Smartweed	LR	Limesink ponds, clay-lined Carolina bays, blackwater stream edges	Yes
65	*Pinguicula pumila*	Small Butterwort	LR	Savannas	Yes
66	*Plagiochila ludoviaciana*	A Liverwort	LR	On bark in swamps and maritime forests	Yes
67	*Plagiochila miradorensis miradorensis*	A Liverwort	LR	On bark in maritime forests and swamps	Yes
68	*Plantago sparsiflora*	Pineland Plantain	S	Wet calcareous savannas	Yes
69	*Platanthera integra*	Yellow Fringeless Orchid	S	Savannas	Yes
70	*Platanthera nivea*	Snowy Orchid	LR	Wet savannas	Yes
71	*Polygala hookeri*	Hooker's Milkwort	S	Savannas	Yes
72	*Ponthieva racemosa*	Shadow-witch	LR	Blackwater forests and swamps over calcareous rock (marl)	Yes
73	*Pycnanthemum setosum*	Awned Mountain-mint	LR	Dry pinelands and blackwater swamps	Yes
74	*Quercus austrina*	Bluff Oak	LR	Bluff or basic mesic forest	No
75	*Quercus minima*	Dwarf Live Oak	LR	Pine flatwoods, coastal fringe sandhills	Yes
76	*Rhexia aristosa*	Awned Meadow-beauty	S	Clay-lined Carolina bays, limesink ponds	No
77	*Rhynchospora alba*	Northern White Beaksedge	LR	Limesink ponds, pocosin openings	No
78	*Rhynchospora galeana*	Short-bristled Beaksedge	S	Wet savannas, may colonize disturbed areas/roadsides	Yes
79	*Rhynchospora harperi*	Harper's Beaksedge	LR	Limesink ponds and cypress savannas	No
80	*Rhynchospora macra*	Southern white Beaksedge	S	Seepage or sphagnum bogs in frequently burned streamhead pocosins	Yes
81	*Rhynchospora microcarpa*	Southern Beaksedge	LR	Limesink ponds, maritime grasslands, clay-lined Carolina bays	No
82	*Rhynchospora pleiantha*	Coastal Beaksedge	S	Sandy margins of limesink ponds	No
83	*Rhynchospora thornei*	Thorne's Beaksedge	S	Wet savannas	Yes
84	*Sagittaria chapmanii*	Chapman's Arrowhead	S	Limesink ponds with drawdown	No
85	*Sagittaria weatherbiana*	Grassleaf Arrowhead	S	Fresh to slightly brackish marshes, swamps and ponds	Yes
86	*Schoenoplectus etuberculatus*	Canby's Bulrush	LR	On peat in depression ponds, in flowing blackwater streams	Yes
87	*Scirpus lineatus*	Drooping Bulrush	LR	Low rich swamp forests over coquina limestone	Yes
88	*Scleria baldwinii*	Baldwin's Nutrush	LR	Wet savannas associated with longleaf pine, pond pine, and pond cypress	Yes

Species No.	Scientific Name	Common Name	USFS Status [a]	Habitat Type	Potentially Suitable Habitat Identified in Evaluation Area
89	*Solidago leavenworthii*	Leavenworth's Goldenrod	LR	Savannas, clay-based Carolina bays, peaty seeps, pocosin borders	Yes
90	*Solidago pulchra*	Carolina Goldenrod	S	Savannas	Yes
91	*Solidago tortiflora*	Twisted-leaf Goldenrod	LR	Dry savannas and moist flatwoods	Yes
92	*Solidago verna*	Spring-flowering Goldenrod	S	Moist pine savannas, lower slopes in sandhills, roadsides in pinelands	Yes
93	*Solidago villosicarpa*	Coastal Goldenrod	S	Maritime, edge of coastal fringe evergreen forest in outer coastal plain	No
94	*Sphagnum cribrosum*	Florida Peatmoss	S	Blackwater streams, ditches	Yes
95	*Sphagnum fitzgeraldii*	Fitzgerald's Peatmoss	S	Pocosins and savannas	Yes
96	*Sphagnum torreyanum*	Giant Peatmoss	LR	Millponds, beaver ponds	Yes
97	*Spiranthes eatonii*	Eaton's Ladies'-tresses	LR	Wet savannas	Yes
98	*Spiranthes longilabris*	Giant Spiral Orchid	S	Wet savannas	Yes
99	*Sporobolus pinetorum*	Carolina Dropseed	S	Wet savannas	No
100	*Stylisma pickeringii* var. *pickeringii*	Pickering's Dawnflower	LR	Dry sandy roadsides, sandhills	Yes
101	*Teloschistes flavicans*	Sunrise Lichen	S	Maritime forest	No
102	*Thalictrum macrostylum*	Piedmont Meadowrue	S	Bogs, wet woods, tidal freshwater marshes, associated with circumneutral soils and mafic outcrops over olivine	No
103	*Tofieldia glabra*	Carolina Asphodel	S	Wet pine savannas and sandhill seeps, savanna-pocosin ecotones	Yes
104	*Tridens chapmanii*	Chapman's Redtop	LR	Roadside, loamy sands of disturbed longleaf pine woodlands	Yes
105	*Utricularia olivacea*	Dwarf Bladderwort	LR	Limesink ponds, beaver ponds	Yes
106	*Xyris floridana*	Florida Yellow-eyed Grass	LR	Savannas	Yes
107	*Xyris stricta*	A Yellow-eyed Grass	LR	Savannas, depression ponds, depressional meadows, ditches	Yes

[a] E – Endangered; LR- Locally Rare; S – Sensitive; T – Threatened.

APPENDIX C

USFS Rare Animal Species
on the Croatan National Forest

(August 2013 List)

Table C-1. Proposed, Endangered, Threatened, Sensitive, and Locally Rare Animal Species on the Croatan National Forest (August 2013 List)

Species No. [a]	Scientific Name	Common Name	USFS Status [b]	Habitat Type	Potentially Suitable Habitat Identified in Evaluation Area
MAMMALS					
108	*Canis rufus*	Red Wolf	E	Upland and lowland forests, shrublands, coastal prairies, marshes with heavy cover – in North Carolina limited to Albemarle Peninsula	No[d]
109	*Condylura cristata* pop. 1	Star-nosed Mole (coastal plain population)	LR	Moist meadows, bogs, swamps, bottomlands	Yes
110	*Corynorhinus rafinesquii macrotis*	Rafinesque's Big-eared Bat	LR	Abandoned structures, caves, hollow trees, loose bark trees near wooded areas	Yes
111	*Lasiurus intermedius*	Northern Yellow Bat	LR	Roosts in Spanish moss and other thick vegetation near water, often in longleaf pine habitats	Yes
112	*Myotis austroriparius*	Southeastern Myotis	LR	Roosts in buildings and hollow trees, forages near water	Yes
113	*Neotoma floridana floridana*	Eastern Woodrat (coastal plain population)	LR	Lowland deciduous forest with dense palmetto cover	Yes
114	*Peromyscus leucopus buxtoni*	Buxton Woods White-footed Mouse	LR	Maritime forests in Cape Hatteras area	No
115	*Peromyscus leucopus easti*	Pungo White-footed Mouse	LR	Dunes and maritime thickets along coast south to Corolla	No
116	*Puma concolor couguar*	Eastern Cougar	E	Extensive forests and remote areas – considered extirpated from North Carolina since 1880s	No[e]
117	*Sorex* sp. 1	An Undescribed Shrew	LR	Early successional fields, possibly low pocosin on the Albemarle Peninsula	No[c]
118	*Trichechus manatus*	West Indian Manatee	E	Warm waters of estuaries and river mouths	No
BIRDS					
119	*Ammodramus henslowii susurrans*	Eastern Henslow's Sparrow	LR	Clearcut pocosins, damp weedy fields	Yes
120	*Botaurus lentiginosus*	American Bittern	LR	Freshwater or brackish marshes, lake and pond edges with emergent vegetation	No
121	*Charadrius melodus*	Piping Plover	T	Sandy upper beaches especially where scattered grass tufts are present, sparsely vegetated shores and islands of shallow lakes, ponds, rivers, and impoundments	No
122	*Circus cyaneus*	Northern Harrier	LR	Marshes, meadows, grasslands	No
123	*Dendroica kirtlandii*	Kirtland's Warbler	E	Jack pine forests; migrates through NC	No[c]
124	*Dendroica virens waynei*	Black-throated Green Warbler (coastal plain population)	LR	Nonriverine wetland forests, especially where white cedar or cypress are mixed with hardwoods	Yes
125	*Falco peregrinus*	Peregrine Falcon	S	Cliffs, bay, sound, tidal flats, river mouth, herbaceous wetland	No

Species No. [a]	Scientific Name	Common Name	USFS Status [b]	Habitat Type	Potentially Suitable Habitat Identified in Evaluation Area
126	*Gelochelidon nilotica*	Gull-billed Tern	LR	Coastlines, salt marshes, estuaries, sand flats on maritime islands	No
127	*Haliaeetus leucocephalus*	Bald Eagle	S	Large bodies of water with mature trees for perching	Yes
128	*Himantopus mexicanus*	Black-necked Stilt	LR	Fresh or brackish ponds	No
129	*Hydroprogne caspia*	Caspian Tern	LR	Seacoasts, bays, estuaries, lakes, marshes, and rivers	No
130	*Laterallus jamaicensis*	Black Rail	LR	Salt, brackish, and freshwater marshes; pond borders, wet meadows, grassy swamps	No
131	*Mycteria americana*	Wood Stork	E	Freshwater or brackish marshes, swamps, lagoons, ponds, flooded fields, nests in trees over water or on islands	No
132	*Passerina ciris ciris*	Eastern Painted Bunting	LR	Maritime shrub thickets, forest edges	No
133	*Peucaea aestivalis (=Ammodramus aestivalis)*	Bachman's Sparrow	LR	Open pine woods with grassy cover	Yes
134	*Phalacrocorax auritus*	Double-crested Cormoran	LR	Lakes, ponds, rivers, lagoons, swamps, and coastal bays with scattered trees for nesting	No
135	*Picoides borealis*	Red-cockaded Woodpecker	E	Pine savannas	Yes
136	*Plegadis falcinellus*	Glossy Ibis	LR	Forests or thickets on maritime islands	No
137	*Porphyrio martinica*	Purple Gallinule	LR	Freshwater ponds and rivers with floating vegetation	No
138	*Sterna dougallii*	Roseate Tern	E	Seacoasts, bays, estuaries, sand flats on maritime islands	No
139	*Vermivora bachmanii*	Bachman's Warbler	E	Moist hardwood forests, swamps, and canebrakes; last observed in NC in 1891	No[f]
REPTILES AND AMPHIBIANS					
140	*Alligator mississippiensis*	American Alligator	T(S/A)	Fresh and brackish marshes, ponds, lakes, rivers, swamps	Yes
141	*Ambystoma tigrinum*	Eastern Tiger Salamander	LR	Breeds in fish-free semi-permanent ponds; forages adjacent sandy pinelands	No[c]
142	*Caretta caretta*	Loggerhead Seaturtle	T	Nests on beaches, forages in ocean and sounds	No
143	*Chelonia mydas*	Green Seaturtle	T	Nests on beaches, forages in ocean and sounds	No
144	*Crotalus adamanteus*	Eastern Diamondback Rattlesnake	LR	Pine flatwoods, savannas, pine-oak sandhills	Yes
145	*Dermochelys imbricata*	Leatherback Seaturtle	E	Oceans, rarely sounds	No
146	*Eretmochelys imbricata*	Hawksbill Seaturtle	E	Oceans, very rarely in sounds	No
147	*Eurycea quadridigitata*	Dwarf Salamander	LR	Pocosins, Carolina bays, pine flatwoods, savannas, wetland habitats	No[c]
148	*Heterodon simus*	Southern Hognose Snake	LR	Sandy woods, particularly pine-oak sandhills	Yes
149	*Lampropeltis getula sticticeps*	Outer Banks Kingsnake	LR	Maritime forests, thickets, and grasslands on the Outer Banks	No

Species No. [a]	Scientific Name	Common Name	USFS Status [b]	Habitat Type	Potentially Suitable Habitat Identified in Evaluation Area
150	*Lepidochelys kempii*	Kemp's Ridley Seaturtle	E	Oceans and sounds	No
151	*Malaclemys terrapin terrapin*	Northern Diamondback Terrapin	LR	Coastal marshes, tidal flats, coves, estuaries, lagoons	No[c]
152	*Micrurus fulvius*	Eastern Coral Snake	LR	Pine-oak sandhill, sandy flatwoods, maritime forests	No[c]
153	*Nerodia sipedon williamengelsi*	Carolina Salt Marsh Snake	S	Salt or brackish marshes	No
154	*Ophisaurus mimicus*	Mimic Glass Lizard	S	Dry, sandy pine flatwoods, savannas, pine/oak sandhills	Yes
155	*Rana capito*	Carolina Gopher Frog	S	Dry turkey oak-pine associations, sandy areas in pine savannas	Yes
156	*Rana sylvatica* pop.3	Wood Frog (coastal plain population)	LR	Mesic to moist hardwood forests on Albemarle Peninsula	No[c]
157	*Regina rigida*	Glossy Crayfish Snake	LR	Marshes, cypress ponds, other wetlands	Yes
158	*Seminatrix pygaea*	Black Swamp Snake	LR	Lush vegetation of ponds, ditches, sluggish streams	Yes
			INSECTS		
159	*Acronicta perblanda*	Cypress Daggermoth	LR	Cypress swamps	Yes
160	*Acronicta sinescripta*	A Daggermoth	LR	Savannas and flatwoods	Yes
161	*Agrotis carolina*	A Dart Moth	LR	Open longleaf pine or longleaf pine-oak savanna with pyxie-moss	Yes
162	*Amblyscirtes alternata*	Dusky Roadside Skipper	LR	Open grassy pine flatwoods, savannas, sandhill ridges	Yes
163	*Melanapamea mixta (=Apamea mixta)*	A Noctuid Moth	LR	Savannas, wet meadows	No[c]
164	*Apantensis* sp. 1 nr. *carlotta*	A Tiger Moth	LR	Savannas and sandhill seeps	Yes
165	*Atrytone arogos arogos*	Arogos Skipper	S	Mesic to boggy reedgrass savannas	Yes
166	*Atrytonopsis* sp. 1	An Undescribed Skipper	LR	Dunes and sandy flats	No
167	*Baetisca obesa*	A Mayfly	LR	Lower Tar River	No[c]
168	*Bleptina sangamonia*	A Noctuid Moth	LR	Ecology not yet assessed; only NC record from Bladen County	No[c]
169	*Calephelis virginiensis*	Little Metalmark	LR	Grassy fields, savannas, marshes	Yes
170	*Callophrys irus*	Frosted Elfin	LR	Grassy openings or burn scars in barrens and savannas, ROW and powerlines	Yes
171	*Chlorochroa dismalia*	Dismal Swamp Stink Bug	LR	Canebrakes	Yes
172	*Datana robusta*	A Prominent Moth	LR	Savannas, flatwoods, and sandhills	Yes
173	*Euphyes berryi*	Berry's Skipper	LR	Wet prairies, marshes, savannas with pitcher plants	Yes
174	*Euphyes bimacula*	Two-Spotted Skipper	LR	Wet savannas, bogs, sedge areas near wet woods	Yes
175	*Euphyes dukesi dukesi*	Duke's Skipper	S	Ecotones of brackish or freshwater marshes with swamps	Yes
176	*Faronta aleada*	A Noctuid Moth	LR	Maritime grasslands	No
177	*Gabara sp. 1*	A Noctuid Moth	LR	Savannas; southeastern NC	No[c]
178	*Hemipachnobia subporphyrea*	Venus Flytrap Cutworm Moth	S	Large stands of Venus flytraps in wet pine savannas, around pocosins	Yes
179	*Hesperia attalus slossonae*	Dotted Skipper	S	Xeric natural communities on sterile white sands (or disturbances within)	No

Species No. [a]	Scientific Name	Common Name	USFS Status [b]	Habitat Type	Potentially Suitable Habitat Identified in Evaluation Area
180	*Hypomecis buchholzaria*	Buchholz's Gray	LR	Fire-maintained glades and pine barrens, xeric scrub-oak	No
181	*Papilio cresphontes*	Giant Swallowtail	LR	Primarily coastal in maritime forests or thickets	No
182	*Pyreferra ceromatica*	Anointed Sallow Moth	LR	Flatwoods and pocosins, ecotones between mesic woodland and bottomlands	Yes
183	*Spartiniphaga carterae*	Carter's Noctuid Moth	S	Savannas and sandhills with Pinebarren Sand-reedgrass (*Calamovilfa brevipilis*)	Yes
184	*Tornos cinctarius*	A Gray Moth	LR	Savannas and sandhills	Yes
FRESHWATER FISH, MOLLUSKS, AND CRUSTACEANS					
185	*Acipenser brevirostrum*	Shortnose Sturgeon	E	Brackish water of large rivers and estuaries; spawns in freshwater areas	No
186	*Acipenser oxyrhynchus*	Atlantic Sturgeon	S	Coastal waters, estuaries, large rivers	No
187	*Elliptio folliculata*	Pod Lance	LR	Coastal plain, mainly Lake Waccamaw	No[c,g]
188	*Ferrissia hendersoni*	Blackwater Ancylid	LR	Mainly margins of Carolina Bay lakes	No[c]
189	*Fundulus confluentus*	Marsh Killifish	LR	Fresh to brackish waters along coast	No
190	*Fundulus luciae*	Spotfin Killifish	LR	Ponds and pools along coast	No
191	*Lampetra aepyptera*	Least Brook Lamprey	LR	Tar and Neuse drainages	No[c]
192	*Lampsilis sp. 2*	Chameleon Lampmussel	LR	Neuse, Tar, and Cape Fear systems; above Fall Line	No
193	*Lasmigona subviridis*	Green Floater	S	Tar, Neuse, and Cape Fear systems downstate; New and Watauga systems in mountains	No[c,g]
194	*Leptodea ochracea*	Tidewater Mucket	LR	A number of systems primarily in the coastal plain, abundant in Lake Waccamaw	No[c,g]
195	*Lynceus gracilicornis*	Graceful Clam Shrimp	LR	Temporary ponds, pools, and ditches	Yes
196	*Notropis bifrenatus*	Bridle Shiner	LR	Stream near lower Neuse River	Yes
197	*Noturus furiosus*	Carolina Madtom	S	Tar and Neuse drainages, small to medium rivers	No[c]
198	*Sphaerium simile*	Grooved Fingernail Clam	LR	White Oak River	No[c]
199	*Strophitus undulatus*	Creeper	LR	Tar, Neuse, Cape Fear, and other systems	No[g]

[a] Species numbering continued from Appendix B.
[b] E – Endangered; LR – Locally Rare; S – Sensitive; T – Threatened.
[c] No documented occurrence in Craven, Carteret, or Jones Counties; not carried forward for further evaluation.
[d] Red wolf is extirpated from North Carolina except for an experimental population on the Albemarle Peninsula and there are no documented occurrences in Craven, Carteret, or Jones Counties; not carried forward for further evaluation.
[e] Eastern cougar is extirpated from North Carolina, last records in 1880s; not carried forward for further evaluation.
[f] Bachman's warbler is considered extinct, last records documented in North Carolina were 1891; not carried forward for further evaluation.
[g] Streams in the evaluation area are too acidic to provide suitable habitat for freshwater mussels.

APPENDIX D

Summary of USFS Rare Species Documented in the Evaluation Area

Table D-1. USFS Rare Species Documented in the Evaluation Area.

Thirty-six USFS rare species have been documented or are presumed present in the evaluation area based on a combination of NCNHP records, USFS records, and field surveys undertaken in 2004 – 2014 for NFS lands within the evaluation area. USFS rare species with potential effects can be divided into two broad categories based on generalized habitat requirements for discussing potential for effects and possible minimization measures: 1) species that occur in open fire-maintained habitats; and 2) species that occur in mature swamp forest and/or peatland forest habitats.

Habitat Group	Species Number [a]	Common Name	Scientific Name	USFS Status [b]	Potential Impacts	
					Direct	Indirect
Fire Maintained	18	Small Spreading Pogonia	*Cleistesiopsis oricamporum (=Cleistes bifaria)*	S	Yes	Yes
	51	Loomis's Loosestrife	*Lysimachia loomisii*	S	Yes	Yes
	59	Piedmont Cowbane	*Oxypolis ternata (=O. denticulata)*	S	Yes	Yes
	69	Yellow Fringeless Orchid	*Platanthera integra*	S	No	Yes
	71	Hooker's Milkwort	*Polygala hookeri*	S	No	Yes
	78	Short-bristled Beaksedge	*Rhynchospora galeana*	S	No	Yes
	90	Carolina Goldenrod	*Solidago pulchra*	S	No	Yes
	92	Spring-flowering Goldenrod	*Solidago verna*	S	Yes	Yes
	94	Florida Peatmoss	*Sphagnum cribrosum*	S	Yes	Yes
	95	Fitzgerald's Peatmoss	*Sphagnum fitzgeraldii*	S	Yes	No
	4	Bog Bluestem	*Andropogon mohrii*	LR	No	Yes
	16	LeConte's Thistle	*Cirsium lecontei*	LR	Yes	Yes
	28	Eaton's Witch Grass	*Dichanthelium spretum*	LR	No	Yes
	62	Mudbank Crown Grass	*Paspalum dissectum*	LR	Yes	Yes
	70	Snowy Orchid	*Platanthera nivea*	LR	No	Yes
	73	Awned Mountain-mint	*Pycnanthemum setosum*	LR	Yes	Yes
	97	Eaton's Ladies'-tresses	*Spiranthes eatonii*	LR	No	Yes
	119	Eastern Henslow's Sparrow	*Ammodramus henslowii susurrans*	LR	Yes	Yes
	133	Bachman's Sparrow	*Peucaea aestivalis (=Ammodramus aestivalis)*	LR	Yes	Yes
	135	Red-cockaded Woodpecker	*Picoides borealis*	E	Analyzed in separate Biological Assessment	
	148	Southern Hognose Snake	*Heterodon simus*	LR	Yes	Yes
	162	Dusky Roadside Skipper	*Amblyscirtes alternata*	LR	Yes	Yes
	165	Arogos Skipper [c]	*Atrytone arogos arogos*	LR	Yes	Yes
	169	Little Metalmark	*Calephelis virginiensis*	LR	Yes	Yes
	173	Berry's Skipper	*Euphyes berryi*	LR	Yes	Yes
	175	Two-spotted Skipper [c]	*Euphyes bimacula*	LR	Yes	Yes
Swamp Forest / Peatland Forest	42	A Liverwort	*Lejeunea bermudiana*	LR	Yes	Yes
	53	Florida Adder's Mouth	*Malaxis spicata*	LR	No	Yes
	66	A Liverwort	*Plagiochila ludoviciana*	LR	Yes	Yes
	72	Shadow-witch	*Ponthieva racemosa*	LR	No	Yes
	140	American Alligator [c]	*Alligator mississippiensis*	T(S/A)	Yes	Yes
	110	Rafinesque's Big-eared Bat	*Corynorhinus rafinesquii macrotis*	LR	Yes	Yes
	112	Southeastern Myotis	*Myotis austroriparius*	LR	Yes	Yes
	124	Black-throated Green Warbler	*Dendroica virens waynei*	LR	Yes	Yes
	175	Duke's Skipper	*Euphyes dukesi dukesi*	S	Yes	Yes
	182	Anointed Sallow Moth [c]	*Pyreferra ceromatica*	LR	Yes	Yes

[a] Species number corresponds with species number presented in Tables A-1 and B-1 located in Appendices A and B.
[b] USFS Status: E – Endangered; FC – Forest Concern; LR – Locally Rare; S – Sensitive
[c] Species not observed in the evaluation area but determined to likely be present.

APPENDIX E

Tuscarora Nation Tribal Coordination Letter

U.S. Department of Transportation
Federal Highway Administration

North Carolina Division

310 New Bern Avenue, Suite 410
Raleigh, NC 27601
(919) 856-4346
(919) 747-7030
http://www.fhwa.dot.gov/ncdiv/

January 6, 2014

In Reply Refer To:
HDA-NC

Chief Leo Henry
Tuscarora Nation
2006 Mt. Hope Road
Lewiston, NY 14092

Dear Chief Henry:

The North Carolina Department of Transportation (NCDOT) proposes to construct a four-lane, divided roadway on new location in the vicinity of the City of Havelock in Craven County, North Carolina. The length of the project is 10.1 miles. This transportation improvement project is identified in the 2013-2023 Draft Statewide Transportation Improvement Program (STIP) as Project No. R-1015.

The study area for this project includes an identified archeological site that may have relevance to the Tuscarora Nation. **We are requesting your review of the enclosed information and appreciate any input you may have. A response by February 14, 2014, is requested**. The enclosed exhibits show the project study area vicinity and the Preferred Alternative. A summary of the project's history, purpose and need, and archaeological resources is included below.

Project History
NCDOT began the initial planning and environmental studies for the Havelock Bypass project in the early 1990's. These studies included an analysis of improving the existing highway versus various proposed bypass routes (corridors) with respect to potential impacts to the human and natural environment resources in the project study area.

NCDOT presented the findings of the initial planning studies in the Environmental Assessment (EA) that was approved by the Federal Highway Administration (FHWA) on Jan. 27, 1998. That document included a recommendation for the selection of Corridor 3 as the Preferred Alternative because it generated the lowest environmental impacts and was the most cost effective route.

After the EA was distributed for review and comment, NCDOT held a Corridor Public Hearing in May 1998, to present three bypass corridors for review and the majority of the public, the municipal officials, and the Interagency Team supported Corridor 3.

After the Corridor Public Hearing, FHWA, NCDOT, and other members of a federal and state "Interagency Team" selected Corridor 3 as the Preferred Alternative. NCDOT subsequently

prepared preliminary design plans for Corridor 3, as the associated potential impacts were assessed and evaluated.

Based upon the magnitude of the potential impacts from Corridor 3, it was determined that an Environmental Impact Statement (EIS) would be needed to assess the potential impacts from each of the three bypass corridors in greater detail.

In order to prepare the EIS, design plans needed to be refined, and existing features such as historic architectural and archaeological sites, streams, wetlands, threatened and endangered species, and the existing and predicted land uses needed to be updated and documented for each of the three bypass corridors. Indirect and cumulative impacts resulting from the construction of the project also needed to be considered and discussed in the Environmental Impact Statement. Those studies were updated during 2007 and 2008 to determine the potential impacts related to the bypass corridors.

NCDOT presented the findings of those updated environmental studies in the Draft EIS that was approved by FHWA on Sept. 6, 2011, and distributed during September (a CD with the DEIS is affixed). NCDOT began the public comment period for the document on Sept. 9, 2011. NCDOT held a Pre-Hearing Open House & Corridor Public Hearing on Dec. 6, 2011.

Preparation of the Final EIS is currently in progress, with completion anticipated for the summer of 2014. After the Final EIS is approved and circulated, a Record of Decision (ROD) will be issued by the FHWA. The current project schedule is for right of way acquisition to begin in 2014 and for construction to begin in 2016.

Project Description and Purpose and Need

The US 70 corridor connects Raleigh, Smithfield, Goldsboro, Kinston, New Bern, Havelock and Morehead City. Regionally, US 70 provides connectivity with the Port of Morehead City, Global TransPark, industries in New Bern and Craven County, Cherry Point US Marine Corps Air Station, Camp Lejeune and other military facilities, and it functions as a primary route for seasonal beach traffic.

The lack of highway access control on US 70 through Havelock, with its 14 signalized intersections and numerous unsignalized street and driveway connections, substantially reduces the mobility of this corridor. Commercial, institutional, and residential growth in the City of Havelock and an increasing regional reliance on US 70 has led to a deterioration of traffic operations along the existing route. The capacity of US 70 is currently limited by the operational capabilities of its signalized intersections. In 2008, the level of service (LOS) performance of two of the major existing signalized intersections along US 70 (at NC 101 and SR 1765, Catawba Road) were already undesirable. By the design year 2035, none of the major existing signalized intersections will operate at an acceptable LOS without substantial improvements.

Because US 70 is the state's primary connection to the Port of Morehead City and a main route between military facilities and the port, the NCDOT Strategic Highway Corridors (SHC) Program goal to protect the mobility and connectivity of critical highway facilities is particularly relevant to the proposed project. The North Carolina Maritime Strategy Final Report identifies the proposed Havelock Bypass as one of a number of recommended infrastructure projects to

improve the regional transport of goods. US 70's function as part of the US Department of Defense Strategic Highway Network for moving military personnel and equipment also illustrates the regional need for the proposed project.

Archeological Resources

Between March 18 and June 11 of 1999, an intensive archaeological survey was conducted within the study area of the proposed US 70 Havelock Bypass preferred corridor. All fieldwork was designed to comply with guidelines established by the Secretary of the Interior's Guidelines and Standards for Archaeological Documentation (Federal Register 48: 44734, September 29, 1983). A report, An Intensive Archaeological Survey of the Preferred Corridor for the US 70 Havelock Bypass, Craven County, North Carolina, was prepared in April of 2000. A copy of this report is enclosed. It was the finding of that report that one site was eligible for listing in the National Register of Historic Places (Site 31CV302). This site is a Woodland Period Site and is located approximately 1148 feet north of Tuckers Creek and 246 feet west of US 70. The artifacts recovered were prehistoric potsherds representing the Middle and Late Woodland periods. The diversity reflected in the ceramic assembly may merely be the result of using a variety of clay sources or may reflect trade or use of the site by different cultures over time. With regard to the latter, the site is located at the point where the Tuscarora, Algonquian, and Waccamaw linguistic groups are thought to have overlapped (Phelps 1983: 37)

Given its location at the interface of three cultural groups, and cultural diversity represented in the recovered assemblage, additional work at this site would provide further information on pre-historic socio-economic and political aspects of the region, making it eligible for listing in the National Register of Historic Places. The site will be preserved in place. A redesign of the proposed US 70 Havelock Bypass has effectively avoided the site. No impacts will occur as a result of the proposed project, but it is recommended that further work be undertaken at Site 31CV302 if it is threatened in the future.

Section 4(f) of the Federal-Aid Highway Transportation Act of 1968, (PL-90-495), requires consideration of cultural resources, particularly preservation-in-place, of archaeological resources that are eligible for the National Register. If potentially significant sites are found within the Preferred Alternative and, based on a program of site testing, such sites are determined eligible for the National Register; it is most likely that a data recovery program will be the appropriate form of mitigation.

We would appreciate any information you might have that would be helpful in identifying and evaluating archeological resources within the project corridor. Please identify any areas of concern and indicate in writing if the Tuscarora Nation would like to request consulting party status under 36 CFR 800.3(f)(2).

If you have any questions concerning the subject project, please contact me at (919) 747-7019 or Ron.Lucas@dot.gov.

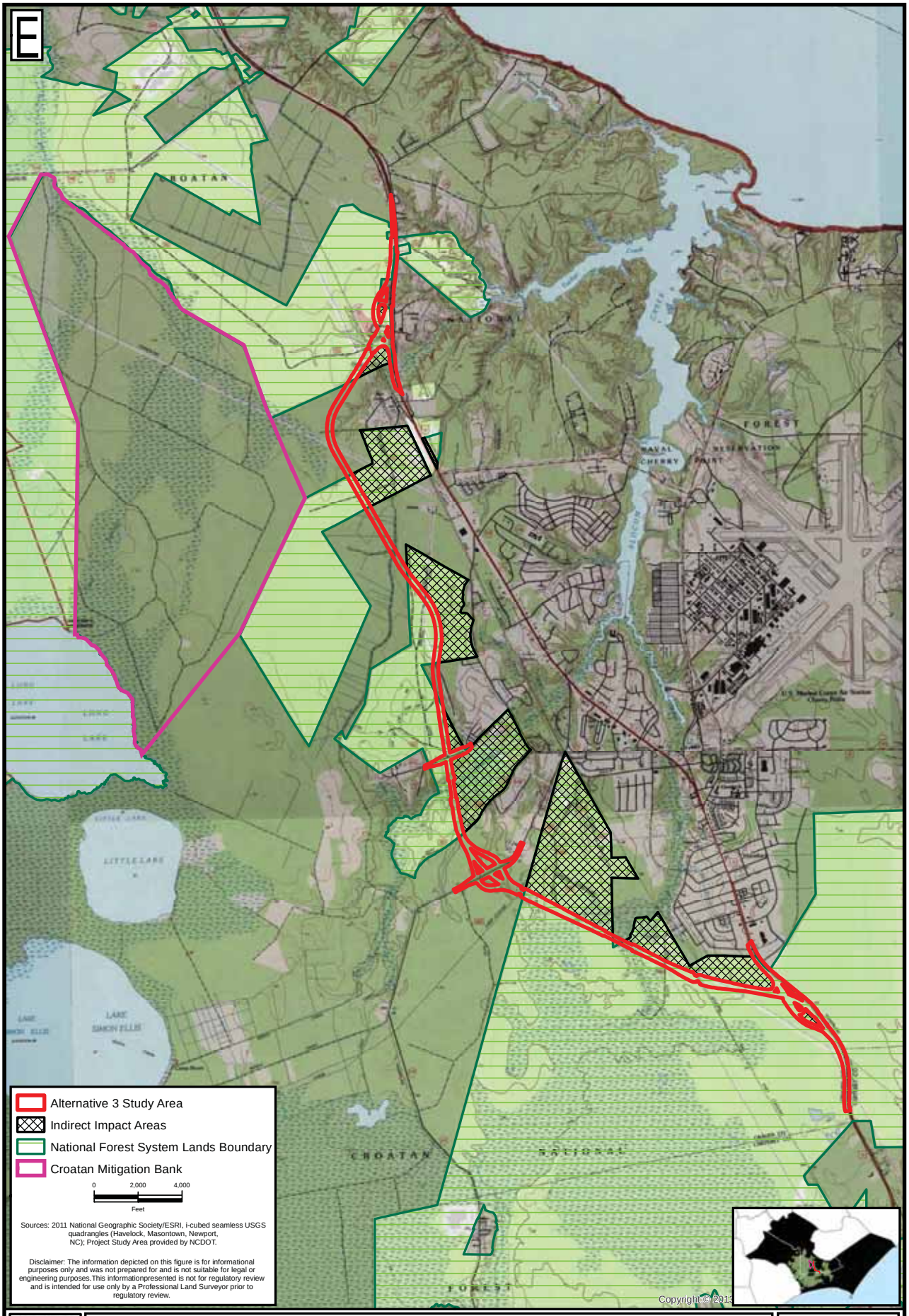
Sincerely,

For John F. Sullivan, III, P.E.
Division Administrator

Enclosures: 2000 Archeological Study
Exhibits 1 and 2
2011 DEIS

APPENDIX F

Figures



Project Location

US 70 Havelock Bypass Biological Evaluation

Croatan National Forest, North Carolina

T.I.P. R-1015

Project:	ER12050.10
Date:	June 2014
Drwn/Chkd:	KT/MKS
Figure:	1

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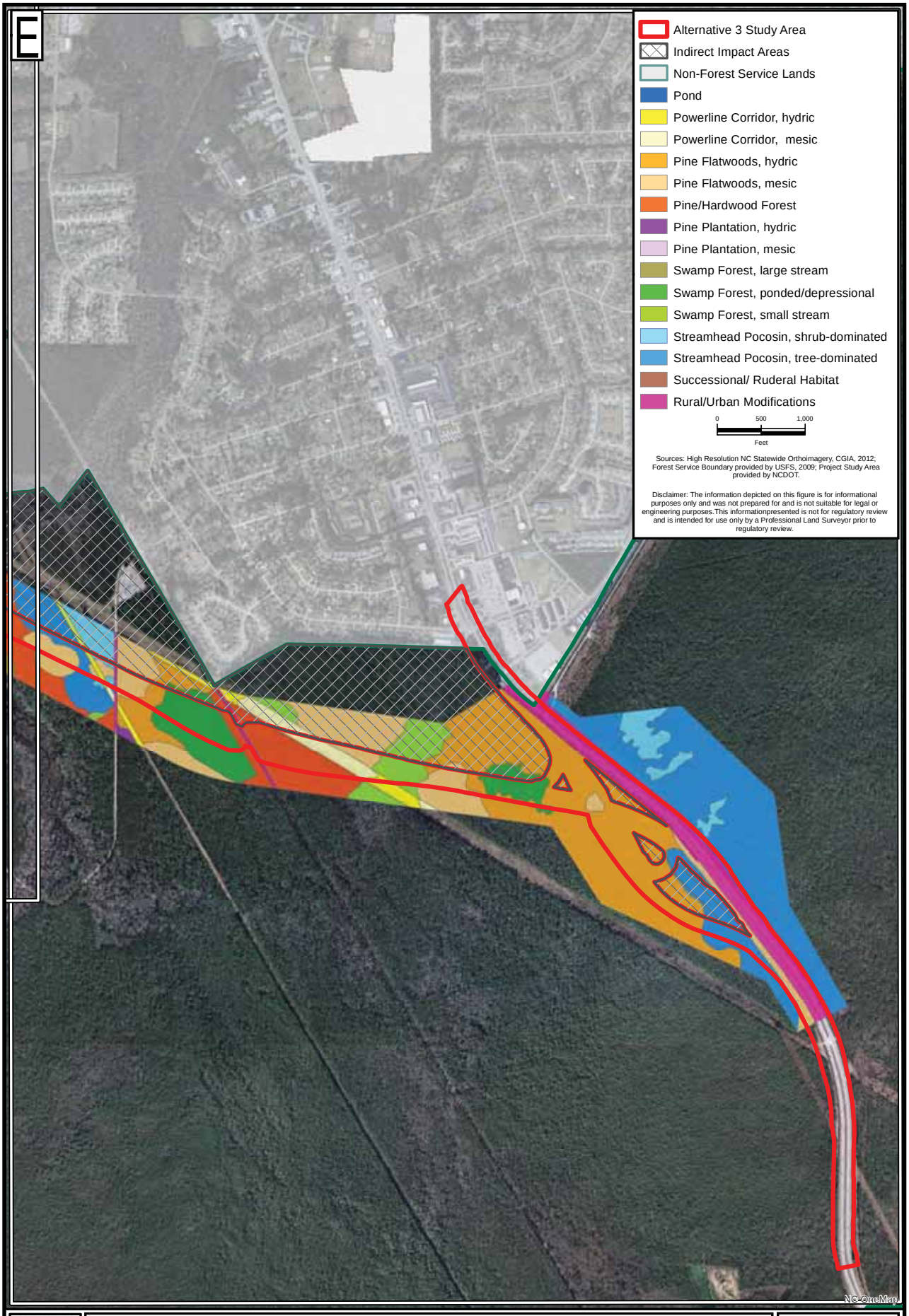

Terrestrial Communities Map

US 70 Havelock Bypass Biological Evaluation

Croatan National Forest, North Carolina

T.I.P. R-1015

Project:	ER12050.10
Date:	June 2014
Drwn/Chkd:	KT/MKS
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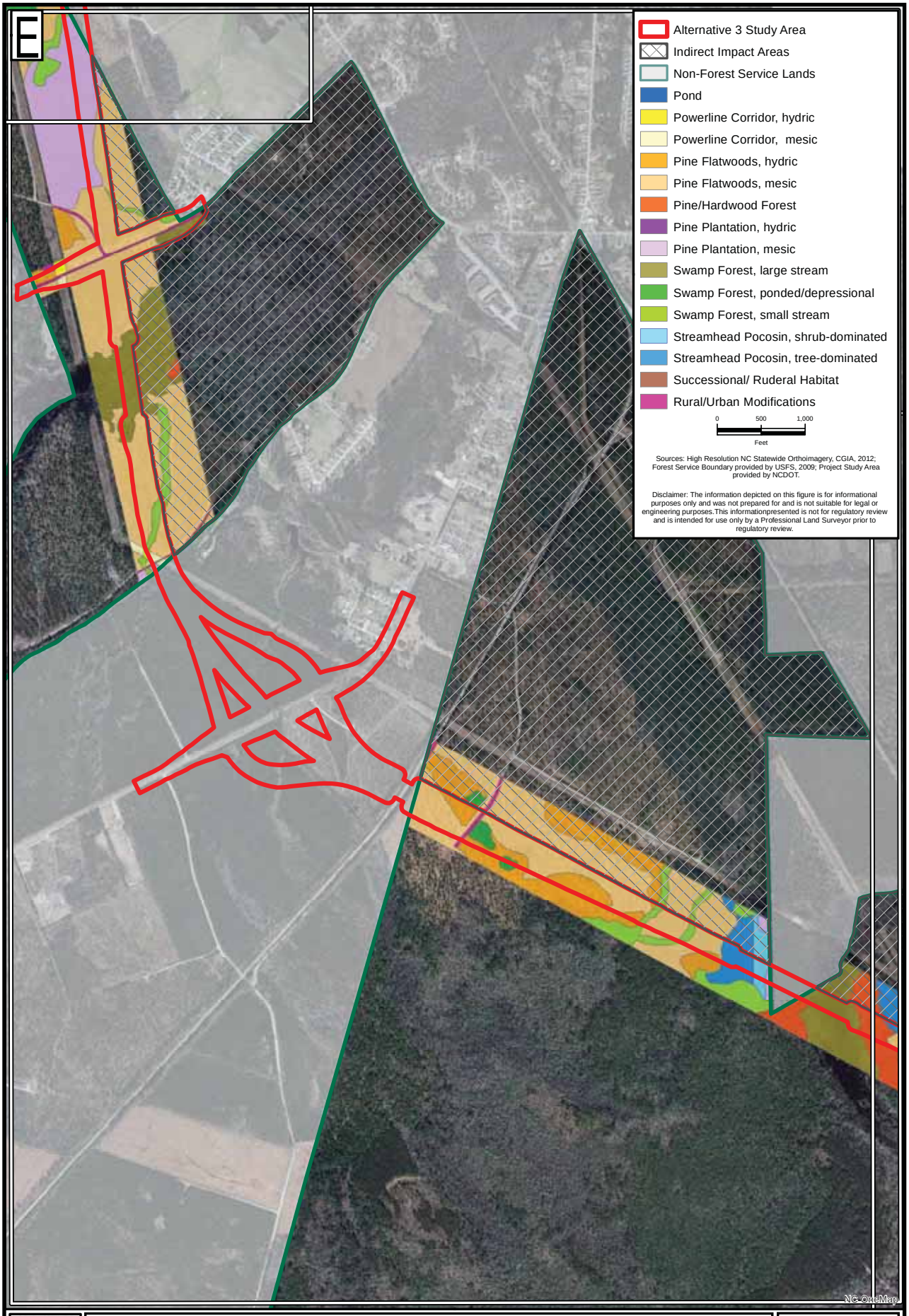

Terrestrial Communities Map

US 70 Havelock Bypass Biological Evaluation

Croatan National Forest, North Carolina

T.I.P. R-1015

Project:	ER12050.10
Date:	June 2014
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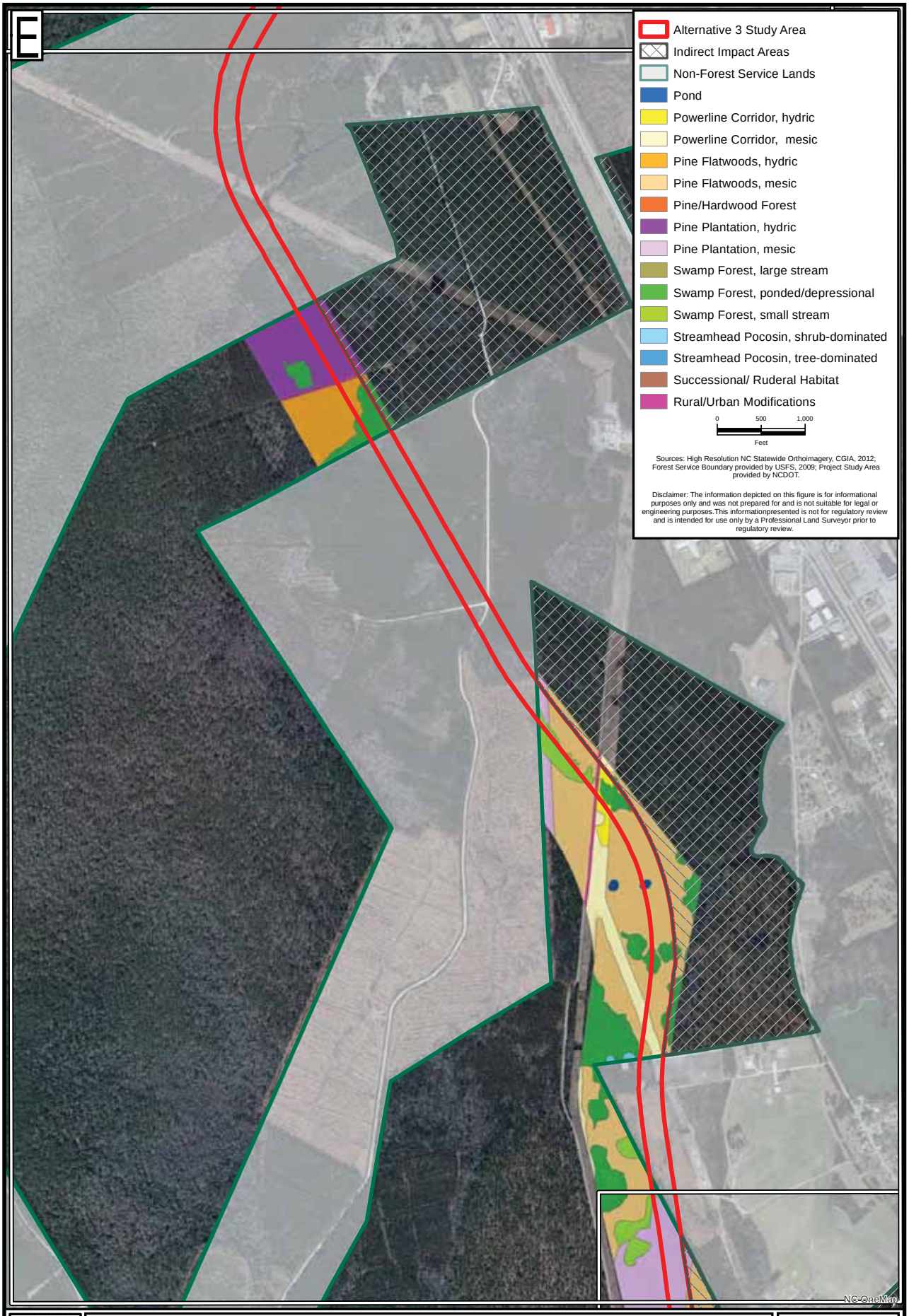

Terrestrial Communities Map

US 70 Havelock Bypass Biological Evaluation

Croatan National Forest, North Carolina

T.I.P. R-1015

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Date:	June 2014
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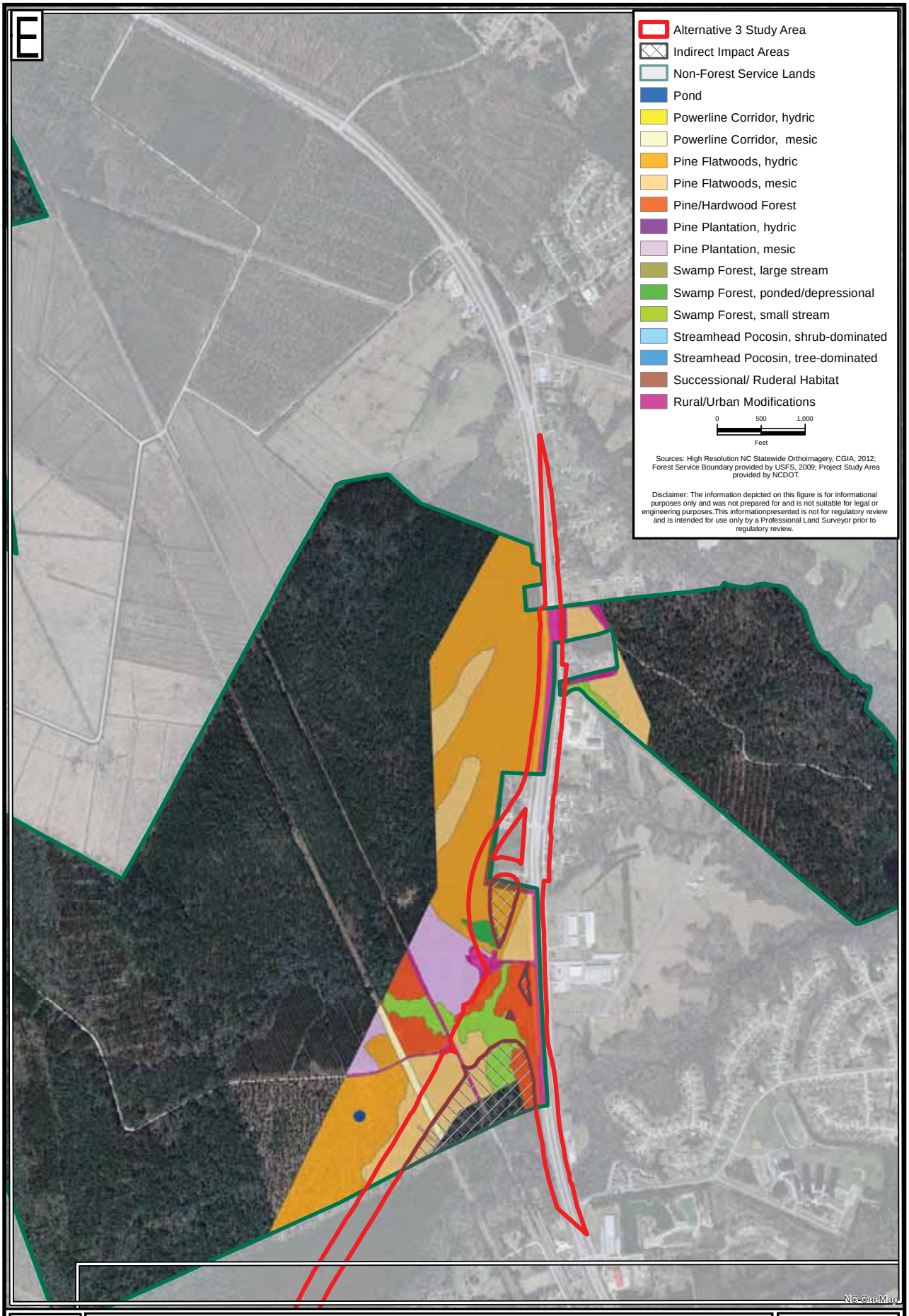

Terrestrial Communities Map

US 70 Havelock Bypass Biological Evaluation

Croatan National Forest, North Carolina

T.I.P. R-1015

Project:	ER12050.10
Date:	June 2014
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Figure:	**2d**

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U.S. Forest Service Rare Species

US 70 Havelock Bypass Biological Evaluation

Croatan National Forest, North Carolina

T.I.P. R-1015

Project:	ER12050.10
Date:	June 2014
Drwn/Chkd:	KT/MKS
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U.S. Forest Service Rare Species

US 70 Havelock Bypass Biological Evaluation

Croatan National Forest, North Carolina

T.I.P. R-1015

Project:	ER12050.10
Date:	June 2014
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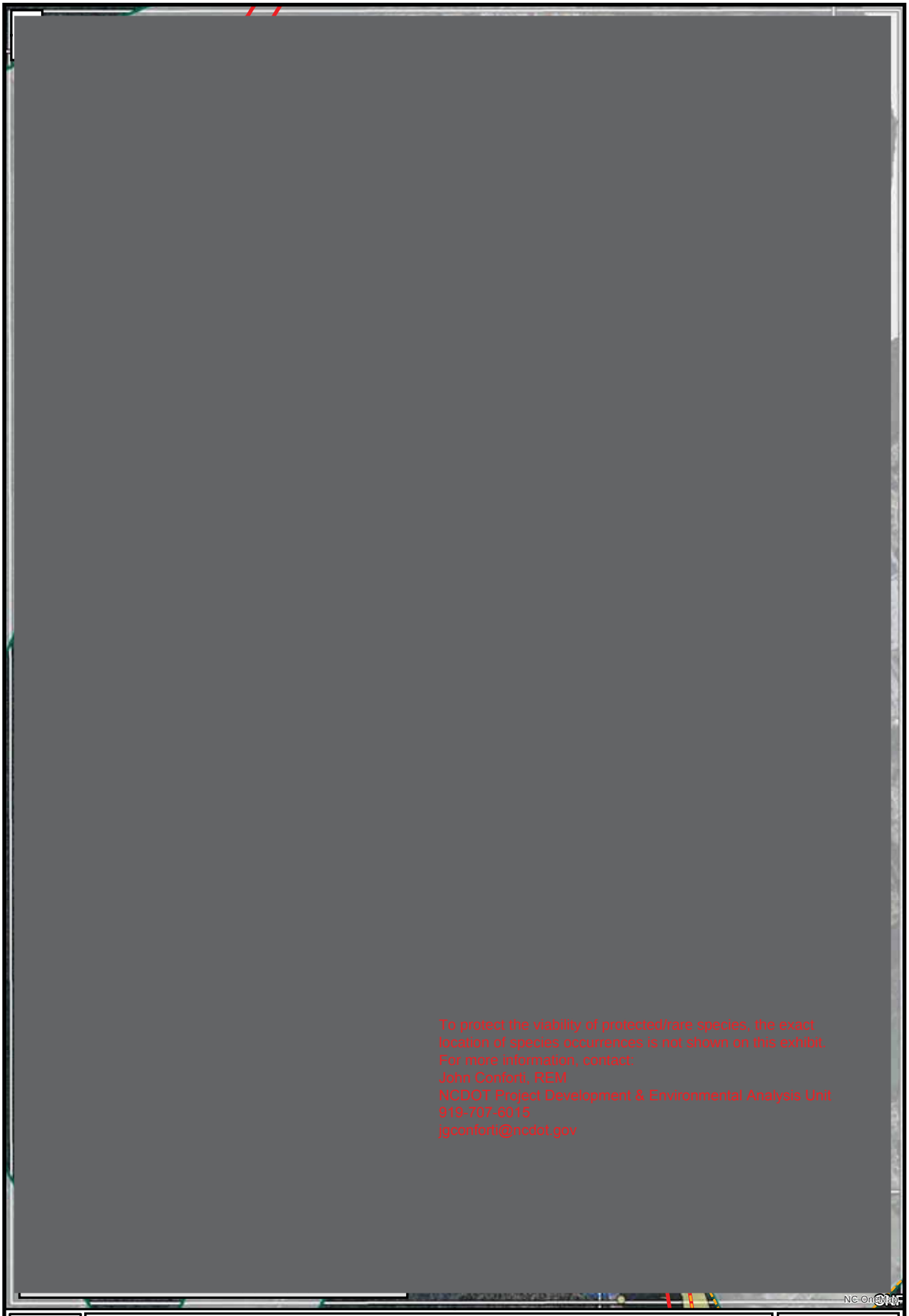

U.S. Forest Service Rare Species

US 70 Havelock Bypass Biological Evaluation

Croatan National Forest, North Carolina

T.I.P. R-1015

Project:	ER12050.10
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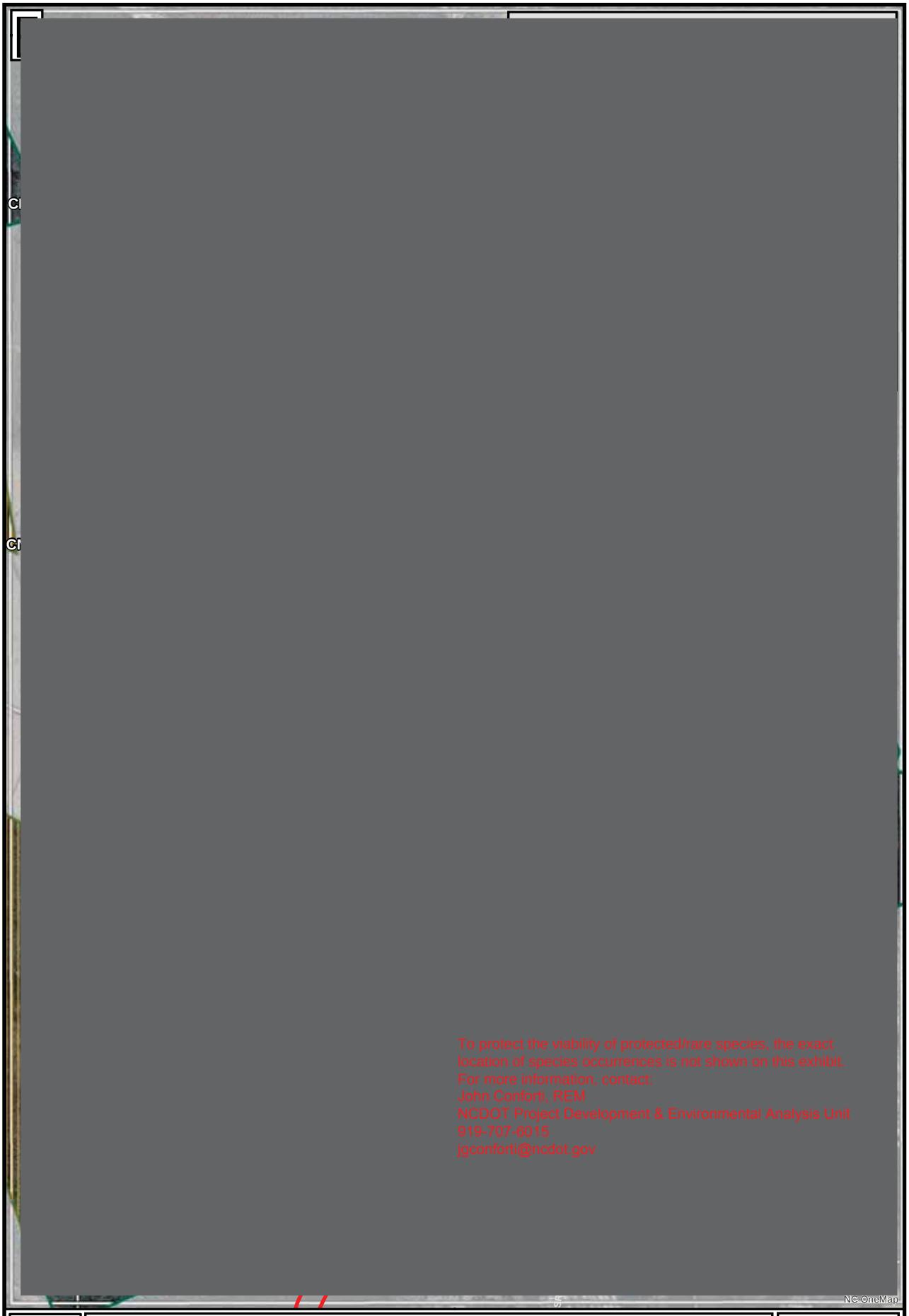

U.S. Forest Service Rare Species

US 70 Havelock Bypass Biological Evaluation

Croatan National Forest, North Carolina

T.I.P. R-1015

Project:	ER12050.10
Date:	June 2014
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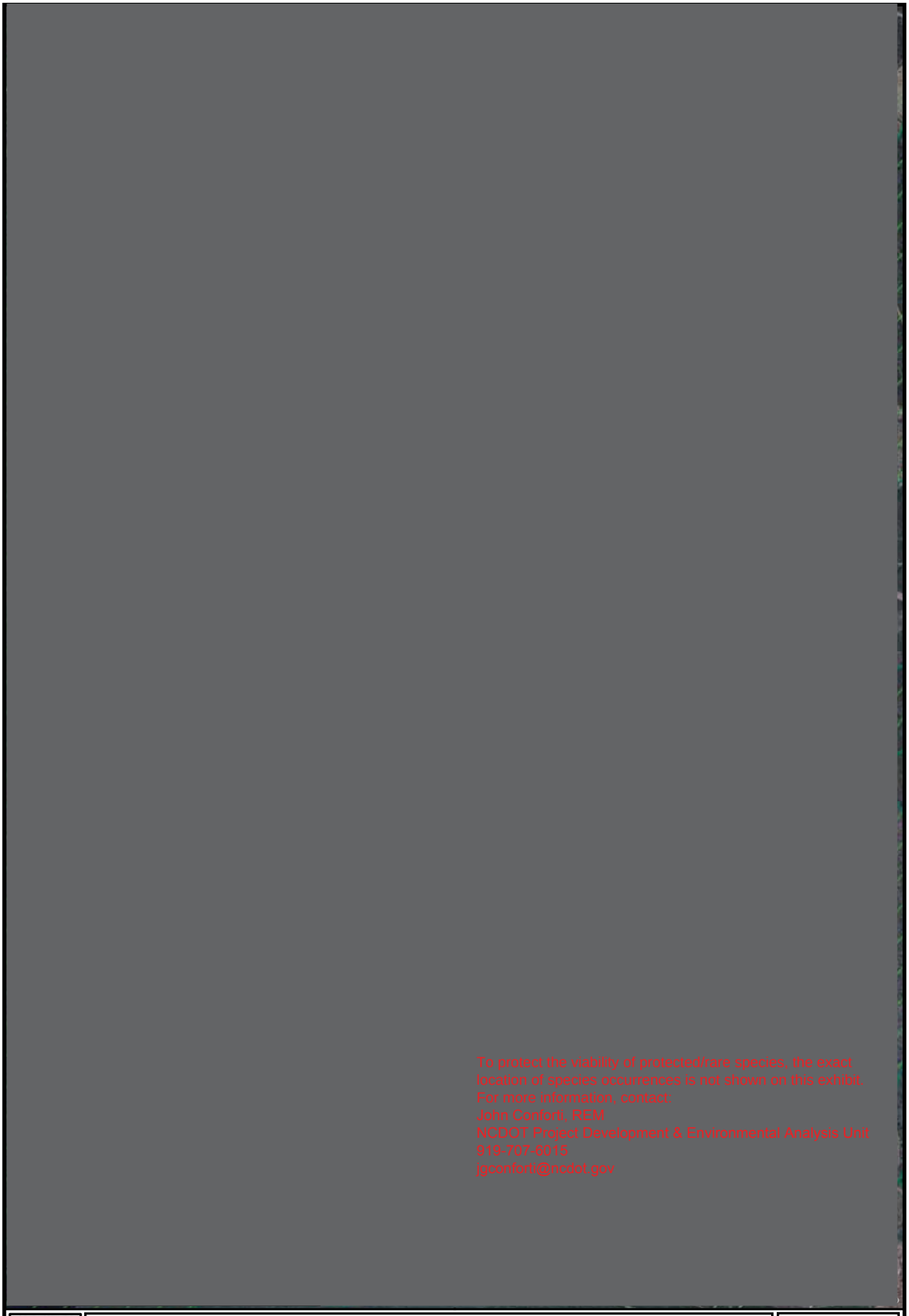

Croatan Mitigation Bank (CMB) - USFS Rare Species

US 70 Havelock Bypass Biological Evaluation

Croatan National Forest, North Carolina

T.I.P. R-1015

Project:	ER12050.10
Date:	June 2014
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APPENDIX G

Attachments

ATTACHMENT 1

Havelock Bypass Environmental Survey-Noctournal Lepidoptera

This survey was initiated to sample for six species of moths whose habitats are rapidly declining and whose status is or could become threatened by the disturbance associated with the construction of a road bypass around Havelock in Craven County. They are Acronicta sinescripta, Agrotis n. sp. 1, Hemipachnobia subporphyrea, Lithacodia sp. 1, Pyreferra ceromatica and Spartiniphaga carterae.

Moths were sample by blacklight trapping (Hall, et. al. 1999) at numerous locations within the area potentially affected by the Havelock Bypass. These sites are described in Table 1. Sites were chosen based on their flora, access, and surrounding habitats. The study focused on four chosen sites and attempted to sample the most promising ones monthly. The actual sampling days and relevant collections are given in Table 2. Forty four traps were set out at dusk and picked up the following dawn. Each trap held 100-200 specimens on average and they were examined for the target species and for any other species of special interest.

Hemipachnobia subporphyrea adults are on the wing from late March through the first 3 weeks in April in locations where their foodplant, Venus flytraps, occur. Pyreferra ceromatica adults are active from early December through early April (on warm nights). The caterpillars feed on Witch Hazel and were reared this year for the first time (Sullivan and Wagner (U. Conn.)). Clearly the sampling period did not overlap the flight period for either of these species. While flytraps could occur in the study area, I am unaware of any colonies. Pyreferra caterpillars were collected in Craven County and have only been seen in habitats where witch hazel occurs near small streams with cabbage palmetto nearby. Such habitat occurs in the study area on both sides of the southwest prong of Slocum Creek. This species very likely occurs there.

Agrotis n. sp. 1 has now been described as a new species, Agrotis carolina (Schweitzer and McCabe, 2004). Caterpillars have been reared for several stages (Sullivan, unpublished) on Pyxidanthera barbulata a ground cover growing on xeric sand ridges in Longleaf Pine savannas. Adults are on the wing in April, June and September but none were taken in this study. If Pyxidanthera does occur in the study area, I did not locate it. However, should it be found in moderate sized populations (it is most visible in early spring when in bloom), the moths will likely accompany it. Acronicta sinescripta has been taken as far north as Millis Road in Carteret County where it occurs in Longleaf pine savannas. Unfortunately, the moth is rarely seen and we do not know its foodplant nor its habitat requirements. Its status in the study area is problematical. Spartiniphaga caterae is tightly associated with its foodplant, Calamovilfa brevipilis and flys in late October-early November. This grass is associated with open savannas and power line right-of-ways and is known to occur in the study area. It usually can be found at the junction of open savanna and pocosin. In spite of real efforts to

locate the species, it was not found. However, the power lines in the study area were mowed to a height of several inches in October and trapping in them was fruitless. No moths ventured into the mowed areas which were made even more inhospitable by a loss of warmth in the evening resulting in a 5-10 degree drop in temperature relative to the surrounding woodlands.

Lithacodia new species 1 is actually a complex of two undescribed species. They have arbitrarily been called species 1 and species 2. Only Lithacodia species 2 was found in the study area at the power line site west of Sunset Road and in the swamp forest east of Sunset Road. Severn specimens were captured on July 5 and 17 on August 26, 28. Both undescribed Lithacodia species seem to be associated with high quality, mature Arundinaria (cane grass) habitat but because this plant species has been searched extensively for caterpillars by Eric Quinter at the American Museum of Natural History without finding any Lithacodia, the two undescribed species are probably feeding on other plant species that grow in the same habitat. Both Lithacodia species have been trapped from the sandhills to the coast in North Carolina.

Several non-target species of special concern were taken. In the swamp forest east of Sunset Road a single specimen of Melanomma auricinctaria, a rivuline noctuid, was taken on May 19. The caterpillar is thought to feed on Gaylussacia sp. and only 4 specimens are known from North Carolina. However, this rarely encountered species is regularly found outside of North Carolina from Florida to Texas. On July 5 nine specimens of an undescribed cane borer (Quinter genus 2 species 3) were trapped in the cane break west of the Sunset Road power line. Only a few records of this species are known from North Carolina, most from the Dismal Swamp area. Two specimens of an undescribed species of the noctuid genus Rivula were taken. This species was known from 6 specimens taken in Craven and Onslow Counties in North Carolina. It seems to be associated with small streams in mesic forests which suport a flora of streamside grasses and sedges and has not been taken out of the state. A single specimen of Eupithecia pecorum was taken at the Hillman Loop site on September 30. Adults of this uncommon species are on the wing in the early spring and fall. The foodplant of the caterpillars is unknown but could be pond pine.

CONCLUSIONS: It is difficult to draw extensive conclusions based on the limited trapping data in this study. The power line sites have been burned or cut regularly and are supporting a lot of the flora associated with Longleaf pine savannas which at one time must have been throughout the study area. The cane breaks near the power line west of Sunset Road are in excellent condition and appear to support most of the fauna associated with high quality stands. This type of habitat is far less extensive than in the past but remains scattered throughout the area. Well over ten undescribed moth species are associated with high quality cane breaks. The swamps and associated woodlands along the southwest prong of Slocum Creek are excellent examples of their habitats and

few remain in the Coastal Plain. Hopefully, they will be disturbed a little as possible by the upcoming bypass.

References:

Hall, S.P., J. B. Sullivan and D. F. Schweitzer 1999. Assessment of risk to non-target macro-moths after Bacillus thuringiensis var. kurstaki application to Asian Gypsy Moth in the Cape Fear region of North Carolina. United States Department of Agriculture. Forest Health Technology Enterprise Team publication 98-16, 95 pp.

Schweitzer, D. F. and T. L. McCabe 2004. The taxonomy, larva and ecology of Agrotis buchholzi (Noctuidae) with a new sibling species from North Carolina. J. Lep. Soc. 58: 65-74.

Submitted by: J. Bolling Sullivan
200 Craven St.
Beaufort, N. C. 28516
Dec. 10, 2005

Table 1

Havelock Bypass Trapping Localities

Table 2

Havelock Bypass Trapping Effort

Date	location	effort	interesting species

ATTACHMENT 2

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

December 2, 2005

MEMORANDUM

TO: Matt Smith, ESI

FROM: Mary Frazer, PDEA

SUBJECT: Survey and assessment for PETS species, Havelock Bypass, R-1015

NCDOT has conducted surveys or assessments along the proposed Havelock bypass alternatives for several protected, endangered threatened and sensitive species, as requested by the US Forest Service (USFS). The surveys were conducted by Logan Williams (butterflies), Neil Medlin (fish), Mike Sanderson (birds), Dennis Herman (herps and Eastern woodrat), and Jay Mays (crustaceans and mollusks), with assistance from other PDEA staff. Other PETS species requiring surveys have been covered by ESI and its subcontractors, and by Jay Carter and Associates.

METHODS

Aerial photographs, topographic maps, and on-the-ground analysis were used to find the best habitat for the target species within the three project alternatives. Habitat information was also provided by ESI, Dave DuMond and John Fussell. Information was collected about habitat preferences and known occurrences in the project vicinity for each of the species to be surveyed. Surveys were conducted as appropriate for each species. Supporting information for some of these surveys (such as I received) is attached.

RESULTS

Butterflies

Two-spotted Skipper (*Euphyes bimacula*)
Berry's Skipper (*Euphyes berryi*)
Little Metalmark (*Calephelis virginiensis*)
Arogos Skipper (*Atrytone arogos arogos*)

Surveys were conducted on four days in September and October of 2003, targeting species' preferred habitat, primarily transmission lines and forest edges, mostly around alternative 3. One little metalmark was observed in a powerline where alternatives 2 and 3 join on the north side of the project. John Fussell has also reported it from the project vicinity (Harry LeGrand, pers. comm., 2005). A survey was conducted by the NC Natural Heritage Program (NHP) staff on August 28, 2005, primarily in the powerline corridors and savannas of Croatan National Forest. They counted the following PETS species: three little metalmark, one Arogos skipper, and two Berry's skippers. NHP also has records of these three species, as well as the two-spotted skipper, within Croatan boundaries prior to this 2005 survey.

Two-spotted skippers and Berry's skippers have been found in a powerline clearing near Catfish Lake Road, 4-4.5 miles west of the proposed bypass. The hydric powerline corridors that provide habitat preferred by Berry's skipper and the two-spotted skipper occur in the project study area. Given that these species occur nearby and that suitable habitat is present, it is reasonable to assume that they occur in the study area. Alternatives 2 and 3 would affect more hydric powerline habitat than alternative 1; however, alternative 1 will cause more fragmentation, leading to potential indirect effects on these species.

The little metalmark most likely inhabits hydric powerline corridors in the project study area. As with the two skippers above, alternatives 2 and 3 would affect more hydric powerline habitat than alternative 1, however, alternative 1 will cause more fragmentation, leading to potential indirect effects.

The only site where the Arogos skipper is currently known to occur in North Carolina is in Croatan along Millis Road, about 7.4 miles south of the proposed bypass. It may occur in mesic and hydric powerline corridors as well as pine flatwoods, but requires *Calamovilfa brevipilis* (pinebarren sand-reedgrass), which has been found in at least five powerline corridors scattered in and near the project study area (John Fussell, pers. comm., 2005). Due to these occurrences of *Calamovilfa*, there may be widely scattered plants in flatwoods of the project area, and it is likely that the Arogos skipper may be in the project area, especially during the first growing season after a burn is conducted. All three alternatives will affect areas where *Calamovilfa* has been found. Proper fire management, which could be affected by the construction of the bypass, is critical for maintaining the Arogos skipper's habitat.

Dotted Skipper (*Hesperia attalus slossonae*)
The dotted skipper is unlikely to be in the project area, as its range has mostly contracted to the sandhills region (Harry LeGrand, pers. comm., 2005).

Grasshoppers
Slender-bodied Melanoplus (*Melanoplus attenuatus*)
A short-winged Melanoplus (*Melanoplus nubilus*)
Surveys were conducted on four days in September and October of 2003, targeting preferred habitat; neither species was found. The short-winged melanoplus inhabits flatwoods and savannas, while the slender-bodied melanoplus inhabits wet swales in pine woods. Since little is known about these species, and since their preferred habitat is common throughout the study area, it should be assumed that they are present and that they will be affected by any of the three bypass alternatives.

Fish
Pinewoods Shiner (*Lythrurus matutinus*)
Fish communities were sampled using nets and backpack shockers in two streams: Southwest Prong Slocum Creek and East Prong Slocum Creek. Surveys were conducted April 11-12, 2005. A total of 12 species were found, but the target fish species, the pinewoods shiner, was not. The lower coastal plain streams with dark, slow-flowing water, do not provide optimal habitat for the pinewoods shiner; it should not be affected by the proposed bypass.

Birds
Point counts were conducted March 30 and April 20-21 in the project corridors. Surveys were also conducted within the corridors in areas of preferred habitat. None of the five target PETS species were detected. Alternative 3 was determined to have the best habitat for a wide range of species. The habitat in alternative 2 was also considered excellent, especially for the mature stands of longleaf pine. Alternative 1, the outermost corridor, was determined to have the least appropriate habitat. Alternative 2 will alter some of the preferred habitat in the forest, however it will prevent extensive fragmentation within Croatan. It is important to note that even though alternative 1 has the least amount of preferred

habitat for target species, the resulting fragmentation of the forest and subsequent secondary impacts will have a greater overall negative effect. Species-specific information is below.

Henslow's Sparrow (*Ammodramus henslowii)*
In 1999, three Henslow's sparrows were seen in a power line corridor and adjacent pine flatwoods in the Southwest Prong Flatwoods Natural Area, within alternative 3. In March of 2005, an individual was seen in a power line corridor and adjacent pine flatwoods in the Southwest Prong Flatwoods Natural Area, within the corridor that is common to alternates 2 and 3 (John Fussell, pers. comm., 2005). It is assumed to be a winter resident, albeit a rare one, within Croatan. There is one breeding-season record within the Croatan National Forest from 1985, in a clearcut/young pine plantation on a moist site [Chat 50(1):27].

Currently the best (wintering) habitat for Henslow's sparrow in the project area is within some of the power line corridors and contiguous pine flatwoods within the Southwest Prong Flatwoods Natural Area that would be affected by alternative 3 or the common alternatives 2/3. Habitat also occurs within the section of Southwest Prong Flatwoods Natural Area power line corridor that will be fragmented by (i.e. lies north of) alternatives 3/2. Other good habitat lies within the power line corridor immediately adjacent to the stretch of alternative 2 that is next to FSR 3086, in the Havelock Station Natural Area. Potential habitat also is within a power line corridor adjacent to alternative 1 (near FSR 3084).

Black-necked Stilt (*Himantopus mexicanus)*
This species inhabits shallow freshwater and brackish ponds, alkaline lakes, wet meadows, open marshes, and flooded fields and pastures. In North Carolina, it is found in close proximity to coastal areas. Habitat preferred by the black-necked stilt does not exist within any of the project corridors.

Black-throated Green Warbler Wayne's Race (*Dendroica virens waynei*)
These birds might occur anywhere in the project area where there are mixtures of pines and hardwood on hydric soils. The best habitat on USFS land within the study area is 1) the western fringe of the common corridor at the north end of the project area, between US 70 and the railroad, 2) within the common corridor adjacent to and south of FSR 601, and 3) within the common corridor between Scott Road (Forest Service Road 604) and US 70. Three males were observed in this last area in April, 2001 (John Fussell, pers. comm., 2005).

Migrant Loggerhead Shrike (*Lanius ludovicianus migrans)*
The loggerhead shrike occurs in habitat characterized by short grasses, interspersed with spiny shrubs and low trees. Pastures and hay meadows with hedges or shrubs are particularly suitable. Within Croatan, there is no optimal habitat for the species in the project area. Potential habitat in the project area occurs along the borders of the power line corridors within the Southwest Prong Flatwoods Natural Area (alternatives 3 and 2/3) and along the borders of the power line corridor in the Havelock Station Natural Area (alternate 2), adjacent to FSR 3086. However, the species is unlikely to occur in the project area because its range has contracted westward in recent decades such that it now very rare or absent as far east as the project area, even in optimal habitat.

Bachman's Sparrow (*Aimophila aestivalis)*
In the Croatan National Forest, Bachman's sparrow is a fairly common summer resident and possible winter resident in the extreme southern portion of the forest, i.e. within about five miles of NC 24. It is now of rare and sporadic occurrence in the central and northern portions of the National Forest, i.e. within Jones and Craven counties, but has recently been observed four times in the general project area (John Fussell, pers. comm., 2005).

Habitat for Bachman's sparrow in the project area has become marginal due largely to an alteration of the natural fire regime. However, portions of the project area contain some of the most restorable habitat remaining within the northern/central Croatan. The areas having such potential habitat are 1) most of the Southwest Prong Flatwoods Natural Area, 2) much of the Havelock Station Natural Area (which lies adjacent to FSR 3086), and 3) areas adjacent to FSR 3085. All of the three alternatives will affect various portions of the above three areas. In terms of direct impacts, alternative 3 will be the most damaging to Bachman's sparrow habitat. Alternative 1 will have the least direct impact, while alternative 2 will have intermediate impacts. If burning frequency is reduced in lands that are fragmented by the bypass after construction is complete, then alternative 1 may ultimately have the greatest negative impact on Bachman's sparrow habitat.

Herps

American Alligator (*Alligator mississippiensis*)
Surveys were conducted March – April in the bottomland swamps along the various forks of Slocum Creek. No nighttime surveys were conducted. Alligators have been observed in Croatan National Forest (NHP data; Dennis Foster pers. comm. 2005), in the adjacent Croatan mitigation bank (ESI staff), and within the town of Havelock adjacent to Croatan National Forest (Mary Frazer, 7/05). Alligators can be assumed to be present in any of the larger creeks or swamps within the project study area, especially the Southwest Prong Slocum Creek and East Prong Slocum Creek. Both creeks will be affected by the project regardless of which alternative is selected.

Eastern Diamondback Rattlesnake (*Crotalus adamanteus*)
Southern Hognose Snake (*Heterodon simus*)
Mimic Glass Lizard (*Ophisaurus mimicus*)
Surveys were conducted on 3/29, 3/30, 4/19, 4/20, 4/21, and 6/14 of 2005. Search techniques included 1) walking the pinewoods searching in an around stump holes, push piles (logs, limbs, etc.), fallen trees, etc.; 2) peeling bark on dead pine trees and lifting fallen pine bark at the base of dead trees; 3) lifting logs, boards, trash around dumps, and raking through woody debris; and 4) driving along USFS and adjacent paved roads during early morning, late afternoon, and after dark looking for dispersing snakes. None of these three species were observed.

Eastern diamondbacks may occur in the study area because of NHP and NC Natural Sciences Museum (NCSM) records for them around and within the Croatan National Forest. An eastern diamondback was found in 1991 crossing Roberts Road (SR 1140) near the junction with Nine Mile Road (SR 1124) adjacent to Croatan National Forest property. This area was searched briefly on 4/21/05 (although it was not in the project corridor) and was found to have the best diamondback habitat seen during the surveys.

Based on survey results and records from NCSM, it is unlikely that the mimic glass lizard occurs within the project area. It is possible that the southern hognose snake occurs is present, because NCSM has records from north, east, and southwest of the project area.

Only two small areas provided the more or less, open, park-like habitat optimal for these three species within the study area, although more habitat could be created with more frequent burns. One was north of the intersection of Greenfield Blvd and Sunset Drive (FSR 613 @ Sunset Road and FSR 3087 along the powerline); this site would be directly affected by alternative 3. The other site was southeast of the interchange with SR 1756 (FSR 3085/3084 quad), where it will be affected by alternatives 1 and 3.

Herps will be able to cross under the proposed bypass in areas where extensive bridging will take place, i.e., the Southwest Prong and East Prong Slocum Creek. However, additional crossings should be considered to provide connectivity between populations and to reduce mortality.

Crustaceans

Tar River Crayfish, *(Procambarus medialis)*

North Carolina Spiny Crayfish *(Orconectes carolinensis)*

Crayfish were collected on 6/6 using dip nets and on 6/14-15, 2005 using crayfish traps in ephemeral and semi-permanent ponds. The majority of the ponds were located under the powerline and extending back into the forest, just east of FSR 613. Additional ponds were surveyed with dip nets in other areas of the project. In addition to the trapping and dip netting, crayfish that were captured during fish surveys in the Southwest Prong and East Prong Slocum Creek were examined to determine species presence. Neither the Tar River crayfish nor North Carolina spiny crayfish was captured. Croatan crayfish (*Procambarus plumimanus*) were found to be abundant, however. It is likely that the Tar River crayfish does not occur in the project study area, as it is not known to co-occur with the Croatan crayfish (John Cooper, pers. comm., 2005). Although the potential range for the North Carolina spiny crayfish includes the Havelock area, the closest NHP record is over 15 miles away; the proposed bypass will presumably not affect it.

Graceful Clam Shrimp (*Lynceus gracilicornis*)

The best habitat for this species was determined to be in ponds located off FSR 613, in the Southwest Prong Flatwoods Natural Area, which would be affected by alternative 3. Visual searches were conducted for this species on 6/6, 6/14-6/15 of 2005 in ephemeral and semi-permanent ponds. In addition, substrate was dug by hand and examined in detail. No individuals were found. NHP records indicate the graceful clam shrimp has been found within five miles of the proposed bypass on the other side of Havelock in the year 2000. Due to the ephemeral nature of the species' habitat, the nauplii hatch as soon as the pond they inhabit fills; the eggs rest in the substrate during the dry season. There is only one generation of the clam shrimp per wet season, so sampling for adults can be problematic. Due to the presence of the species within five miles of the project area, and due to the difficulty in timing the sampling event when adults are present, *Lynceus gracilicornis* could be present in ephemeral ponds in the project vicinity. This species is probably more common than is currently known by the scientific community because of its ephemeral nature and the lack of data (Barbara Taylor, pers. comm., 2005).

Mollusks

Triangle Floater, *Alasmidonta undulata*

Atlantic Pigtoe, *Fusconaia masoni*

Eastern Lampmussel, *Lampsilis radiata*

A Bivalve, *Lampsilis* species 2

Green Floater, *Lasmigona subviridus*

Creeper (formerly Squawfoot), *Strophitus undulatus*

Savannah Lilliput, *Toxolasma pullus*

It was determined, based on stream pH (5.4 in both Southwest Prong Slocum Creek and East Prong Slocum Creek) and previous mussel work in the area conducted by NCDOT and the NC Wildlife Resources Commission, that suitable habitat was not present for any PETS mussels in any of the bypass alternatives. Mussel surveys were not conducted.

Eastern Woodrat (*Neotoma florida* sp.1)

Surveys for the conspicuous nests of the Eastern woodrat were conducted on 4/20-21, 2005 in two locations where this species' preferred habitat, lowland deciduous forests with a palmetto understory, was observed. Only one of these sites was in the project study area, located at the western end of Gray Road, between alternatives 2 and 3. No nests or woodrats were found. NHP has a 1991 record of *Neotoma floridana floridana* located 16 miles from the study area; this is the closest record. It is assumed that the woodrat is not present in the study area.

If you have any questions or need additional information please call Mary Frazer at (919) 715-1419.

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

Matt - I may have sent you this FSL report already - this is a corrected version. - M

June 9, 2005

Memorandum To: Mary Frazer
Natural Environment Biological Survey Group

From: Neil Medlin NM
Natural Environment Biological Survey Group

Subject: Fisheries surveys associated with the Havelock By-pass, TIP No. R-1015.

Background

Fisheries surveys were conducted for this project as part of the overall surveys for US Forest Service Protected, Endangered and Threatened Species (PETS) list of species. The specific fish species of concern was the pinewoods shiner, *Lythrurus matutinus*, which is known from the Neuse River Basin.

Survey Location and Methods

Fish communities were sampled from two streams, Southwest Prong Slocum Creek and East Prong Slocum Creek. The Southwest Prong collection location was off of SR 1747 and the collection location on the East Prong was immediately above the railroad tracks near SR 1734.

The fish surveys were conducted by using two Smith-Root model LR-24 backpack electrofishing units to stun the fish, which were then collected with dip nets and temporarily placed in 5-gallon buckets. All available habitat types, flow regimes, and water depths were sampled. With the exception of two voucher specimens, all fish were identified and released onsite.

Physical water chemistry parameters were measured at both fish collection sites using a YSI Model 85 multiparameter field meter.

Results and Discussion

Physical water chemistry measurements were typical of lower coastal plain swamp stream systems. The results are presented in Table 1.

MAILING ADDRESS:
NC DEPARTMENT OF TRANSPORTATION
PROJECT DEVELOPMENT AND ENVIRONMENTAL ANALYSIS
1548 MAIL SERVICE CENTER
RALEIGH NC 27699-1548

TELEPHONE: 919-733-3141
FAX: 919-733-9794

WEBSITE: WWW.DOH.DOT.STATE.NC.US

LOCATION:
TRANSPORTATION BUILDING
1 SOUTH WILMINGTON STREET
RALEIGH NC

Table 1. Physical Water Chemistry for Southwest Prong Slocum Creek and East Prong Slocum Creek, April 2005, Craven County.

Parameter	Southwest Pr.	East Pr.
Temperature (°C)	20.7	14.5
Dissolved Oxygen (mg/l)	7.4	5.0
Conductivity (umhos/cm^2)	65	40
PH	5.4	5.4

The habitat in Southwest Prong Slocum Creek was variable with a large open impoundment above a series of beaver dams and a single channel below the dams. The open portions of the impoundment were dominated by submerged aquatic vegetation while the wooded areas at the dams and the channel below lacked the vegetation. The habitat pattern was reversed in the East Prong Slocum Creek location, with a single channel present at the railroad crossing and beaver dams and impoundments upstream.

The dark-water, slow flowing, lower coastal plain streams potentially affected by this project do not provide appropriate habitat for the pinewoods shiner. The completion of this project will not affect this species. Fish species that were collected in the project area are presented below in Table 2.

Table 2. Fish Species and Relative Abundance for Southwest Prong Slocum Creek and East Prong Slocum Creek, April 2005, Craven County

Species	Southwest Pr.	East Pr.
Bowfin, *Amia calva*		Rare
American eel, *Anguilla rostrata*	Abundant	Abundant
Eastern mosquitofish, *Gambusia holbrooki*	Abundant	Rare
Creek chubsucker, *Erimyzon oblongus*	Rare	Rare
Redfin pickerel, *Esox americanus*	Common	Common
Pirate perch, *Aphredoderus sayanus*	Common	Abundant
Bluespotted sunfish, *Enneacanthus gloriosus*	Rare	Rare
Pumpkinseed, *Lepomis gibbosus*	Common	Common
Flier, *Centrarchus macropterus*	Common	Common
Bluegill, *Lepomis macrochirus*	Abundant	Rare
Warmouth, *Lepomis gulosus*	Rare	Rare
Mud sunfish, *Acantharchus pomotis*		Common

NORTH CAROLINA NATURAL HERITAGE PROGRAM SPECIAL ANIMAL SURVEY FORM

Scientific Name : *Procambarus (Ortmannicus) plumimanus*

Common Name: Croatan Crayfish

Observer(s): Jason W. Mays (NCDOT)

Date(s) of Observation: 6, 14,15 June 2005

County: Craven 7.5'

Quad Map: Havelock

Exact Location (**be specific! – attach copy of map with site marked**):
NC: Craven County, ~1 mi west of the town of Havelock, Croatan National Forest. The site is located off of Forest Road (FR) 613. Access to 613 is off of Sunset Road (aka. Dogwood Road *Delorme*). Pools are located along the east side of the FR partially under ~~under~~ the powerline cuts and extending back into the woods. N 34.90693 W 76.94454

Number of Animals (**include age and sex, if known**):
7 adult male, 4 adult female

Type of Observation (**sight record, vocal record, specimen, photograph, etc.**):
Specimens collected in traps, vouchers held at NC Museum

Behavior of Animals (**singing, foraging, at nest, etc.**):
Foraging in open water

Habitat (**use NC NHP natural community name if known; describe dominant vegetation, maturity of vegetation, slope, aspect, etc.**): Specimens were collected from ephemeral and semi-permanent pools in swamp forest depressions of the Croatan National Forest. Pools are located at the edge of disturbance caused by the road and powerline cut. Pools are approximately .10-.25 acre in area and extend back into the natural forested area. Area dominated by pines with a moderately dense shrub layer.

Owner(s) of Land, if known:
Croatan National Forest

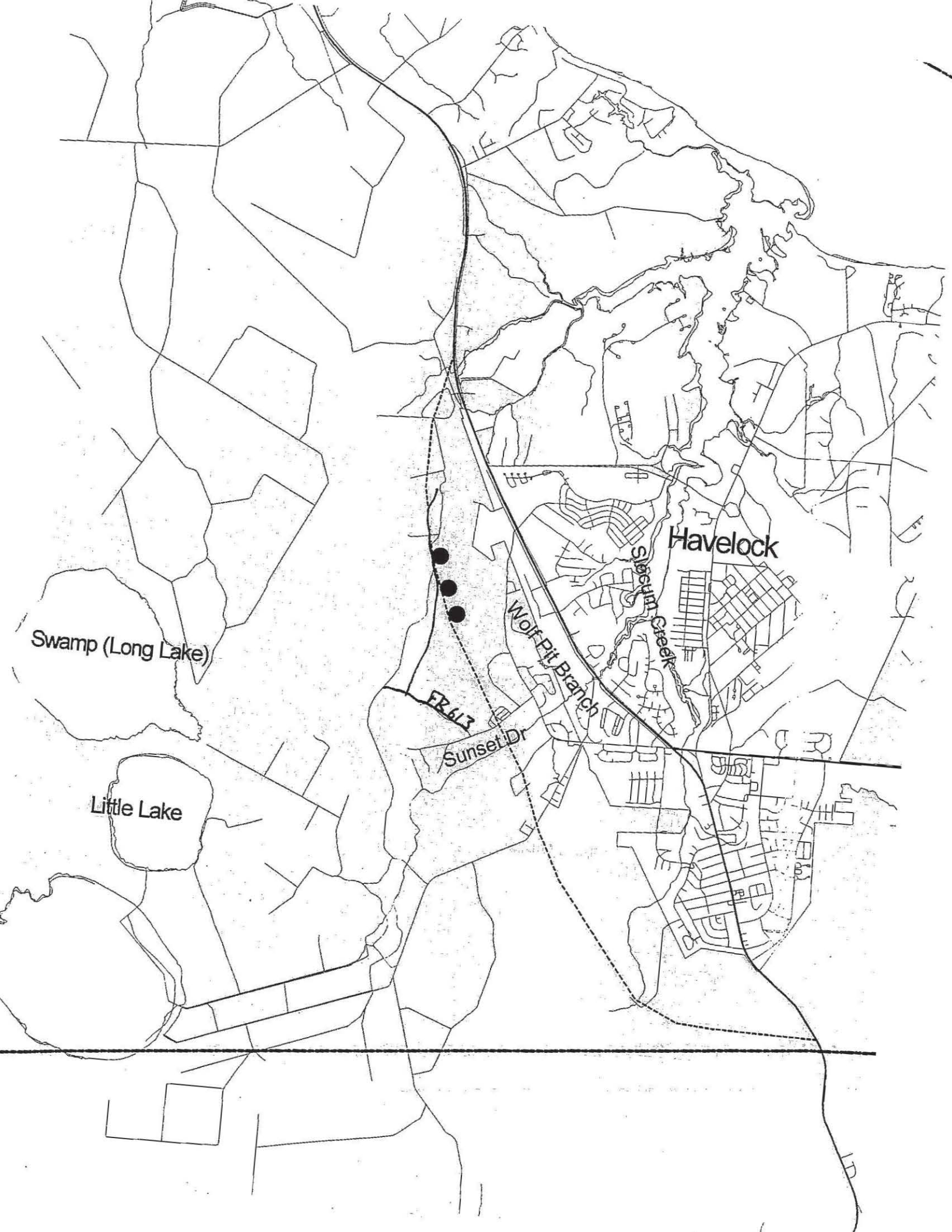
Other Comments (**significance of record, disturbance to habitat, etc.**):

Person making this report: Jason W. Mays
Address: 1324 Takeaway Place, Morrisville, NC 27650

Date: 29 June 2005

Phone: 919-270-9213

Return form to: N.C. Natural Heritage Program; Office of Conservation and Community Affairs
MSC 1601; Raleigh, NC 27699-1601

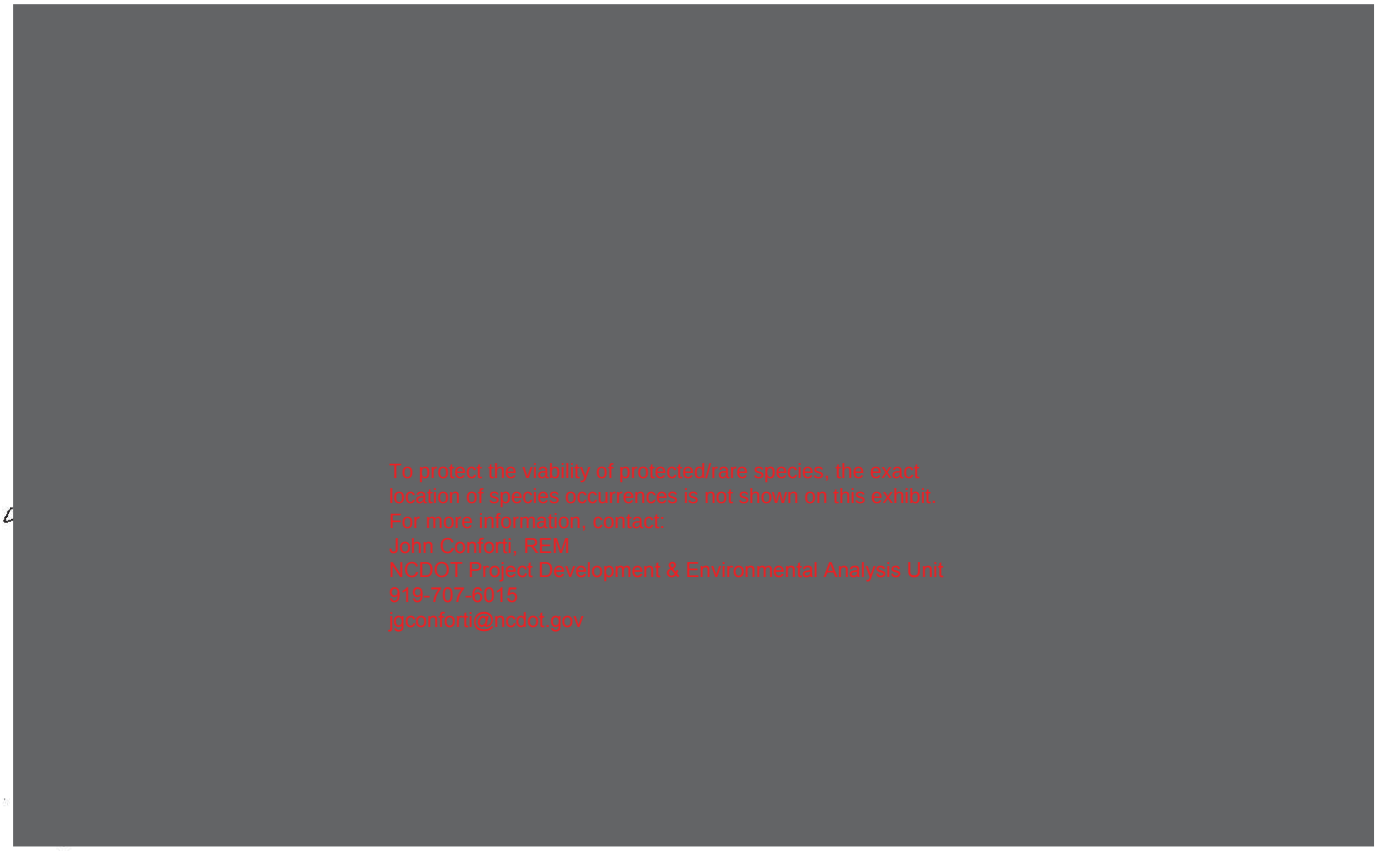

Havelock
Swamp (Long Lake)
Little Lake
Wolf Pit Branch
Slocum Creek
SR 1613
Sunset Dr

Subject: Calamovilfa brevipilis
Date: Wed, 23 Nov 2005 14:47:28 -0500
From: "John Fussell" <jfuss@clis.com>
To: "Mary E. Frazer" <MEFrazer@dot.state.nc.us>

Mary,

Here's what I have.

John Fussell



R-1015: U.S. 70 / Havelock By-pass
Croatan National Forest PETS Surveys

Reptile & Amphibian Observation List (2005)

29 March

1. **Catfish Lake Road** (DWH, LW, KL, MS, RB, CD, DR, MF, EA, AB)

Florida Cooter	*Pseudemys floridana floridana*	8
Yellowbelly Slider	*Trachemys scripta scripta*	3

2. **East side of Catfish Lake (lunch break) along FSR 158 (.3 mi NW jct. Catfish Lake Rd.)** (DWH, LW, KL, MS, RB, CD, DR, MF, EA, AB)

Northern Black Racer	*Coluber constrictor constrictor*	1
Scarlet Kingsnake	*Lampropeltis triangulum elapsoides*	1
Green Anole	*Anolis carolinensis*	1

3. **Along powerline E Little Road, .1 mi SE jct. Catfish Lake Road** (DWH, LW, KL, MS, NM, JG, JM, RB, CD, DR, MF, EA, AB)

Little Grass Frog	*Pseudacris ocularis*	1

4. **★FSR 613 @ Sunset Road** (DWH, MF, MS, NM. JG)

Northern Black Racer	*Coluber constrictor constrictor*	1
Green Anole	*Anolis carolinensis*	1
Ground Skink	*Scincella lateralis*	1

5. **FSR 3086, ca. 1 mile ESE Lake Road (SR 1756)** (DWH & MS)

Southeastern Five-lined Skink	*Eumeces inexpectatus*	1
Green Anole	*Anolis carolinensis*	2
Atlantic Coast Slimy Salamander	*Plethodon chlorobryonis*	1

30 March

1. **★FSR 3087 along powerline (north of FSR 613 where powerline splits) near horse farm/cell tower road** (DWH, MS, John Fussel)

Northern Black Racer	*Coluber constrictor constrictor*	3
Atlantic Coast Slimy Salamander	*Plethodon chlorobryonis*	1

2. **★FSR 604 off Creek Road near electric substation & powerline** (DWH, MS, John Fussel)

Little Grass Frog	*Pseudacris ocularis*	1

19 April

1. **★FSR 613 @ Sunset Road quad (including big hill)** (DWH & Jerry H. Reynolds)

Corn Snake	*Elaphe guttata guttata*	1
Green Anole	*Anolis carolinensis*	5
Southeastern Five-lined Skink	*Eumeces inexpectatus*	7

2. **★FSR 3087 quad (above powerline split); West of powerline** (DWH & JHR)

Eastern Hognose Snake	*Heterodon platirhinos*	1
Scarlet Kingsnake	*Lampropeltis triangulum elapsoides*	1
SE Five-lined Skink	*Eumeces inexpectatus*	5

3. **★FSR 3087 quad (above powerline split); East of powerline** (DWH, JHR, & MS)

Corn Snake	Elaphe guttata guttata	1
Northern Black Racer	*Coluber constrictor constrictor*	1

4. **Brice Road @ Brice Creek** (DWH, JHR, & MS)

Bullfrog	*Rana catesbeiana*	4

20 April

1. **FSR 604/Substation/Powerline quad** (DWH, JHR, & MS)

Eastern Box Turtle	*Terrapene carolina carolina*	1
Atlantic Coast Slimy Salamander	*Plethodon chlorobryonis*	1

2. **★FSR 3085/3084 quad; SSE Lake Road (SR 1756)** (DWH, JHR, & MS)

Corn Snake	*Elaphe guttata guttata*	3
Pinewoods Snake	*Rhadinaea flavilata*	1
Eastern Worm Snake	*Carphophis amoenus amoenus*	1
Southern Copperhead	*Agkistrodon contortrix contortrix*	1
Green Anole	*Anolis carolinensis*	5
SE Five-lined Skink	*Eumeces inexpectatus*	9
Ground Skink	*Scincella lateralis*	3
Southern Cricket Frog	*Pseuadacris gryllus gryllus*	5
Atlantic Coast Slimy Salamander	*Plethodon chlorobryonis*	1
Green Treefrog	*Hyla cinerea*	1
Pinewoods Treefrog	*Hyla femoralis*	3
Squirrel Treefrog	*Hyla squirella*	1
Southern Toad	*Bufo terrestris*	1

3. **★Horse Farm/Cell Tower quad**(DWH, JHR, MS, & Jeff Hall)

Eastern Worm Snake	*Carphophis amoenus amoenus*	1
SE Five-lined Skink	*Eumeces inexpectatus*	3
Atlantic Coast Slimy Salamander	*Plethodon chlorobryonis*	1

4. **Millis Road** (DWH, JHR, MS, & Jeff Hall)

Rough Green Snake	*Opheodrys aestivus*	1
Eastern Box Turtle	*Terrapene carolina carolina*	1

21 April

5. **Gray Road quad** (DWH, JHR, & MS)

Southern Ringneck Snake	*Diadophis punctatus punctatus*	1
SE Five-lined Skink	*Eumeces inexpectatus*	4
Green Anole	*Anolis carolinensis*	2
Chamberlain's Dwarf Salamander	*Eurycea chamberlaini*	1
Atlantic Coast Slimy Salamander	*Plethodon chlorobryonis*	1
Gray Treefrog	*Hyla chrysoscelis*	1

6. **★Roberts Road (SR 1140) @ jct. Nine Mile Road (SR 1124) quad** (DWH & JHR)

Northern Black Racer	*Coluber constrictor constrictor*	1
Green Anole	*Anolis carolinensis*	3
SE Five-lined Skink	*Eumeces inexpectatus*	3

14 June

1. **★FSR 3087 along powerline (north of FSR 613 where powerline splits) near horse farm/cell tower road**

Southern Toad	*Bufo terrestris*
Southern Leopard Frog	*Rana utricularia*

2. **Trail to Southwest Prong Slocum Creek off Sunset Road (across from FSR 613 gate)**

Eastern Box Turtle	*Terrapene carolina carolina*
Southern Leopard Frog	*Rana utricularia*

3. **Greenfield Heights Boulevard and Southwest Prong Slocum Creek bridge**

Eastern Box Turtle (nesting)	*Terrapene carolina carolina*

4. **Millis Road**

Pinewoods Treefrog	*Hyla femoralis*
Southern Leopard Frog	*Rana utricularia*

★ Indicates the sites that have the best potential for the eastern diamondback rattlesnake, southern hognose, and mimic glass lizard.

Checklist of Reptiles & Amphibians Observed in Croatan National Forest
(Craven & Carteret counties)
2005

Class Amphibia

Order Caudata

Family Plethodontidae

Eurycea chamberlaini	Chamberlain's Dwarf Salamander
Plethodon chlorobryonis	Atlantic Coast Slimy Salamander

Order Anura

Family Bufonidae

Bufo terrestris	Southern Toad

Family Hylidae

Acris gryllus gryllus	Southern Cricket Frog
Pseudacris ocularis	Little Grass Frog
Hyla chrysoscelis	Gray Treefrog
Hyla cinerea	Green Treefrog
Hyla femoralis	Pinewoods Treefrog
Hyla squirella	Squirrel Treefrog

Family Ranidae

Rana catesbeiana	Bullfrog
Rana utricularia	Southern Leopard Frog

Class Reptilia

Order Squamata (Suborder Serpentes)

Family Colubridae

Carphophis amoenus amoenus	Eastern Worm Snake
Coluber constrictor constrictor	Northern Black Racer
Diadophis punctatus punctatus	Southern Ringneck Snake
Elaphe guttata guttata	Corn Snake
Heterodon platirhinos	Eastern Hognose Snake
Lampropeltis triangulum elapsoides	Scarlet Kingsnake
Opheodrys aestivus	Rough Green Snake
Rhadinaea flavilata	Pinewoods Snake

Family Viperidae (Subfamily Crotalinae)

Agkistrodon contortrix contortrix	Southern Copperhead

Order Squamata (Suborder Lacertilia)

Family Polychridae

Anolis carolinensis	Green Anole

Family Scincidae

Eumeces inexpectatus	Southeastern Five-lined Skink
Scincella lateralis	Ground Skink

Order Testudines

Family Emydidae

Pseudemys floridana floridana	Florida Cooter
Trachemys scripta scripta	Yellowbelly slider
Terrapene carolina carolina	Eastern Box Turtle

Results of Herp Surveys

American Alligator (*Alligator mississippiensis*) - Surveys were conducted March – April in the bottomland swamps along the various forks of Slocum Creek. No night time surveys were conducted. Alligators have been observed in Croatan National Forest (NHP data; Dennis Foster pers. comm. 2005), in the adjacent Croatan mitigation bank (ESI staff), and in Havelock adjacent to Croatan National Forest (M. Frazer, 7/26/05). Alligators can be assumed to be present in any of the larger creeks or swamps within the project study area, especially the Southwest Prong Slocum Creek and East Prong Slocum Creek.

Eastern diamondback rattlesnake (*Crotalus adamanteus*), Southern hognose snake (*Heterodon simus*), and the mimic glass lizard (*Ophisaurus mimicus*) – surveys were conducted on 3/29/05, 3/30/05, 4/19/05, 4/20/05, 4/21/05, and 6/14/05. Search techniques included 1) walking the pinewoods searching in an around stump holes, push piles (logs, limbs, etc.), fallen trees, etc.; 2) peeling bark on dead pine trees and lifting fallen pine bark at the base of dead trees; 3) lifting logs, boards, trash around dumps, and raking through woody debris; and 4) driving along USF and adjacent paved roads during early morning, late afternoon, and after dark looking for dispersing snakes. None of these species were observed, but they may likely occur in study area because of NC State Museum and NHP records for them around and within the Croatan National Forest. An eastern diamondback was found in 1991 crossing Roberts Road (SR 1140) near the junction with Nine Mile Road (SR 1124) adjacent to Croatan National Forest property. This area was searched briefly on 4/21/05 (although it was not in the project corridor) and was found to have the best diamondback habitat seen during the surveys.

Eastern Woodrat (*Neotoma florida* sp.1) - surveys for the woodrat nests were conducted on 4/20/05 & 4/21/05 in two locations where palmetto was observed. Only one of these sites was in the project corridor. No nests or woodrats were found. (No NHP records of this spp.?) It is assumed that the woodrat is not present in the study area.

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

November 29, 2005

Memorandum to: Mary Frazer, Natural Environment Unit

From: Mike Sanderson, Natural Environment Unit

Subject: R-1015 Havelock Bypass PETS
Bird Surveys in the Croatan National Forest
Craven County, NC

Five species of birds listed as protected, endangered, threatened or sensitive, which occur in the Croatan National Forest, were requested to be surveyed by the US Forest Service. This memo addresses these five species in context of the proposed Havelock Bypass, R-1015.

Methods

Using a combination of aerial photographs, topographic maps, and on the ground analysis, the project area was examined to find the best potential habitat for the target species. Corridor number 3, the preferred corridor, was determined to have the best habitat for a wide range of species. The habitat in corridor 2 was also considered excellent, especially for the mature stands of Longleaf Pine (*Pinus palustris*). Corridor 1, the outermost corridor, was determined to have the least appropriate habitat for target species.

Following "A Land Manager's guide to Point Counts of Birds in the Southeast" (Hamel et al, 1996), point counts were conducted March 30 and April 20-21 in the project corridors. Surveys were also conducted by walking along the project corridors in areas of preferred habitat and birding in those areas. Species were detected by sight and by vocalizations. Approximately 42 person/hours were spent on surveys.

In addition to fieldwork in the spring of 2005, historical data provided by John Fussell and other experts has been used in the preparation of this document.

Henslow's Sparrow (*Ammodramus henslowii)* Federal Species of Concern

Habitat: Breeding habitat can be described as relatively large open fields and other similarly open habitats with tall, dense grass and little or no woody vegetation. Typical winter habitat is extensive, open, moist to wet pine flatwoods (pine savanna) or other similarly open, moist to wet areas having dense herbaceous cover, such as some

MAILING ADDRESS:
NC DEPARTMENT OF TRANSPORTATION
PROJECT DEVELOPMENT AND ENVIRONMENTAL ANALYSIS
1548 MAIL SERVICE CENTER
RALEIGH NC 27699-1548

TELEPHONE: 919-733-3141
FAX: 919-733-9794

WEBSITE: WWW.DOH.DOT.STATE.NC.US

LOCATION:
TRANSPORTATION BUILDING
1 SOUTH WILMINGTON STREET
RALEIGH NC

abandoned fields and some clearcuts. In some areas (Carter 1993), power line corridors that are contiguous with pine flatwoods may be important as winter habitat.

This secretive species occurs within the Croatan National Forest primarily as a very local winter resident. Judging its abundance in winter is difficult, because of its secretive nature, but it is apparently rare. To date, it has been observed at only two locations within the Croatan in the overwintering period —the Millis Road Savanna in Carteret County, and in power line corridors and contiguous flatwoods in the Southwest Prong Flatwoods Natural Area. There is also one breeding-season record (1985) within the Croatan National Forest [Chat 50(1):27]. That record of a single territorial male was in a clearcut/young pine plantation on a moist site.

Henslow's Sparrows have been observed in the project area during two different winters. In 1999, three individuals were seen in a power line corridor and adjacent pine flatwoods in the Southwest Prong Flatwoods Natural Area on 23 & 27 February, by John Fussell, Susan Arrington, and Ray Winstead [Chat 63 (3):152]. The locations of these observations were within Corridor 3. In 2005, a single individual was seen in a power line corridor and adjacent pine flatwoods in the Southwest Prong Flatwoods Natural Area on 14 & 24 March by John Fussell, Paul Spitzer, and Nan Bowles. The locations of these observations lie within the corridor that is common to Alternatives 2 and 3.

Currently the best wintering habitat for the species in the project area that is within the alignments of proposed corridors occurs in the power line corridors and contiguous pine flatwoods located within the Southwest Prong Flatwoods Natural Areas. These sections of power line corridors lie within corridor 3 or the common corridor alternative 2/3. Habitat of similar quality also exists within the section of Southwest Prong Flatwoods Natural Area power line corridor that will be fragmented by Alternatives 3/2. Other similarly good quality habitat lies within the power line corridor immediately adjacent to the alternative 2 corridor next to FSR 3086—Havelock Station Natural Area. Potential habitat also occurs within the power line corridor adjacent to Corridor 1 near FSR 3084.

Bachman's Sparrow: (*Aimophila aestivalis)* Federal Species of Concern

Habitat: Primarily open-canopied pine woods with little or no understory/shrub vegetation but having a well-developed herbaceous ground layer. In portions of the range, may also occupy overgrown weedy fields, pastures, and clearcuts. However, in the Croatan National Forest and nearby areas, Bachman's sparrow has not been found to occur in the latter types of habitats.

In the Croatan National Forest, the Bachman's Sparrow is a fairly common summer resident in suitable habitat in the extreme southern portion of the forest, i.e. within about five miles of NC 24. In this same area, it may overwinter sporadically. Overwintering is most likely at sites that have been burned over during the previous year, especially if the burn was during the growing season. Such burns are more likely to produce abundant wiregrass seeds, which are known to be an important food source for the sparrow in winter.

Bachman's Sparrows are now of rare and sporadic occurrence in the central and northern portions of the National Forest, i.e. within Jones and Craven counties. However, it is likely that the species was formerly a common summer resident in these areas. For instance, Brown (1929) said of this species "found rather commonly between Havelock and Lake Ellis during late June, July, and early August." Furthermore, Pearson et al. (1942) state that in the "pinelands of Craven and Brunswick, we have often found it after a little search." The current scarcity of the species in the central and northern Croatan is likely related to the reduction in fire frequency during the 20th Century as well as other factors. Fire suppression has had a more dramatic impact on altering vegetation structure on the loam soils common in the north and central Croatan as compared to the sand soils which are more common in the south Croatan (see Frost 1996).

Bachman's sparrow has recently been observed four times in the general project area. 1) On 2 April & 12 April 2002 John Fussell observed a singing male adjacent to FSR 3085, near the intersection of FSR 3085 and FSR 3084. This site is within the corridor for Alternative1/Alternative 3. 2) On 11 April 2002, Fussell observed a singing male within the Southwest Prong Flatwoods Natural Area, near the intersection of the two power lines, near FSR 3087. This site is within the corridor of Alternative 3, and is immediately adjacent to the corridor of Alternative 2. 3) On 11 April 2002, Fussell observed a singing male within the Southwest Prong Flatwoods Natural Area, adjacent to FSR 3087. This site is adjacent to the corridor of Alternative 3. 4) On 17 February & 10 March 2005, Charles Thomas and John Fussell found a Bachman's sparrow adjacent to the intersection of FSR 3085 and FSR 3086. This bird responded to a tape recording of the species' song. Its presence in winter was likely due to the fact that the site was burned over during the previous year. This site lies near Alternative 2.

As is generally the case for the northern/central Croatan National Forest, the project area is an area where habitat for the Bachman's Sparrow has become marginal due largely to an alteration of the natural fire regime during the last half of the 20th Century. However, portions of the project area contain some of the most restorable habitat remaining within the northern/central Croatan. The areas having such potential habitat are 1) most of the Southwest Prong Flatwoods Natural Area, 2) much of the Havelock Station Natural Area (which lies adjacent to FSR 3086), and 3) areas adjacent to FSR 3085.

All of the three alternative corridors will include various portions of the above three areas. In terms of direct impacts, Alternative 3 will be the most damaging to Bachman's Sparrow habitat. Alternative 1, the westernmost; will have the least direct impact. Alternative 2, the easternmost, will have intermediate impacts.

In terms of indirect impacts, a major question is whether or not the introduction of a bypass will lead to a reduction in burning frequency/efficiency in those lands that are fragmented by the bypass. If that is the case, than Alternative 1 may ultimately have the greatest negative impact on Bachman's Sparrow habitat.

Black-necked stilt (*Himantopus mexicanus)*

Habitat: Inhabits shallow freshwater and brackish ponds, alkaline lakes, wet meadows, open marshes, and flooded fields and pastures. In North Carolina, this species is found in close proximity to coastal areas. Commonly associates with other shorebirds, especially avocets, godwits, and curlews.

Typical habitat for the black-necked stilt does not exist within any of the project corridors.

Black-throated green warbler – Wayne's Race (*Dendroica virens waynei*)

Habitat: Found in forested wetlands that occur on interstream flats or in the uppermost portions of streams. Generally shuns riverine situations. Associated with hardwoods, especially where having a component of mature conifers (may be white cedar, baldcypress, or pines). These birds might occur anywhere in the project area where there are mixtures of pines (mostly pond and loblolly) and hardwoods lying on hydric soils.

The best habitat on Forest Service land lying within actual corridors is 1) the western fringe of the common corridor at the north end of the project area, between US 70 and the Atlantic and East Carolina Railroad, 2) within the common corridor adjacent to and S of FSR 601; 3) within the common corridor between Scott Road (FSR 604) and US 70. Within a portion of the last area, John Fussell observed 3 singing males on 7 & 8 April 2001.

We did not detect black-throated green warblers during our 2005 surveys.

Migrant loggerhead shrike: (*Lanius ludovicianus migrans)*

Habitat: The loggerhead shrike occurs in habitat characterized by short grasses, interspersed with spiny shrubs and low trees. Pastures and hay meadows with hedges or shrubs are particularly suitable. Shrubs and trees are required for nesting and perching as well as for sites on which to impale their prey, which ranges from ants and spiders to small birds and mammals.

On Croatan National Forest land, there is no optimal habitat for the species in the project area. The best habitat in the project area is probably along the borders of the power line corridors that lie within the Southwest Prong Flatwoods Natural Area (alternatives 3 and 2/3) and along the borders of the power line corridor in the Havelock Station Natural Area (alternative 2), adjacent to FSR 3086. However, the species is currently very unlikely to occur in the project area because its range has contracted westward in recent decades such that it now very rare or absent as far east as the project area, even in optimal habitat.

Bird species detected as present during surveys of proposed Havelock bypass in Croatan National Forest: Surveys conducted on March 30, April 20-21, 2005.

Wood Duck	*Aix sponsa*
Hooded Merganser	*Lophodytes cucullatus*
Northern bobwhite	*Colonis virginianis*
Great Blue Heron	*Ardea herodias*
Great Egret	*Ardea alba*
Snowy Egret	*Egretta thula*
Little Blue Heron	*Egretta caerulea*
Black vulture	*Coragyps atratus*
Turkey vulture	*Cathartes aura*
Osprey	*Pandion haliaetus*
Red-shouldered Hawk	*Buteo lineatus*
Red-tailed Hawk	*Buteo jamaicensis*
Killdeer	*Charadrius vociferus*
Spotted sandpiper	*Actitis macularius*
Ring-billed gull	*Larus delawarensis*
Rock Pigeon	*Columba livia*
Mourning Dove	*Zenaida macroura*
Barred Owl	*Strix varia*
Chuck-will's-widow	*Caprimulgus carolinensis*
Whip-poor-will	*Caprimulgus vociferus*
Chimney Swift	*Chaetura pelagica*
Ruby-Throated Hummingbird	*Archilochus colubris*
Belted Kingfisher	*Ceryle alcyon*
Red-headed Woodpecker	*Melanerpes erythrocephalus*
Red-bellied Woodpecker	*Melanerpes carolinus*
Downy Woodpecker	*Picoides pubescens*
Hairy Woodpecker	*Picoides villosus*
Red-cockaded Woodpecker*	***Picoides borealis***
Northern Flicker	*Colaptes auratus*
Pileated Woodpecker	*Dryocopus pileatus*
Acadian Flycatcher	*Empidonax virescens*
Eastern Kingbird	*Tyrannus tyrannus*
White Eyed Vireo	*Vireo griseus*
Blue-Headed Vireo	*Vireo solitarius*
Red-eyed Vireo	*Vireo olivaceus*
Blue Jay	*Cyanocitta cristata*
American Crow	*Corvus brachyrhynchos*
Fish Crow	*Corvus ossifragus*
Purple Martin	*Progne subis*
Tree Swallow	*Tachycineta bicolor*
Barn Swallow	*Hirundo rustica*
Carolina Chickadee	*Poecile carolinensis*

Tufted titmouse	*Baeolophus bicolor*
Red-breasted Nuthatch	*Sitta canadensis*
White-breasted Nuthatch	*Sitta Carolinensis*
Brown-headed Nuthatch	*Sitta pusilla*
Carolina Wren	*Thryothorus ludovicainus*
House Wren	*Troglodytes aedon*
Ruby-crowned Kinglet	*Regulus Calendula*
Blue-gray Gnatcatcher	*Polioptila caerulea*
Eastern bluebird	*Sialia sialis*
Hermit Thrush	*Catharus guttatus*
Wood Thrush	*Hylochchla mustelina*
American Robin	*Turdus migratorius*
Gray Catbird	*Dumetella carolinensis*
Northern Mockingbird	*Mimus polyglottos*
Brown Thrasher	*Toxostoma rufum*
European Starling	*Sturnus vularis*
Northern Parula	*Parula americana*
Yellow-rumped Warbler	*Dendroica coronata*
Yellow-throated Warbler	*Dendroica dominica*
Pine Warbler	*Dendroica pinus*
Prairie Warbler	*Dendroica discolor*
Black and White Warbler	*Mniotilta varia*
Prothonotary Warbler	*Prothonitaria citrea*
Worm-eating Warbler	*Helminteros vermivorum*
Swainson's Warbler	*Limnothlypis swainsonii*
Ovenbird	*Seirus aurocapilla*
Common Yellowthroat	*Geothlypis trichas*
Hooded Warbler	*Wilsonia citrina*
Yellow-breasted Chat	*Icteria virens*
Summer Tanager	*Piranga rubra*
Eastern Towhee	*Pipilo erythrophthalmus*
Swamp Sparrow	*Melospiza georgiana*
Northern Cardinal	*Cardinalis cardinalis*
Common Grackle	*Quiscalus quiscula*
Brown-headed Cowbird	*Molothrus ater*
American Goldfinch	*Carduelis tristis*

* The Federally Endangered Red-cockaded Woodpecker was found foraging in the preferred corridor on 30 March, 2005 by Mike Sanderson, Dennis Herman and John Fussell.

Note: This list is not intended to represent the entire species list one might encounter in the Croatan National Forest. Rather, it is an indication of the diversity and complexity of the habitats encountered along the proposed corridors during a seasonal snapshot of surveys. The spring of 2005 was considered by many to be "late." Therefore many species which would otherwise be easily detectable may not have arrived on the breeding grounds at the time of the surveys.

Discussion

Some of the species detected or known to be found in the Croatan National Forest are considered to be in decline (Rich et al. 2004). The primary cause of decline in these species is loss of habitat through alteration and fragmentation.
Additional fragmentation of habitat in the Croatan National forest caused by the development of the Havelock bypass is expected to have a negative effect on several bird species of conservation concern. The option that causes the least fragmentation (alternative corridor 2) will alter some of the preferred habitat in the forest, however it will prevent extensive separation of habitat from the interior of the Croatan. It is important to note from an ecological perspective, that even though alternative corridor 1 has the least amount of preferred habitat for target species, the resulting fragmentation of the forest and subsequent secondary impacts will have a greater negative effect on these species.

John Fussell provided extensive comments and expertise in the preparation of this document. Mr. Fussell also assisted with field research in the spring of 2005.

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ATTACHMENT 3

Results of Bat Surveys Conducted in the Vicinity of the Proposed Havelock Bypass

Prepared for:
Environmental Services, Inc.
524 South New Hope Road
Raleigh, 27610

Submitted 19 May 2006

Prepared by
Mary K. Clark, Moonlight Environmental Consulting
1612 Bayleaf Trail, Raleigh, NC 27614
mkclark141@aol.com; 919-848-8117

Results of Bat Surveys Conducted in the Vicinity of the Proposed Havelock Bypass

Mary K. Clark, Moonlight Environmental Consulting
1612 Bayleaf Trail, Raleigh, NC 27614
mkclark141@aol.com; 919-848-8117

INTRODUCTION

Moonlight Environmental Consulting was contracted by Environmental Services, Inc. (ESI, 524 South New Hope Road, Raleigh, NC 27610) to conduct a habitat assessment and mist-net survey to assist with detection of protected and endangered bats in the vicinity of the Havelock Bypass proposed by the N. C. Department of Transportation. This report summarizes the methods and results of efforts conducted for that purpose.

Three federally protected bats are known from western North Carolina: Indiana bat, gray bat and Virginia big-eared bat (*Myotis sodalis, M. grisescens,* and *Corynornhinus townsendii virginianus*). No federally endangered or threatened bat species are known from the Coastal Plain of the state; however, two species are in categories of concern and protected by North Carolina native wildlife legislation. Rafinesque's big-eared bat (*Corynorhinus rafinesquii*) is state threatened and the southeastern bat (*Myotis austroriparius)* is a species of concern. Additionally, each of these species has a "sensitive" designation within the USDA Forest Service.

It was deemed that the state-threatened status of Rafinesque's big-eared bat warranted survey for that species in the proposed bypass area. The specific contract request was to survey sites that represented the best habitat for the species in the bypass proposal area in order to determine presence/absence of Rafinesque's big-eared bat.

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STUDY AREA

The proposal to create a bypass around the city of Havelock includes alternative routes that are all primarily within Craven County. Fourteen communities in the Havelock Bypass proposal area were identified in the materials provided by ESI (Table 1).

METHODS

Habitat Assessment

Topographic and aerial maps showing the bypass options as well as detailed descriptions of the community types within the proposed bypass areas were provided by ESI in spring of 2005. A tour of the survey area was conducted in spring 2005 to view sites and to begin to make assessments of the habitat potential for Rafinesque's big-eared bat. The community descriptions and site visit were used in combination to determine the likelihood of occurrence of this species in each of the community types (Table 1).

Table 1. Likelihood of occurrence of Rafinesque's big-eared bat in the 14 communities within the proposed Havelock bypass options in Carven County, NC.

Code	Community Label	Occurrence likelihood	Comment
M	Rural/Urban Modifications	Not expected	Open, lacks roost potential
P	Pond	Not expected	Open, lacks roost potential
PCh	Powerline Corridor, hydric	Not expected	Open, lacks roost potential
PCm	Powerline Corridor, mesic	Not expected	Lacks roost potential
PFh	Pine Flatwoods, hydric	Not expected	Lacks roost potential
PFm	Pine Flatwoods, mesic	Not expected	Lacks roost potential
PH	Pine Hardwoods	Not expected	Lacks roost potential
PPh	Pine Plantation, hydric	Not expected	Lacks roost potential
PPm	Pine Plantation, mesic	Not expected	Lacks roost potential
SFl	Swamp Forest, large stream	Possible	Potential for roost habitat
SFp	Swamp Forest, ponded depressional	Possible	Potential for roost habitat
SFs	Swamp Forest, small stream	Possible	Potential for roost habitat
SPs	Streamhead Pocosin,shrubdominated	Not expected	Lacks roost potential
SPt	Streamhead Pocosin, tree-dominated	Possible	Potential for roost habitat

Site Selection

Mist net sites were selected using the plant community data provided by ESI in combination with the onsite visits to wetlands in the bypass areas. Bat surveys are most often conducted near water sources such as ponds, beaver impoundments, streams and other waterways because bats are likely to congregate in these areas for drinking and feeding. Sites were selected based on habitat characteristics for Rafinesque's big-eared bat that are described in literature and from my 20+ years of experience with surveys for this species.

In coastal plain portions of its range the target species has been most often associated with old-growth bottomland hardwood swamp forests. The forest stand characteristic that is thought to be most important is the presence of a preponderance of large diameter trees with cavities. These cavities are used as roosts by this species (and also by the southeastern bat) and roosts are believed to be a limiting factor for some bat species (Kunz 1982, Kunz and Lumsden 2003). Large, shallow ponded areas (sloughs) within the forest and small protected streams or black water rivers are present in preferred habitat in juxtaposition with the large diameter hollow trees (tree roost and foraging characteristics described by Clark et al 1998).

Bat Survey

Mist nets of 2-ply, 50 denier nylon construction with a mesh size no larger than 38 mm were used in this survey. Net lengths varied based on the size of the area to be covered. Nets were suspended in forested areas over waterways in areas as described above. They were deployed at dusk, and monitored every 10-15 minutes for three-five hours. Data collected on bats that were captured included species, sex, age (adult or young) and reproductive condition. An acoustic detector was used in conjunction with mist-netting to determine general bat activity levels. Acoustic detection devices are not recommended as a primary survey means for Rafinesque's big-eared bat due to the fact that the echolocation calls for this species have characteristics that make detection by such devices difficult.

RESULTS

Habitat assessment

Preferred habitat in the proposed bypass area appears to be limited for Rafinesque's big-eared bat. The acreage of bottomland hardwood forest is small and the stands in the area do not contain a significant number of large diameter trees (24 inches or greater) with cavities. Sites in the Southwest Prong Slocum Creek, in the vicinity of the Greenlevel Road bridge, were selected for mist net survey. Although the bottomland forest in this area does not contain a large number of high diameter trees this area does contain a number of other characteristics that are similar to those where Rafinesque's big-eared bat has been found in other areas. A beaver impounded area upstream from the bottomland swamp was also netted due to the presence of a large number of cavity trees and its proximity to the bottomland hardwood forest. GPS coordinates were recorded for these mist net sites by Mary Frazer of the NC Department of Transportation.

Survey results-mist netting

Mist-netting was conducted in the summer of 2005 for six nights. Two-to-six nets were set per night for a minimum of 12 net nights ("net night"=one net set for one night), and a total of 10 bats of four species were captured (Table 2). All captures occurred in nets set in the bottomland swamp along the Southwest Prong of Slocum Creek; no captures occurred in the beaver impoundment. There were no Rafinesque's big eared bats captured or otherwise documented during these surveys, however, one species of concern, the southeastern bat, was captured in the bottomland swamp forest.

Survey results-acoustic survey

Mary Frazer, NC DOT, collected acoustic data at each site that was netted.
This data provided some additional documentation of species habitat use and some insight into activity levels at the beaver impoundment and in the swamp forest.
The data is in NCDOT files, but a brief summary of those efforts was provided to me and information from that summary is included in this report courtesy of M. Frazer.

All four species that were captured in the swamp forest were also documented by acoustic detection in the beaver impoundment (Table 2). Over 300 call sequences that could be analyzed were recorded in the beaver impounded area, but no species other than those documented by mist netting were identified.

Acoustic monitoring during the netting sessions in the bottomland swamp forest indicate that the low capture rates may be due to low activity in the area. Very few passes were recorded or heard during mist netting sessions there, on several nights one to two hours elapsed before a lone bat pass was heard. In contrast, bat activity was high in the beaver impounded area during the September survey period. In the beaver impoundment peak bat activity occurred between 7:15 and 8:00 p.m. Eastern Daylight Time which coincides with the period when most bats emerge from their roosts (20-30 minutes before and after dusk).

Table 2. Bats documented from the Havelock Bypass vicinity in summer 2005.
(# = number captured in mist-nets)

#	**Species**
4	Eastern pipistrelle, *Pipistrellus subflavus*
1	Evening bat, *Nycticieus humeralis*
4	Red bat, *Lasiurus borealis*
1	Southeasern bat, *Myotis austroriparius*

DISCUSSION

The primary purpose of this report was to determine if protected bat species, in particular, Rafinesque's big-eared bat, were present in the vicinity of proposed bypass options for the city of Havelock, NC. The range of this species in the state includes the entire coastal plain and it seems likely that, even though the survey efforts did not produce any documentation for this species, it could be in the area. This species is known to be difficult to detect with acoustic means and many have reported that this species is difficult to capture in mist nets due to its ability to detect and avoid nets. Habitat in the Southwest Prong Slocum Creek area appears to have suitable characteristics for roosting. The capture and detection of the southeastern bat in both the beaver impoundment area and the swamp forest also indicates that habitat is present in this area for Rafinesque's big-eared bat as the two species have been found to use the same types of roost trees, even using the same tree on occasion. Fragmentation of the swamp forest may adversely affect roosting, foraging and commuting habitat for this species by creating open areas between roost sites. This species is not known to regularly frequent open areas and its flight behavior may make it more susceptible to predation by avian predators such as hawks and owls.

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ATTACHMENT 4

PRELIMINARY HABITAT AND PETS SPECIES EVALUATION

FOR THE

CROATAN WETLAND MITIGATION BANK (CWMB)

CRAVEN COUNTY, NORTH CAROLINA

State Project No. 8.T170701

T.I.P. No. R-1015

Federal Aid Project No. R-56-4(34)

Consulting Project No. 06-ES-03

Prepared for:

The North Carolina Department of Transportation
Division of Highways Planning and Environment
Project Development and Environmental Analysis Branch
Office of Natural Environment
Raleigh, North Carolina

May 2008

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Preliminary Habitat and PETS Species Evaluation
for the Croatan Wetland Mitigation Bank (CWMB)
Craven County, North Carolina

1.0 Introduction and Background

The North Carolina Department of Transportation (NCDOT) is the current landowner and steward for an approximately 4,035-acre property referred to as the Croatan Wetland Mitigation Bank (CWMB), an in-holding located within the boundaries of the Croatan National Forest (CNF). Restoration of the wetland and stream systems on this property was completed during 2001 and 2002. The CWMB is expected to provide compensatory mitigation for wetland impacts associated with the US 70 Havelock Bypass and other NCDOT projects. The CMWB is also expected to be used to offset the loss and fragmentation of U.S. Forest Service (USFS) property by the US 70 Havelock Bypass. In 2007, NCDOT determined that a preliminary evaluation of the CWMB should be conducted to assess the potential for current use by, and as potential mitigation for, USFS Proposed, Endangered, Threatened, or Sensitive (PETS) species.

Specifically a preliminary evaluation of the CWMB was undertaken to: 1) determine the presence and type of habitats currently existing on the CWMB; 2) determine which habitats may be potentially suitable for PETS species, with specific emphasis on the species potentially affected directly or indirectly by the US 70 Havelock Bypass; 3) document any PETS species occurrences found during the course of the field work; and 4) evaluate existing habitats in CWMB for potential mitigation value for PETS species affected by the US 70 Havelock Bypass. The current effort represents a preliminary evaluation of PETS species on the CWMB.

The CWMB was established as a coastal plain wetland mitigation bank by the NCDOT and is currently being managed by the N.C. Ecosystem Enhancement Program (EEP). The mitigation bank includes approximately 4,035 acres of low-lying and varying habitats located between Catfish Lake Road (SR 1100) and Long Lake, a naturally occurring blackwater lake in western Craven County, North Carolina (Figure 1). The property is roughly 5 miles in length and up to two miles in width in locations. It is largely surrounded by USFS holdings with privately owned lands located adjacent to the east and southeast boundaries, and a NCDOT parcel located along the east central boundary. Mitigation success monitoring of the CWMB is essentially complete at the end of the 2007 growing season except for final agency approvals of mitigation credits.

Much of the current flow of water leaving the mitigation bank exits the site via East Prong Brice Creek which flows north across Catfish Lake Road and eventually into the Trent River upstream of New Bern, North Carolina. Water moves across the CWMB from an elevation at Long Lake of approximately 38 feet above sea level downslope toward East Prong Brice Creek drainage at the stream's crossing at Catfish Lake Road with a low at approximately 20 feet above sea level (1994 Havelock 7.5" US Geological Survey Quadrangle Map). This is an average fall of approximately 3.6 feet per mile. There are few visible topographic prominences throughout the

area and it is essentially flat with a minimal slope to the north that is more prominent at the northern end of the site. A few very low ridges generally parallel the main access road maintained through much of the length of CWMB. These ridges are accompanied by soil textural changes to sand and slight topographic highs may represent relic sand features associated with ancient estuarine limits.

Soils throughout most of the project area have mucky or hydric loamy profiles frequently associated with lower coastal plain wetlands. Three major soil series have been mapped (Goodwin 1989, and later modified by ESI 2002) within the project area, Bayboro, Croatan and Pantego (Table 1). Bayboro and Pantego are wet loamy, mineral soils with heavy organic horizons at their surfaces. Croatan is an organic soil, composed largely of deposited or re-deposited residue from the decay of plant material. All three have formed under long regimes of flooding and saturation. These three soils may occur over as much as 75% of the project area. By soil taxonomic convention, all named soil series mapped within CWMB have formed under conditions of permanent or periodic saturation and reduction (Soil Survey Staff 1999; Table 1).

There are two basic classes of soils, loamy soils with substantial amounts of clay in their lower horizons and organic soils with profiles formed in accumulations of decayed plant material. Loamy soils such as Leaf, Rains, Pantego, and Bayboro, give evidence of long hydroperiods by gray subsurface horizons and surface horizons with high organic content. Organic soils have mucky, organic horizons through their profiles, direct indications of long hydroperiods. As the re-introduction of water is completed some, not all, of the soil will regain some of the original hydrological characteristics that were in effect at the time of their first drainage. This process will involve a slow filling of soil profile interstices, pores, root spaces, and animal tunnels. The new hydroperiods will achieve equilibrium with extant climatic events and, as a result, plant species will be redistributed along new hydrologic gradients. This sorting process will require many years. Some species will slowly disappear. Some may reappear, provided a seed source is available. The new balance will ultimately affect new vegetation patterns across the landscape.

Table 1. Mapped soil series at the CWMB.

Soil Series Name	Textural Classification	Subgroup Name
Bayboro	Mucky loam	Umbric Paleaquults
Croatan	Muck	Terric Medisaprists
Dare	Muck	Typic Medisaprists
Dorovan	Muck	Typic Medisaprists
Goldsboro	Loamy fine sand	Aquic Paleudults
Leaf	Silt loam	Typic Albaquults
Leon	Sand	Aeric Alaquods
Lynchburg	Fine sandy loam	Aeric Paleaquults
Masontown	Mucky fine sandy loam	Cumulic Humaquepts
Muckalee	Sandy loam	Typic Fluvaquents
Murville	Mucky loamy sand	Typic Endoaquods
Pantego	Fine sandy loam	Umbric Paleaquults
Rains	Fine sandy loam	Typic Paleaquults

The length of time these soils remained under non-characteristic hydrological conditions is not known; aerial photographs indicate that some hydrologic modifications were in place by 1949, with the pre-mitigation hydrological modifications apparently in place by 1981. It must be assumed that there were pedological changes that took place during the years they remained hydrologically modified and experienced significantly reduced hydroperiods. Some of these changes may have been loss of organic materials through oxidation of surface horizons, chemical modifications of spodic soils and some leaching of E-horizons, and drying and oxidation of at least the upper A-horizons of loamy soils. With the re-introduction of water these drying changes may be reversed or further modified. The long-term future may see a return to some simulation of natural conditions in some areas.

Extensive areas of forested habitat were cleared in the period immediately prior to NCDOT acquiring the site for mitigation purposes. The entire acreage has an apparent long history of timber harvest with associated drainage of wetlands. Some trees seen on spoil adjacent to channelized sections of East Prong Brice Creek may be as old as 60 to 75 years. Fires are evidenced by charred stumps and tree boles. Thin layers of ash in upper soil horizons were observed in areas in close proximity to Long Lake. However, fire was not likely a recurrent factor in more recent years.

As part of the mitigation activities in 2000-2001, approximately 675 acres of the recently clear cut areas were drum chopped as part of the site preparation to remove undesirable, early successional shrubs and tree saplings. These areas were checked for target vegetation community plantings with combinations of tree species that included water oak (*Quercus nigra*), swamp chestnut oak (*Quercus michauxii*), overcup oak (*Quercus lyrata*), cherrybark oak (*Quercus pagoda*), laurel oak (*Quercus laurifolia*), willow oak (*Quercus phellos*), green ash (*Fraxinus pennsylvanica*), swamp tupelo (*Nyssa biflora*), pond pine (*Pinus serotina*), loblolly pine (*Pinus taeda*), longleaf pine (*Pinus palustris*), and bald cypress (*Taxodium distichum*).

Plantings have grown to the extent they are now visible in some of the habitats. Many other areas are progressing largely under the effects of natural conditions and the plantings have been heavily browsed by wildlife or overtopped by vigorous early stages of natural vegetation succession. Native shrubs have rebounded from stump, rhizome or root sprouts as have the more common canopy trees such as red maple (*Acer rubrum*) and sweetgum (*Liquidambar styraciflua*) where clearing has taken place. Some areas that remain un-cleared are associated with the historically wettest soils. Many cleared wet areas are currently dominated by a mix of early successional coarse graminoid and shrubby species.

2.0 Aims and Methods

On November 14 and November 27-30, 2007, and January 15, 2008, a brief field effort was completed for the purpose of gathering information at CWMB for vegetation community mapping and assessment of possible occurrences of PETS species as well as possible PETS species mitigation measures. During this field work it was determined that normal seasonal senescence was exacerbated by drought that had persisted through the year into fall. Soils in many areas that were normally flooded were exposed during the period of the field work and appeared to have been so for much of the past growing season. Most ditches were largely dry. Ponds held little water. Evidence in the form of water marks on trees, water stained leaves, and monitoring gauge data indicate that many of these areas are typically significantly wetter than what was observed during the field work.

Habitat over the extent of the mitigation bank was visited as time allowed. Observations were made at points recorded by a Global Positioning System (GPS) handheld unit to facilitate graphical projection of information on aerial photographs upon returning from the field. This information was used in constructing a vegetation map containing 16 vegetation units (Figure 2). The mapping units are subjective and represent a diversity of both mature climax and early seral stages of vegetation. It should be assumed that some of the units represent vegetation that is currently changing following recent hydrological restoration efforts in the mitigation area.

Of initial interest in the current survey is a preliminary assessment of CWMB vegetation assemblages as potential habitat for a group of rare plant species considered by the USFS to be PETS species. PETS plant and animal species are listed in Section 5.0 and are the topic of the current report. PETS species have been named by the US Forest Service as important to overall species diversity management in the CNF. Many of these species also have been listed by the North Carolina Natural Heritage Program (NCNHP) as important rare species in North Carolina.

A number of PETS species known from or near alternatives of the proposed US 70 Havelock Bypass that pass through US Forest Service property in Croatan National Forest may be subjects for mitigation efforts in CWMB. The vegetation map that accompanies this report represents current vegetation conditions present at CWMB, but offers no portents of future conditions. Hopefully these early observations will allow some estimates for habitats and management scenarios for PETS species. Future conditions may be in the realm of best estimates.

Common and scientific names of vascular plant species are taken, where possible, from Weakley 2007.

3.0 Mapped Vegetation Assemblages

Sixteen vegetation cover types have been recognized and mapped for purposes of this project in the CWMB. These plant cover types represent various levels of past disturbance, response to water level changes and a variety of human landscape manipulations. No attempt has been made to delineate minor variations within these plant cover patterns. Most of the units used can not be relegated to any one level of plant assemblage whether community, association, consocies, etc. Because of past disturbances, some map units may represent seral stages of more mature units also present on the landscape. Mapped unit names and conventions follow those used for the US 70 Havelock Bypass vegetation mapping to the greatest extent feasible. Additional community assemblages not found in association with the Bypass occur on large portions of the CWMB.

Map units named and defined below are a mix of types easily recognized for this preliminary mapping exercise. More careful field analysis and ground truthing efforts would be necessary to resolve finer detail within these map units. Mapped renderings of vegetation cover at CWMB will be subject to varying degrees of change on the ground until disturbed cover types regain equilibrium with their new environments. Map unit areas are summed below by type (Table 2). Map unit abbreviations used on the accompanying map are included in parentheses with each map unit discussion. The CWMB was divided into Management Units (MUs) during mitigation feasibility studies and implementation, and these MUs are used to reference specific regions of the CWMB in this report (Figure 2).

Table 2. Summary of vegetation mapping units for the CWMB.

Vegetation Mapping Unit Name		Summary of Acreages
Swamp Forest, small stream	SFs	122.0
Pine Flatwoods, mesic	PFm	53.7
Pine Flatwoods, transitional	PFt	40.7
Pine Flatwoods, hydric	PFh	76.7
Successional/Ruderal Habitat, grass-sedge	SRg	593.3
Powerline Corridor, hydric	PCh	47.0
Successional/Ruderal Habitat, shrub-scrub	SRs	667.7
Non-riverine Wet Hardwood Forest	NWH	99.5
Non-riverine Swamp/Bay Forest	NSB	1912.0
Lake Ridge Pine Forest	LPF	5.0
Pond	P	6.9
Pine Plantation, hydric	PPh	46.1
Pine Savanna, hydric	PSh	111.5
Upland Hardwood Forest	UHF	1.4
Pine/Hardwood Forest	PH	234.4
Rural/Urban Modifications	M	17.7
Total Mapped Acreage		4035.6

3.1 Swamp Forest, small stream (SFs)

Most surface runoff leaving CWMB reaches shallow drainage ways slowly carved and filled as runoff moves across 18 feet of slope over 5 miles from headwater wetland habitats in and adjacent to the mitigation area toward Catfish Lake Road. To the west the Sheep Ridge Wilderness Area, owned by the US Forest Service, supplies water to Brice Creek via a western branch of the East Prong of the stream as well as West Prong proper. This western branch of the stream system is also fed by runoff from the western half of CWMB. An eastern branch in the stream along the northern boundary has been partially channelized in the past and carries flow that rises from the extensive swamps in the southeastern portions of CWMB. These two branches of East Prong meet near the northern end of the mitigation area and flow under the bridge on Catfish Lake Road. Some of this drainage may at times carry water that leaves Long Lake at the southern tip of CWMB. A fragment of this vegetation unit just west of the main entrance to CWMB was cut off by construction of Catfish Lake Road and may now feed into a ditch just west of the entrance to CWMB.

The waters carried by the stream originate in wetlands with deposits of organic matter and are stained by tannins derived from vegetation detritus, hence the color. The western branch of East Prong has been used by beaver (*Castor canadensis*) that appear to have benefited from the rising water levels within CWMB. Their dams and culvert plugs can be seen along the main entrance road. Other signs where tree bark has been gnawed are visible along much of the western branch and some of the eastern branch. Where more open, the channel is wide and scattered with the trunks of dead, fallen trees that have died either from the rising water levels or from damming by beaver. Within some headwater areas, the flow is more sheet-like, often indiscernible below trees, shrubs, and in some cases, fairly widely spaced trees in swamps. This particular mapping unit, identified as Coastal Plain Small Stream Swamp (blackwater subtype) in Schafale and Weakley (1990), has been applied to small, blackwater streams throughout the eastern part of the state.

Characteristic soils along these streams are a mix of Masontown and Muckalee as evidenced by mixing of the alluvial layers. Dorovan and Croatan soils representing deeper organic deposits may also be found in some middle reaches. Croatan soils are mapped for some headwater areas. Some histosol deposits may be relicts of previously active stream channels that now contain deposits of organic material, as suggested by their linear shapes on soils maps (Goodwin 1989).

The characteristic tree species within the more open channels are swamp tupelo, red maple, sweetgum, and sweet bay (*Magnolia virginica*). Cherrybark oak is scattered. Titi (*Cyrilla racemiflora*) is one of the more common large shrubs. Shining fetterbush (*Lyonia lucida*) clearly marks the channel edge, particularly along the lower stream reaches, and in the upper reaches may be common across the areas of flow where water passes through thick stands of pocosin-like vegetation. Loblolly pine and water oak may occur on hummocks slightly above regular flow.

3.2 Pine Flatwoods, mesic (PFm)

Areas identified as mesic Pine Flatwoods occupy low upland to mesic sandy ridges scattered along the main access road through CWMB. The soils in these areas are often mapped as Goldsboro (Aquic Paleudults) extending into adjacent areas of Rains, Leaf, and Pantego mapping units. Not all areas seem to show evidence of aquic moisture conditions. Mesic Pine Flatwoods parcels along the access road in the central eastern portion of the site are loamy in the B-Horizon and retain bright soil chromas, similar to Autryville (Arenic Paleudults). With the exception of a small area of Upland Hardwood Forest discussed in Section 3.13, these are the driest habitats seen at CWMB. Soils of pine stands, included within this mapping unit, nearer the entrance are darker and seem to have accumulated more organic matter, perhaps more indicative of somewhat poorer drainage. The more northern habitats grade into wetter habitats to the east (Swamp Forest, small stream) and, west of the access, into transitional Pine Flatwoods and hydric Pine Flatwoods.

The canopy dominants of the mesic Pine Flatwoods map unit are usually loblolly pine, but longleaf pine is occasionally an important co-dominant. Pond pine may become more important near transitions to wetter habitats. Important subcanopy species include sweetgum, red maple, and water oak. Swamp chestnut oak becomes more common toward streams. American beech (*Fagus grandifolia*) may be scattered in well drained soils adjacent to streams. Red bay (*Persea palustris*), not usually competitive in the forest canopy in these habitats, is often present as a subcanopy species or shrub layer. Other species functioning in the understory shrub layer within this forest type include horse sugar (*Symplocos tinctoria*) and sweet pepper bush (*Clethra alnifolia*). Switch cane (*Arundinaria tecta*) is also common, particularly in moister soils.

3.3 Pine Flatwoods, transitional (PFt)

Areas identified as transitional Pine Flatwoods can represent an intermediate step between mesic Pine Flatwoods as discussed in Section 3.2 and hydric Pine Flatwoods as discussed in Section 3.4. Soils supporting this forest canopy type are intermediate along a textural gradient between sandier Goldsboro soils mapped near the road and wetter silt loam soils in the Leaf series. Along with the textural gradation, a drainage gradient may account for poor drainage from the Goldsboro through Rains and across Leaf soils.

Within this map unit, loblolly pine and longleaf pine are joined by pond pine. Red maple is more abundant and somewhat replaces sweetgum in the subcanopy. Swamp tupelo seems to replace water oak. American beech disappears. Pond cypress (*Taxodium ascendens*) is scattered in the canopy and below. Wetland species including bamboo-vine (*Smilax laurifolia*), inkberry (*Ilex glabra*), Virginia chain fern (*Woodwardia virginica*), and coastal plain gentian (*Gentiana catesbaei*) are commonly present. Carolina loosestrife (*Lysimachia loomisii*), a PETS plant species, and eastern narrowleaf seedbox (*Ludwigia linearis*) are common where seeds have been scattered by human foot traffic along trails used for installation and checking of shallow water monitoring gauges.

3.4 Pine Flatwoods, hydric (PFh)

Areas identified as hydric Pine Flatwoods have a scattered canopy cover shared by pond cypress and pond pine in loamy Rains, Leaf, and Pantego soils. Scattered stands of clonal shrubs dominate much of the understory shrub stratum. Many clumps are somewhat elevated above the substrate, with bases that appear to usually be flooded during periods of normal precipitation. This growth form often regenerates several years following passage of severe wild fire through a pocosin-like wetland. Root mats were frequently exposed, possibly resulting from oxidation of organic matter during drained site conditions prior to site restoration.

A widely scattered canopy of pond cypress and pond pine may also contain stems of red maple, red bay, loblolly bay (*Gordonia lasianthus*), and swamp tupelo. The shrub stratum contains several clump-forming species that have assumed dominance from place to place depending on how the original occurrence of each species was favored following fire. Titi, sweet gallberry (*Ilex coriacea*), shining fetterbush, inkberry, myrtle holly (*Ilex myrtifolia*), and bamboo-vine are principle among the closely spaced clumps of woody vegetation.

Many open areas between and at the bases of clonal shrubs are occupied by species of sphagnum moss (*Sphagnum* spp.) characteristic of open pocosin habitats. These include *Sphagnum affine, S. molle, S. perichaetiale,* and *S. magellanicum*. Mounds of sphagnum moss form the basis of habitat for purple pitcher plant (*Sarracenia purpurea*), several species of beak-rushes (*Rhynchospora* spp.), common ten-angled pipewort (*Eriocaulon decangulare*), and other species not readily identifiable in the fall season. Potential for occurrence of rare species in this habitat is high.

3.5 Successional/Ruderal Habitat, wet grass-sedge (SRg) and Powerline Corridor, hydric (PCh)

Successional/Ruderal Habitat with a dominance by wet grass and sedge species have most characteristically formed where existing non-riverine swamp/bay forest vegetation has been removed and soils have been disturbed by heavy machinery. Closure of drainage systems has resulted in subsequent flooding of these areas. Extensive areas recently cleared of forest cover, as well as much of the length of the power line easement passing through CWMB, are now occupied by variations of this map unit; the powerline easement is presented here as a separate community based on the regular and frequent maintenance schedule that keeps the area in an early successional state. The soil map units Pantego, Bayboro, and Croatan serve as substrate for this map unit. However, other soil map units may be included as well. In addition, smaller inclusions of areas dominated by shrub-scrub vegetation can be found within grass and sedge dominated areas. Mapping resolution did not always allow separation of variations.

Much of the microtopographic structure of these wet habitats is associated with the remains of downed trees, stumps, and variable mixtures of rotting branches and low mounds of soil materials. These surfaces offer a gradient of growing conditions relative to hydric conditions.

Together with seasonal and yearly variations in water levels, these diverse habitats offer a wide range of flooded as well as draw-down growing conditions.

The most abundant plant forms within the grass and sedge dominated areas are graminoids such as giant plume grass (*Saccharum giganteum*), bunched broomsedge (*Andropogon glomeratu*s), velvet grass (*Dichanthelium scoparium*), tall swamp witch grass (*Dichanthelium scabrisculum*), warty panic grass (*Panicum verrucosum*), and sedges that include wool grass (*Scirpus cyperinus*) and beak-rushes (*Rhynchospora glomerata*, *R. chalarocephala*, *R. inexpansus*, *R. gracilenta*). Variations of these habitats due to slight differences in soils, flooding, past land use, and seed or diaspore availability may promote considerable differences in species content.

Residual plant materials remaining from the original clearing process have also contributed to the complement of plant species. Woody plant materials have regenerated from stumps, roots, and layered materials. Mobile plant seeds, root materials, and rhizomes can take advantage of the newly exposed wet substrates. Some of the other common species that occupy these habitats are red maple, dog fennel (*Eupatorium capillifolium*), flat-top golden rod (*Euthamia tenuifolia*), sweetgum, hairy seedbox (*Ludwigia pilosa*), swamp black gum (*Nyssa sylvatica*), fireweed (*Erechtites heiracifolia*), yellow-eyed grass (*Xyris ambigua*), Virginia chain fern, and shortspur creeping bladderwort (*Utricularia gibba*). Weak rush (*Juncus debilis*) and Canadian rush (*Juncus canadensis*) are irregularly common from place to place. Wetter areas may display a greater variety of wetland or aquatic species.

During years where draw-down of water exposes organic muck surfaces, such pioneering species as long-beak baldsedge (*Rhynchospora scirpoides*) are able to complete their life cycles. One large occurrence of this PETS plant species was found within the Progress Energy power transmission corridor near the east side of CWMB.

3.6 Successional/Ruderal Habitat, wet shrub-scrub (SRs)

The creation of areas dominated by wet shrub-scrub vegetation within the CWMB has resulted from clear-cutting and subsequent early regeneration within a variety of wetland vegetation map units. Clear-cutting has taken place numerous times over a period of years that extends into previous land ownerships. The most recent clear-cuts immediately preceded conversion of the area to a mitigation bank. Some regeneration seems to be following a course that will lead directly back to mature woodlands resembling those that were harvested. Other stands, some seeming to have been cut multiple times and/or burned, appear to be following a course through a form of pocosin. These latter areas may eventually regain bay forest content and stature. Other stands in less hydric soils are following a course of regeneration through a different set of species.

A number of variables effective prior to cutting, during, and following cutting may be responsible for some of the observed regeneration differences. The timing or number of times areas have been cut or burned could be responsible for differences in regeneration. Soil factors including texture, major profile contents, oxidation and drainage characteristics can modify the course of

regeneration. Soil series characteristically applied to these habitats include Croatan, Pantego, Bayboro, and Murville. All these soils have either organic profiles or organic epipedons and may have been subject to burning in the past. Diaspore availability can be important to stand species composition. For instance, in large monotypic stands absence or abundance of seed source for some species may figure strongly into the course of regeneration. Fire during regeneration can profoundly change the multi-factor succession process.

Within one larger stand of the vegetation mapping unit Non-riverine Swamp/Bay Forest, a recently cut area just south of the eastern end of Progress Energy power corridor (CWMB MU 9), shows the simpler form of regeneration. This area supports young individuals of the same dominant species as adjacent areas that have not been recently cut. Few if any species differences occur between the two age stands. Additionally, there were no particular variations within the young stand even though a line defining Croatan soils from Pantego soils bisects the regenerating stand. A few large trees remain uncut from the pre-existing forest. Dominant trees were young stems of sweetgum, red maple, and red bay. These were not particularly thick. Red bay was present in multiple size classes from seedlings to young trees, having been stimulated by increased light. Other species present were Virginia chain fern, scattered young stems of giant plume grass, high bush blueberry (*Vaccinium formosum*), muscadine (*Vitis rotundifolia*), and seedlings of loblolly pine. Within another variation of this stand type a bit further south, there were widely scattered patches of dense shining fetterbush and titi.

Another area, further south along the east side of CWMB (MU 14), appeared to have been timbered several years ago. Currently this area supports a dense pocosin-like shrub stratum from which emerge scattered canopy individuals of red maple, red bay and sweet bay. The shrub stratum consists largely of shining fetterbush with scattered patches of dense titi, red bay, inkberry, high bush blueberry, bamboo-vine, and whiteleaf greenbrier (*Smilax glauca*). Dense pocosin-like vegetation dominates both north and south sides of the road removed between MUs 10A and 13A. This latter area has soils segments mapped as Croatan and Bayboro. Similar immature vegetation dominates in more southerly timbered areas mapped as having Murville soils.

Westward, along the main operational access road into the site, a different variation on the areas dominated by wet shrub-scrub vegetation dominates several large timbered areas along the east side of the road. These areas, mapped as having largely Pantego soils, appear to have somewhat coarser textures. Dominants consist of water oak, sweetgum, loblolly pine. Shining fetterbush, titi, southern bayberry (*Morella caroliniensis*), and inkberry are common. Muscadine is the main woody vine while whiteleaf greenbrier is scattered. These latter stands represent a sub-climax stage of an altogether different forest type that is not yet understood.

3.7 Non-riverine Wet Hardwood Forest (NWH)

Two stands of Non-riverine Wet Hardwood Forest occupy segments of Pantego soils in the northwest portion of CWMB. One smaller stand occupies segments of soils mapped as Pantego,

Murville, and Croatan soils near the south end of the project area not far from Long Lake. These tentative forest designations are subject to change.

In the north, along the western boundary of Brice Creek, young stages of what appear to be Non-riverine Wet Hardwood Forest merge very gradually with the blackwater phase of the small stream Swamp Forest. The two occurrences extended westward and joined across what is now a removed roadway. These two segments have been timbered and have begun to regenerate in young trees at least somewhat representative of the pre-existing forest stands.

Some of the regeneration of this cover type appears to now be passing through a pine forest stage in which loblolly pine is dominant. Much of the rest of this cover type is largely hardwood or mixed loblolly pine and hardwood. With more critical analysis, several communities may eventually be recognized. Currently, much of the area is dominated by either young stems of hardwoods possibly representing such species as sweetgum, water oak, swamp chestnut oak, and cherrybark oak. With the return of flooded soils at CWMB, a different course of natural succession may be defined. Understory strata within these areas include shining fetterbush, common wax myrtle (*Morella cerifera*), bamboo vine, and others.

3.8 Non-riverine Swamp/Bay Forest (NSB)

The most extensive tracts of largely natural forest have been mapped as Non-riverine Swamp/Bay Forest. Two forested wetland types have been combined as one map unit for the purposes of the current evaluation. Both Non-riverine Swamp Forest and Bay Forest habitats have been outlined by Schafale and Weakley (1990). With more extensive examinations in the future, it may be possible to separate these entities at CWMB. For the current effort these two forested entities have been lumped as one extensive forest system occupying nearly half of the CWMB.

The Non-riverine Swamp/Bay Forest vegetation occupies approximately 1912 acres within CWMB (Table 2). This map unit extends from near the margins of Long Lake in irregular parcels northward to north of the Progress Energy power transmission corridor that crosses the project just north of the center. It is likely that much of this habitat, at least historically, served as watershed for Brice Creek. Construction of drainage ditches and roads from the 1940s to the 1970s within what is now CWMB altered the flow of groundwater and surface water through this system. Wetland mitigation activities appear to have restored movement of groundwater and surface water through these wetland forests.

Bay Forest, at least, and Non-riverine Swamp/Bay Forest have been modified in various ways and at various places through out the extent of this forest system. These modifications have resulted in the regeneration of vegetation cover types that resemble young Non-riverine Swamp Forest and those that resemble pocosin, or the successional precursor of Bay Forest. As indicated above, the nature of or sequence of events responsible for development of these seres is not understood at this time. Timbering, fire, soils, and flooding likely have been influential. This forest complex becomes more fragmented from south to north within CWMB, possibly because historical

disturbances began in the north and shifted south with time. A history of land use events in the area accompanied by a chronology of the removal of timber resources would aid in explaining current differences through these landscapes, their current cover of vegetation, and the general course of future changes.

The canopy species composition of what appear to be the most mature stands of Non-riverine Swamp/Bay Forest is presently dominated by a small group of deciduous hardwood and conifer species. These are sweetgum, red maple, and swamp tupelo. Cypress (*Taxodium* spp.) is scattered, as is mature loblolly pine. The characteristic species of the understory is red bay, even though this species is occasionally present in the canopy. Within forests with relatively large, buttressed canopy trees, red bay is often a widely dispersed sapling. Shining fetterbush may occur in scattered small or large clones as a significant part of the shrub layer. Other shrub or woody vine species present are often inkberry, sweet gallberry, scattered clumps of bamboo vine and jessamine (*Gelsemium* spp.).

One specimen of jessamine collected from a regularly flooded portion of this habitat fits descriptions of vegetative material for swamp jessamine (*Gelsemium rankinii*), somewhat north of the recognized range of the species. Verification of this material would have to be accomplished during spring (March). Carolina jessamine (*Gelsemium sempervirens*) is common in other stands of this and other map units.

3.9 Lake Ridge Pine Forest (LPF)

A low sandy ridge follows the northern margin of Long Lake for a short distance in the vicinity of the hunting lodge that is no longer extant. This ridge may have developed as an artifact of wind and wave action and deposition of sand, perhaps somewhat augmented by construction of a sandy beach during historical human use of the area. This sandy substrate currently supports an aging forest stand dominated by large loblolly pine. A subcanopy composed largely of water oak, Darlington oak (*Quercus hemisphaerica*), sweetgum, and red bay occurs below the pine canopy. Switch cane is an important shrub species along with common wax myrtle.

3.10 Pond (P)

Ponds within the CWMB were largely either very low or dry during the period of the reconnaissance survey. Most of these ponds appeared to have been created during excavations for fill material for construction along the road system built through the area. During seasons of ordinary rainfall these ponds offer a diverse set of aquatic and/or draw-down habitats. Some of these habitats have succeeded naturally and contain somewhat more diverse assemblages of plant species.

Species noted within some of these ponds were short-leaf yellow-eyed grass (*Xyris brevifolia*), small-seed spikerush (*Eleocharis microcarpa*), creeping rush (*Juncus repens*), diffuse rush (*Juncus diffusissimus*), sphagnum mosses, water sundew (*Drosera intermedia*), shining

fetterbush, and others. One nearly dry pond contained an extensive occurrence of Florida peat moss (*Sphagnum cribosum*, previously known as *S. floridanum* or *S. macrophyllum* ssp. *floridanum*) that floats at and just below the surface when the pond contains water; this species is a PETS species on the CNF.

Ponded areas considered more directly artifacts of land clearing exist within other map units, but have not been specifically mapped separately. Most are more ephemeral than the borrow ponds created specifically by removal of fill material. Most pools that expand and contract with seasonal precipitation variations occur within the Successional/Ruderal Habitats, including those areas dominated by wet shrub-scrub vegetation and wet grass and sedge vegetation. Some of these, as well as the borrow areas, support species of bladderwort (*Utricularia* spp.) and sundew (*Drosera* spp.).

3.11 Pine Plantation, hydric (PPh)

Three stands of hydric Pine Plantation were seen within CWMB during the course of the survey. These stands were planted prior to creation of the mitigation area, and are not associated with pine plantings completed during construction of CWMB. It appears that these monoculture stands, located along the eastern boundary south of the Progress Energy power corridor, are dying. Water levels have risen since completion of the mitigation area and the soils supporting the plantations are now largely depleted of oxygen needed for root growth and functioning.

The plantations seem to have been created in areas previously dominated by Non-riverine Swamp/Bay Forest. A juvenile sere of that mapping unit resembling pocosin has begun to regenerate beneath the dying pines. Titi, shining fetterbush, inkberry, sweet gallberry, and bamboo-vine dominate the shrub layers between and under the pines.

3.12 Pine Savanna, hydric (PSh)

Hydric Pine Savanna has been created where thick pocosin-like vegetation with an emergent, scattered canopy of Pond Pine has been cleared over Murville and some Pantego soils. Both these soils customarily support traditional pocosin vegetation similar to much of the mapped wet shrub-scrub dominated areas. Following clearing, much of the substrate supports a variety of species characteristic of wet savanna that is often maintained by burning. In this instance, mechanical clearing has to some extent taken the place of burning. Burning of the hydric Pine Savanna community mapped here has not been a recent ecological factor and without fire these areas will soon succeed again to wet shrub-scrub dominated, pocosin-like vegetation.

Cleared areas currently support a variety of low shrubs, grasses and sedges. Abundant shrubs consist of inkberry, sweet gallberry, wax myrtle, creeping blueberry (*Vaccinium crassifolium*), southern sheepkill (*Kalmia carolina*), and southern bayberry. Titi may occupy lower, wetter areas where not removed during clearing.

Common herbaceous species include wire grass (*Aristida stricta*) and numerous species of beak rushes (*Rhynchospora* spp.) along with broomsedge (*Andropogon* spp). Walter's sedge (*Carex striata*) and Virginia chain fern most frequently occupy lower areas subject to seasonal standing water. Giant plume grass is commonly scattered throughout these areas along with several species of yellow-eyed grasses (*Xyris* spp.). Yellow pitcher plant (*Sarracenia flava*) and purple pitcher plant grow in some areas.

3.13 Upland Hardwood Forest (UHF)

One small stand of Upland Hardwood Forest is mapped near the south-central part of CWMB. The stand is associated with a source of sandy upland soil apparently used for fill material during construction of roads through the area prior to its use as a mitigation area. As an inclusion this sandy, upland soil has not been specifically mapped. However, it has some characteristics of the Kureb series (Spodic Quartzipsamments).

The sandy soils in this small habitat support a small stand of Darlington oaks scattered over a level to pitted topographic micro-relief, an artifact of sand removal. Understory shrubs consist of switch cane, southern bayberry, inkberry, and southern blueberry (*Vaccinium tenellum*). Depressions contain sphagnum moss and Virginia chain fern. Larger borrow pits are included as ponds.

3.14 Pine/Hardwood Forest (PH)

Most stands of Pine/Hardwood Forest are located in the northern half of CWMB and are supported on previously drained portions of Leaf or Bayboro soils. Southeastern stands within this vegetative unit (MUs 2B, 3, 7) are often surrounded by the remnants of ditches. These plugged ditches are adjacent to and once likely fed the channelized eastern branch of East Prong Brice Creek. Channelization of the eastern branch was likely completed years ago, judging by the size of older trees occupying spoil mounds that parallel the channel. The adjacent lattice work of ditches may have been completed subsequent to channelization. A period of timber harvest followed channelization and ditching. Most of this area is again re-flooding and taking on the character of young, non-riverine hardwood forest with, however, a substantial contingent of loblolly pine.

Two additional stands of Pine-Hardwood forest are located on a low ridge near the junction of the two branches of East Prong Brice Creek; the access road separates these two stands (MU 2a, 5). Both of these forest stands are relatively young, but the stand west of the road seems the older of the two. Loblolly pine is more abundant in the stand east of the road. Both these stands are largely upland. Though soils are mapped as Leaf, significant Goldsboro or other less hydric inclusions may be present in these two stands.

Water oak, red maple, southern red oak (*Quercus falcata*), swamp chestnut oak, white oak (*Quercus alba*), sweetgum, and loblolly pine occupy the canopies of the more upland stands.

Cherrybark oak and willow oak occupy drained soils adjacent to the East Prong Brice Creek channelization and are included in this mapping unit. Large American beech are scattered along the spoil mound. Hardwoods are widely scattered in some areas. Red bay and horse sugar are functioning as subcanopy species as well as shrubs along with sweet pepperbush. More frequently flooded areas support more of a predominance of red maple. Open, wet areas where a continuous canopy thins usually support a thicker herb layer.

3.15 Rural/Urban Modifications (M)

The main gravel roads and adjacent shoulders that will be maintained for future access to the CWMB are included in the classification of Rural/Urban Modifications in the mapping scheme for this project, consistent with the inclusion of these types of areas in this designation in the evaluation of the US 70 Havelock Bypass investigation.

4.0 General Comparison of Havelock Bypass Corridors and CWMB Habitats

Since some level of mitigation effort may be considered for CWMB with respect to rare plant and animal species considered by the USFS as PETS species found within corridor alternatives for the US 70 Bypass of Havelock, a preliminary comparison of the landscape control of plant habitats within these two disparate geographic areas may be in order. For many habitats found along Havelock Bypass alternatives, there are few or no similar CWMB analogues. A look at the general dissimilarity of basic landforms provides an overview explanation of this dissimilarity. Even where similarity in general vegetation coverage can be observed, variations in soils, landscape position, and hydroperiods distinguish the vegetation assemblages of the US 70 Havelock Bypass from those present on the CWMB in many cases.

The dominant landform in the bypass area is a slightly undulating upland/wetland plateau with an elevation of 25-30 feet above sea level. Substantial slopes have been formed by lateral stream dissection along the edges of the plateau. The plateau has been further dissected by human landscape manipulations and a variety of habitats dedicated to various sorts of corridors have increased the overall diversity of landscape features. These modifications, along with natural variations in soil textures, mineral components, and varying parent material characteristics further increase the landscape diversity within the various alternatives. Stream slopes offer wide variation in soil textures and chemistry, particularly within and near flood plain deposits. This is particularly true where dissection and/or deposition may have exposed or deposited circum-neutral soils through active flood plains. Water flow, and hence hydrologic characteristics, within streams is quite rapid due to higher stream gradients. Slopes that have developed as a result of stream dissection have a variety of aspects, that is, they face a variety of different cardinal points of the compass. Aspect may account for considerable variation in insolation and effective light availability, soil temperature, moisture residence times, organic material decay speeds, and weathering and soil characteristics, particularly within A-horizons.

The general landscape at CWMB is a made up of a single plateau that slopes very gently northward. Substantial stream dissection across this plateau is absent; however minor dissection does occur at the northern end of the mitigation area. Topographic variation is barely unidirectional as opposed to multidirectional. Most of the plateau is distinctly hydric in nature and soils are dominated by the slow deposition of organic material derived from decay of plant material. The topographic gradient over the length of CWMB, even though generally unidirectional, is only about 18 feet over roughly 5 miles. Lateral topographic gradient is only a few feet. East Prong Brice Creek and its tributaries constitute the only main topographic variations. The major causes of landscape and habitat diversity results from human manipulation and degradation, such as sand deposits near the center of the mitigation bank that have been diversified by excavation. Additional habitat diversity has been caused by road placement and power line corridor clearing.

The greatest landscape and habitat variations at CWMB have been the short-term effects of hydrologic modifications and the changes in ecological succession resulting from clearing and timber harvesting. The most profound landscape changes in the bypass corridors have been the long-term effects of stream dissection. In summary, overall topographic and habitat diversity is greatest within the bypass corridors.

Within the CWMB, there may be more opportunities for small variations in larger expanses of what are most apparently similar habitat types. Some variations of stream head pocosin that were found in a limited area within the bypass corridors may occur over greater extents as shrub-scrub and grass-sedge wetland. Similarly, the occurrence of narrow, shallow, water flow-dominated wetlands in the bypass corridors have variations at CWMB that have developed over very wide extents. However, they exist without the abrupt topographic marginal relief. Effectively, there are few directly comparable habitat analogues between the two geographies, due mostly to the lack of abrupt topographic variations at CWMB.

One more example focusing on variations in dissimilarities between the Havelock Bypass Alternative Corridors and CWMB will be useful. The largest vegetation map unit at CWMB, Non-riverine Swamp/Bay Forest, may have several successional seres visible on the landscape. These seres seem to be dependent on degree, repeated occurrence, and type of disturbance. Disturbances combined with fire may be responsible for these sere variations. When timbered, these habitats can return from stump and root sprouts and regenerate into the parent forest type. With some other mix of factors added, such as fire or very severe disturbance along with the diaspore introduction, these habitats appear to regenerate through early pocosin-like habitat. If these latter habitats are successively burned, other habitats including possibly Atlantic white cedar (*Chamaecyparis thyoides*) swamp, may develop. Areas mapped as containing wide areas of Murville soils seem, to a greater extent, to reflect this tendency. These suggestions are highly speculative at this point and should be investigated further before consideration in any management plan. These successional tendencies seem generally to be absent within the bypass corridors.

5.0 Occurrences of USFS PETS Plant Species

The USFS has issued a list of plant species that are considered important to the overall plant species diversity supported within Croatan National Forest. This list of the PETS plant species is presented below (Table 3). Among these plant species are those which have been reported within or near the US 70 Havelock Bypass Alternative Corridors, as well as three which thus far have been reported from the CWMB area.

Table 3. Summary of PETS plant species currently as applicable to the CNF.

Common Name [a]	**Scientific Name** [a]	**Habitat at CWMB** [f]
Mosses		
Carolina campylopus	*Campylopus carolinae*	None
Hall's fissiden moss	*Fissidens hallii*	SFs
Fitzgerald's peatmoss	*Sphagnum fitzgeraldii* [d]	SRg
Florida peatmoss	*Sphagnum cribrosum* [b,d,e]	P, SFs (streams)
giant peatmoss	*Sphagnum torreyanum*	P, SFs (streams)
Liverworts		
a liverwort	*Cylindrocolea rhizantha*	None
a liverwort	*Frullania donnellii*	Moist, open habitats
a liverwort	*Lejeunea bermudiana* [d]	Moist bases of hardwoods
a liverwort	*Lejeunea dimorphophylla*	None
a liverwort	*Metzgeria uncigera*	None
a liverwort	*Plagiochila ludoviaciana* [d]	None
a liverwort	*Plagiochila miradorensis*	Moist upland habitats
Lichens		
sunrise lichen	*Teloschistes flavicans*	None
Vascular Plants		
sensitive jointvetch	*Aeschynomene virginica*	None
scale-leaf gerardia	*Agalinis aphylla* [d]	SRg, PCh
branched gerardia	*Agalinis virgata*	PSh
tall bentgrass	*Agrostis altissima*	PSh
bog bluestem	*Andropogon mohrii*	PSh
dogbane	*Apocynum sp.* [d]	None
spreading sandwort	*Arenaria lanuginosa* ssp. *lanuginosa*	None
Chapman's three-awn	*Aristida simpliciflora*	PSh
savanna indian-plantain	*Arnoglossum ovatum* var. *lanceolatum* [c]	None
savanna milkweed	*Asclepias pedicellata*	None
Carolina spleenwort	*Asplenium heteroresiliens*	None
twining screwstem	*Bartonia paniculata* spp. *paniculata* [d]	SRg, PCh
many-flowered grass pink	*Calopogon multiflorus*	SRg, PCh
Long's bittercress	*Cardamine longii*	None
widow sedge	*Carex basiantha* [c]	None
Leconte's thistle	*Cirsium lecontei* [d]	None
twig-rush	*Cladium mariscoides*	Potential in draw-down areas
small spreading pogonia	*Cleistes bifaria* [d]	SRg, PCh
carolina sunrose	*Crocanthemum carolinianum*	PFm
Tennessee bladder-fern	*Cystopteris tennesseensis*	None
Hirst's panic grass	*Dichanthelium hirstii*	PSh

Table 3 Continues.

Table 3 Continued.

Common Name [a]	**Scientific Name** [a]	**Habitat at CWMB** [f]
a witch grass	*Dichanthelium* sp.	None
Venus flytrap	*Dionaea muscipula*	SRg, PCh
Robbin's spikerush	*Eleocharis robbinsii*	None
dissected sneezeweed	*Helenium pinnatifidum*	SRg, PCh
comfortroot	*Hibiscus aculeatus*	None
quillwort	*Isoetes microvela*	None
white wicky	*Kalmia cuneata*	None
southern bogbutton	*Lachnocaulon beyrichianum*	None
pondspice	*Litsea aestivalis*	None
Boykin's lobelia	*Lobelia boykinii*	PFh
flaxleaf seedbox	*Ludwigia linifolia*	SRg, PCh
Raven's seedbox	*Ludwigia ravenii*	SRg, PCh
rough-leaved loosestrife	*Lysimachia asperulaefolia*	PFh, PSh
Loomis's loosestrife	*Lysimachia loomisii* [d,e]	Scattered throughout
Carolina birds-in-a-nest	*Macbridea caroliniana*	None
Florida adder's mouth	*Malaxis spicata* [d]	None
Godfrey's sandwort	*Minuartia godfreyi*	None
loose watermilfoil	*Myriophyllum laxum*	P
narrowleaf cowlily	*Nuphar sagittifolia*	None
savanna cowbane	*Oxypolis denticulate* [c,d]	SRg,PCh
southeastern panic grass	*Panicum tenerum*	PSh
large-seed pellitory	*Parietaria praetermissa*	None
Carolina grass-of-parnassus	*Parnassia caroliniana*	None
mudbank crown grass	*Paspalum dissectum* [d]	P
spoonflower	*Peltandra sagittifolia*	PSh, SRs
hairy knotweed	*Persicaria hirsuta* [c,d]	P, SFs
pineland plantain	*Plantago sparsiflora*	None
yellow fringeless orchid	*Platanthera integra* [d]	PFh
snowy orchid	*Platanthera nivea* [d]	PFh
Hooker's milkwort	*Polygala hookeri* [d]	PSh
small butterwort	*Pinguicula pumila*	PSh
shadow-witch	*Ponthieva racemosa* [d]	None
awnpetal meadow-beauty	*Rhexia aristosa*	PFh
West Indies meadow-beauty	*Rhexia cubensis*	P, SRg,PCh
short-bristled beaksedge	*Rhynchospora breviseta*	PSh
Harper's beaksedge	*Rhynchospora harperi*	None
large beakrush	*Rhynchospora macra*	PFh
feather-bristle beaksedge	*Rhynchospora oligantha* [d]	SRg, PCh
coastal beaksedge	*Rhynchospora pleiantha*	SRg, PCh
long-beak baldsedge	*Rhynchospora scirpoides* [e]	SRg, PCh
Thorne's beaksedge	*Rhynchospora thornei*	None
Chapman's arrowhead	*Sagittaria chapmanii* [c]	SRg, PCh
grassleaf arrowhead	*Sagittaria weatherbiana* [c]	SRg, PCh
drooping bulrush	*Scirpus lineatus*	None
Baldwin's nutrush	*Scleria baldwinii*	PSh
Georgia nutrush	*Scleria georgiana* [d]	PFm (edges)
graceful goldenrod	*Solidago gracillima*	None
Leavenworth's goldenrod	*Solidago leavenworthii*	PFh
Carolina goldenrod	*Solidago pulchra*	PSh

Table 3 Continues.

Table 3 Concluded.

Common Name [a]	**Scientific Name** [a]	**Habitat at CWMB** [f]
spring-flowering goldenrod	*Solidago verna* [d]	PFm
coastal goldenrod	*Solidago villosacarpa*	None
giant spiral ladies'-tresses	*Spiranthes longilabris*	PSh, PFh
piedmont meadowrue	*Thalictrum macrostylum*	None
smooth tofieldia	*Tofieldia glabra*	PSh
dwarf bladderwort	*Utricularia olivacea*	P
savanna yellow-eyed grass	*Xyris flabelliformis*	PSh
Florida yellow-eyed grass	*Xyris floridana*[c]	PSh
a yellow-eyed grass	*Xyris stricta*	PSh

[a] Common and scientific names in this table follow those in use by the NCNHP (Franklin and Finnegan 2006) unless otherwise indicated.

[b] Recent name change documented in McQueen and Andrus 2007.

[c] Recent name changes documented in Weakley 2007.

[d] PETS plant species potentially affected by the US 70 Havelock Bypass.

[e] PETS plant species reported from CWMB.

[f] P=Pond; PCh=Powerline Corridor, hydric; PFh=Pine Flatwoods, hydric; PFm=Pine Flatwoods, mesic; PSh=Pine Savanna, hydric; SFs=Swamp Forest, small stream; Srg=Successional/Ruderal Habitat, wet grass-sedge; SRs=Succsessional/Ruderal Habitat, wet shrub-scrub.

A brief review of each species potentially directly or indirectly affected by the US 70 Havelock Bypass study corridors and an assessment of its potential for occurring within the CWMB follows.

- *Sphagnum fitzgeraldii*--Fitzgerald's peatmoss is found in scattered and isolated mats in open mesic savanna habitats, sometimes along regularly mowed power transmission corridors. Since the species does not compete effectively in wet or submerged habitats as do many other Sphagnum species, its potential presence at CWMB would currently be limited to non-flooded savanna sites, making it most likely non-existent in the CWMB.
- *Sphagnum cribrosum*--Florida peatmoss is found in continuous or broken mats, often floating or sometimes stranded during periods of draw down, in slowly flowing blackwater streams or ponds. These sorts of habitats are present at CWMB, and the species already has been found in a linear borrow pond.
- *Lejeunea bermudiana*--This species of liverwort occurs at the bases of large hardwood trees (black gum, sweetgum, etc.) near or possibly in heavily forested blackwater swamps where it is not regularly inundated by flood waters. Habitat may possibly occur along some of the tributaries of Brice Creek at CWMB, but this species may have some affinities for circum-neutral soils formed from weathered limestone in the bypass area. No evidence of circum-neutral soils has been seen at CWMB. However, lower in the watershed of Brice Creek, downstream of CWMB, plant species favored by circum-neutral soils do occur.

- *Plagiochila ludoviciana*--This liverwort species has been found on the bases of American Beech near and above blackwater streams. This species may also have an affinity for soils influenced by weathered limestone. It is likely not present at CWMB
- *Agalinis aphylla*--Scale-leaf gerardia is found in open, moist savanna habitat, characteristically in power transmission corridors that are regularly mowed. Habitat at CWMB may be present near the southwestern sections of the site where soils are sandier and contain a large amount of organic matter in pocosin-like habitats recently cleared for mitigation plantings in soils mapped as Murville. Reported occurrences of this species have not been verified in the study corridors for the US 70 Havelock Bypass for purposes of the current study.
- *Apocynum* sp.--This unidentified species of dogbane was found atop a heavily forested sandy ridge along a stream channel on the US 70 Havelock Bypass. This sort of habitat does not occur at CWMB.
- *Bartonia paniculata* spp. *paniculata*--Twining screwstem is found in cleared wet pocosin soils under power transmission corridors in the bypass area, but was not added by the USFS as a PETS plant species until late 2007. Habitats at CWMB where this species may reside may be associated with Successional/Ruderal Habitats including those dominated by wet shrub-scrub and wet grass-sedge species.
- *Cirsium lecontei*--Leconte's thistle occurs in mesic savanna over loamy soils. These habitats occur largely within power transmission corridors maintained by regular mowing in the bypass area. No such habitat occurs in CWMB.
- *Cleistes bifaria*--Small spreading pogonia has been found within the US 70 Havelock Bypass Alternative Corridors in longleaf pine/switch cane savanna over loamy soils and at the edge of mucky loam soils in disturbed pocosin at the edge of stream channels. Suitable habitats may be present at CWMB within Successional/Ruderal Habitats including those dominated by wet shrub-scrub and wet grass-sedge species.
- *Lysimachia loomisii*--Loomis' loosestrife is a ubiquitous species of open wet areas where it is easily spread by animal and human vectors. This species is common in many open wet or mesic edge habitats at CWMB.
- *Malaxis spicata*--Florida adder's mouth may associate most closely with wooded, somewhat organic soils subject to slight sedimentation by calcium carbonate leached from limestone. Apparent preferred habitats are most usually found at the bases of slopes near blackwater streams. This combination of habitat features probably is not present at CWMB.
- *Oxypolis denticulata*--Savanna cowbane is a species of savannas over loamy soils with organic epipedons. Habitats of this sort may be found at CWMB associated with Successional/Ruderal Habitats including those dominated by wet shrub-scrub and wet grass-sedge species.
- *Paspalum dissectum*--Mudbank crown grass is associated with lentic habitats and seen during seasonal draw-down phases when bottom substrate is exposed. Habitat may exist in association with borrow ponds at CWMB.

- *Persicaria hirsuta*--Hairy knotweed is characteristically found in more or less permanent pond, stream or ditch habitats. It may also be associated with beaver impoundments along streams. This species may be sought along small stream Swamp Forest or flooded borrow area Ponds.
- *Platanthera integra*--Yellow fringeless orchid is most usually associated with wet savannas in the coastal plain. Habitat associated with hydric Pine Flatwoods may exist at CWMB.
- *Platanthera nivea*--Snowy orchid is often found in wet savanna habitats dominated by Pond Cypress. Habitat associated with hydric Pine Flatwoods may exist at CWMB.
- *Polygala hookeri*--Hooker's milkwort is known from loamy, mesic savannas in the bypass corridors and is most usually associated with power corridors. Its occurrence in the CWMB project area is doubtful, but it may be found in drier phases of Successional/Ruderal Habitats, wet grass-sedge.
- *Ponthieva racemosa*--Shadow-witch is known to associate most closely with wooded somewhat organic soils subject to slight sedimentation by calcium carbonate leached from limestone. Apparent preferred habitats are most usually found at the bases of slopes near blackwater streams. This combination of habitat features probably is not present at CWMB.
- *Rhynchospora oligantha*--Feather-bristle beaksedge may be found associated with somewhat disturbed wet savannas or open bog edges. Habitat for this species in wet grass-sedge Successional Ruderal Habitat may be present at CWMB.
- *Rhynchospora scirpoides*--Long-beak baldsedge has not been reported from the Havelock Bypass Corridors. It was documented at the CWMB in the power transmission corridor near the eastern boundary and, given the right conditions, should be expected more extensively within the mitigation bank. This is an annual and a drawdown species. It may appear as a pioneer on non-flooded, mucky substrate wherever the seed manages to germinate, if other variables allow.
- *Scleria georgiana*--Georgia nutrush is associated with savannas and may be found along the upper rims of natural ponds in the Havelock Bypass Alternative Corridors. Its occurrence at CWMB is doubtful, but if present it may be found in savanna-like habitat along the more open edges of Pine Flatwoods, mesic near the central western edge of the CWMB.
- *Solidago verna*-- Spring-flowering goldenrod is found in mesic pine savanna under closed or scattered pine canopy and responds positively to canopy loss along power transmission corridors and to fire. Mesic Pine Flatwoods over loamy soils at CWMB may provide needed habitat essentials, but preliminary searches in this limited habitat at CWMB have had only negative results.

6.0 Occurrences of USFS PETS Animal Species

The USFS has issued a list of animal species that are considered important to the overall species diversity supported within Croatan National Forest. This list of the PETS animal species is presented below (Table 4). Among these. animal species are those which have been reported within or near the US 70 Havelock Bypass Alternative Corridors, as well as seven which thus far have been reported from the CWMB.

Table 4. Summary of USFS PETS animal species as applicable to the CNF.

Common Name [a]	**Scientific Name** [a]	**Habitat at CWMB** [d]
Mollusks		
Atlantic geoduck	*Panopea bitruncata*	None
triangle floater	*Alasmidonta undulata*	None
Atlantic pigtoe	*Fusconaia masoni*	None
eastern lampmussel	*Lampsilis radiata*	None
chameleon lampmussel	*Lampsilis* sp. 2	None
green floater	*Lasmigona subviridis*	None
squawfoot	*Strophitus undulatus*	None
Savannah lilliput	*Toxolasma pullus*	None
blackwater ancylid	*Ferrissia hendersoni*	None
Crustaceans		
graceful clam shrimp	*Lynceus gracilicornis*	PSh, SRg
North Carolina spiny crayfish	*Orconectes carolinensis*	SFs
Tar River crayfish	*Procambarus medialis*	None
Croatan crayfish	*Procambarus plumimanus* [d]	Scattered throughout
Aquatic Insects		
a mayfly	*Baetisca laurentina*	None
Fish and Aquatic Salamanders		
Atlantic sturgeon	*Acipenser oxyrhynchus*	None
spinycheek sleeper	*Eleotris pisonis*	None
Lyre goby	*Evorthodus lyricus*	None
freckled blenny	*Hypsoblennius ionthas*	None
least brook lamprey	*Lampetra aepyptera*	None
pinewoods shiner	*Lythrurus matutinus*	None
Carolina madtom	*Noturus furiosus*	None
bridle shiner	*Notropis bifrenatus*	None
sandhills chub	*Semotilus lumbee*	None
Neuse River waterdog	*Necturus lewisi*	SFs
Non-Aquatic Insects		
a dart moth	*Agrotis carolina*	PFm
Venus flytrap cutworm moth	*Hemipachnobia subporphyrea*	SRg

Table 4 Continues.

Table 4 Continued.

Common Name [a]	**Scientific Name** [a]	**Habitat at CWMB** [d]
a bird-dropping moth	*Lithacodia* sp. 1 [b]	SRs
Lemmer's pinion	*Lithophane lemmeri*	None
an owlet moth	*Meropleon diversicolor sullivani*	None
an owlet moth	*Franclemontia interrogans*	Scattered throughout
southern ptichodis	*Ptichodis bistrigata*	None
annointed sallow moth	*Pyreferra ceromatica*	PSh, PFh, SRs
Carter's noctuid moth	*Spartiniphaga carterae*	PSh
arogos skipper	*Atrytone arogos arogos*	PSh
little metalmark	*Calephelis virginiensis* [b]	PSh
Berry's skipper	*Euphyes berryi*	P
two-spotted skipper	*Euphyes bimaculata*	PSh
Duke's skipper	*Euphyes dukesi*	None
dotted skipper	*Hesperia attalus slossonae*	None
slender-bodied melanoplus	*Melanoplus attenuatus*	SRs, PFh, PSh
a short-winged melanoplus	*Melanoplus nubilus*	SRs, PFh, PSh
Terrestrial Amphibians		
Carolina gopher frog	*Rana capito*	UHF, PH
Reptiles		
American alligator	*Alligator mississippiensis* [c]	Scattered throughout
eastern diamondback rattlesnake	*Crotalus adamanteus*	UHF, PH
southern hognose snake	*Heterodon simus*	UHF, PH
Carolina salt marsh snake	*Nerodia sipedon williamengelsi*	None
mimic glass lizard	*Ophisaurus mimicus*	UHF, PH
black swamp snake	*Seminatrix pygaea*	P, SFs
Mammals		
red wolf	*Canis rufus*	Throughout
Rafinesque's big-eared bat	*Corynorhinus rafinesquii*	Scattered throughout
southeastern myotis	*Myotis austroriparius* [d]	Scattered throughout
eastern woodrat - coastal population	*Neotoma floridana floridana*	None
eastern cougar	*Puma concolor couguar*	Throughout
Dismal Swamp southern bog lemming	*Synaptomys cooperi helaletes*	SRs
Birds		
Bachman's sparrow	*Aimophila aestivalis* [b]	PSh, PFh, PFm, SRg (edges)
Henslow's sparrow	*Ammodramus henslowii* [b]	SRs, SRg, PCh
anhinga	*Anhinga anhinga* [c]	P, SFs, NSB (flooded portions)
American bittern	*Botaurus lentiginosus* [c]	SRg, PCh
northern harrier	*Circus cyaneus*	None – nesting habitat (marshes) not present
yellow rail	*Coturnicops noveboracensis*	SRg
black-throated green warbler	*Dendroica virens waynei* coastal population [b,c]	NSB

Table 4 Continues.

Table 4 Concluded.

Common Name [a]	**Scientific Name** [a]	**Habitat at CWMB** [d]
bald eagle	*Haliaeetus leucocephalus* [c]	Observed, nesting not confirmed
black-necked stilt	*Himantopus mexicanus*	None
Mississippi kite	*Ictinia mississippiensis* [c]	SFs, NSB
migrant loggerhead shrike	*Lanius ludovicia migrans*	SRg, PSh
painted bunting	*Passerina ciris ciris*	None
double-crested cormorant	*Phalacrocorax auritis* [c]	NSB (along Long Lake)
red-cockaded woodpecker	*Picoides borealis* [b]	TBD

[a] Common and scientific names in this table follow those in use by the North Carolina Natural Heritage Program (Franklin and Finnegan 2006) unless otherwise indicated.

[b] PETS animal species potentially affected by the US 70 Havelock Bypass.

[c] PETS animal species reported from CWMB.

[d] P=Pond; PCh=Powerline Corrider, hydric; PFh=Pine Flatwoods, hydric; PFm=Pine Flatwoods, mesic; PSh=Pine Savanna, hydric; SFs=Swamp Forest, small stream; Srg=Successional/Ruderal Habitat, wet grass-sedge; SRs=Succsessional/Ruderal Habitat, wet shrub-scrub; NSB=Non-riverine Swamp/Bay Forest; PH=Pine/Hardwood Forest; UHF=Upland Hardwood Forest.

A brief review of each species potentially directly or indirectly affected by the US 70 Havelock Bypass study corridors and an assessment of its potential for occurring within the CWMB follows.

- *Aimophila aestivalis* – The focus of conservation efforts in the CNF is on breeding habitat for Bachman's sparrow. Bachman's sparrow breeds in dense grassy areas with an open canopy of pine species. On the CWMB these habitats may occur in drier areas that resemble pine savanna habitat including portions of the grass-sedge Successional/Ruderal areas.
- *Ammodramus henslowii* -- Henslow's sparrow can be found in similar habitats to Bachman's sparrow but generally occupies areas with a higher occurrence of shrub strata as opposed to tree strata. These habitats may be found on the CWMB in the vegetation assemblages grass-sedge and shrub-scrub Successional/Ruderal areas and hydric powerline corridors.
- *Calephelis virginiensis* — Little metalmark is found in open pine savanna habitats with open pine canopies with thistle (*Cirsium* spp.). Potential habitat for this species is present on the CWMB in the Pine Savanna habitat areas.
- *Dendroica virens waynei* — Black-throated green warbler was a common breeder heard singing on territory throughout the Non-riverine Swamp Forest/Bay Forest prior to mitigation activities. Confirmation of continued usage of these habitats on the CWMB should be made in the spring, as well as investigating the other swamp stream habitats on the CWMB.

- *Lithacodia* sp. 2 — This bird dropping moth is found in dense pocosin-like habitats that have a high occurrence of switch cane as well as the shrubby edges of other pine habitats where switch cane is common.
- *Myotis austroriparius* — Southeastern myotis utilizes larger dead trees with hollow cavities in close proximity to water and generally forages over open water. Potential roosting sites may now be found scattered throughout the CWMB with foraging opportunities present in scattered areas which experience extended periods of flooding.
- *Picoides borealis* — Red cockaded woodpeckers habitat and mitigation opportunities are being evaluated under a separate agreement by J. Carter Associates. A report summarizing findings will be provided to NCDOT under separate cover.
- *Procambarus pluminanus* — Croatan crayfish is likely present in permanent waters and temporary waters scattered throughout the site.

Observations of American bittern, double-crested cormorant, bald eagle, Mississippi kite, and northern harrier have occurred on the CWMB. No nesting habitat is present for northern harrier or American bittern, which may be present on the CWMB in suitable habitat during non-breeding season. CWMB may provide potential nesting habitat for Mississippi kite and bald eagle but no evidence of usage of the site for nesting has been observed. Double-crested cormorant has been observed in Long Lake but no nesting activity has been observed. However, potential nesting habitat is present.

Anhingas nested on the CWMB in 2007 and 2008. In May 2007 at least nine adults were observed with two confirmed on nests at the location noted on Figure 3; one nest and at least six adults were observed at the same location in May 2008. No effort was made to systematically investigate this colony due to concerns over disturbing nesting activities.

American alligator is widespread throughout the site in areas where permanent water occurs. Evidence of successful reproduction has been observed since the completion of mitigation activities in the areas identified as the Anhinga colony noted on Figure 3.

7.0 PETS Species and Potential Habitat Management Strategies

Various habitats associated with the proposed Havelock Bypass Alternative Corridors have been shown to support small occurrences of PETS species. As indicated previously, in an attempt to develop mitigation measures for possible loss of these occurrences preliminary surveys were undertaken to: 1) determine the presence and type of PETS habitats present throughout CWMB; 2) determine which habitats may be potentially suitable for PETS species, with specific emphasis on the species potentially affected directly or indirectly by the US 70 Havelock Bypass; and 3) evaluate existing habitats in CWMB as mitigation sites for Havelock Bypass PETS species. The subject for discussion now will involve the last point.

Two mapped vegetation units at CWMB are in the more youthful seral stages following clearing. These units are the wet scrub-shrub and wet grass-sedge variants of the Successional/Ruderal Habitat vegetation unit and are currently worthy of consideration for long-term management (Figure 3). These areas were planted in 2001-2002 with tree species mixes selected for targeted plant community restoration.

Habitats found at CWMB may be limited in their current capacity to support US 70 Havelock Bypass PETS species. The following points are important to consider with respect to the currently understood list of these species:

- Of the habitat types identified on the CWMB, the generalized savanna habitat included in the hydric Pine Savanna vegetation unit is the most important with respect to potential habitat for the largest number of PETS species. Savanna is a very general term and refers to vegetation forms consisting of a more or less continuous stratum of predominantly herbaceous species, but often with scattered shrub species, below an open or scattered canopy dominated by pines or occasionally pond cypress. Savannas form in wet, mesic (moist), and xeric (dry) environments and in a variety of soil types.

- Savanna habitats require burning for maintenance. Without fire, shrubs will quickly overtake open herbaceous vegetation, shading and blocking direct sunlight needed for optimum growth. The course of succession with fire can be highly variable depending on species compositions, soil characteristics and soil moisture conditions. Over-lapping fire regimes can eventually create a broad patchwork of vegetation patterns, each holding particular affinities for a few or a set of fire-adapted plant species. Adaptation to fires by plants may take many forms. One such adaptation in pond pine, seed-bearing cones that begin to open only during periods of high heat, is considered specific to pocosin or savanna habitats in our area. Management surrogates sometimes used in place of fire, specifically mowing and bush-hogging, are intolerant of optimum soils conditions and produce their own set of secondary impacts in natural vegetation.

- Documentation of occurrences of rare plants is not always a process that can be accomplished over one or two growing seasons. Factors governing the appearance of plants from season to season may change depending on unknown variables in species and habitat ecology. A multitude of factors can limit the growth of plants. Such species as snowy orchid are prime examples of rare plants that may not reappear on a yearly basis.

It does not appear that savanna has been an important habitat type in the overall natural vegetation of CWMB for many years. This may mean that seed or diaspore sources for many savanna species are absent. Evidence of fire within the CWMB habitats is present, but it is not common or widespread. Management of habitat with fire, specifically those habitats which can develop into some sort of savanna, is the most effective tool available for maintaining a fire sub-climax vegetation type. With the implementation of frequent fire, some occurrences of Successional/Ruderal Habitat, including wet shrub-scrub and wet grass-sedge variants, can be managed in the form of savanna habitat. These are the habitats considered potentially most valuable for management of many of the PETS species. However, most of the savanna types at CWMB would be wet with intermittent or seasonal standing water. Potential for mesic savanna with largely emergent soils at CWMB is limited. Specific areas of hydric Pine Savanna and Successional/Ruderal Habitat that should be assessed for potential restoration/management as Pine Savanna are identified in Figure 3.

Fire may also be an important tool in returning hydric Pine Flatwoods or transitional Pine Flatwoods to a fire sub-climax vegetation type. It appears that both of these habitats, especially hydric Pine Flatwoods have been deeply burned in the past, possibly during only a few events. Dominants in this habitat complex are widely scattered trees and an open tall shrub stratum quite capable of supporting several important rare species. The hydric Pine Flatwoods mapped at CWMB in the extreme northwestern portion of the mitigation site should be assessed carefully for potential restoration to Pine Savanna (Figure 3). Since this forest type will slowly change without recurrent fire, this tool should be considered in its management.

Recurrent fire anywhere through habitats in CWMB would produce unique and potentially important habitats that have long been absent from the larger landscape of eastern North Carolina and the CNF. A mitigation area dedicated to the preservation of fire sub-climax communities could be of value in understanding these long-stifled habitats and in providing potential habitat for a suite of PETS species.

8.0 Summary

Sixteen broad vegetation categories were identified, preliminarily assessed, and described from field data gathered during an evaluation of the roughly 4,035-acre CWMB. These habitats were compared with the current list of PETS plant and animal species reported from the proposed US 70 Havelock Bypass study corridors. Comparisons with existing habitats were made to establish the potential existence of these species in CWMB and/or to assess the potential for mitigation of these species using the resources present in CWMB. Potential management of habitat for PETS species was also considered both for those species reported from the proposed Havelock Bypass as well as others listed for the CNF.

The possibility of finding all or most of the plant species in question within CWMB is low. Three PETS plants and two PETS animal species were identified on the CWMB during field investigations (Figure 3). Several additional PETS bird species have been observed on the CWMB, but nesting of these species has not been confirmed. A possible rare plant species find, swamp jessamine, can be verified in spring. This species is not currently on the USFS list of PETS species. Characteristics of the available habitats at CWMB currently favor mostly a few savanna-pocosin edge plant species.

The possibility of considering CWMB for management as a fire sub-climax mitigation area would allow for additional PETS species mitigation opportunities beyond those available on the CWMB without management. In general, those PETS species with a reasonable capability of using wet, currently unmanaged, savanna available in one habitat complex in the northern end and one complex near the southern end of CWMB could be expected to be present. Management of habitat using fire would increase the numbers of PETS species for which mitigation measures might be attempted. A few other species that utilize swamp forest habitats, both small stream and nonriverine/bay forest types, can be expected to utilize or continue to utilize the CWMB; active management of these habitats is not expected to be necessary for these species.

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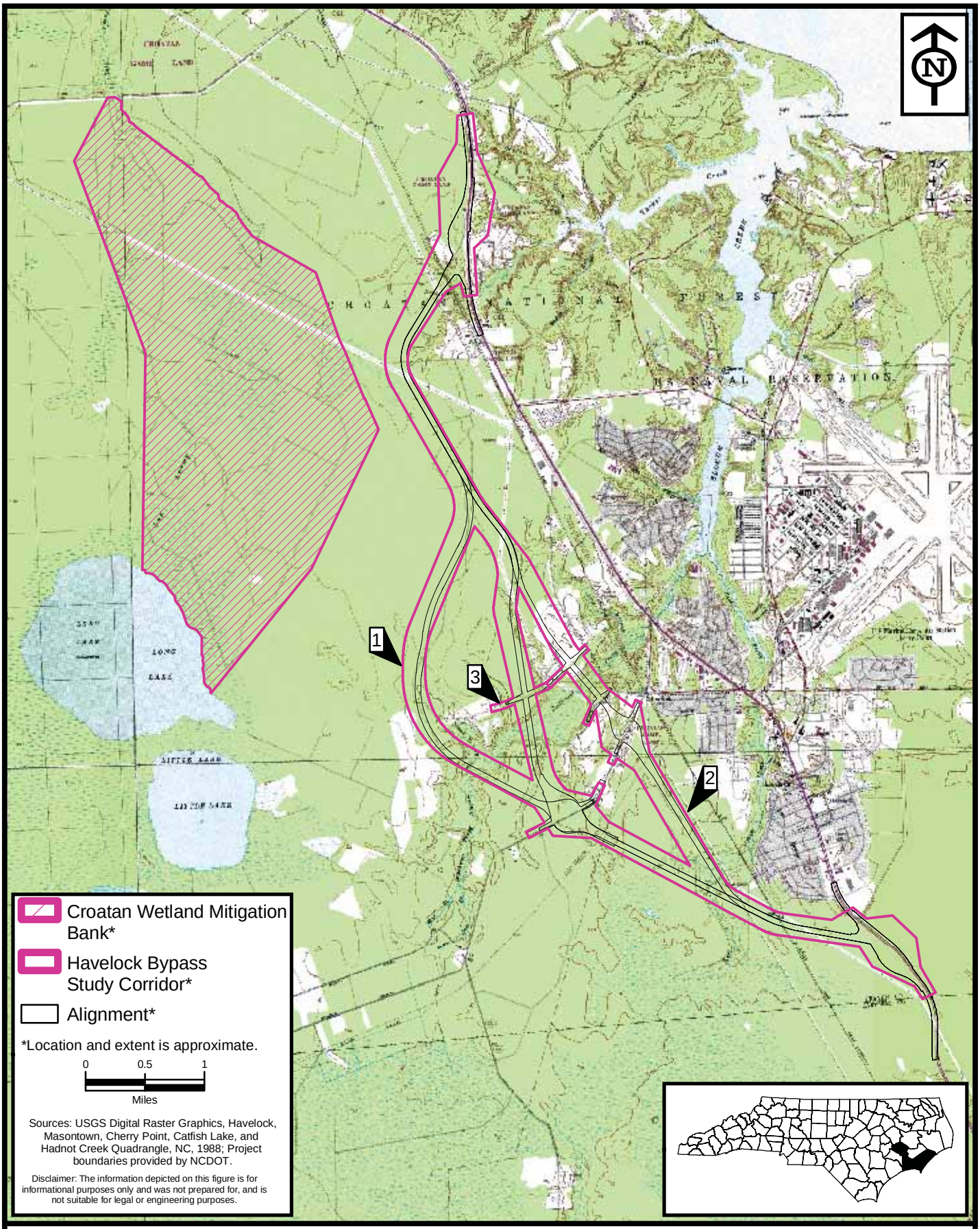
Appendix 1



ENVIRONMENTAL SERVICES, INC.
524 S. New Hope Road
Raleigh, North Carolina 27610
(919) 212-1760
(919) 212-1707 FAX
www.environmentalservicesinc.com

Project Location
Croatan Wetland Mitigation Bank PETS Species Evaluation
Craven County, North Carolina
T.I.P. No. R-1015

Project:	ER06091.03
Date:	May 2008
Drwn/Chkd:	ESL/MKS
Figure:	**1**

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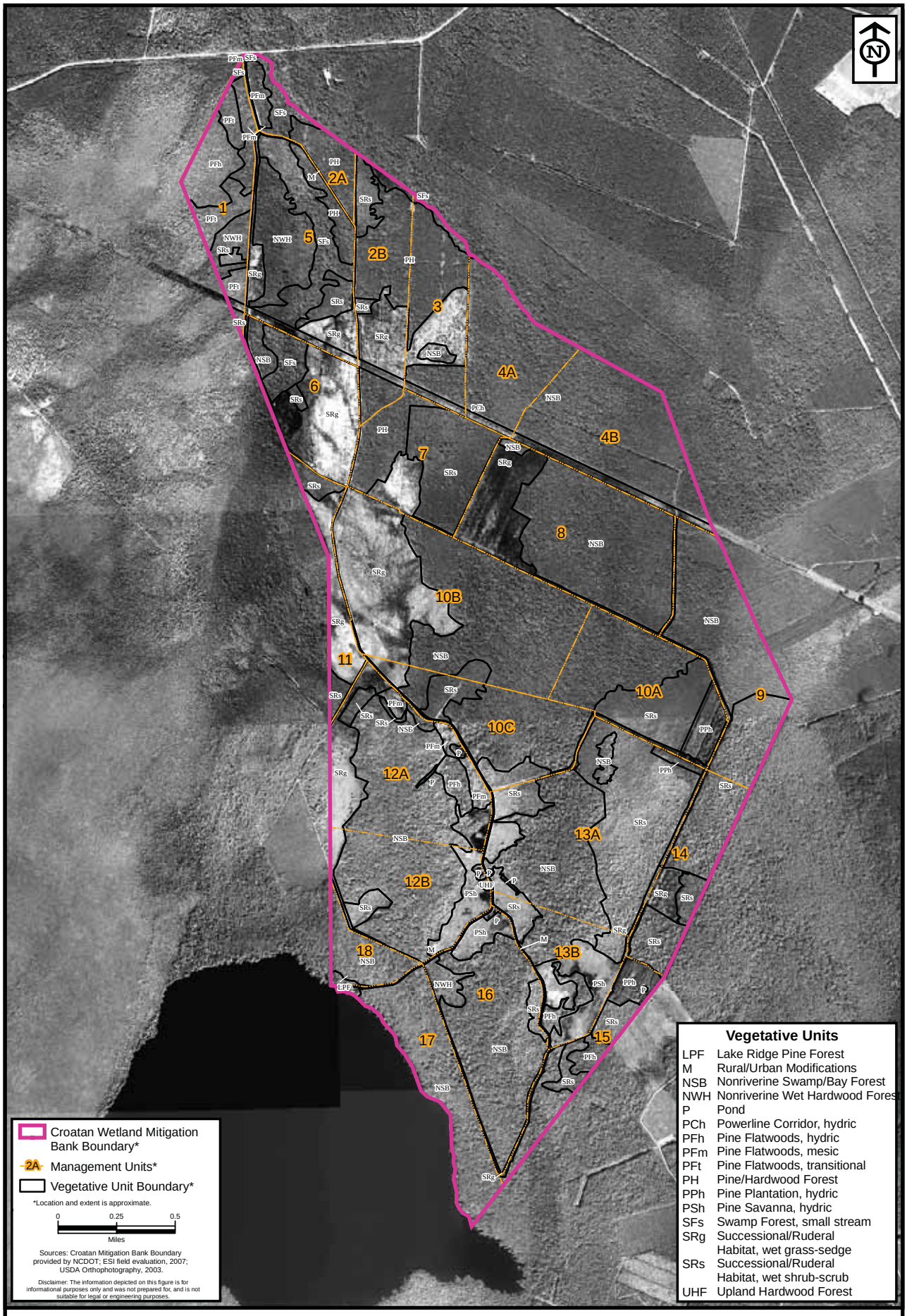

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524 S. New Hope Road
Raleigh, North Carolina 27610
919-212-1760
919-212-1707 FAX
www.environmentalservicesinc.com

Vegetative Units
Croatan Wetland Mitigation Bank PETS Species Evaluation
Craven County, North Carolina
T.I.P. No. R-1015

Project:	ER06091.03
Date:	May 2008
Drwn/Chkd:	ESL/MKS
Figure:	2

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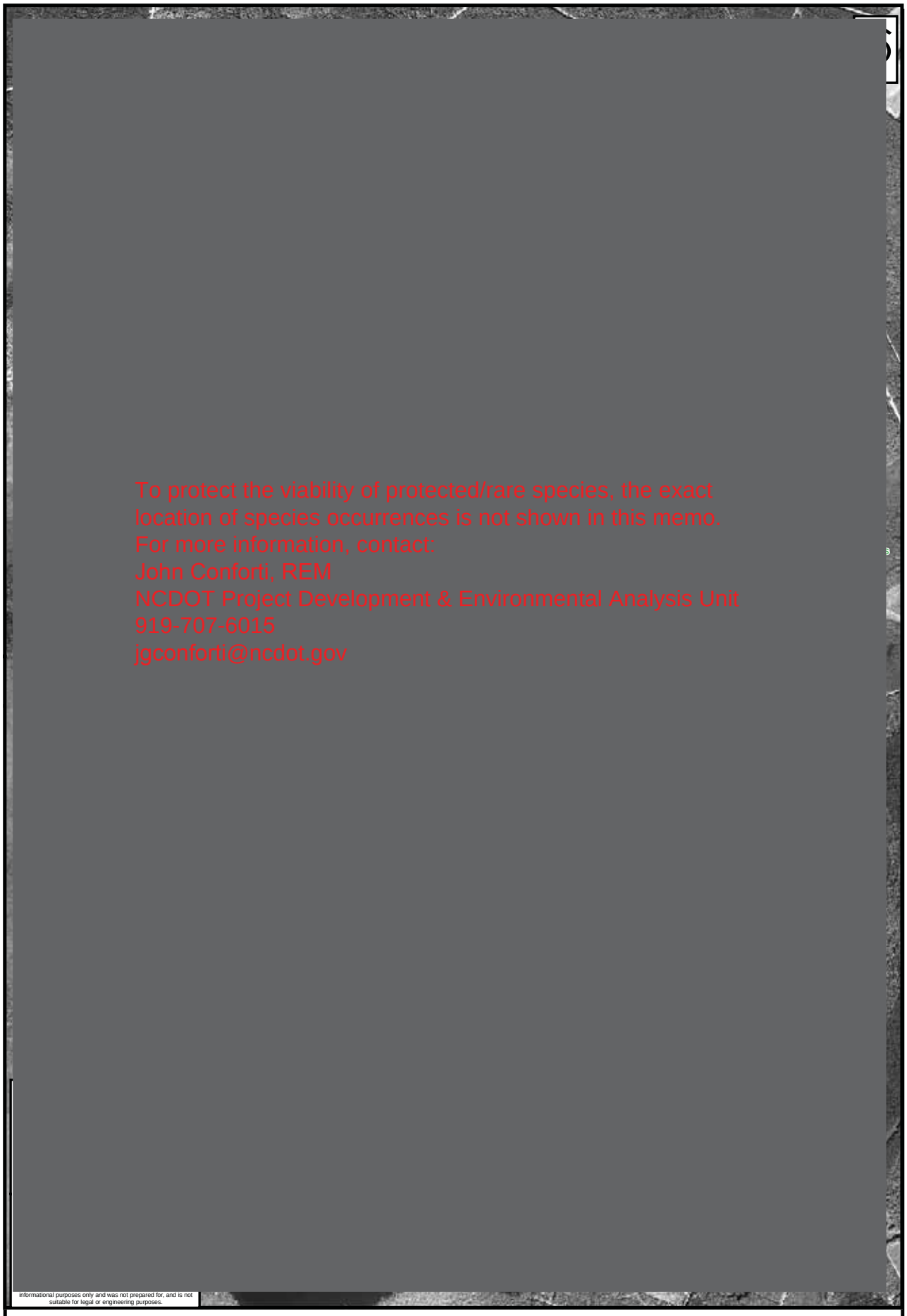

ENVIRONMENTAL SERVICES, INC.
524 S. New Hope Road
Raleigh, North Carolina 27610
919-212-1760
919-212-1707 FAX
www.environmentalservicesinc.com

PETS Species Occurrences
Croatan Wetland Mitigation Bank PETS Species Evaluation
Craven County, North Carolina
T.I.P. No. R-1015

Project:	ER06091.03
Date:	May 2008
Drwn/Chkd:	ESL/MKS
Figure:	**3**

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Appendix 2

PETS List Taxonomy Changes (December 2007)

Old Name	**New Name**
Sphagnum macrophyllum floridanum	*Sphagnum cribosum*
Carex willdenowii megarhyncha	*Carex superata* (Not a PETS species)
Arnoglossum ovatum	*Arnoglossum ovatum lanceolatum*
Oxypolis ternata	*Oxypolis denticulata*
Polygonum hirsutum	*Persicaria hirsuta*
Sagittaria graminea chapmanii	*Sagittaria chapmanii*
Sagittaria graminea weatherbiana	*Sagittaria weatherbiana*
Xyris difformis floridana	*Xyris floridana*
Agrotis n. sp. 1	*Agrotis carolina*
Phragmitiphila interrogans	*Franclemontia interrogans*
Corynorhinus rafinesquii	*Corynorhinus rafinesquii macrotis*
Neotoma floridana pop. 1	*Neotoma floridana floridana*

NCNHP is no longer tracking the subspecies of the following:

Lanius ludovicia migrans

Rana capito capito

ATTACHMENT 5

2008 USFS PETS SPECIES SURVEYS AND MITGATIVE MEASURES EVALUATION FOR THE US 70 HAVELOCK BYPASS ON THE CROATAN NATIONAL FOREST (CNF) CRAVEN AND CARTERET COUNTIES, NORTH CAROLINA

State Project N. 8.T170701

TIP R-1015

Federal Aid Project No. R-56-4(34)

Consulting Project No. 06-ES-03

THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
Project Development and Environmental Analysis Branch
Natural Environment Unit

June 2009

Table of Contents

List of Tables

1.0 Introduction

Environmental Services, Inc., (ESI) has been assisting NCDOT with the evaluation of U.S. Forest Service (USFS) Proposed, Endangered, Threatened, or Sensitive (PETS) species for the US 70 Havelock Bypass project. Since the proposed project crosses U.S. Forest Service (USFS) property (Figure 1 in Appendix A), a special use permit from the USFS will be required. Prior to approving a special use permit for the project, the USFS requires that potential direct and indirect impacts to PETS species be evaluated and that mitigative measures to offset potential impacts to PETS species be identified.

This study serves as a part of the mitigative measures to assist NCDOT in obtaining a special use permit for the project. Specifically this study attempts to identify additional occurrences of specific PETS species of concern not previously documented by USFS or in North Carolina Natural Heritage Program (NCNHP) records. Also at the request of USFS, known occurrences of several potentially impacted PETS species were also reviewed to determine if they continued to exist. The results of this study are included in Section 3.0. Non-targeted PETS species identified during the course of the surveys are also included.

In addition, an areal analysis of direct and indirect PETS species impacts for the US 70 Havelock Bypass study corridor alternatives is included in Appendix B. This analysis provides areal impacts to individual polygons representing sub-element occurrences of element occurrences for these species as tracked by the NCNHP.

2.0 Areas Evaluated

The Croatan National Forest (CNF) outside of the areas being directly or indirectly impacted by the US 70 Havelock Bypass was included in this study and used as the basis for selecting the areas that were surveyed. Specific areas surveyed within the CNF were selected based on a combination of ecological factors including: soil type, vegetative community type, frequency of fire management, hydrology, slope aspect, forest age, and known occurrences of other rare species. Mapping depicting the areas evaluated as part of this study is included as Figure 2.

3.0 Survey Results

Surveys were initiated in July 2008 and continued through the end of the 2008 growing season, with a final survey conducted in May 2009. Twelve new PETS species occurrences, representing five targeted species, were documented (Table 1) during this period. Seven additional non-targeted PETS species occurrences, representing five species incidentally documented during this period; are presented in Section 3.16. Mapping depicting the locations of new occurrences of PETS species documented by this study is included in Figure 3.

Table 1. New Occurrences of Targeted PETS Species Documented 2008-2009

Common Name	**Scientific Name**	**USFS Status**	**Site Name** [a]
Twining screwstem	*Bartonia paniculata paniculata*	LR	Millis Swamp Rd A
Twining screwstem	*Bartonia paniculata paniculata*	LR	Hibbs Rd
Twining screwstem	*Bartonia paniculata paniculata*	LR	Powerline south of Lake Rd
Fitzgerald's peatmoss	*Sphagnum fitzgeraldi*	S	Camp Sam Hatcher Rd
Fitzgerald's peatmoss	*Sphagnum fitzgeraldi*	S	Powerline north of US 70
Hooker's milkwort	*Polygala hookeri*	S	Millis Swamp Rd A
A liverwort	*Lejeunea bermudiana*	LR	SW Prong Slocum Creek
A bird dropping moth	*Lithacodia* sp.	LR	FR 147
A bird dropping moth	*Lithacodia* sp.	LR	FR 169
A bird dropping moth	*Lithacodia* sp.	LR	Haywood Landing
A bird dropping moth	*Lithacodia* sp.	LR	FR 3046
A bird dropping moth	*Lithacodia* sp.	LR	Powerline @ Sunset Blvd

[a] See figures 1 and 2.

3.1 Twining Screwstem (*Bartonia paniculata paniculata*)

Twining screwstem generally occurs in open wet areas over sandy or peaty soils in association with sphagnum moss. In the CNF these habitats are often found in powerline rights-of-way and open depressional areas within pine savannas, flatwoods, and pocosins. This species is sensitive to changes in hydrology.

Multiple locations throughout the CNF were investigated in order to search for new occurrences of this species. Areas searched included potentially suitable habitat identified within recently burned wet pine savannas and power line rights-of-way. During the course of this study three new occurrences of twining screwstem were documented on the CNF. This increases the total number of known occurrences of twining screwstem on the CNF to four. One previously documented occurrence (EO #25322) and one of the newly documented occurrences (EO # not yet assigned) of twining screwstem are located in areas subject to potential indirect impacts that could result from the US 70 Havelock Bypass. Tnd the other two newly documented occurrences (EO# not yet assigned) are located in portions of the CNF unaffected by the US 70 Havelock Bypass.

The two occurrences of this species with potential indirect impacts are located in powerline easements that are subject to regular management through mowing. No change in management of the existing habitat is expected to result from project construction. Indirect impacts can be minimized through strict implementation of NCDOT BMPs for Construction and Maintenance Activities and other measures that consider the ecological requirements of this species, particularly managing open habitat and maintaining existing hydrology for its habitat. Due to the close proximity (less than 200 ft) of one of these occurrences (EO # 25322) to a shared section of

all three corridors and the close proximity (less than 200 ft) of another occurrence (EO# not yet assigned) to Corridor 2, special consideration should be made during the roadway design process to avoid alterations to surface and groundwater hydrology in these areas. In addition, appropriate restrictions should be placed and enforced during project construction to prevent these areas being used as construction staging areas. The seeding mix used for road shoulder stabilization should contain native species and avoid using invasive species that could encroach into adjacent habitats.

While two of these occurrences have potential indirect impacts, it is believed that the habitat for this species can be maintained if hydrological alterations are minimized. The habitat required by this species is fire-maintained, however the affected occurrences are located in areas that are currently being managed by mowing and construction of the US 70 Havelock Bypass is not expected to change management of these specific occurrences. No loss of viability is expected as a result of construction of the US 70 Havelock Bypass if potential indirect impacts are minimized through implementation of the measures identified.

3.2 Leconte's Thistle (*Cirsium lecontei*)

Leconte's thistle is a biannual herb that generally occurs in open pine flatwoods and savannas with moist to wet loamy or sandy soils. In the CNF these habitats are often found in power line rights-of-way. Frequent fire, especially during the growing season, is considered important to maintaining open habitat for this species.

To better understand the importance of occurrences of Leconte's thistle potentially impacted by the US 70 Havelock Bypass, ESI attempted to document the continued existence of a large occurrence documented in NCNHP records near Millis Road (EO # 24991) that if documented as thriving could potentially alleviate concerns regarding potential impacts to this species from project construction. It should be noted that the USFS conducted a controlled burn within this area during the winter of 2009.

ESI biologists David DuMond and Matt Smith reviewed the vicinity associated with this element occurrence on 21 July 2008 and 5 May 2009 and did not identify any individuals of Leconte's thistle. At the time of the investigation the habitat in the vicinity of this occurrence was composed of dense shrub cover with very limited open areas. No evidence of recent management through controlled burning was observed in 2008. This area was burned in the winter of 2009 and if this land management practice continues including controlled burns, further review of this area may potentially have greater success if the improved habitat conditions result in re-colonization of this area.

One occurrence (EO # 25190) of this species will be directly affected by Corridor 1, and three occurrences (EO # 22758, 23163, 25190) of this species will each be directly affected by Corridor 2 and Corridor 3. Portions of each of these occurrences exist outside of the proposed impact area.

Direct impacts can be minimized through strict implementation of NCDOT BMPs for Construction and Maintenance Activities and other measures that consider the ecological requirements of this species, particularly for managing open habitat and maintaining proper hydrology for its habitat. Special consideration should be made during the roadway design process to minimize alterations to surface and groundwater hydrology in these areas. In addition, appropriate restrictions should be placed and enforced during project construction to prevent these areas being used as construction staging areas. The seeding mix used for road shoulder stabilization should contain native species and avoid using invasive species that could encroach into adjacent habitats.

Three of the occurrences (EO # 22758, 23163, 25190) of this species are fairly extensive and also have the potential for indirect impacts. These occurrences are located in powerline easements that are subject to regular management through mowing. No change in management of the existing habitat is expected to result from project construction. Indirect impacts can be minimized through strict implementation of NCDOT BMPs for Construction and Maintenance Activities and other measures that consider the ecological requirements of this species, particularly managing open habitat and maintaining existing hydrology for its habitat.

3.3 A Liverwort (*Lejeunea bermudiana*)

This liverwort generally occurs on the bark at the base of mature hardwood trees within swamp forests that flood on an infrequent basis. These swamp forests typically occur in areas with high topography and the presence of marl at or near the surface within the swamp forest may be important for producing suitable habitat and conditions for this species.

Multiple locations throughout the CNF were surveyed in order to search for new occurrences of this species. Areas searched included potentially suitable habitat identified in portions of Southwest Prong Slocum Creek, Otter Creek, Tucker Creek, Holston Creek, Hadnot Creek, Pettiford Creek, and others. One new occurrence of *Lejeunea bermudiana* (EO # not yet assigned) was identified in a portion of Southwest Prong Slocum Creek not previously surveyed. This increases the total number of known occurrences on the CNF to five.

One occurrence (EO # 25863) of this species will be directly impacted in a shared section of all three corridors and one additional occurrence (EO # 25862) will be directly impacted by Corridor 1 and Corridor 3.

Both occurrences (EO # 25862 and 25863) of this species with potential direct impacts are extensive and occupy large areas located in the Swamp Forest (large stream) community associated with Southwest Prong Slocum Creek. Due to the extensive nature of these two occurrences, the potential for indirect impacts was evaluated. Special consideration should be made during the roadway design process to avoid hydrological changes to Southwest Prong Slocum Creek. In addition, clearing within 200 feet of these occurrences should be avoided to

avoid increasing direct sunlight on this occurrence, which could adversely affect temperature and moisture conditions.

While two of the five occurrences have potential direct impacts, due to the extensive nature of the occurrences, only part of the occurrences will be directly impacted. For the remaining portions of the occurrences subject to indirect impacts, it is believed that the habitat for this species can be maintained if hydrological alterations and clearing limits are minimized and this species viability on the CNF will not be affected. The habitat required by this species is not fire-maintained, and construction of the US 70 Havelock Bypass is not expected to change USFS management of this habitat. No loss of viability as expected as a result of construction of the US 70 Havelock Bypass.

3.4 A Bird-dropping Moth (*Lithacodia* sp.)

This species of moth occurs in pine flatwoods and savannas with groundcover dominated by giant cane (*Arundinaria gigantea*). Habitat in the CNF is often found in powerline rights-of-way and open forested habitats dominated by giant cane.

During the course of this study, rare moth data were obtained from Dr. Bo Sullivan including five additional occurrences of this species on the CNF. This increases the total number of known occurrences on the CNF to seven.

The three occurrences (EO # not assigned) of this species with potential indirect impacts are located in a powerline right-of-way subject to regular management through mowing in close proximity to existing roads. No change in management of the existing habitat is expected to result from project construction. Appropriate restrictions should be placed and enforced during project construction to prevent these areas being used as construction staging areas. The seeding mix used for road shoulder stabilization should contain native species and avoid using invasive species that could encroach into adjacent habitats. No loss of viability is expected as a result of construction of the US 70 Havelock Bypass if potential indirect impacts are minimized through implement of the measures identified.

3.5 Florida Adder's Mouth (*Malaxis spicata*)

Florida adder's mouth occurs in higher areas subject to less frequent flooding within swamp forests. In general these areas have little competition from shrub and other herbaceous species.

An occurrence (EO # 2536) of Florida adder's mouth located at the intersection of Greenfield Heights Blvd and Southwest Prong Slocum Creek was evaluated on 22 July 2008 and 6 May 2009 to determine if it extends onto USFS property. This occurrence was determined to extend onto USFS property and is in an area subject to potential indirect impact. This is the only occurrence of this species potentially affected by the US 70 Havelock Bypass and one other

occurrence of this species is present on a portion of the CNF unaffected by the US 70 Havelock Bypass.

The one occurrence (EO # 2536) of this species with potential indirect impacts is located along the ecotone between the Swamp Forest (large stream) community and Pine Hardwood community associated with Southwest Prong Slocum Creek approximately 500 feet east of Alignment 2. Special consideration should be made during the roadway design process to avoid hydrological changes to Southwest Prong Slocum Creek. In addition, clearing within 200 feet of this occurrence should be avoided so that the current amount of available sunlight is maintained. It should be noted that the USFS thinned pine stands located within 200 feet of this occurrence in spring 2009.

The habitat required by this species is not fire-maintained, and construction of the US 70 Havelock Bypass is not expected to change USFS management of this habitat. No loss of viability is expected as a result of construction of the US 70 Havelock Bypass.

3.6 Southeastern Myotis (*Myotis austroriparius*)

Southeastern myotis is most often associated with old-growth bottomland hardwood swamp forests. The forest stand characteristic that is thought to be most important is the presence of a preponderance of large diameter trees with cavities.

NCDOT biologists conducted mist-netting for this species on the Croatan Wetland Mitigation Bank. Southeastern myotis was not documented during the mist-netting conducted but Rafinesque's big-eared bat (*Corynorhinus rafinesquii*) was identified in this location. NCDOT plans to conduct additional surveys in the spring of 2009. ESI will provide NCDOT biologists with potential sampling locations identified during the 2008 surveys for use in NCDOT's 2009 surveys.

The one occurrence (EO #24788) of southeastern myotis with potential indirect impacts is located in the Swamp Forest (large stream) community associated with Southwest Prong Slocum Creek east of Corridor 2. Special consideration should be made during the roadway design process, specifically with the design of this bridge, to maintain connectivity between upstream and downstream habitats. The bridge should be designed to be low enough to allow for bats to fly over without being hit by traffic or high enough for bats to pass under easily. Consideration could be given to incorporating bat-roosting access into the bridge design, or attaching a bat house under or in close proximity to the bridge. In addition, clearing of trees within the Southwest Prong Slocum Creek floodplain should be minimized in proximity to the bridge in order to minimize impacts to the habitat for this species. No loss of viability is expected as a result of construction of the US 70 Havelock Bypass.

3.7 Mudbank Crown Grass (*Paspalum dissectum*)

Mudbank crown grass is generally found in mud flats with little competition from other species. In the CNF this habitat is found along the margins of depressional areas that typically flood during the winter months and drawdown in the spring and summer.

Multiple locations throughout the CNF were surveyed to search for new occurrences of this species. Areas searched included potentially suitable habitat within wet depressions identified in powerline rights-of-way and pine flatwoods during the course of the field reviews. Most of the depressions investigated did not show evidence of recent periods of inundation. These areas exhibited evidence of water table drawdown likely due to the drier than normal conditions during the preceding year and included well established woody and herbaceous vegetation. No new occurrences of this species were identified during the course of this study. It is likely that drier than normal conditions during the growing season contributed to not finding new occurrences of this species.

Several attempts were also made to document the continued existence of the occurrence (EO # 21480) of this species potentially affected by the US 70 Havelock Bypass. The habitat in the area of this occurrence was found to be degraded by extended dry periods and encroachment by competing herbaceous and woody species. ESI biologists were not able to document the presence of this occurrence of this species. This species may be present in the area, but not fully vegetatively expressed due to site conditions; this species may become more apparent in this area when a return to normal hydrologic conditions occurs and regular inundation and draw-down events reoccur in these depressional pools. This occurrence is located in two distinct depressions separated by approximately 1400 ft of non-suitable habitat. One of these locations will be directed impacted by a shared section of Corridor 2 and Corridor 3. The other location has potential indirect impacts for all three Corridors.

This occurrence is located in a powerline easement that is subject to regular management through mowing. No change in management of the existing habitat is expected to result from project construction. Special consideration should be made during the roadway design process to avoid alterations to surface and groundwater hydrology in these areas. In addition, appropriate restrictions should be placed and enforced during project construction to prevent these areas being used as construction staging areas. The seeding mix used for road shoulder stabilization should contain native species and avoid using invasive species that could encroach into adjacent habitats.

3.8 A Liverwort (*Plagiochila ludoviaciana*)

This liverwort generally occurs on the bark at the base of mature hardwood trees within swamp forests that flood on an infrequent basis. These swamp forests typically occur in areas with high

topography and the presence of marl outcrops within the swamp forest may be an important part of the habitat for this species.

Multiple locations throughout the CNF were surveyed in order to search for new occurrences of this species. Areas searched included potentially suitable habitat identified within portions of Southwest Prong Slocum Creek, Otter Creek, Tucker Creek, Holston Creek, Hadnot Creek, Pettiford Creek, and others. No new occurrences of this species were identified during the course of this study. Currently only one occurrence of this species (EO # 25196) is known from the CNF.

The only occurrence (EO # 25196) of this species on the CNF will be directly affected by Corridor 1, based on the preliminary design. No impacts to this species are anticipated to result from the construction of either Corridor 2 or Corridor 3. If Corridor 1 is determined to be the preferred alternative for this project then the USFS may recommend that the alignment be shifted to avoid direct impacts to this species. Special consideration should be made during the roadway design process to avoid alterations to surface and groundwater hydrology in this area. In addition, appropriate restrictions should be placed and enforced during project construction to prevent this area being used as construction staging area. The seeding mix used for road shoulder stabilization should contain native species and avoid using invasive species that could encroach into adjacent habitats. No loss of viability is expected as a result of construction of the US 70 Havelock Bypass if either Corridor 2 or Corridor 3 are selected as the preferred alternative.

3.9 Yellow Fringeless Orchid (*Platanthera integra*)

Yellow fringeless orchid is a perennial herb that generally occurs in open pine flatwoods and savannas with wet loamy or sandy soils. In the CNF these habitats are often found in powerline rights-of-way. Frequent fire is considered important to maintaining open habitat for this species.

Multiple locations throughout the CNF were surveyed in order to search for new occurrences of this species. Areas searched included potentially suitable habitat identified within recently burned wet pine savannas and power line rights-of-way. No individuals of this species were identified during the surveys. However, the common small white fringed orchid (*Platanthera blephariglottis*) and yellow fringed orchid (*Platanthera ciliaris*) were observed at each location investigated. It is likely that drier than normal conditions during the growing season contributed to not finding new occurrences of this species.

The one occurrence (EO # 170) of this species with potential indirect impacts is located in a portion of the Pine Flatwoods (mesic) community that is currently managed by controlled burns. Further coordination with the USFS may be necessary to determine if a management strategy is available that does not adversely affect this occurrence for Corridor 1, 2, or 3 if it is determined that this area can no longer be managed by controlled burns. Indirect impacts can be minimized through strict implementation of NCDOT BMPs for Construction and Maintenance Activities and

other measures that consider the ecological requirements of this species, particularly for managing the open habitat and maintaining proper hydrology. Due to the close proximity (less than 200 ft) of this occurrence to Corridor 2, special consideration should be made during the roadway design process to avoid alterations to surface and groundwater hydrology in these areas. In addition, appropriate restrictions should be placed and enforced during project construction to prevent these areas being used as construction staging areas. The seeding mix used for road shoulder stabilization should contain native species and avoid using invasive species that could encroach into adjacent habitats. No loss of viability is expected as a result of construction of the US 70 Havelock Bypass if the habitat can continue to be maintained by burning or other suitable means, and if potential indirect impacts are minimized trough implementations of the measures identified.

3.10 Snowy Orchid (*Platanthera nivea*)

Snowy orchid is a perennial herb that generally occurs in open pine flatwoods and savannas with wet loamy or sandy soils. In the CNF these habitats are often found in powerline rights-of-way. Frequent fire is considered important to maintaining open habitat for this species.

Multiple locations throughout the CNF were surveyed in order to search for new occurrences of this species. Areas searched included potentially suitable habitat identified within recently burned wet pine savannas and power line rights-of-way. No individuals of this species were identified during the surveys. However, the common small white fringed orchid and yellow fringed orchid were observed at each location investigated. It is likely that drier than normal conditions during the growing season contributed to not finding new occurrences of this species.

Several attempts (September 2004, August 2007, July 2008, September 2008) were also made to document the continued existence of a historic occurrence (EO # 18805) of this species in an area subject to potential indirect impacts that could result from the US 70 Havelock Bypass. ESI biologists were not able to find evidence of the continued presence of this species at the historic occurrence location. The habitat in the vicinity of this occurrence is composed of dense shrub cover with very limited open areas. No evidence of recent management through controlled burning was observed. If land management practices change and controlled burns are conducted, further review of this area may potentially have greater success in documenting this species, if this species is still present but not vegetatively expressed due to current habitat conditions. The adjacent powerline corridor is too dry to support suitable habitat for this species.

It is recommended that this occurrence be removed from impact consideration for the US 70 Havelock Bypass project because no known occurrences will be directly impacted and the historic occurrence subject to consideration for indirect impacts may no longer exist. If the USFS does not concur with this recommendation then indirect impacts can be minimized through strict implementation of NCDOT BMPs for Construction and Maintenance Activities and other measures that consider the ecological requirements of this species, particularly for managing open

habitat and maintaining proper hydrology for its habitat. In addition, appropriate restrictions should be placed and enforced during project construction to prevent this area being used as a construction staging area. The seeding mix used for road shoulder stabilization should contain native species and avoid using invasive species that could encroach into adjacent habitats. No loss of viability is expected as a result of the construction of the US 70 Havelock Bypass.

3.11 Hooker's Milkwort (*Polygala hookeri*)

Hooker's milkwort generally occurs in open wet areas over sandy or peaty soils. In the CNF these habitats are often found in powerline rights-of-way and pine savannas. Frequent fires or mowing is important in maintaining the open character of this species habitat.

Multiple locations throughout the CNF were surveyed in order to search for new occurrences of this species. Areas searched included potentially suitable habitat identified within recently burned wet pine savannas and power line rights-of-way. One new occurrence of this species was identified in a recently burned wet pine savanna locate at the end of Millis Swamp Road. This increases the total number of known occurrences of Hooker's milkwort on the CNF to nine including two occurrences with potential indirect impacts.

The two occurrences (EO # 22925, 18855) of this species located in areas subject to indirect impacts are found in powerline rights-of-way subject to regular management through mowing. No change in management of the existing habitat is expected to result from project construction. Indirect impacts can be minimized through strict implementation of NCDOT BMPs for Construction and Maintenance Activities and other measures that consider the ecological requirements of this species, particularly managing open habitat and maintaining existing hydrology for its habitat. Due to the close proximity (less than 200 ft) of one of these occurrences (EO # 18855) to Corridor 2, special consideration should be made during the roadway design process to avoid alterations to surface and groundwater hydrology in these areas. In addition, appropriate restrictions should be placed and enforced during project construction to prevent these areas being used as construction staging areas. The seeding mix used for road shoulder stabilization should contain native species and avoid using invasive species that could encroach into adjacent habitats. No loss of viability is expected as a result of construction of the US 70 Havelock Bypass if potential indirect impacts are minimized through implementation of the measures identified.

3.12 Short-bristled Beaksedge (*Rhynchospora breviseta*)

Short-bristled beaksedge generally occurs in open wet areas over sandy or peaty soils. In the CNF these habitats are often found in powerline rights-of-way and pine savannas. Frequent fires or mowing is important in maintaining the open character of this species habitat.

Multiple locations throughout the CNF were surveyed in order to search for new occurrences of this species. Areas searched included potentially suitable habitat identified within recently burned wet pine savannas and powerline rights-of-way. No individuals of this species were identified during the surveys. It is likely that drier than normal conditions during the growing season contributed to not finding new occurrences of this species.

One occurrence (EO # 21978) of this species will be directly impacted in a shared section of all three corridors. The USFS may allow this impact to be offset through efforts to relocate the population outside the construction areas, or through efforts to use seeds from this occurrence for efforts to establish a new occurrence elsewhere. Conversely, the USFS may recommend that the preferred alignment be shifted to avoid direct impacts to this species.

The occurrences (EO # 21978, 22290) of this species with potential indirect impacts are located in a powerline right-of-way subject to regular management through mowing. No change in management of the existing habitat is expected to result from project construction. Special consideration should be made during the roadway design process to avoid alterations to surface and groundwater hydrology in these areas. In addition, appropriate restrictions should be placed and enforced during project construction to prevent these areas being used as construction staging areas. The seeding mix used for road shoulder stabilization should contain native species and avoid using invasive species that could encroach into adjacent habitats.

3.13 Georgia Nutrush (*Scleria georgiana*)

Georgia nutrush generally occurs in open wet areas over sandy or peaty soils. In the CNF these habitats are often found in powerline rights-of-way and pine savannas. Frequent fires or mowing is important in maintaining the open character of this species habitat.

This species is not currently listed as a species of concern by the NCNHP but is still included as a PETS species since the CNF is located near the northern extent of this species range. It should be noted that numerous occurrences of this species are present in southeastern North Carolina, many on protected lands. ESI biologists revisited two known occurrences of this species indirectly (EO # 2585, 23196) affected by the US 70 Havelock Bypass on 22 July 2008. The habitat at one of these occurrences (EO # 2585) was modified to the point that it no longer provided suitable habitat for the this species (a recently plowed fire break). ESI biologists reviewed the vicinity associated with the other occurrence (EO # 23196) and did not identify any individuals of Georgia nutrush despite the habitat appearing to remain suitable. It is possible that this species is still present as seeds dormant in the seed bank at this site but did not appear in 2008 due to drier than normal conditions during the growing season. It is possible that this occurrence may be expressed vegetatively and be more apparent in a year with normal rainfall.

The two occurrences (EO # 2585, 23196) of this species with potential indirect impacts for Corridor 1 are located in a powerline easement that is subject to regular management through

mowing. No change in management of the existing habitat is expected to result from project construction. These occurrences are both located approximately 2400 feet east of Corridor 1 and 200 feet west of Corridor 3. Indirect impacts can be minimized through strict implementation of NCDOT BMPs for Construction and Maintenance Activities and other measures that consider the ecological requirements of this species, particularly for managing open habitat and maintaining proper hydrology for its habitat. In addition, appropriate restrictions should be placed and enforced during project construction to prevent this area being used as a construction staging area. The seeding mix used for road shoulder stabilization should contain native species and avoid using invasive species that could encroach into adjacent habitats. No loss of viability is expected as a result of construction of the US 70 Havelock Bypass.

3.14 Fitzgerald's Peatmoss (*Sphagnum fitzgeraldi*)

Fitzgerald's peatmoss is generally found in shallow depressional areas within pine flatwoods and savannas.

Multiple locations throughout the CNF were surveyed in order to search for new occurrences of this species. Areas searched included potentially suitable habitat identified within recently burned wet pine savannas and powerline rights-of-way. During the course of this study two new occurrence of Fitzgerald's peatmoss were documented on the CNF. This increases the total number of known occurrences of Fitzgerald's peatmoss on the CNF to six. One additional occurrence is present on the state-owned CWMB within the CNF.

One occurrence (EO # not yet assigned) of Fitzgerald's peatmoss is located such that it will be directly affected by the US 70 Havelock Bypass and one additional occurrence (EO # not yet assigned) is located in an area subject to potential indirect impacts. Four occurrences are located in portions of the CNF or protected state-owned land within the CNF unaffected by the US 70 Havelock Bypass.

The occurrence directly affected by the US 70 Havelock Bypass is located in a powerline right-of-way subject to regular management through mowing within a shared section of all three alternatives. A portion of this occurrence will not be directly impacted, but is subject to potential indirect impacts. If indirect impacts can be minimized through implementation of the measures identified below, then the loss of this occurrence should not affect the overall viability of this species on the CNF. The other occurrence subject to potential indirect impacts is located in a powerline right-of-way that is subject to regular management through mowing in close proximity to Corridor 3. No change in management of the existing habitat is expected to result from project construction. Special consideration should be made during the roadway design process to avoid alterations to surface and groundwater hydrology in these areas. In addition, appropriate restrictions should be placed and enforced during project construction to prevent these areas being used as construction staging areas. The seeding mix used for road shoulder stabilization

should contain native species and avoid using invasive species that could encroach into adjacent habitats.

3.15 Dusky Roadside Skipper (*Amblyscirtes alternata*)

Dusky roadside skipper is generally found in relatively open pine flatwoods and savannas with heavy coverage by wire grass (*Aristida stricta*).

This species was added to the PETS list subsequent to prior NCDOT PETS species investigations for the US 70 Havelock Bypass. As part of this present study ESI evaluated potential habitat within the US 70 Havelock Bypass and CWMB and identified potential areas of suitable habitat within portions of the CNF unaffected by the US 70 Havelock Bypass project. Portions of the CWMB identified in ESI's *Preliminary Habitat and PETS Species Evaluation for the Croatan Wetland Mitigation Bank* as Pine Savanna (hydric) may provide suitable habitat for this species if appropriate vegetation management is implemented. Within the US 70 Havelock Bypass study corridors, areas identified as Powerline Corridor (mesic) and Pine Flatwoods (mesic) in ESI's Natural Resources Technical Report may provide suitable habitat for this species if appropriate vegetation management is implemented.

One occurrence (EO # 25240) of this species was documented in 2007 by NCNHP biologists in an area east of Corridor 2 subject to potential indirect impacts for all three corridors. This is the only occurrence of this species within the CNF. Multiple butterfly surveys of the CNF by NCNHP biologists over multiple years have not identified additional occurrences of this species.

The one occurrence of this species with potential indirect impacts is located in a portion of the Pine Flatwoods (mesic) community to the east of Corridor 2 that is currently managed by controlled burns. Further coordination with the USFS may be necessary to determine if a management strategy is available that does not adversely affect this occurrence for Corridor 1, 2, or 3 if it is determined that this area can no longer be managed by controlled burns. Indirect impacts can be minimized through strict implementation of NCDOT BMPs for Construction and Maintenance Activities and other measures that consider the ecological requirements of this species, particularly for managing open habitat and maintaining proper hydrology for its habitat. Due to the close proximity of this occurrence to Corridor 2 (less than 200 ft), special consideration should be made during the roadway design process to avoid alterations to surface and groundwater hydrology in this area. In addition, appropriate restrictions should be placed and enforced during project construction to prevent this area being used as construction staging areas. The seeding mix used for road shoulder stabilization should contain native species and avoid using invasive species that could encroach into adjacent habitats. Dusky skipper is a minimally mobile animal species that should be able to remain viable if impacts to adjoining suitable habitat are avoided.

3.16 Other PETS Species

During the course of the field surveys for targeted PETS species and other investigations, several occurrences of PETS species not specifically targeted in this study were documented at various locations within the CNF. Table 2 provides a summary of non-targeted PETS species identified on the CNF during the course of the 2008-2009 field surveys. Mapping depicting the locations of new occurrences of PETS species is included in Figure 3.

Table 2. New Occurrences of Non-targeted PETS Species Documented 2008-2009

Common Name	**Scientific Name**	**USFS Status**	**Site Name**
Shadow-witch	*Ponthieva racemosa*	LR	Goodwin Creek
Spoonflower	*Peltandra sagittifolia*	LR	Powerline south of Creek Rd
Venus flytrap	*Dionaea muscipula*	S	Camp Sam Hatcher Rd
Piedmont cowbane	*Oxypolis denticulata*	S	Millis Swamp Rd A
Piedmont cowbane	*Oxypolis denticulata*	S	Millis Swamp Rd B
Piedmont cowbane	*Oxypolis denticulata*	S	Powerline south of Lake Rd
Rafinesque's big-eared bat	*Corynorhinus rafinesquii*	S	CWMB

None of these occurrences are in areas directly or indirectly affected by construction of the US 70 Havelock Bypass. Of these species, shadow-witch and piedmont cowbane are the only species for which other occurrences may be affected by the US 70 Havelock Bypass. Potential affects to individual occurrences of piedmont cowbane and shadow-witch is not expected to result in a loss of viability for these species as noted in previous documents.

4.0 Conclusions

This study provides the results of a surveys in 2008-2009 that attempted to identify new occurrences of fifteen USFS PETS species on the CNF. This survey effort serves as one mitigative measure to offset potential impacts to PETS species associated with the construction of the US 70 Havelock Bypass. In addition, this report discusses potential direct and indirect impacts to these fifteen PETS species and provides recommendations to minimize potential impacts and avoid a potential loss in viability for these species on the CNF.

The fifteen PETS species included in this study can be divided into two broad categories based on generalized habitat requirements for the purposes of discussing mitigative measures; 1) species that occur in open fire-maintained habitats; and 2) species that occur in mature swamp forest habitats.

Table 3. Species Habitat Categories

Fire Maintained Habitats	
Twining screwstem	Hooker's milkwort
Leconte's thistle	Short-bristled beaksedge
A bird dropping moth	Georgia nutrush
Mudbank crown grass	Fitzgerald's peatmoss
Yellow fringeless orchid	Dusky roadside skipper
Snowy orchid	
Swamp Forest Habitats	
A liverwort (*Lejeunea bermudiana*)	Southeastern myotis
Florida adder's mouth	A liverwort (*Plagiochila ludoviaciana*)

Fire-Maintained Habitats: Measures to Minimize Indirect Impacts

- Avoid hydrological alterations that either increase or decrease surface and groundwater in the vicinity of the occurrence.
- Use a seed mix that contains only native species.
- Avoid placing staging areas within 200 ft of occurrences.
- Avoid heavy equipment access, especially during wet periods.
- Avoid herbicide use.

Swamp Forest Habitats: Measures to Minimize Indirect Impacts

- Avoid clearing within 200 ft of occurrences.
- Avoid floodplain alterations that either increase or decrease the number, location, and velocity of overbank flooding events.
- Use a seed mix that contains only native species.
- Avoid herbicide use.

Those species currently located in powerline rights-of-way subject to frequent mowing are not anticipated to present a management concern to the USFS. In addition, species currently located in communities that are not fire maintained are not anticipated to present a management concern to the USFS. In general, it is recommended that power line rights-of-way and other open natural areas located adjacent to the proposed alignments not be used as staging areas to avoid indirect impacts and that native seed mixes be used whenever possible to avoid introduction of potentially invasive species.

Fifteen PETS species were evaluated as part of this study to identify new occurrences of each species in portions of the CNF unaffected by the US 70 Havelock Bypass as a mitigative measure to offset potential direct and indirect impacts to these fifteen species. In addition, potential indirect affects to each of these were presented along with mitigative measures that can be implemented to minimize indirect impacts. The viability on the CNF of the majority of the PETS species included in this study will not be adversely affected if the mitigative measures described above are implemented during the roadway design and construction process.

Five species, yellow fringeless orchid (*Platanthera integra*), Leconte's thistle (*Cirsium lecontei*), short-bristled beaksedge (*Rhynchospora breviseta*), dusky skipper (*Amblyscirtes alternata*), and a liverwort (*Plagiochila ludoviaciana*) have direct impacts and limited occurrences on the CNF. The occurrences of these species directly impacted by the project are all located in forested areas currently managed through controlled burns. Additional coordination with the USFS may be necessary to identify mitigative measures to offset impacts to these species and maintain the viability of these species on the CNF. Potential management strategies for yellow fringeless orchid, Leconte's thistle, and a liverwort could include a combination of relocation of affected populations to unaffected suitable habitat or collecting seeds or propagules from affected populations to use in establishing new populations in unaffected suitable habitat. Dusky skipper is a minimally mobile animal species that should be able to remain viable if impacts to adjoining suitable habitat are avoided.

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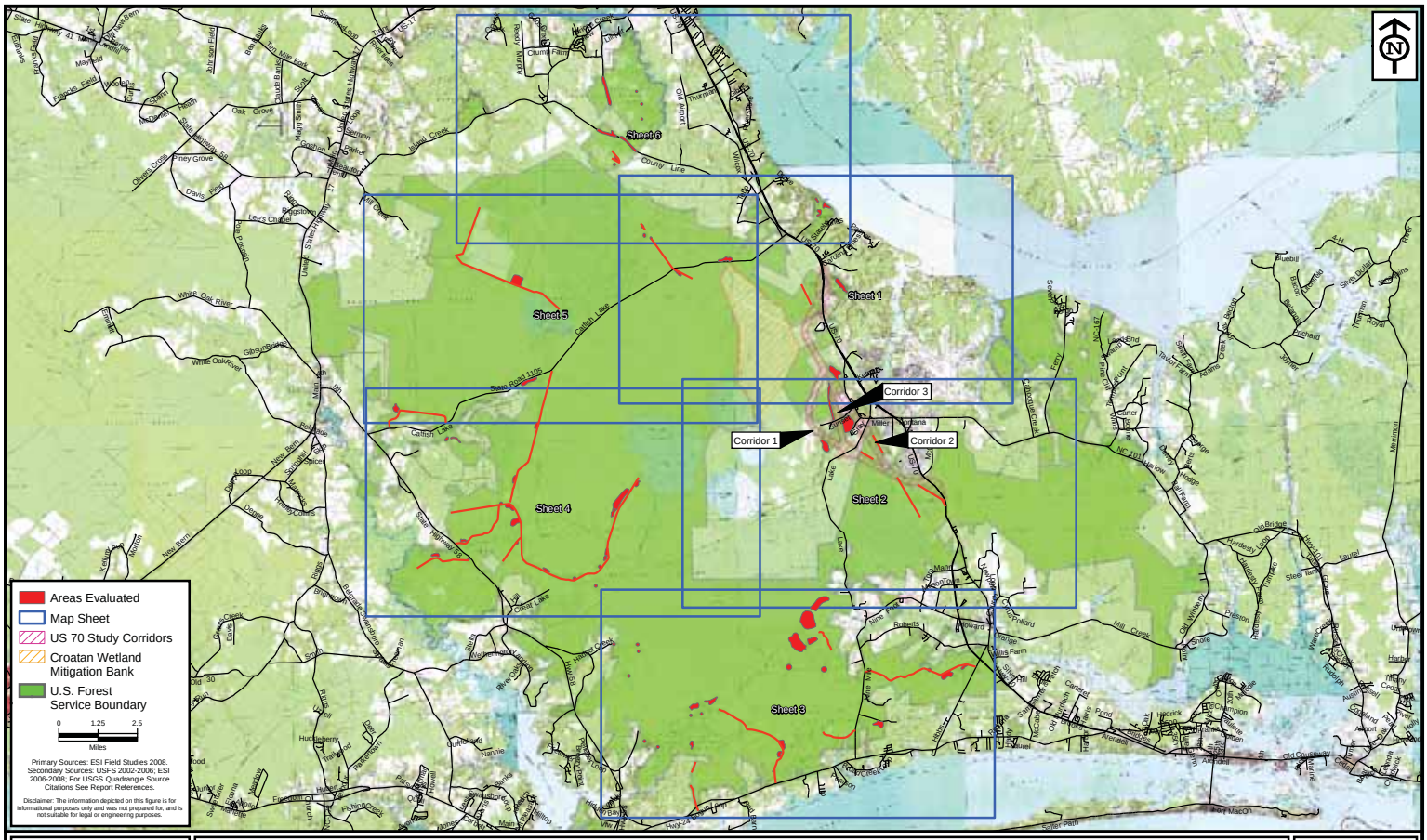
Appendix A:
Figures



ENVIRONMENTAL SERVICES, INC.
1022 Grandiflora Drive, Suite 250
Leland, North Carolina 28451
910-383-6020
910-383-6049 (fax)
www.environmentalservicesinc.com

Areas Evaluated

US 70 Havelock Bypass (R-1015) 2008 PETS Species Evaluations

Craven, Jones, & Carteret Counties, NC

Project:	ER06091.03
Date:	Jun 2009
Drwn/Chkd:	ESL/MKS
Figure:	1

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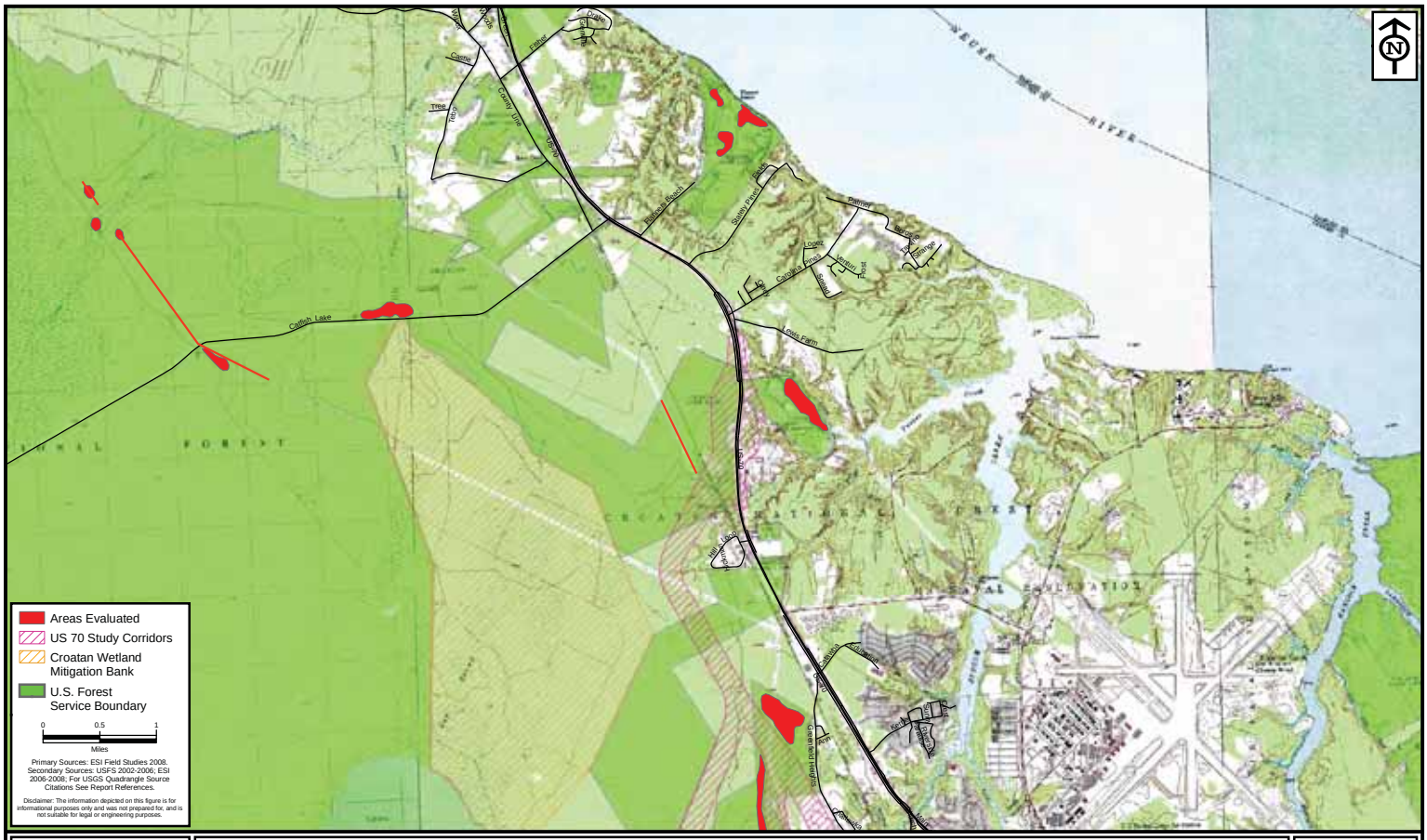

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1022 Grandiflora Drive, Suite 250
Leland, North Carolina 28451
910-383-6020
910-383-6049 (fax)
www.environmentalservicesinc.com

Areas Evaluated: Sheet 1

US 70 Havelock Bypass (R-1015) 2008 PETS Species Evaluations

Craven, Jones, & Carteret Counties, NC

Project:	ER06091.03
Date:	Jun 2009
Drwn/Chkd:	ESL/MKS
Figure:	**1a**

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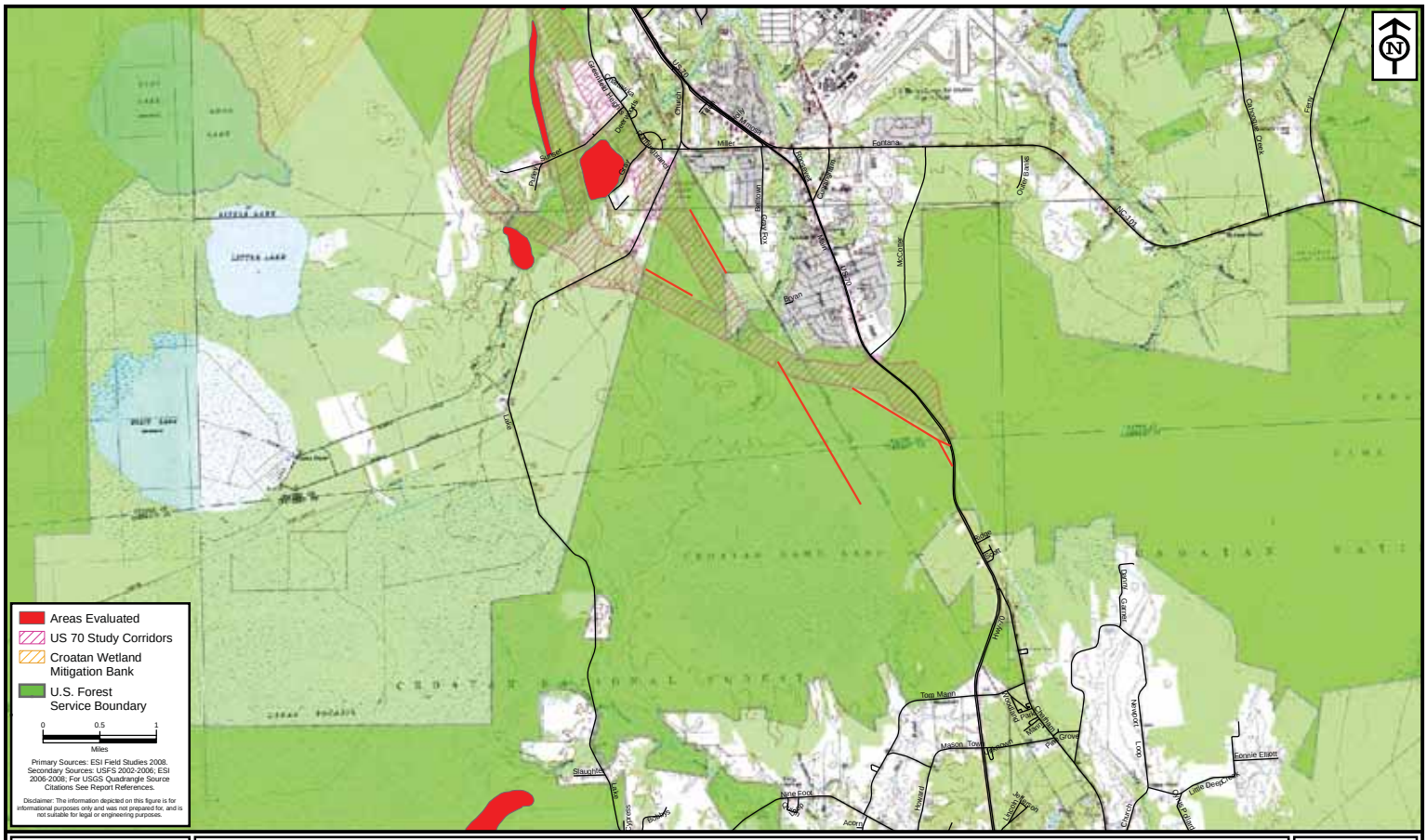

ENVIRONMENTAL SERVICES, INC.
1022 Grandiflora Drive, Suite 250
Leland, North Carolina 28451
910-383-6020
910-383-6049 (fax)
www.environmentalservicesinc.com

Areas Evaluated: Sheet 2

US 70 Havelock Bypass (R-1015) 2008 PETS Species Evaluations

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Project:	ER06091.03
Date:	Jun 2009
Drwn/Chkd:	ESL/MKS
Figure:	**1b**

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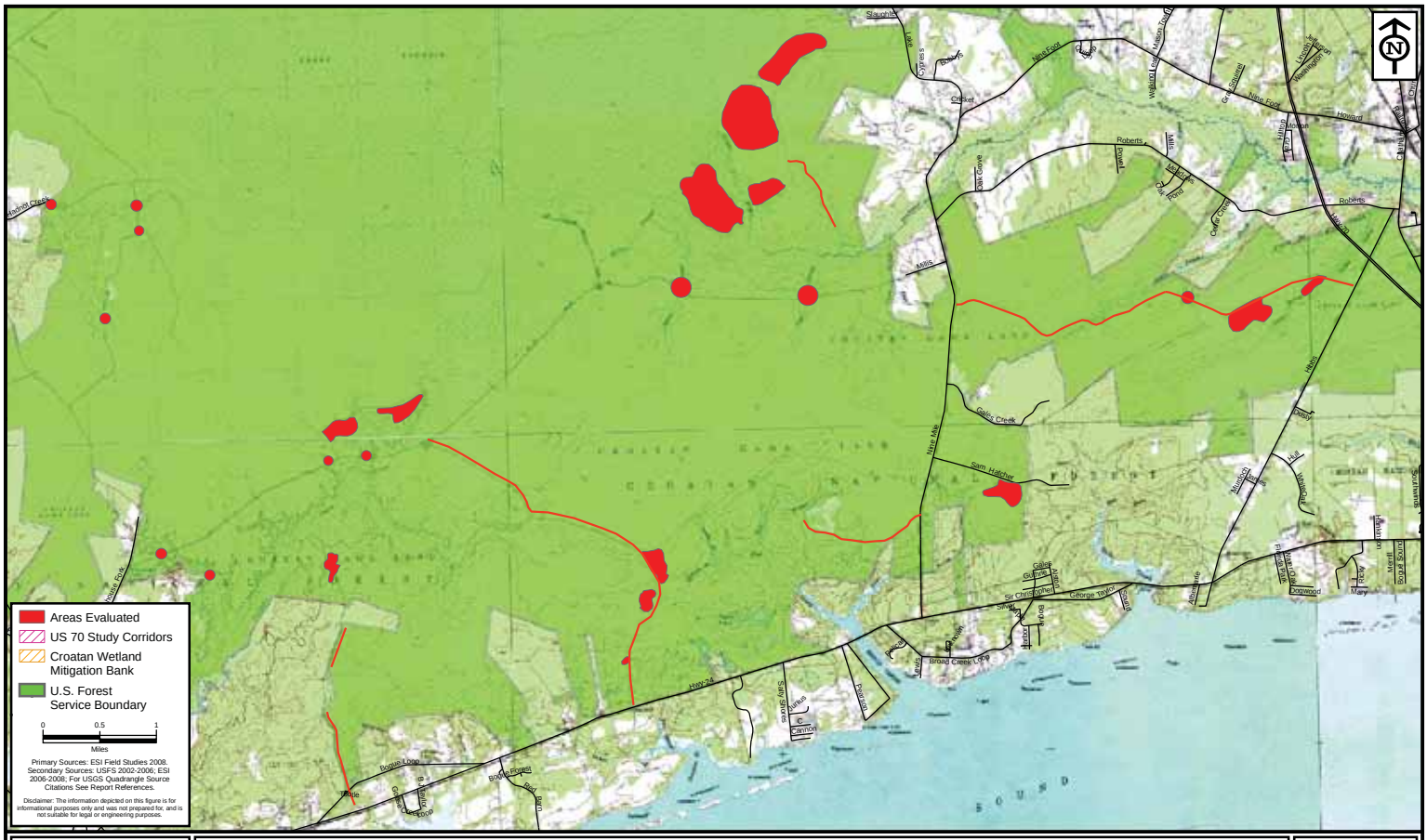

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1022 Grandiflora Drive, Suite 250
Leland, North Carolina 28451
910-383-6020
910-383-6049 (fax)
www.environmentalservicesinc.com

Areas Evaluated: Sheet 3

US 70 Havelock Bypass (R-1015) 2008 PETS Species Evaluations

Craven, Jones, & Carteret Counties, NC

Project:	ER06091.03
Date:	Jun 2009
Drwn/Chkd:	ESL/MKS
Figure:	**1c**

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Leland, North Carolina 28451
910-383-6020
910-383-6049 (fax)
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Areas Evaluated: Sheet 4

US 70 Havelock Bypass (R-1015) 2008 PETS Species Evaluations

Craven, Jones, & Carteret Counties, NC

Project:	ER06091.03
Date:	Jun 2009
Drwn/Chkd:	ESL/MKS
Figure:	**1d**

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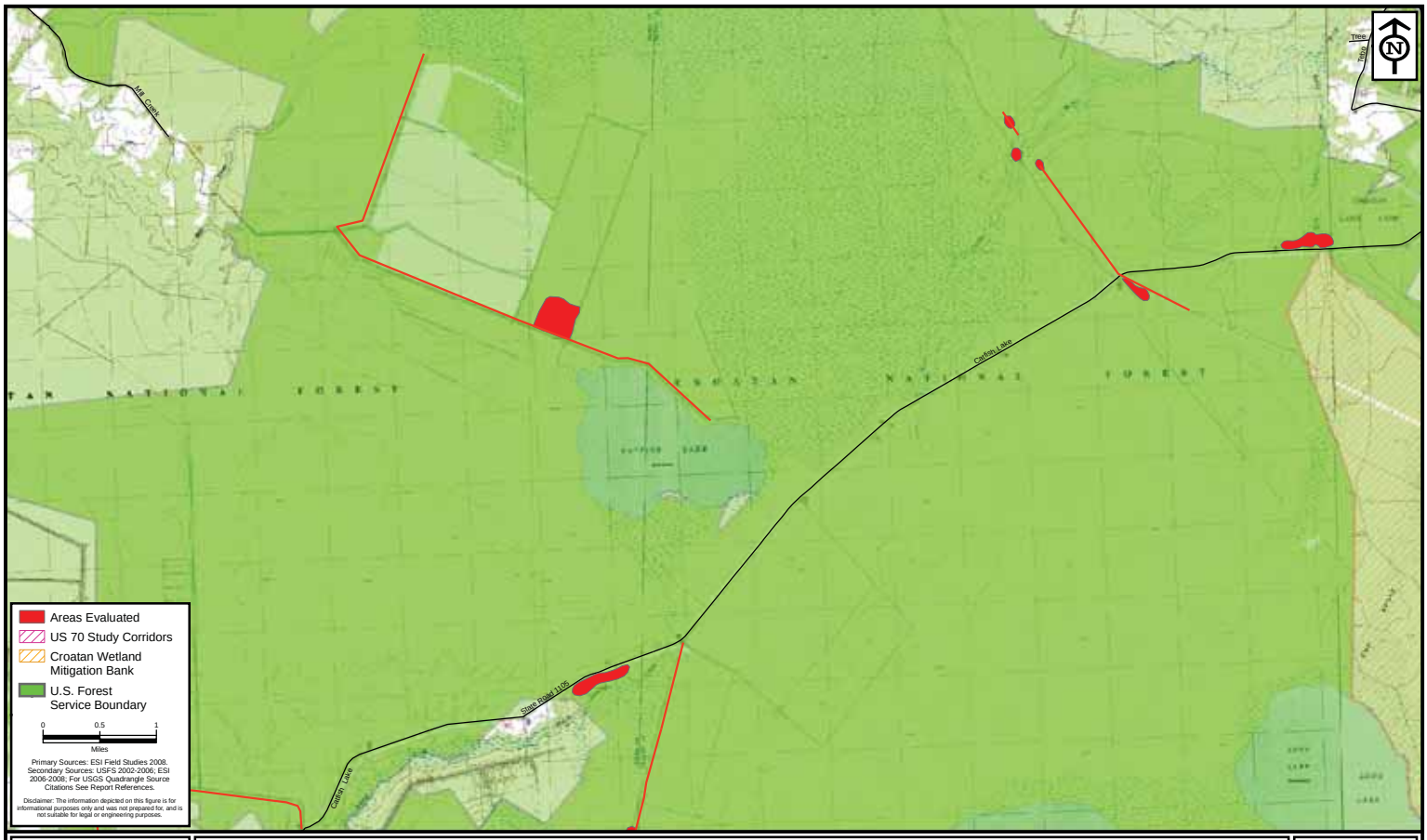

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1022 Grandiflora Drive, Suite 250
Leland, North Carolina 28451
910-383-6023
910-383-6049 (fax)
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Areas Evaluated: Sheet 5

US 70 Havelock Bypass (R-1015) 2008 PETS Species Evaluations

Craven, Jones, & Carteret Counties, NC

Project:	ER06091.03
Date:	Jun 2009
Drwn/Chkd:	ESL/MKS
Figure:	**1e**

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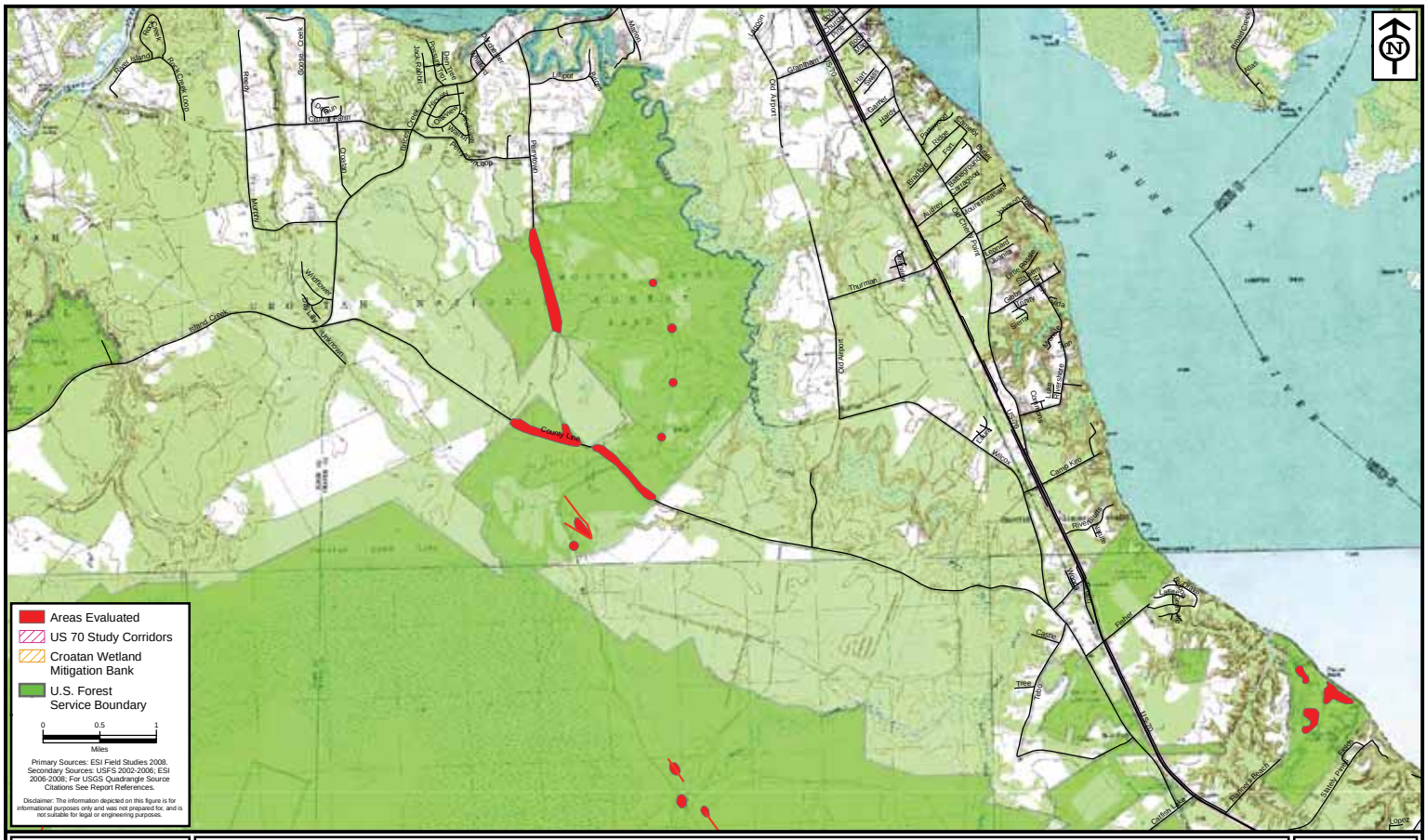

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1022 Grandiflora Drive, Suite 250
Leland, North Carolina 28451
910-383-6023
910-383-6049 (fax)
www.environmentalservicesinc.com

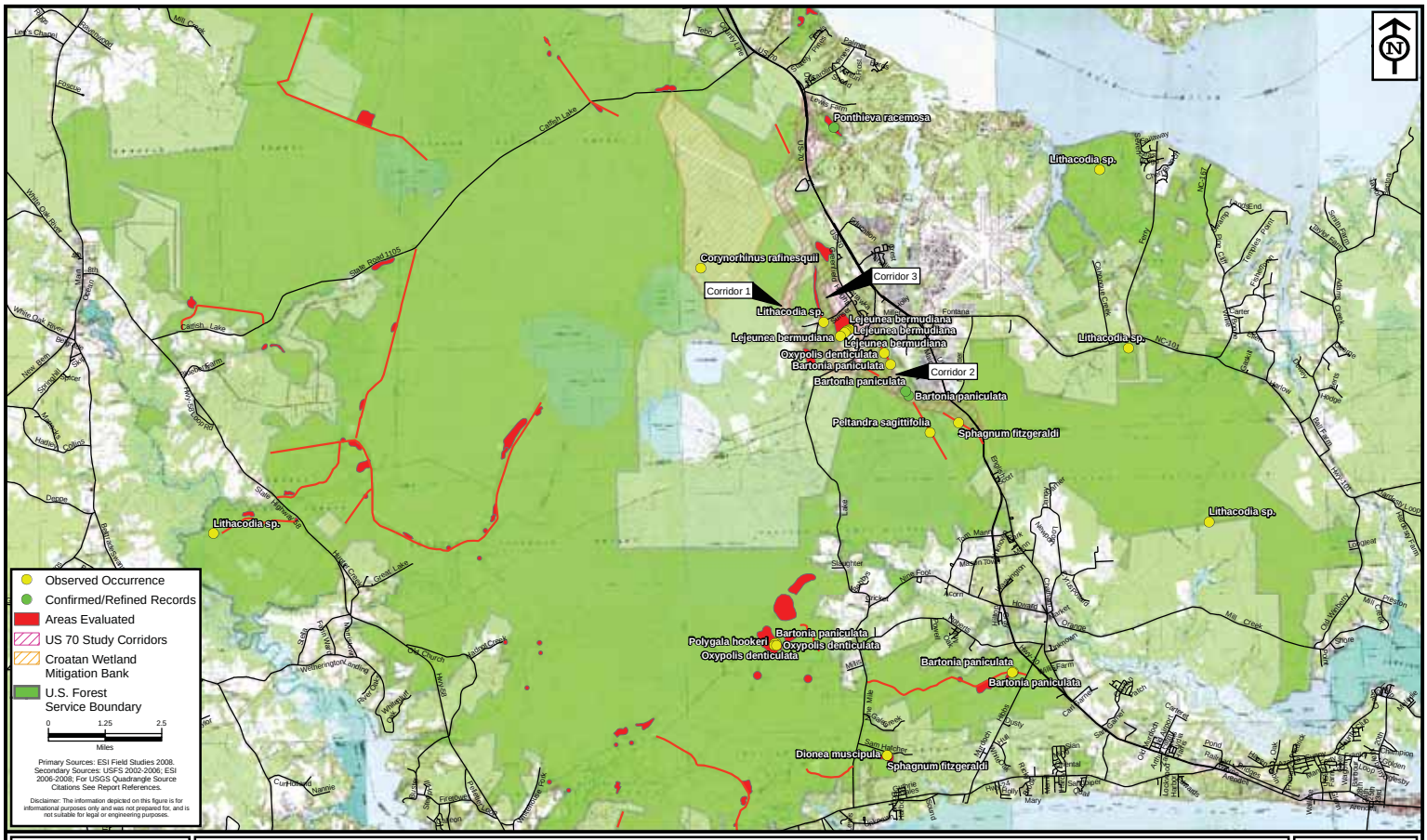
Areas Evaluated: Sheet 6

US 70 Havelock Bypass (R-1015) 2008 PETS Species Evaluations

Craven, Jones, & Carteret Counties, NC

Project:	ER06091.03
Date:	Jun 2009
Drwn/Chkd:	ESL/MKS
Figure:	1f

File: P:\GeoGrat\Projects\2004\046DOT\07\GIS\US70MXD\2008_Croatan_Survey_fig1f.mxd Printed: 02/12/2009 3:58 pm



ENVIRONMENTAL SERVICES, INC.
1022 Grandiflora Drive, Suite 250
Leland, North Carolina 28451
910-383-6020
910-383-6049 (fax)
www.environmentalservicesinc.com

Study Results

US 70 Havelock Bypass (R-1015) 2008 PETS Species Evaluations

Craven, Jones, & Carteret Counties, NC

Project:	ER06091.03
Date:	Jun 2009
Drwn/Chkd:	ESL/MKS
Figure:	2

File: P:\GeoGrat\Projects\2004\046DOT\07\DISUS70MXD\2008_Croatan_Survey_fig2.mxd Printed: 02/12/2009 3:58 pm

Appendix C:
Analysis of NCNHP Polygon Sub-element Occurrences

Summary Table for Sub-element Occurrence Impacts, US 70 Havelock Bypass

Scientific Name	EO ID *	Total Area of EO (acres)	Sub EO ID *	Total Area of Sub EO (acres)	Direct Impacts Alt. 1 Acres	Alt. 1 %	Alt. 2 Acres	Alt. 2 %	Alt. 3 Acres	Alt. 3 %	Indirect Impacts Alt. 1 Acres	Alt. 1 %	Alt. 2 Acres	Alt. 2 %	Alt. 3 Acres	Alt. 3 %
Agalinis aphylla											2.50	100.0	2.50	100.0	2.50	100.0
Agalinis aphylla											2.61	100.0	2.61	100.0	2.61	100.0
Agalinis aphylla											1.14	100.0	1.14	100.0	1.14	100.0
Bartonia paniculata var. paniculata											3.39	100.0	3.39	100.0	3.39	100.0
Cirsium lecontei							1.93	22.9	1.90	22.6	8.42	100.0	5.90	70.1	5.90	70.1
Cirsium lecontei											0.08	100.0				
											33.12	8.0	33.12	8.0	33.12	8.0
							1.93	22.9	1.90	22.6	8.42	100.0	5.90	70.1	5.90	70.1
											4.05	100.0	4.05	100.0	4.05	100.0
											6.76	100.0	6.76	100.0	6.76	100.0
											1.45	100.0	1.45	100.0	1.45	100.0
Lejeunea bermudiana					0.45	93.8										
									0.03	5.9	0.51	100.0			0.48	94.1
											0.48	100.0			0.48	100.0
											0.48	100.0	0.48	100.0	0.48	100.0
Oxypolis denticulata							1.35	27.1	1.32	26.5	4.98	100.0	0.13	2.6	0.13	2.6
Polygala hookeri											0.48	100.0	0.48	100.0	0.48	100.0
Ponthieva racemosa							3.69	25.1			14.71	100.0	7.23	49.2	14.71	100.0
Rhynchospora scirpoides											0.78	40.4	0.78	40.4	0.78	40.4
Solidago verna											0.71	100.0	0.71	100.0	0.71	100.0
					1.73	73.6	1.73	73.6	1.73	73.6						
											0.17	100.0			0.17	100.0
											0.34	100.0				
											0.17	100.0				
											0.05	100.0			0.05	100.0
							0.05	100.0			0.05	100.0			0.05	100.0
							<0.01	100.0	<0.01	100.0	<0.01	100.0				
									0.06	100.0	0.06	100.0				
											0.23	100.0				
											<0.01	100.0	<0.01	100.0	<0.01	100.0
							0.13	14.6			0.89	100.0			0.89	100.0
											4.80	97.0	4.80	97.0	4.80	97.0
							0.60	100.0			0.60	100.0			0.60	100.0
											0.14	100.0				
					0.13	52.0	0.12	48.0	0.13	52.0						
											0.17	100.0	0.17	100.0	0.17	100.0
							0.18	60.0	0.19	63.3	0.30	100.0	0.11	36.7	0.11	36.7
											0.12	100.0			0.12	100.0
									2.67	17.0	15.70	99.9			0.05	0.3
					0.13	10.4	0.14	11.2	0.13	10.4	1.12	89.6	1.12	89.6	1.12	89.6
							0.07	100.0	0.07	100.0	0.07	100.0				
									0.01	100.0	0.01	100.0				
							0.46	9.2			5.02	100.0	4.56	90.8	5.02	100.0
											<0.01	100.0	<0.01	100.0	<0.01	100.0
							0.03	17.6	0.03	17.6	0.17	100.0	0.15	88.2	0.15	88.2
									0.02	25.0	0.08	100.0				

To protect the viability of protected/rare species, the exact location of species occurrences is not shown in this memo. For more information, contact:

John Conforti, REM
NCDOT Project Development & Environmental Analysis Unit
919-707-6015
jgconforti@ncdot.gov

Summary Table for Sub-element Occurrence Impacts, US 70 Havelock Bypass

Scientific Name	EO ID *	Total Area of EO (acres)	Sub EO ID *	Total Area of Sub EO (acres)	Direct Impacts Alt. 1 Acres	Direct Impacts Alt. 1 %	Direct Impacts Alt. 2 Acres	Direct Impacts Alt. 2 %	Direct Impacts Alt. 3 Acres	Direct Impacts Alt. 3 %	Indirect Impacts Alt. 1 Acres	Indirect Impacts Alt. 1 %	Indirect Impacts Alt. 2 Acres	Indirect Impacts Alt. 2 %	Indirect Impacts Alt. 3 Acres	Indirect Impacts Alt. 3 %
	[redacted]										0.51	100.0			0.51	100.0
							0.11	91.7	0.12	100.0	0.12	100.0				
											0.42	100.0	0.42	100.0	0.42	100.0
											<0.01	100.0	<0.01	100.0	<0.01	100.0
											0.23	100.0				
											1.93	100.0	1.93	100.0	1.93	100.0
											<0.01	100.0				
											0.38	100.0	0.38	100.0	0.38	100.0
											0.01	100.0	0.01	100.0	0.01	100.0
											0.05	100.0				
									0.45	93.8	0.48	100.0				
											0.13	100.0				
					0.03	100.0			0.03	100.0						
											0.37	100.0	0.37	100.0	0.37	100.0
							0.02	28.6	0.02	28.6	0.07	100.0	0.05	71.4	0.05	71.4
											0.05	100.0			0.05	100.0
											0.20	100.0	0.20	100.0	0.20	100.0
											0.86	93.5	0.86	93.5	0.86	93.5
											0.12	100.0				
											0.08	100.0			0.08	100.0
											0.04	100.0				
											0.01	100.0			0.01	100.0
							<0.01	100.0			<0.01	100.0			<0.01	100.0
											0.17	100.0			0.17	100.0
											<0.01	100.0				
											12.45	100.0			12.45	100.0
											0.05	100.0	0.05	100.0	0.05	100.0
									0.02	0.2	10.28	100.0				
							0.04	100.0			0.04	100.0			0.04	100.0
											0.07	100.0				
											0.33	100.0	0.33	100.0	0.33	100.0
											0.17	100.0				
									0.14	77.8	0.18	100.0				
					0.49	100.0			0.47	95.9					0.02	4.1
							5.42	51.9	5.86	56.1	10.44	100.0	4.11	39.4	3.55	34.0
									5.70	56.7	9.88	98.3			3.85	38.3
											0.84	100.0			0.84	100.0
					2.38	34.7			2.38	34.7	4.47	65.3			4.47	65.3
											<0.01	4.8	<0.01	4.8	<0.01	4.8
									0.05	100.0	0.05	100.0				
											0.17	100.0				
									0.01	100.0	0.01	100.0				
									2.56	70.5	3.63	100.0			0.12	3.3
									0.02	100.0	0.02	100.0				
											0.72	100.0			0.72	100.0
											0.17	100.0			0.17	100.0
											2.29	100.0				

To protect the viability of protected/rare species, the exact location of species occurrences is not shown in this memo. For more information, contact:

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jgconforti@ncdot.gov

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Scientific Name	EO ID *	Total Area of EO (acres)	Sub EO ID *	Total Area of Sub EO (acres)	Direct Impacts Alt. 1 Acres	Alt. 1 %	Alt. 2 Acres	Alt. 2 %	Alt. 3 Acres	Alt. 3 %	Indirect Impacts Alt. 1 Acres	Alt. 1 %	Alt. 2 Acres	Alt. 2 %	Alt. 3 Acres	Alt. 3 %
			25373_SA	1.20					0.90	75.0	1.20	100.0				
			25373_SC	0.23							0.23	100.0				
			25373_SD	0.01			0.01	100.0			0.01	100.0			0.01	100.0
			25373_TA	0.01			0.01	100.0			0.01	100.0			0.01	100.0
			25373_TC	<0.01							<0.01	100.0				
			25373_TD	0.65			0.48	73.8			0.65	100.0	0.17	26.2	0.65	100.0
			25373_UA	0.01							0.01	100.0				
			25373_UC	4.86					1.27	26.1	4.86	100.0				
			25373_UD	0.20							0.20	100.0			0.20	100.0
			25373_VA	0.72	0.31	43.1					0.41	56.9				
			25373_VC	0.03							0.03	100.0				
			25373_VD	1.93							1.93	100.0	1.93	100.0	1.93	100.0
			25373_WA	<0.01							<0.01	100.0				
			25373_WB	13.43							13.43	100.0	13.43	100.0	13.43	100.0
			25373_WC	0.01							0.01	100.0				
			25373_WD	0.01							0.01	100.0			0.01	100.0
			25373_XA	0.16	0.15	93.8										
			25373_XB	0.73	0.60	82.2	0.60	82.2	0.60	82.2						
			25373_XC	0.17							0.17	100.0				
			25373_XD	0.10							0.10	100.0	0.10	100.0	0.10	100.0
			25373_YA	2.72	1.90	69.9					0.67	24.6				
			25373_YC	0.17							0.17	100.0				
			25373_YD	0.47			0.47	100.0			0.47	100.0			0.47	100.0
			25373_ZB	0.03	0.03	100.0	0.03	100.0	0.03	100.0						
			25373_ZC	0.04							0.04	100.0				
			25373_ZD	0.40	0.34	85.0			0.03	7.5						
			Other SubEOs	37.17												
Sphagnum cribrosum	(101)	0.44	101_A	0.44	0.15	34.1	0.15	34.1	0.15	34.1	0.14	31.8	0.14	31.8	0.14	31.8

* EO ID's in parenthesis represent ID's not available from NCNHP. The ID shown for these species were created by ESI for the purposes of this study

Blank acres/percentage indicates no impact

Two Eos have additional subEO s not affected directly or indirectly (*Rhychospora scirpoides* 25866 and *Solidago verna* EO 25373); additional subEOs cumulatively shown as "Other SubEOs"

ATTACHMENT 6

ENVIRONMENTAL SERVICES, INC.
P.O. Box 2181
Wilmington, North Carolina 28402
910-520-0784 / Facsimile 910-383-6049
www.environmentalservicesinc.com

MEMORANDUM

TO: **Ken Burleson**

FROM: **Matt Smith**

DATE: **16 July 2010**

RE: **US 70 Havelock Bypass (R-1015) Task Order #8 (Rough-leaved Loosestrife Survey Update).**
ER03-134.02

Environmental Services, Inc., (ESI) has completed an update of surveys for rough-leaved loosestrife (*Lysimachia asperulaefolia*) for the US 70 Havelock Bypass in Carteret and Craven Counties, North Carolina. This evaluation was completed for the preliminary design limits plus 10 feet outside the stake limits for alignments 1, 2, and 3 (Figure 1).

At the time the Natural Resource Technical Report (NRTR) was completed for this project (May 2007), the federally Endangered rough-leaved loosestrife was listed by the U.S. Fish and Wildlife Service (USFWS) for Carteret County, but not Craven County. Habitat evaluations and surveys in suitable areas were completed in July 2004 for the portions of the project study area located in Carteret County, as well for the U.S. Forest Service (USFS) property in Craven County as part of the USFS Proposed, Endangered, Threatened, and Sensitive (PETS) species evaluation; potentially suitable habitat on private lands in Craven County was not surveyed at the time since the species was not listed by USFWS for Craven County. Subsequent to completion of the NRTR, this species was added to the USFWS list for Craven County. Based on the addition of rough-leaved loosestrife to the USFWS Craven County list and length of time elapsed since the last survey, a rough-leaved loosestrife survey was conducted in all suitable habitat identified throughout the study area.

Nine major plant community types were identified in the project study area (ESI NRTR May 2007). Potentially suitable habitat for rough-leaved loosestrife was identified in portions of the tree-dominated and shrub-dominated streamhead pocosin, hydric powerline corridor, and portions of the rural/urban modification that are adjacent to the streamhead pocosins vegetative community.

Prior to the initiation of the field investigation, ESI biologists reviewed a reference population of rough-leaved loosestrife located within the Croatan National Forest to confirm the flowering status of this species (date of reference site review: 24 June 2010). The reference population was in the late stages of flowering and individuals in the reference population not in flower at the time of the review were readily identifiable from vegetative characteristics. Surveys for rough-leaved loosestrife were conducted within the study area by ESI biologists during the period of 24-30 June 2010.

The following summary is based on current NCDOT guidelines and templates for Natural Resource Technical Reports. Additional comments are provided following this summary to assist in incorporating this information into the Draft Environmental Impact Statement (DEIS).

Rough-leaved loosestrife

USFWS optimal survey window: mid May-June

Habitat Description: Rough-leaved loosestrife, endemic to the Coastal Plain and Sandhills of North and South Carolina, generally occurs in the ecotones or edges between longleaf pine uplands and pond pine pocosins in dense shrub and vine growth on moist to seasonally saturated sands and on shallow organic soils overlaying sand (spodosolic soils). Occurrences are found in such disturbed habitats as roadside depressions, maintained power and utility line rights-of-way, firebreaks, and trails. The species prefers full sunlight, is shade intolerant, and requires areas of disturbance (*e.g.*, clearing, mowing, periodic burning) where the overstory is minimal. It can, however, persist vegetatively for many years in overgrown, fire-suppressed areas. Blaney, Gilead, Johnston, Kalmia, Leon, Mandarin, Murville, Torhunta, and Vancluse are some of the soil series that occurrences have been found on.

Biological Conclusion: May Affect – Not Likely to Adversely Affect

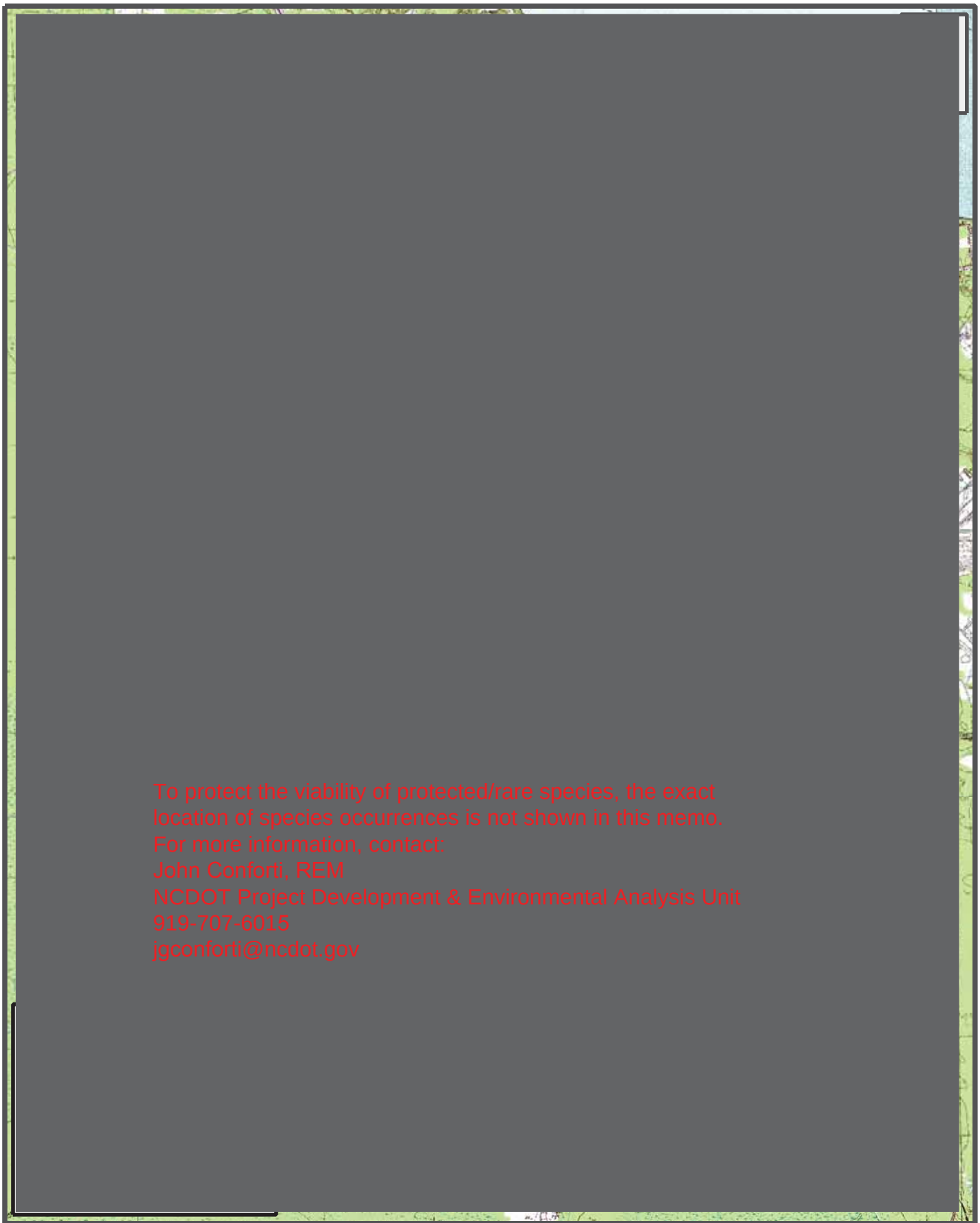
Suitable habitat for rough-leaved loosestrife is present in the study area within areas identified as streamhead pocosin and powerline corridor, as well as portions of areas identified as rural/urban modification adjacent to the streamhead pocosin vegetative community. These plant communities occur throughout the study area, but suitable habitat is generally more prevalent in the southern portion of the study area where the soil mapping units present are sandier and soils remain saturated for longer periods of the year providing habitat more consistent with sites known to support rough-leaved loosestrife. Surveys were conducted by ESI biologists during the period of 24-30 June 2010. Prior to the initiation of the field investigation, ESI biologists reviewed a reference population of rough-leaved loosestrife located within the Croatan National Forest to confirm the flowering status of this species (date of reference site review: 24 June 2010). The reference population was in the late stages of flowering and individuals in the reference population not in flower at the time of the review were readily identifiable from vegetative characteristics. Surveys were conducted by walking pedestrian transects throughout areas of suitable habitat. No individuals of rough-leaved loosestrife were observed. A review of N.C. Natural Heritage Program (NCNHP) records, updated 23 April 2010, indicates no known occurrences within 1.0 mile of the study area.

DEIS Changes Identified

No changes have been identified in DEIS Section 3.5.4.3 as a result of this update. The species description provided above is the standardized description developed by NCDOT in May 2008 for use in all NRTRs. The species description used in DEIS Section 3.5.4.3 is based on the NRTR completed in May 2007. No change in the existing species description text in DEIS Section 3.5.4.3 is recommended to maintain consistency with the format of the other species descriptions used in the DEIS. Table 3.18 in the DEIS had been previously updated to reflect the addition of Craven County for rough-leaved loosestrife and should list "Ca, Cr" in the "County Present" column.

This update will result in two changes identified within DEIS Section 4.1.9.3. Table 4.8 had previously been updated to reflect the addition of Craven County for rough-leaved loosestrife, but the Biological Conclusion for this species should be updated from "No Effect" to "Not Likely to Adversely Affect" in the last column of the table. The Biological Conclusion section from the summary above, including the change in Biological Conclusion from "No Effect" to "Not Likely to Adversely Affect", should be substituted in place of the text previously presented for rough-leaved loosestrife in DEIS Section 4.1.9.3.

Environmental Services, Inc., appreciates this opportunity to provide you with our services. If you have any questions or comments, or need any additional information, please feel free to contact me at (910) 520-0784.



To protect the viability of protected/rare species, the exact location of species occurrences is not shown in this memo.
For more information, contact:
John Conforti, REM
NCDOT Project Development & Environmental Analysis Unit
919-707-6015
jgconforti@ncdot.gov

ENVIRONMENTAL SERVICES, INC.
524 S. New Hope Road
Raleigh, North Carolina 27610
(919) 212-1760
(919) 212-1707 FAX
www.environmentalservicesinc.com

Project Location
US 70 Havelock Bypass
Rough-Leaved Loosestrife Update
Havelock, Craven and Carteret Counties, North Carolina
T.I.P. No. R-1015

Project:	ER06134.02
Date:	Jul 2010
Drwn/Chkd:	KT/MKS
Figure:	1

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ATTACHMENT 7

ENVIRONMENTAL SERVICES, INC.
524 South New Hope Road
Raleigh, North Carolina 27610
919-212-1760 / Facsimile 919-212-1707
www.environmentalservicesinc.com

MEMORANDUM

TO: Rachelle Beauregard

FROM: Matt Smith

DATE: 21 December 2012

RE: US 70 Havelock Bypass (R-1015)
P.O. No. 6300030960
Address USFS Comments on DEIS and PETS Analysis:
Summary of Evaluation for Spring-flowering Goldenrod (*Solidago verna*)
ESI Project No. ER10-060.08

Background

In their review of the Draft Environmental Impact Statements (DEIS) for the US 70 Havelock Bypass project, the U.S. Forest Service (USFS) identified the need for additional information on project-related impacts for spring-flowering goldenrod (*Solidago verna*) to more fully assess potential viability concerns resulting from project implementation. Spring-flowering goldenrod is state listed as Threatened and is also designated as a Federal Species of Concern (FSC) by the U.S. Fish and Wildlife Service (USFWS). Based on these listings, the USFS is required to assess potential impacts to the species resulting from actions by the USFS, such as granting an easement for the US 70 Havelock Bypass, to determine whether the action threatens the viability of the species on National Forest System (NFS) lands in the Croatan National Forest (CNF).

Environmental Services, Inc., (ESI), has been asked by the North Carolina Department of Transportation (NCDOT) to complete a detailed evaluation of impacts to spring-flowering goldenrod associated with Alternative 3 of the proposed US 70 Havelock Bypass (R-1015) (Figure 1). The study area for Alternative 3 is referred to as the Alt. 3 study area in this evaluation (see "Methods for Assessment" below for description of impact areas evaluated). The evaluation presented here utilizes data obtained from the N.C. Natural Heritage Program (NCNHP) in April of 2012. A summary of the evaluation presented here will be incorporated into Chapter 4 of the Final Environmental Impact Statement (FEIS).

Spring-flowering goldenrod is a perennial aster that flowers in the spring and is found in the Coastal Plain of North and South Carolina in habitats including pine savannas, open pine flatwoods, and pine barrens.[i] Managing for these habitats through seasonal mowing of powerline rights-of-way and prescribed burning of forest habitats is important to maintaining open habitat for this species. On the CNF the USFS undertakes prescribed burns on NFS lands in accordance with the Forest Management Plan for the

Croatan National Forest. Powerline rights-of-way are generally managed by mowing by the powerline easement holder.

The scope of work for the spring-flowering goldenrod evaluation is the result of meetings with NCDOT and the USFS and evaluates direct effects on spring-flowering goldenrod occurrences in the Alt. 3 study area as well as indirect effects that may result from the US 70 Havelock Bypass. There are 36 NCNHP Element Occurrences (EOs) on NFS lands within the CNF (Figure 2). The different alternatives evaluated for the US 70 Havelock Bypass study area (referred to as the Alternatives study area in this evaluation) include portions of twelve EOs: 4267, 4897, 8404, 9935, 11682, 15571, 25210, 25211, 25223, 25297, 25300, and 25373. Alternative 3 impacts portions of seven of these EOs. Each of the EOs consists of one to several discreet occupied habitat polygons.

Previous estimates of the spring-flowering goldenrod population on NFS lands in the CNF have incorporated different techniques used by different evaluators at different times for estimating occurrence boundaries and the number of individuals present within an occurrence. The estimates for these occurrences appear to have generally been based on a cursory count or general estimate focusing on flowering individuals. The number of plants for most occurrences does not appear to have been determined by systematic surveys or direct counts. In addition, occurrence boundaries depicted in the NCNHP database reflect different methods of determination and accuracy.

The variability in precision associated with the area and number of individuals present for occurrences of spring-flowering goldenrod on NFS lands in the CNF makes a comparison of potential impacts from the US 70 Havelock Bypass to the overall population on the CNF problematic. Previous estimates for NFS lands in the CNF range from 5,663 to 14,738 individual plants within 320.2 acres of occupied habitat on NFS lands, with approximately 1,855 individual plants estimated within 138 acres of occupied habitat within the Alternatives study area. For this study, a more systematic approach to estimating population size of spring-flowering goldenrod was requested of NCDOT by USFS to better evaluate potential impacts that may result from the US 70 Havelock Bypass.

Methods for Assessment

The initial step in the evaluation was to determine the area of occupied habitat in the Alt. 3 study area, directly affected by Alternative 3 and indirectly affected by Alternative 3. Boundaries for NFS lands were provided by the USFS for use in this evaluation. Direct impacts are based on the tree clearing limits (slope stake limits plus 15 feet) plus an additional 25 feet. Indirect impacts include those polygon areas located on NFS lands between Alternative 3 and existing US 70. The areas considered for indirect impacts will be isolated from contiguous NFS lands by the project and may be subject to different post-project management techniques by USFS. Occupied habitat within the Alternatives study area had been delineated during previous investigations and represented by discrete polygons in GIS format. Thirty discrete occupied habitat polygons were identified as impacted wholly or in part by Alternative 3 and were included in the present evaluation (see Table 1); two of the occupied habitat polygons are connected by a narrow linkage, resulting in 29 occupied habitat polygons for this evaluation.

Boundaries of individual occupied habitat polygons directly affected by Alternative 3 that appeared to be truncated at Alternatives study area boundaries were reviewed to determine if the actual occurrence limits

should be extended beyond the limits of the original survey. The occurrence boundaries for spring-flowering goldenrod in the Alternatives study area were originally established by previous NCDOT studies by walking concentric transects around individual plants until no additional plants were encountered. These boundaries were then flagged and general limits mapped using GPS. For the present evaluation, transects were walked adjacent to the occurrence boundaries to determine if spring-flowering goldenrod plants were present outside the polygon boundaries. No occupied habitat polygon boundary extensions were determined to be required. The next step in the evaluation was to determine the density, estimated number of individuals, and area impacted for occupied habitat polygons impacted by Alternative 3. Occupied habitat polygons were divided into forested and powerline rights-of-way areas and sampled separately.

Each polygon directly affected by Alternative 3 was evaluated in the field to confirm continued presence of spring-flowering goldenrod and to undertake sampling to obtain population estimates and density of spring-flowering goldenrod plants. Surveys and evaluations for spring-flowering goldenrod were undertaken on June 6-7, June 11-14, and July 12-13, 2012. The surveys and evaluations were conducted by an experienced team of biologists led by Matt Smith with support from either Kevin Markham or Jeff Benton. Individual spring-flowering goldenrod plants were identified across a range of growth stage, including basal rosettes and plants in all stages of flowering, including individuals in various stages of seed maturity. The majority of plants observed consisted of basal rosettes with no evidence of flowering during the 2012 season.

Sampling for each occupied habitat polygon consisted of one of two survey methods: 1) full survey coverage within small occupied habitat polygons; or 2) use of subsamples along transects for large occupied habitat polygons. Full survey coverage consisted of two biologists walking transects to provide 100% coverage within the smaller occupied habitat polygons. Transect surveys for subsampling larger occupied habitat polygons consisted of establishing transects using a tape measure and counting all spring-flowering goldenrod plants located within 3 feet of either side of the tape. Transect start and finish points were approximated using GPS as depicted in Figure 3. The number of transects established for each larger occupied habitat polygon was based on size of the polygon, habitat variability, and observed variability in the distribution of the target species. The data collected were utilized to estimate the number and density of spring-flowering goldenrod plants present within the polygon sampled.

Results for Assessment

The results of sampling were analyzed to estimate the number of plants per acre for the habitat types assessed (Table 1). For this study 1,174 individual plants were counted within 4.8 acres of occupied habitat directly sampled. The areas directly sampled were used to estimate the number of individuals present within the Alternatives study area.

Table 1. Spring-flowering goldenrod survey results for Alternative 3.

Polygon #	Transect ID	Habitat Type [a]	Transect length (ft)	Transect Width (ft)	Surveyed Area (ac)	Total Plants Counted	Estimated Plants/ Acre for Survey Areas
1	NA	OW	NA	NA	0.73	49	67
2	NA	OW	NA	NA	0.03	6	226
3	A	OW	196	6	0.03	9	333
3	B	OW	221	6	0.03	2	66
4	NA	OW	NA	NA	0.07	2	27
5	NA	OW	NA	NA	0.17	15	86
6	NA	OW	NA	NA	0.00	0	0
7	NA	OW	NA	NA	0.07	20	269
8	A	PL	77	6	0.01	41	3,866
9	A	OW	492	6	0.07	6	89
9	B	OW	85	6	0.01	1	85
9	C	OW	200	6	0.03	3	109
9	D	OW	103	6	0.01	14	987
10	NA	OW	NA	NA	0.12	0	0
11	A	PL	227	6	0.03	74	2,367
11	A	OW	100	6	0.01	0	0
11	B	PL	235	6	0.03	122	3,769
11	B	OW	175	6	0.02	11	456
11	C	PL	130	6	0.02	68	3,798
11	C	OW	300	6	0.04	9	218
11	D	PL	132	6	0.02	1	55
11	D	OW	159	6	0.02	10	457
11	E	PL	132	6	0.02	8	440
11	E	OW	71	6	0.01	0	0
13	NA	OW	NA	NA	0.05	3	62
14	A	OW	279	6	0.04	17	442
14	B	OW	348	6	0.05	3	63
14	C	OW	246	6	0.03	12	354
14	D	OW	78	6	0.01	1	93
15	A	OW	226	6	0.03	9	289
15	B	OW	408	6	0.06	2	36
15	B	PL	72	6	0.01	83	8,369
15	C	OW	422	6	0.06	16	275
15	C	PL	125	6	0.02	24	1,394
15	D	OW	47	6	0.01	0	0
15	D	PL	115	6	0.02	10	631
15	E	PL	34	6	0.00	0	0
15	E	OW	164	6	0.02	16	708
16	NA	OW	NA	NA	0.97	7	7
16	NA	PL	NA	NA	0.23	74	324
17	NA	OW	NA	NA	0.01	1	141
18	NA	PP	NA	NA	0.08	0	0
12/19	AA	PP	179	6	0.02	2	81
12/19	BB	PP	119	6	0.02	1	61
12/19	A	OW	396	6	0.05	0	0
12/19	B	OW	278	6	0.04	2	52
12/19	C	OW	203	6	0.03	2	72
12/19	C	PP	63	6	0.01	0	0
12/19	D	OW	97	6	0.01	11	823
12/19	D	PP	193	6	0.03	0	0
12/19	E	PP	226	6	0.03	1	32
20	NA	OW	NA	NA	0.02	1	44
21	NA	OW	NA	NA	0.06	2	34

Table 1 continues.

Table 1 continued.

Polygon #	Transect ID	Habitat Type [a]	Transect length (ft)	Transect Width (ft)	Surveyed Area (ac)	Total Plants Counted	Estimated Plants/ Acre for Survey Areas
22	NA	OW	NA	NA	0.01	15	1,165
23	NA	OW	NA	NA	0.48	2	4
24	NA	OW	NA	NA	0.18	16	89
25	A	OW	66	6	0.01	2	220
25	B	OW	59	6	0.01	0	0
26	A	OW	110	6	0.02	1	66
26	B	OW	159	6	0.02	2	91
27	A	OW	393	6	0.05	91	1,681
27	B	OW	445	6	0.06	3	49
27	C	OW	234	6	0.03	99	3,072
27	D	OW	394	6	0.05	109	2,008
27	E	OW	337	6	0.05	35	754
28	NA	OW	NA	NA	0.03	0	0
29	A	DW	156	6	0.02	0	0
29	B	DW	102	6	0.01	0	0
29	C	PL	NA	NA	0.14	27	191
30	A	PL	39	6	0.01	1	186
30	B	PL	40	6	0.01	0	0
30	C	PL	40	6	0.01	0	0
Totals:					**4.83**	**1,174**	**Avg. = 243**

[a] OW = Open Woods, PP = Pine Plantation, DW = Dense Woods, PL = Powerline Right-of-Way.

There are 29 occupied habitat polygons for spring-flowering goldenrod that will be directly affected by Alternative 3, at least in part. Each of these polygons was sampled to estimate the density, estimated number of individuals, and area impacted. Four polygons were divided into forested area and powerline area habitats and sampled separately. Eighteen small polygons were surveyed to provide 100% coverage and 11 larger polygons were subsampled via transects. A total of 4.83 acres was systematically covered by spring-flowering goldenrod surveys to count individuals (stems and basal rosettes) representing 8% of the total 59.90 acres of occupied habitat polygons impacted by Alternative 3. A total of 1,174 individual plants were counted in the 4.83 acres covered during the survey effort.

Table 2 presents a summary for the overall estimated number and density of spring-flowering goldenrod plants for the forested and powerline portions of the occupied habitat polygons impacted by Alternative 3. Forested habitat types (open woods, pine plantation, dense woods) were treated together based on overall lower density estimates compared to powerline habitat, and based on general overlap of density values among the forested habitat types.

Table 2. Estimated density of spring-flowering goldenrod in powerline and forested habitats. [a]

Habitat Type	Occupied Habitat Polygons (29 Polygons) Impacted by Alternative 3		
	Acres	Estimated # Plants	# Plants / Acre
Forested Area	49.93	19,300	387
Powerline Area	9.97	20,683	2,074
Total:	59.90	39,984	Avg. = 668

[a] Based on a weighted average using estimated density per polygon and polygon size. Includes portions of occupied habitat polygons that extend off NFS lands.

Analysis of Impacts

In meetings with NCDOT and the USFS the USFS expressed a desire to see separate population and population density estimates for spring-flowering goldenrod in lower density and higher density habitat

areas. Table 2 provides an estimate of the density and total number of spring-flowering goldenrod plants within the forested (low population density) and powerline (high population density) habitats of the occupied habitat polygons directly impacted at least in part by Alternative 3.

Anticipated impacts to spring-flowering goldenrod are presented in Table 3. The estimated number and density of spring-flowering goldenrod within each occupied habitat polygon are presented by forested habitat and powerline habitat.

Table 3. Impacts to spring-flowering goldenrod for Alternative 3.

Polygon #	Habitat Type	Estimated #Plants/ acre	Polygon Area (Ac)	Estimated #Plants/ Polygon	Polygon Area Direct Impact [a]	Estimated #Plants Direct Impact	Polygon Area Indirect Impact [a]	Estimated #Plants Indirect Impact
1	Forested	67	0.73	49	0.53	36	0	0
2	Forested	226	0.03	6	0.03	7	0	0
3	Forested	200	2.35	468	1.58	315	0.02	4
4	Forested	27	0.07	2	0.07	2	0	0
5	Forested	86	0.17	15	<0.01	0	0.17	15
6	Forested	0	<0.01	0	<0.01	0	0	0
7	Forested	269	0.07	20	0.01	3	0.07	19
8	Powerline	3,866	0.30	1,154	0.12	464	0.18	696
9	Forested	317	10.44	3,314	5.01	1,590	4.11	1,305
10	Forested	0	0.12	0	0.12	0	0	0
11	Powerline	2,086	8.02	16,720	1.23	2,565	0	0
11	Forested	226	7.69	1,739	1.15	260	0.08	18
13	Forested	62	0.05	3	0.05	3	0	0
14	Forested	283	3.63	863	2.09	498	0.17	40
15	Forested	262	3.82	1,000	0.91	238	0	0
15	Powerline	2,599	1.04	2,692	0.21	546	0	0
16	Forested	7	0.97	7	0.96	7	0	0
16	Powerline	324	0.23	74	0.20	65	0	0
17	Forested	141	0.01	1	0.01	1	0	0
18	Forested	0	0.08	0	0	0	0	0
12/19	Forested	272	10.05	1328	4.82	394	4.35	903
20	Forested	44	0.02	1	0.02	1	0	0
21	Forested	34	0.06	2	0.06	2	0	0
22	Forested	1,165	0.01	15	0.01	12	0	0
23	Forested	4	0.48	2	0.41	2	0	0
24	Forested	89	0.18	16	0.11	10	0	0
25	Forested	110	0.40	45	0.27	30	0	0
26	Forested	79	0.49	38	0.49	39	0	0
27	Forested	1,513	6.85	10,365	2.86	4,327	3.99	6,036
28	Forested	0	0.03	0	0.03	0	0	0
29	Forested	0	1.11	0	0.08	0	1.03	0
29	Powerline	191	0.14	27	0	0	0.14	27
30	Powerline	62	0.25	15	0.07	4	0	0
Ind. [b]	Powerline	NA	NA	NA	0	0	7.67	15,908
Ind. [b]	Forested	NA	NA	NA	0	0	41.55	16,088
Totals:		**Avg. = 668**	**59.90**	**39,984**	**23.51**	**11,419**	**63.53** [b]	**43,415** [b]

[a] Only includes the occupied habitat polygon area located on NFS lands.

[b] Includes 49.22 acres and estimated 31,996 additional spring-flowering goldenrod plants within occupied habitat polygons that may be indirectly impacted by Alternative 3, but are not directly impacted by Alternative 3; these additional polygons were not included in the 2012 sampling but numbers were estimated based on averages per habitat type summarized in Table 2.

The powerline habitats were generally found to have a higher density of spring-flowering goldenrod plants per acre in comparison to the forested habitat areas. This is likely due to the regular maintenance

that results in reduced competition from woody shrubs and trees. The forested habitats were generally found to have a lower density of spring-flowering goldenrod plants per acre. This is likely due to increased competition from woody shrubs and trees. Several forested polygons were found to have small areas with a generally higher density than the surrounding areas where the sampling transects encountered small openings in the forest. Spring-flowering goldenrod density within surveyed areas was characterized as relatively low, medium, or relatively high based on the distribution of plants.

- Polygon 1 (Figure 3B) is located in a forested area that has been recently thinned resulting in woody debris covering large areas within the polygon. The survey covering the full extent of this polygon indicates this polygon has a relatively low density of spring-flowering goldenrod.
- Polygon 2 (Figure 3B) is a small polygon located in a forested area that has been recently thinned resulting in woody debris covering large areas within the polygon. The survey covering the full extent of this polygon indicates spring-flowering goldenrod is present throughout the polygon at a medium density.
- Polygon 3 (Figure 3B) is located in a forested area that has been recently thinned resulting in woody debris covering large areas within the polygon. The survey consisted of two transects through the polygon. The survey and site observations indicate spring-flowering goldenrod is present throughout the polygon mostly at a medium density, but at a relatively lower density in the southwestern portion of this polygon.
- Polygon 4 (Figure 3D) is a small polygon located in a forested area. The survey covering the full extent of this polygon indicates this polygon has a relative low density of spring-flowering goldenrod.
- Polygon 5 (Figure 3D) is a small polygon located in a forested area. The survey covering the full extent of this polygon indicates this polygon has a relative low density of spring-flowering goldenrod.
- Polygon 6 (Figure 3D) is a small polygon located in a forested area. No spring-flowering goldenrod was found in the survey covering the full extent of this very small polygon (<0.01 acre). Spring-flowering goldenrod may persist in this area but in numbers too low and difficult to detect under present habitat conditions.
- Polygon 7 (Figure 3D) is located in a forested area adjacent to a road and powerline right-of-way. This polygon included generally open habitat and the survey covering the full extent of this polygon indicates spring-flowering goldenrod is present throughout the polygon at a medium density.
- Polygon 8 (Figure 3D) is located in a powerline right-of-way that is frequently maintained. This area is dominated by a dense covering of wire grass (*Aristida stricta*). The survey consisted of a transect through the polygon. The survey and site observations indicate spring-flowering goldenrod is present throughout the polygon at a relatively high density.
- Polygon 9 (Figure 3D) is located in a forested area that has areas of low dense shrubs interspersed with areas that are more open associated with tree falls, fire breaks, and other disturbances. The survey consisted of four transects through different sections of the polygon. The survey and site observations indicate spring-flowering goldenrod is present at a relatively low density across most of the polygon. The species is present at relatively higher densities in more open areas present in the south-central and northeastern portions of the polygon. Most of these more open areas were characterized as supporting medium densities of spring-flowering goldenrod,

increasing to relatively high density along the edge of the polygon to the northeast, outside the Alt. 3 study area.

- Polygon 10 (Figure 3D) is a small polygon located in a forested area. No spring-flowering goldenrod was found in the survey covering the full extent of this polygon. Spring-flowering goldenrod may persist in this area but in numbers too low and difficult to detect under present habitat conditions.
- Polygon 11 (Figure 3D) includes powerline right-of-way areas and forested areas. The survey consisted of five transects through the polygon. The survey and site observations indicate the northern portion of this polygon includes some of the highest densities of spring-flowering goldenrod identified during this evaluation, with density diminishing toward the southern portions of the polygon. The high density areas are located outside the Alt. 3 study area. The survey and site observations for the portion of the polygon within the Alt. 3 study area indicates spring-flowering goldenrod is present at a medium density within the powerline right-of-way in this area, and at a low density in the adjacent forested portion of the polygon.
- Polygon 12/19 is located in a forested area that includes a portion that is managed as pine plantation and has areas of low dense shrubs interspersed with areas that are more open associated with tree falls, fire breaks, and other disturbances. The survey consisted of seven transects through different sections of the polygon. The survey and site observations indicate spring-flowering goldenrod is found mostly at low densities throughout most of the polygon, with relatively greater densities, characterized as medium density, in the southeastern and southwestern portions of the polygon where more open areas were encountered.
- Polygon 13 (Figure 3E) is a small polygon located in a forested area separated by small strips of habitat from adjacent Polygon 12. No spring-flowering goldenrod was found in the survey covering the full extent of this polygon. Spring-flowering goldenrod may persist in this area but in numbers too low and difficult to detect under present habitat conditions.
- Polygon 14 (Figure 3E) is located in a forested area at the intersection of Sunset Drive and a forest road. The survey consisted of four transects through the polygon. The survey and site observations indicate that spring-flowering goldenrod is present throughout most of the interior of this polygon at relatively low densities, with relatively greater densities along the forest road edge. The northwestern portion of the polygon adjacent to the forest road is characterized as having a relatively high density of spring-flowering goldenrod. The highest density areas are outside of the Alt. 3 study area.
- Polygon 15 (Figure 3E) includes powerline right-of-way and forested areas. The survey consisted of five transects through the polygon. The survey and site observations indicate that the western portion of this polygon located in the powerline contains relatively higher densities of spring-flowering goldenrod than the forested areas of the polygon. The southern portion of the powerline area of the polygon contains a relative high density of spring-flowering goldenrod, with density diminishing to the north away from Sunset Road. Spring-flowering goldenrod densities were characterized as medium density throughout most of the interior of the forested part of this polygon, with densities increasing and mostly characterized as medium density along the forest edges with the powerline right-of-way to the west and roads along the eastern and southern borders of the polygon.

- Polygon 16 (Figure 3E) includes powerline right-of-way areas and forested areas. The survey covering the full extent of this polygon indicates that spring-flowering goldenrod is present at a medium density in the powerline right-of-way and at a low density in the adjacent forested areas.
- Polygon 17 (Figure 3E) is a small polygon located in a forested area. The survey covering the full extent of this polygon indicates that spring-flowering goldenrod is present throughout the polygon at a density characterized as medium.
- Polygon 18 (Figure 3E) is a small polygon located in a pine plantation area along the western edge of the Alt. 3 study area. No spring-flowering goldenrod was found in the survey covering the full extent of this polygon. Spring-flowering goldenrod may persist in this area but in numbers too low and difficult to detect under present habitat conditions.
- Polygon 20 (Figure 3F) is a small polygon located in a forested area that has been recently thinned resulting in woody debris covering areas within the polygon. The survey covering the full extent of this polygon indicates that spring-flowering goldenrod is present throughout the polygon at a relative low density.
- Polygon 21 (Figure 3F) is a small polygon located in a forested area that has been recently thinned resulting in woody debris covering areas within the polygon. The survey covering the full extent of this polygon indicates that spring-flowering goldenrod is present throughout the polygon at a relative low density.
- Polygon 22 (Figure 3F) is a small polygon located in a forested area that has been recently thinned, and the polygon is located along the edge of an old skidder trail. The survey covering the full extent of this polygon indicates that spring-flowering goldenrod is present throughout the polygon at a density characterized as medium.
- Polygon 23 (Figure 3F) is a small polygon located in a forested area that has been recently thinned resulting in woody debris covering large areas within the polygon. The survey covering the full extent of this polygon indicates that spring-flowering goldenrod is present throughout the polygon at a relative low density.
- Polygon 24 (Figure 3F) is a small polygon located in a forested area that has been recently thinned resulting in woody debris covering large areas within the polygon. The survey covering the full extent of this polygon indicates that spring-flowering goldenrod is present throughout the polygon at a relative low density.
- Polygon 25 (Figure 3G) is located in a forested area that has been recently thinned resulting in woody debris covering areas within the polygon. The survey consisted of two transects across the polygon. The survey and site observations indicate that spring-flowering goldenrod is present throughout the polygon, with low densities characterizing the northern portion of the polygon increasing to medium density in the southern portion of the polygon.
- Polygon 26 (Figure 3G) is located in a forested area that has been recently thinned resulting in woody debris covering areas within the polygon. The survey consisted of two transects across the polygon. The survey and site observations indicate that spring-flowering goldenrod is present throughout the polygon, with low densities characterizing the northern portion of the polygon increasing to medium density in the southern portion of the polygon.
- Polygon 27 (Figure 3G) is located in a forested area. The survey consisted of five transects through the polygon. The survey and site observations indicate that spring-flowering goldenrod is present throughout the polygon with relatively greater densities in the northern and western portions of the polygon and densities diminishing towards the southern portions of the polygon.

The high density areas were generally observed to include a larger number of flowering individuals and young plants as evidence of recent recruitment. This forested area has experienced recent growing season prescribed burns and recent thinning resulting in reduced competition from woody shrubs and trees and a relatively open canopy and subcanopy allowing substantial light penetration to the ground layer. The portion of the polygon within the Alt. 3 study area is mostly characterized by low to medium densities, but part of the high density area of spring-flowering goldenrod extends into the Alt. 3 study area.

- Polygon 28 (Figure 3G) is a small polygon located in a forested area. No spring-flowering goldenrod was found in the survey covering the full extent of this polygon. Spring-flowering goldenrod may persist in this area but in numbers too low and difficult to detect under present habitat conditions.
- Polygon 29 (Figure 3H) consists mostly of a forested area characterized as dense woods and a small part of the polygon extends into the adjacent powerline right-of-way. The survey consisted of two transects through the dense forested area, and a survey covering the full extent of the powerline right-of-way portion. The dense shrub cover present in the woods resulted in conditions in which no spring-flowering goldenrod were found in the sampling. Spring-flowering goldenrod may persist in this area but in numbers too low and difficult to detect under present habitat conditions. The survey and site observations indicate that spring-flowering goldenrod is present throughout the powerline right-of-way portion of the polygon at a density characterized as medium.
- Polygon 30 (Figure 3H) is located in a narrow powerline right-of-way area that has not been maintained in recent years. The survey consisted of three transects across the polygon. The survey and site observations indicate that spring-flowering goldenrod is scarce in this polygon in comparison to other powerline right-of-way areas sampled. The extensive coverage by woody shrubs and young trees represent competition for spring-flowering goldenrod and also create shaded conditions that may not be suitable for spring-flowering goldenrod. Spring-flowering goldenrod was not observed in most of the polygon, but may persist in these areas in numbers too low and difficult to detect under present habitat conditions.

Summary of Analysis

- NCNHP records, which have been updated to include NCDOT's pre-2012 survey efforts, indicated spring-flowering goldenrod is known from 36 EOs that cover 320.2 acres of occupied habitat documented on NFS lands in the CNF. Recent data provided by the USFS shows that 6 of these occurrences (mapped as covering 4 acres) have not been relocated during recent survey attempts. Previous estimates for NFS lands in the CNF range from 5,663 to 14,738 individual plants within an estimated 320.2 acres of occupied habitat (Figure 2). Occurrences on NFS lands outside of the Alternatives study area have not been systematically surveyed, but based on the results of the present evaluation the actual number of individuals would be likely higher than previous estimates if these occurrences were evaluated using systematic surveys.

- Within the Alternatives study area evaluated for the Havelock Bypass, there are 115 occupied habitat polygons identified in the NCNHP database that total 138 acres. The Alternatives study area includes the study corridors for all three alternatives as well as the areas between these corridors and the existing US 70 facility. Using the average densities for forested areas and

powerline areas presented in Table 2, there are an estimated 94,026 individual spring-flowering goldenrod plants in the Alternatives project study area (Figure 3). Due to variations in soils, hydrology, land management, and survey methodology for occurrences outside of the Alternatives study area it is not possible to apply the results of this study to occurrences outside of the Alternatives study area.

- Alternative 3 directly affects 23.51 acres of occupied habitat on NFS lands and estimated 11,419 individual spring-flowering goldenrod plants. This impact represents approximately 17% of occupied habitat within NFS lands within the Alternatives study area and 12% of the estimated population within NFS lands within the Alternatives study area.

- An additional 63.53 acres of occupied habitat is in areas that may be indirectly affected by Alternative 3 that include an estimated 43,415 individual spring-flowering goldenrod plants. This impact represents approximately 46% of occupied habitat within NFS lands within the Alternatives study area and 46% of the estimated population within NFS lands within the Alternatives study area. Mitigative measures previously proposed by NCDOT regarding management agreements with USFS for the potential indirect impact areas would reduce the likelihood for adverse effects to these areas. Mitigative measures discussed include:
    - Allowing for the temporary closure of the bypass to allow the USFS to conduct period prescribed burns;
    - Avoid planting of aggressive non-native species for re-vegetation;
    - Avoid placing staging areas within 200 ft of PETS plant species occurrences, where practicable;
    - Avoiding heavy equipment access, especially during wet periods;
    - Minimizing the use of herbicides and pesticides; and
    - Collecting seeds to establish new populations on NFS lands.

Potential Mitigation Site Identification

Spring-flowering goldenrod generates from seeds under suitable habitat conditions.[i] Direct affects to this species may be mitigated through a combination of relocation of affected populations to unaffected suitable habitat or collecting seeds or propagules from affected populations to use in establishing new populations in unaffected suitable habitat. NCDOT is proposing to collect seeds from the areas to be affected by Alternative 3 and distributing the seeds into an area of the CNF where the species does not currently occur but where there is appropriate habitat. On-site mitigation in the vicinity of the RCW foraging partition north of Sunset Rd and west of Alternative 3 is proposed in a report, Recommended mitigation plan for *Solidago verna* in Craven Co., North Carolina; Havelock Bypass, R-1015,[ii] prepared by Dr. Jon Stucky and Miranda Fleming for NCDOT in 2006. The on-site area proposed for establishing spring-flowering goldenrod is identified as the Wolf Pit Branch Road Area on Figure 4.

As part of the present evaluation, additional areas with mitigation potential for use in establishing new populations on NFS lands of spring-flowering goldenrod were reviewed outside of the Alternatives study area in case additional mitigation areas would be requested by the USFS to help offset project related impacts. As part of the mitigation effort, seeds were collected from several occupied habitat polygons sampled within Alternative 3 in addition to seed collection completed by NCDOT personnel in 2011 and

2010. Seeds were collected in accordance with the USFS seed collection permit issued to NCDOT for this purpose.

Potential sites were identified based on USFS land ownership, potential suitability of soils, potential suitability of hydrology, and proximity to the impacted areas (Figure 4). Proximity to red-cockaded woodpecker cavity trees was also considered as this indicates an increased likelihood that periodic prescribed burns will be conducted. Soils considered were those identified by Stucky and Fleming (2006) as having greater than 50% overall survivability of transplanted individuals, as well as soils not evaluated by Stucky and Fleming but upon which spring-flowering goldenrod has been documented as occurring in the CNF. These soils include Craven silt loam, Leaf silt loam, and Lenoir silt loam (evaluated by Stucky and Fleming), as well as Rains fine sandy loam and Onslow fine sandy loam (other soils supporting spring-flowering goldenrod). Several areas identified along Middle Little Road and South Little Road may have potential to be utilized as offsite mitigation areas for establishing spring-flowering goldenrod. These Little Road Areas are located off Catfish Lake Road (SR 1100) west of the Alt. 3 study area. Suitable soils and hydrologic conditions are expected to be present within portions of the 770 acres preliminarily identified.

It may also be feasible to establish spring-flowering goldenrod where suitable soils and hydrologic conditions occur along selected roadsides and mesic inclusions present within the Croatan Mitigation Bank (CMB). More information on site conditions for the CMB is provided in a report commissioned by NCDOT.[ii] Although not currently NFS lands, the NCDOT and USFS are planning the development, use, and management of the CMB with planning directed at conveyance of the CMB to the USFS for inclusion in the CNF. Long-term management of the CMB parcel, including land uses and practices consistent with the mitigation objectives, is outlined in a Memorandum of Understanding among the U.S. Army Corps of Engineers, NCDOT, and USFS.[iii]

Mitigation measures will be coordinated with USFS and finalized before NCDOT's FEIS is complete.

Cumulative Impacts

One other activity proposed by NCDOT on NFS lands has the potential to affect occupied habitat for spring-flowering goldenrod resulting in cumulative impacts. NCDOT is proposing improvements to US 17 (R-1514B, C, D) from south of the Town of Belgrade to north of the Jones/Craven County line. The proposed improvements include bypasses of the Towns of Maysville and Pollocksville with a widening section that connects the bypasses. The widening section includes approximately 108 acres of NFS lands on the Croatan National Forest. The NFS lands affected by the project include part of the existing US 17 facility.

One spring-flowering goldenrod occurrence occupies a total of 13.0 acres within the US 17 project area, including areas located on NFS lands within the CNF and areas located within the existing US 17 right-of-way adjacent to private property. Approximately 12.8 acres of this spring-flowering goldenrod occurrence will be directly affected as a result of this project, which includes approximately 9.9 acres (98%) of the 10.1 acres of habitat occupied on NFS lands in the CNF. This occurrence is estimated to include approximately 4,700 individual plants and it is estimated that approximately 3,584 individual

plants may be directly impacted on NFS lands and an additional 1,050 individual plants may be directly impacted within the US 17 right-of-way adjacent to private property.

NCDOT proposes to mitigate spring-flowering goldenrod impacts on NFS lands resulting from the US 17 Improvements project by establishing new populations on NFS lands in areas identified as potentially suitable based on favorable soil and hydrology conditions. NCDOT is in the process of identifying appropriate candidate sites and mitigation measures will be coordinated with USFS before NCDOT's FEIS is complete. As part of the mitigation effort, seeds were collected from the US 17 impact area in 2012, 2011, and 2010 by NCDOT personnel in accordance with the USFS seed collection permit issued to NCDOT for this purpose.

Conclusions and Recommendations

The US 70 Havelock Bypass (R-1015) Alternative 3 will result in unavoidable direct impacts to spring-flowering goldenrod and additional areas occupied by spring-flowering goldenrod may be subject to indirect impacts. The direct impacts for Alternative 3 are not likely to result in a loss of viability on NFS lands within the CNF, but with the inclusion of indirect impacts represent an impact to a significant portion of the overall population on the CNF, particularly for the population within the Alternatives study area, that may result in viability concern on NFS lands within the CNF. Cumulative impacts associated with US 17 (R-2514B, C, and D) further increase the concern for maintaining viability on NFS lands.

Mitigation measures are needed to reduce the threat for a loss of viability for spring-flowering goldenrod on NFS lands within the CNF. Implementation of mitigation measures agreed to between NCDOT and USFS would minimize viability concerns resulting from indirect impacts. These mitigation measures include allowing for the closure of the bypass to allow for periodic prescribed burns to be conducted; avoiding use of aggressive, non-native vegetation in the ROW; avoiding placing staging areas within 200 feet of spring-flowering goldenrod occurrences, where practicable; avoiding heavy equipment access, especially during wet periods; and minimizing the use of herbicides and pesticides. Additional mitigation measures agreed to between NCDOT and USFS would offset viability concerns resulting from direct impacts. These mitigation measures include collecting seeds from the impact areas for establishing new populations on NFS lands in areas identified as potentially suitable based on favorable soil and hydrology conditions.

With the implementation of mitigation measures the US 70 Havelock Bypass (R-1015) Alternative 3 project is not likely to cause a trend towards federal listing or a loss of viability for spring-flowering goldenrod on NFS lands within the CNF.

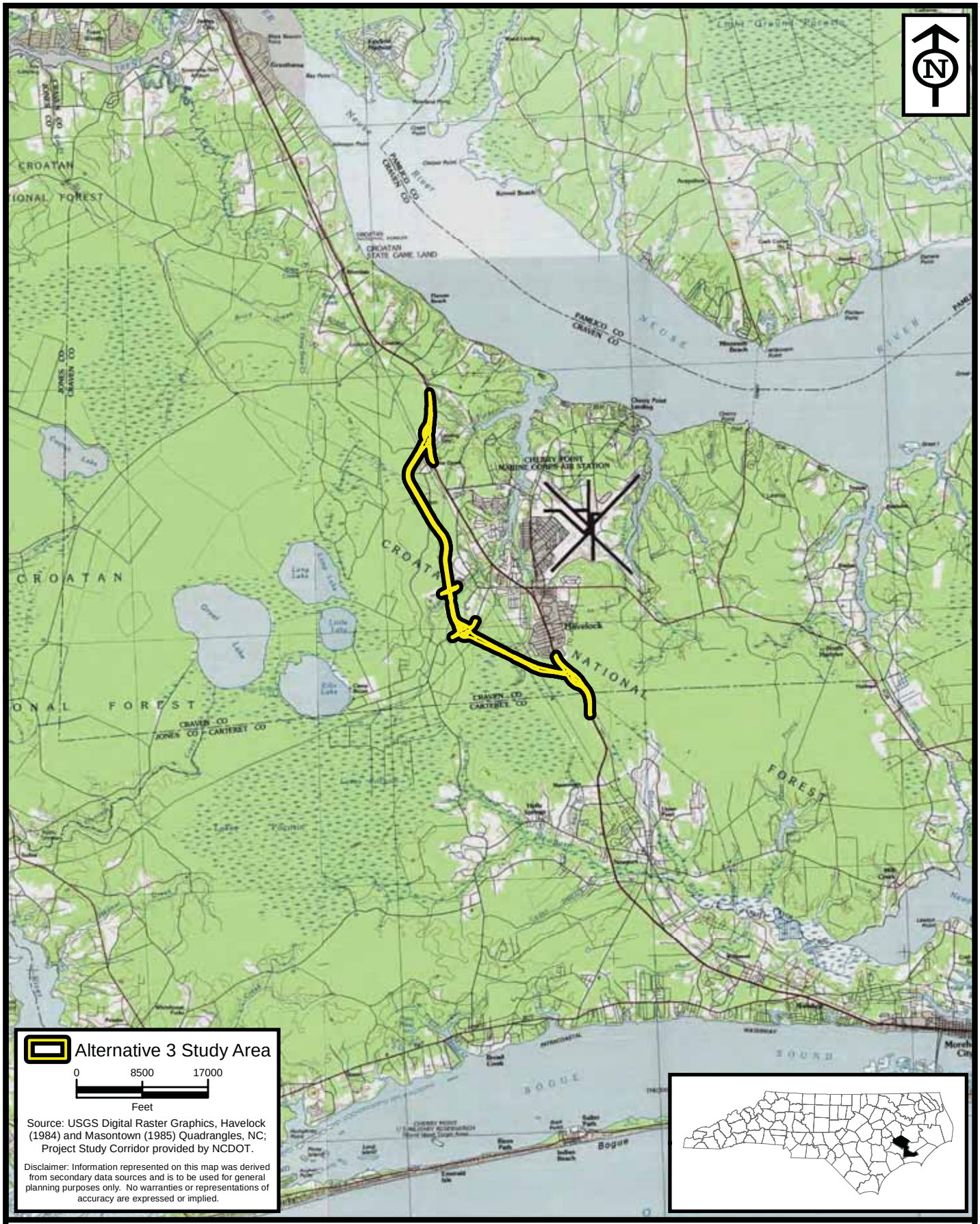
[i] Center for Plant Conservation website. http://www.centerforplantconservation.org/Collection/CPC_ViewProfile.asp?CPCNum=4050 accessed 7 December 2012.

[ii] Stucky, J.M. and M. Fleming, 2006. Recommended mitigation plan for *Solidago verna* in Craven Co., North Carolina; Havelock Bypass, R-1015. Research project conducted for NCDOT, No. HWY-0733.

[ii] EcoScience Corporation and Axiom Environmental, Incorporated. 2009. Croatan Mitigation Bank

Addendum to the NCDOT UMBI. Report prepared for NCDOT, January 2009. 16 pp + appendices.

[iii] U.S. Army Corps of Engineers (USACE), N.C. Department of Transportation (NCDOT), and U.S. Forest Service (USFS). 2003. Memorandum of Understanding between the U.S. Army Corps of Engineers, State of North Carolina Department of Transportation, and the United States Forest Service for the Disposition and Management of the Croatan Wetland Mitigation Bank in Craven County, North Carolina. Agreement No. 02-MU-11081100-034. 5pp.



Project Location

US 70 Havelock Bypass (R-1015)

Craven and Carteret Counties, North Carolina

Project:	ER10060.08
Date:	Oct 2012
Drwn/Chkd:	CD/MS
Figure:	1

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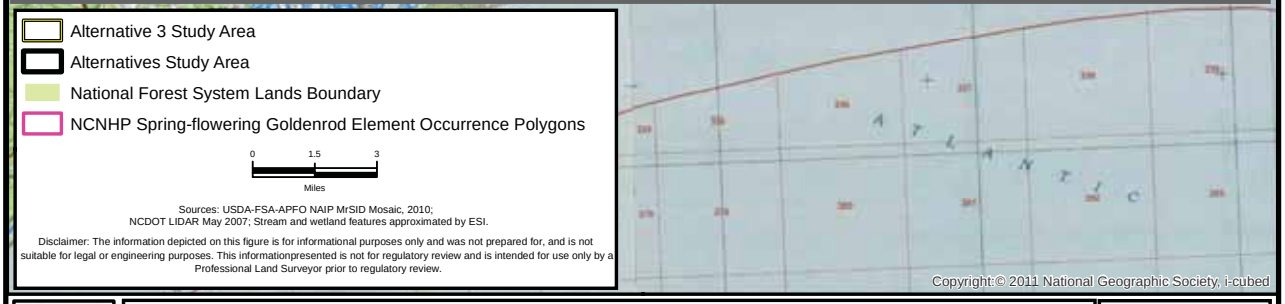
To protect the viability of protected/rare species, the exact location of species occurrences is not shown in this memo.
For more information, contact:
John Conforti, REM
NCDOT Project Development & Environmental Analysis Unit
919-707-6015
jgconforti@ncdot.gov



Project Location - Spring-flowering Goldenrod

US 70 Havelock Bypass (R-1015)

Craven and Carteret Counties, North Carolina

Project:	ER10060.08
Date:	Dec 2012
Drwn/Chkd:	KT/MKS
Figure:	**2**

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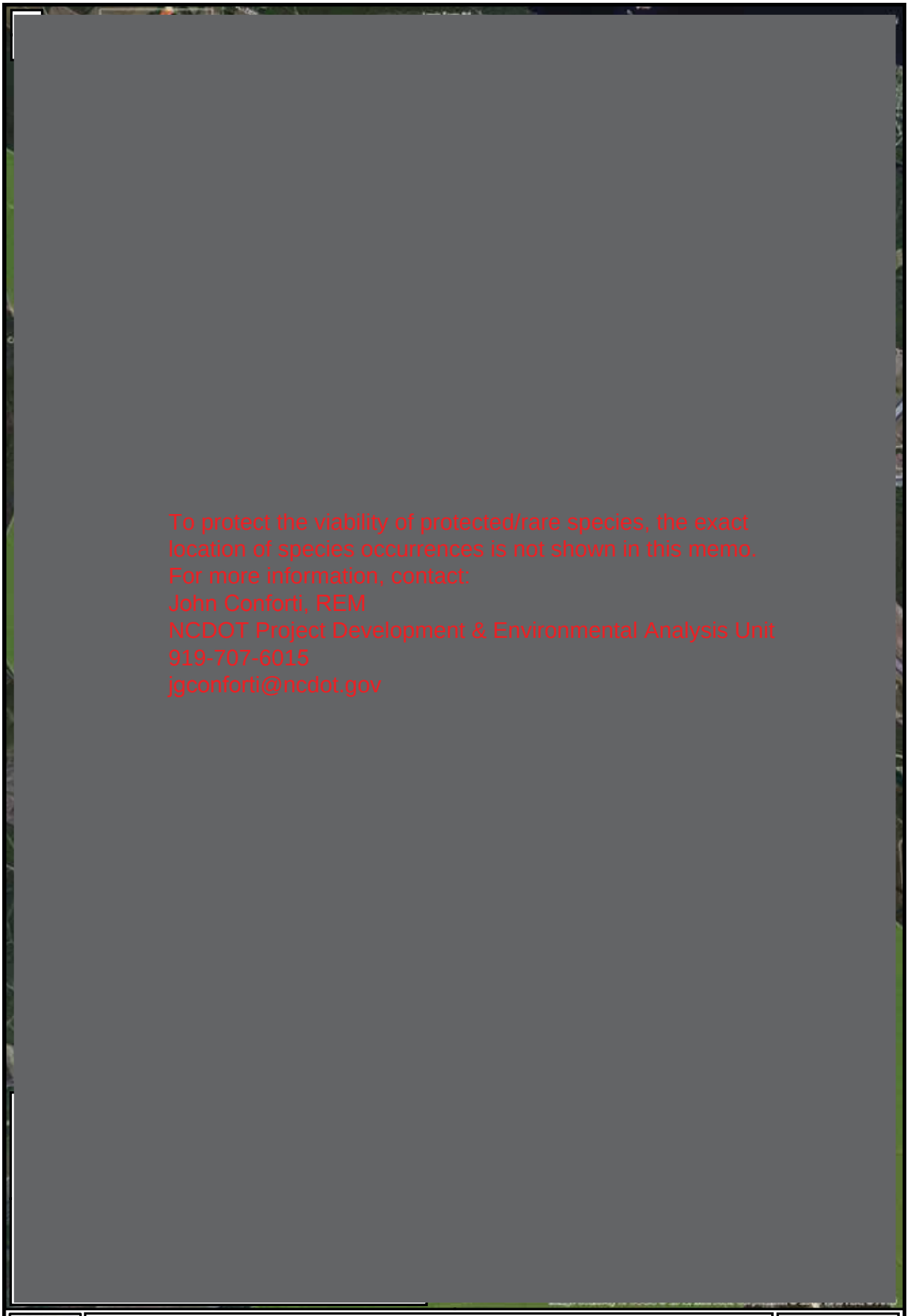

Spring-flowering Goldenrod Assessment Overview

US 70 Havelock Bypass (R-1015)

Craven and Carteret Counties, North Carolina

Project:	ER10060.08
Date:	Dec 2012
Drwn/Chkd:	CD/MS
Figure:	**3**

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Spring-flowering Goldenrod Assessment

US 70 Havelock Bypass (R-1015)

Craven and Carteret Counties, North Carolina

Project:	ER10060.08
Date:	Dec 2012
Drwn/Chkd:	CD/MS
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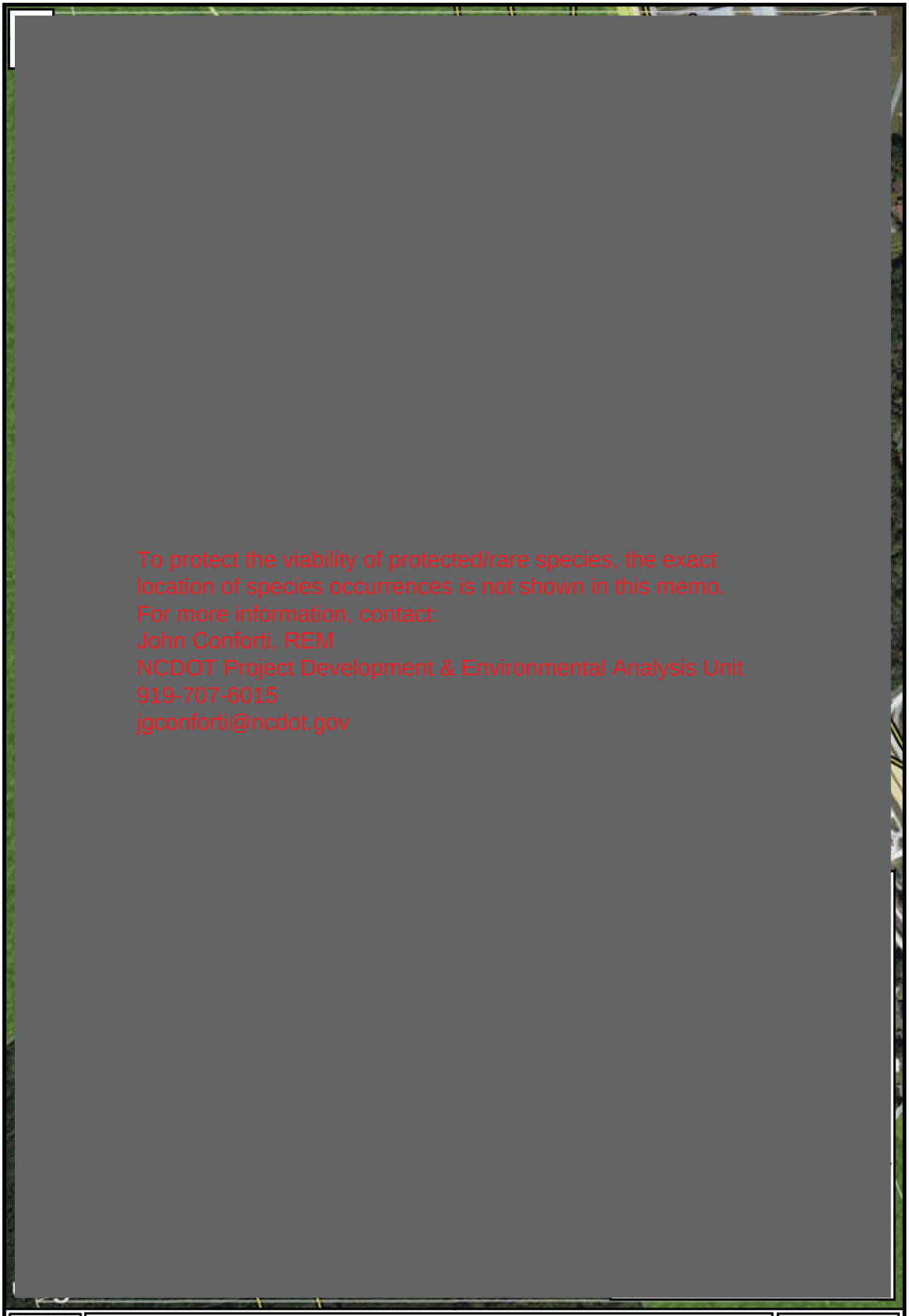

Spring-flowering Goldenrod Assessment

US 70 Havelock Bypass (R-1015)

Craven and Carteret Counties, North Carolina

Project:	ER10060.08
Date:	Dec 2012
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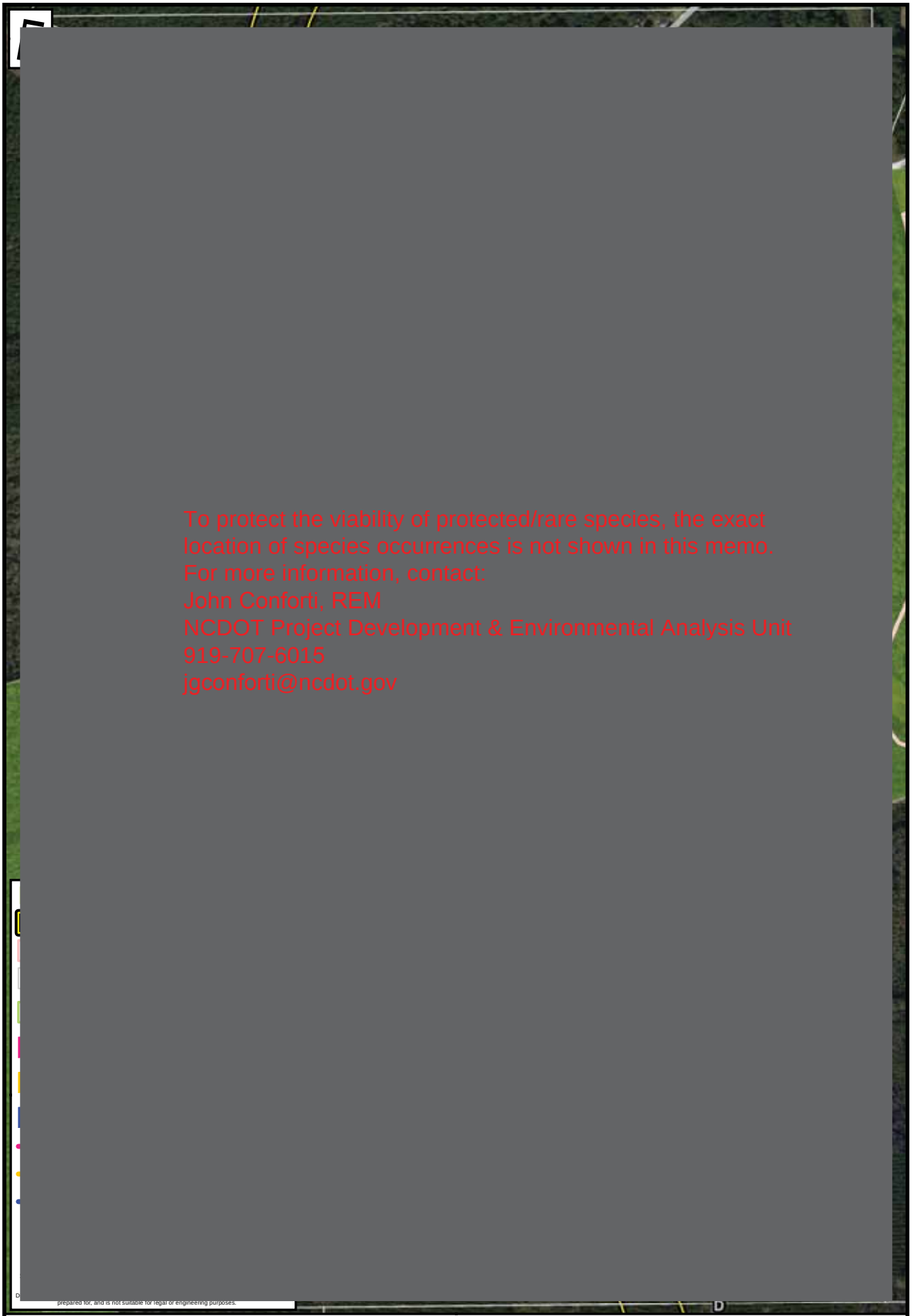

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Spring-flowering Goldenrod Assessment

US 70 Havelock Bypass (R-1015)

Craven and Carteret Counties, North Carolina

Project:	ER10060.08
Date:	Dec 2012
Drwn/Chkd:	CD/MS
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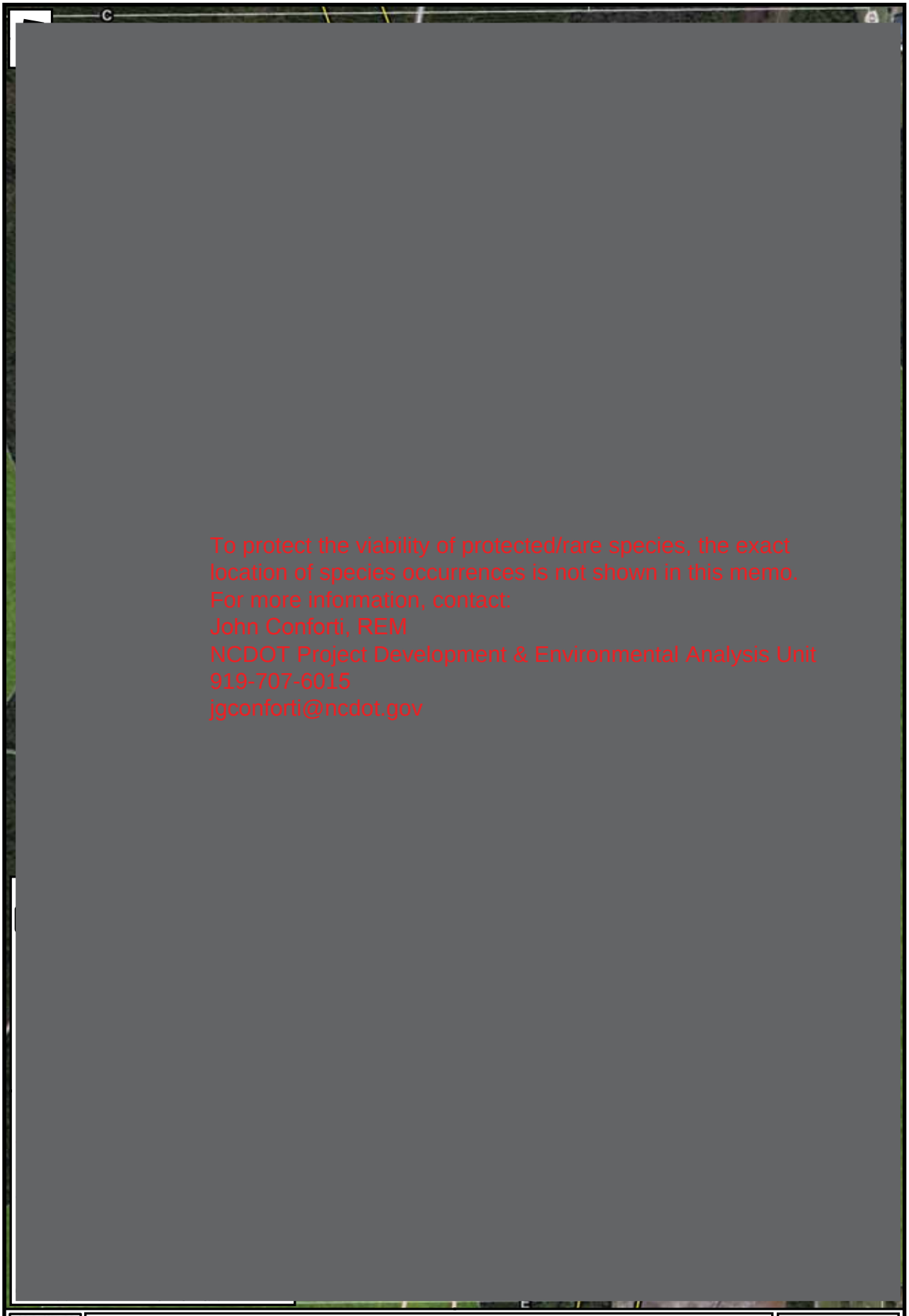

Spring-flowering Goldenrod Assessment

US 70 Havelock Bypass (R-1015)

Craven and Carteret Counties, North Carolina

Project:	ER10060.08
Date:	Dec 2012
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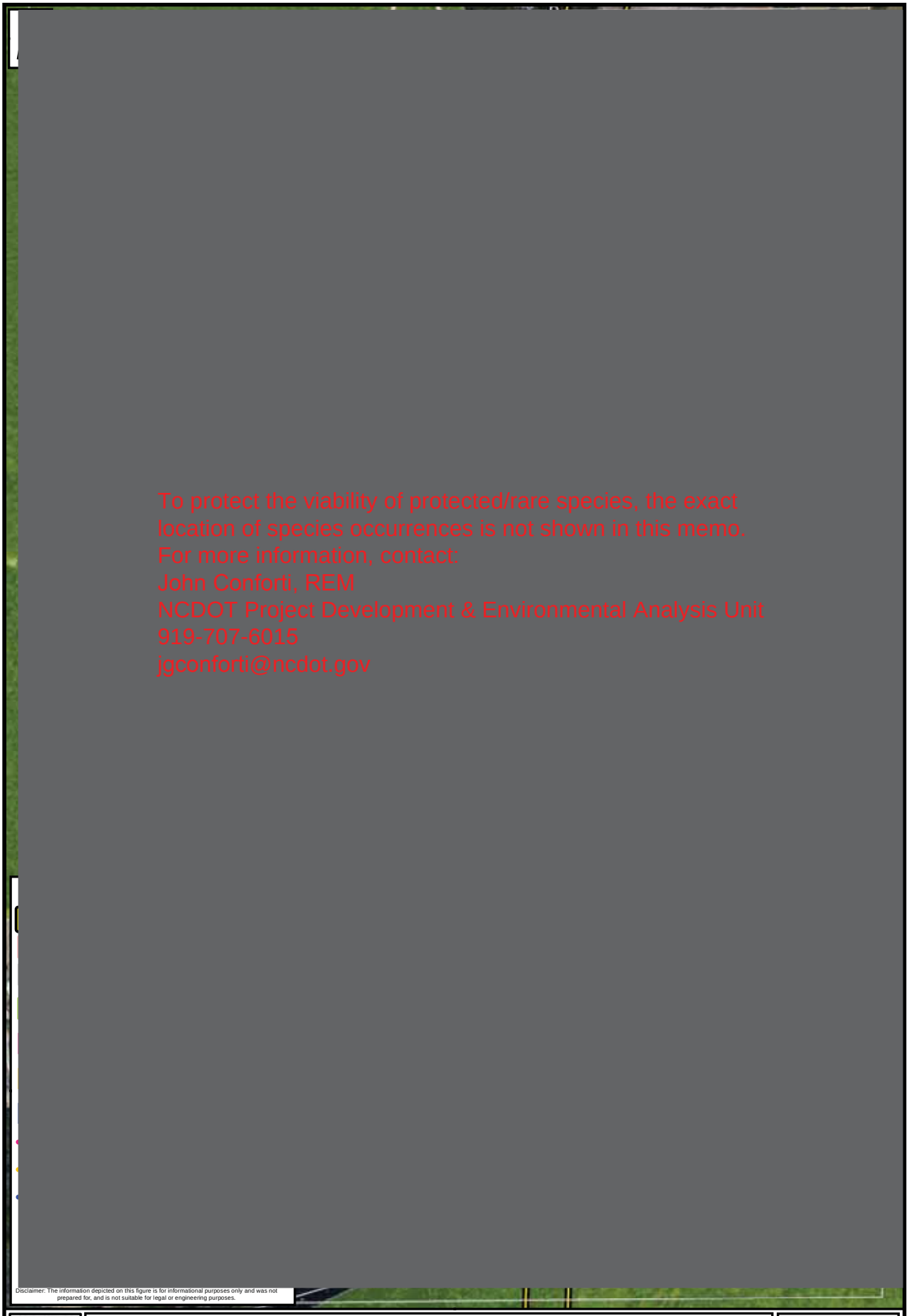

To protect the viability of protected/rare species, the exact location of species occurrences is not shown in this memo. For more information, contact:
John Conforti, REM
NCDOT Project Development & Environmental Analysis Unit
919-707-6015
jgconforti@ncdot.gov

Disclaimer: The information depicted on this figure is for informational purposes only and was not prepared for, and is not suitable for legal or engineering purposes.

Spring-flowering Goldenrod Assessment
US 70 Havelock Bypass (R-1015)
Craven and Carteret Counties, North Carolina

Project:	ER10060.08
Date:	Dec 2012
Drwn/Chkd:	CD/MS
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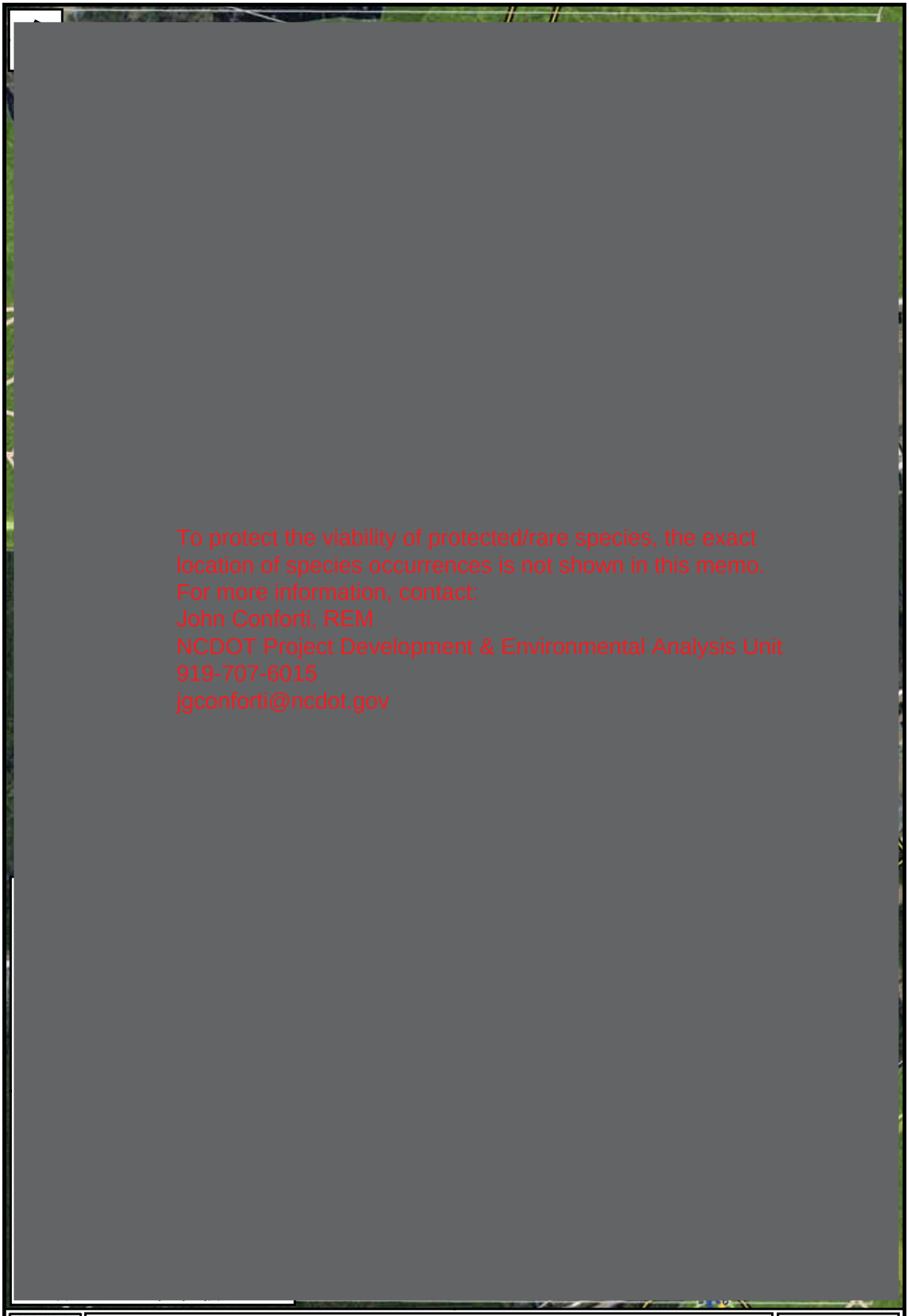

Spring-flowering Goldenrod Assessment

US 70 Havelock Bypass (R-1015)

Craven and Carteret Counties, North Carolina

Project:	ER10060.08
Date:	Dec 2012
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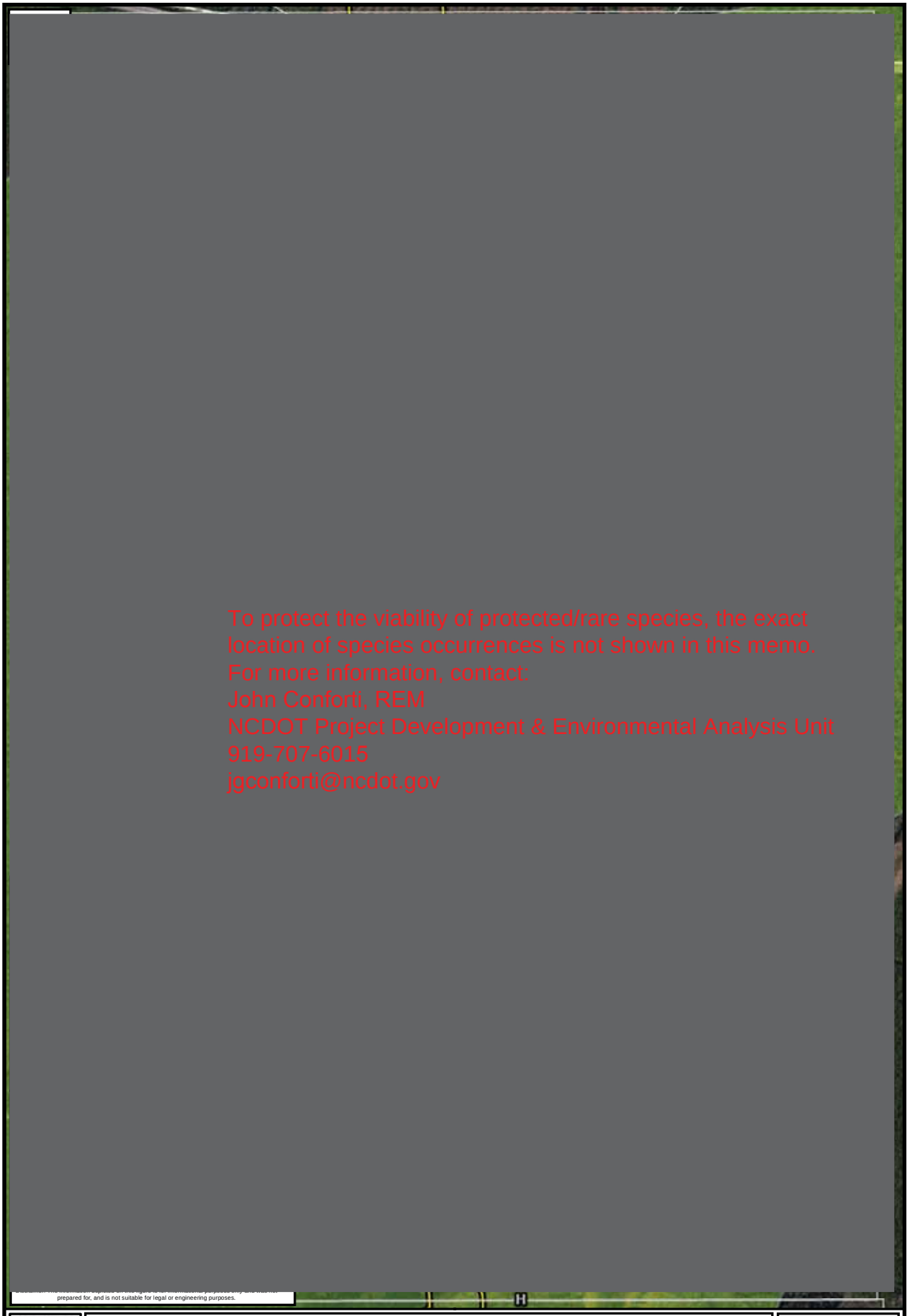

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Spring-flowering Goldenrod Assessment

US 70 Havelock Bypass (R-1015)

Craven and Carteret Counties, North Carolina

Project:	ER10060.08
Date:	Dec 2012
Drwn/Chkd:	CD/MS
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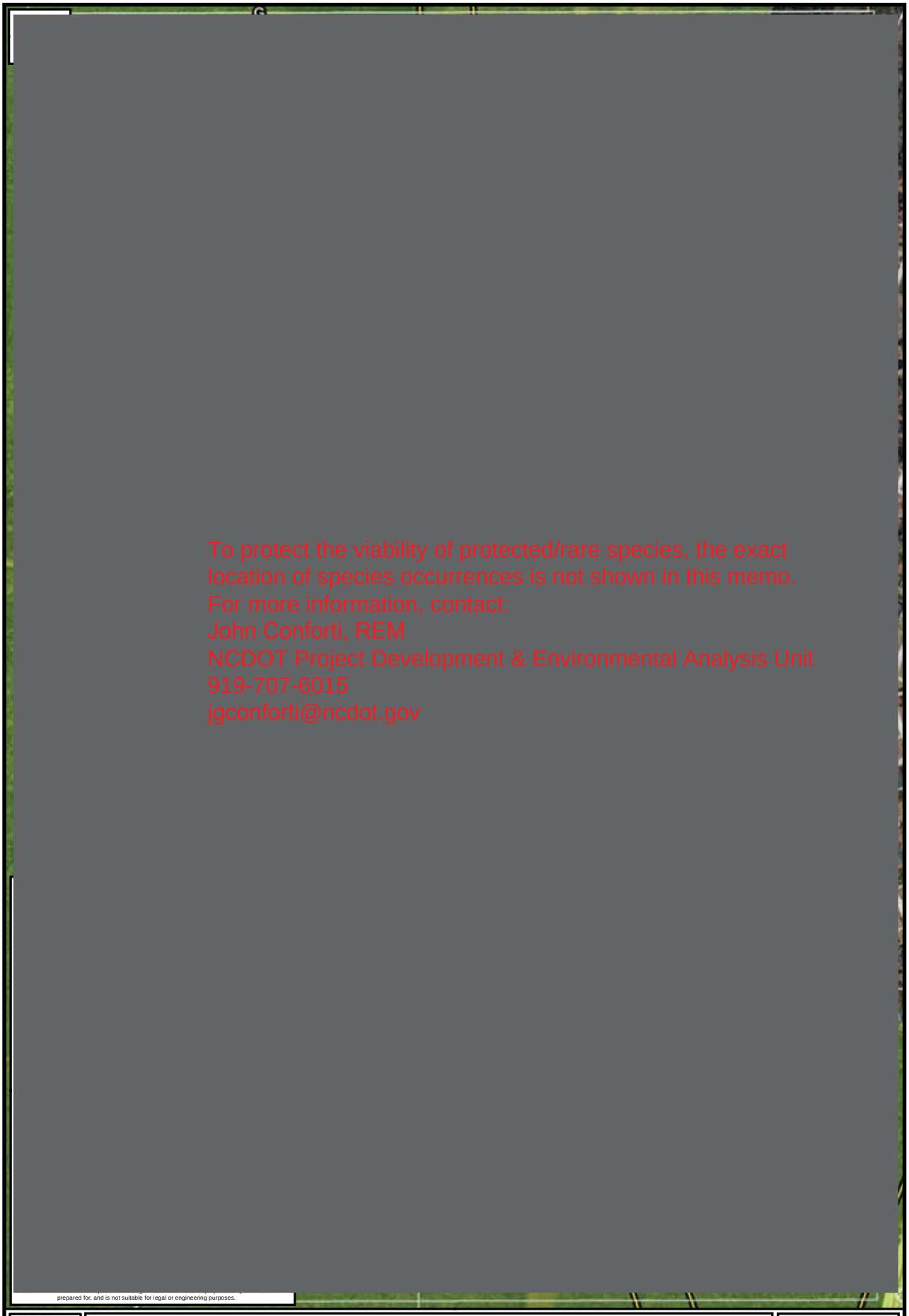

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Spring-flowering Goldenrod Assessment

US 70 Havelock Bypass (R-1015)

Craven and Carteret Counties, North Carolina

Project:	ER10060.08
Date:	Dec 2012
Drwn/Chkd:	CD/MS
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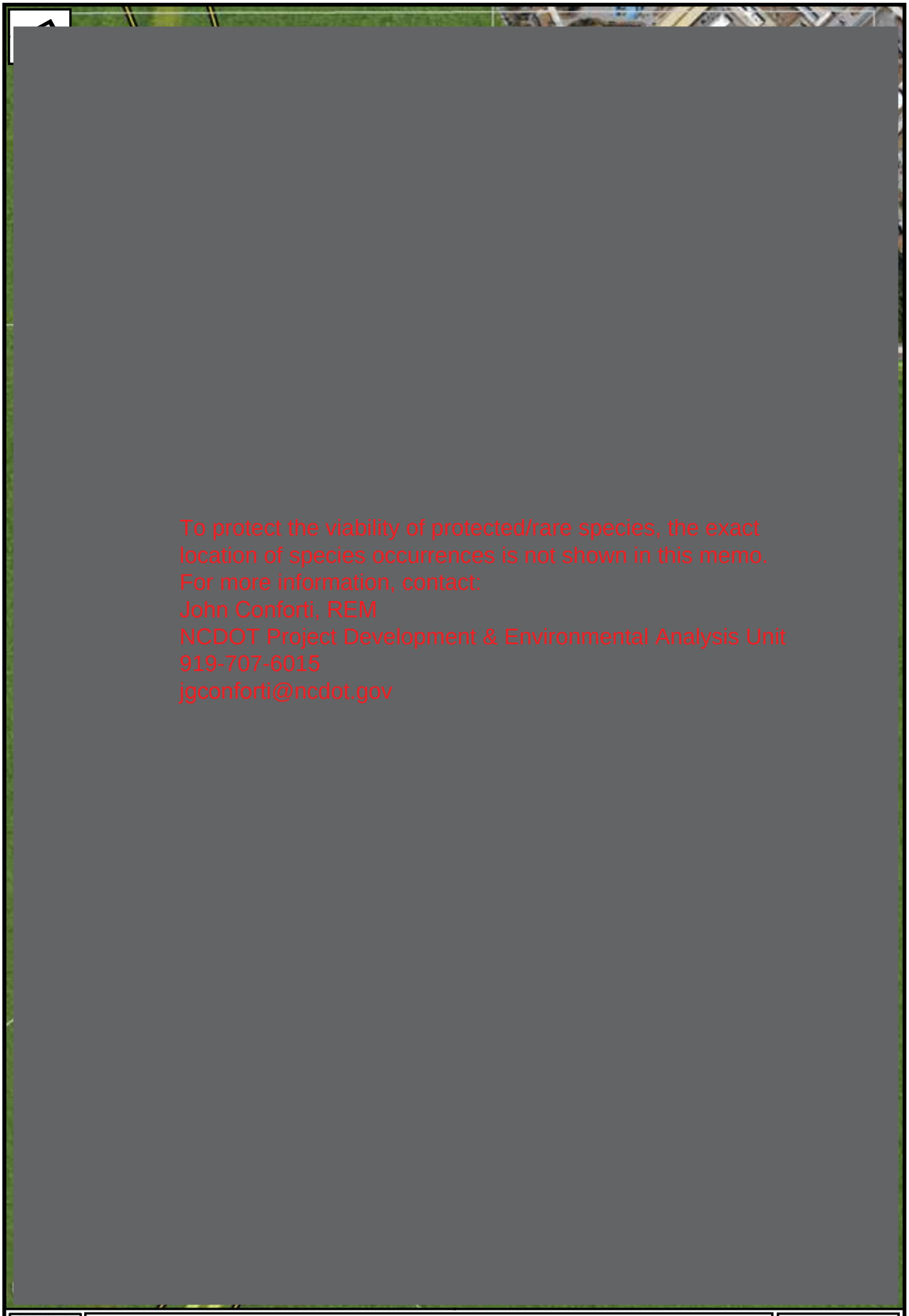

Spring-flowering Goldenrod Assessment

US 70 Havelock Bypass (R-1015)

Craven and Carteret Counties, North Carolina

Project:	ER10060.08
Date:	Dec 2012
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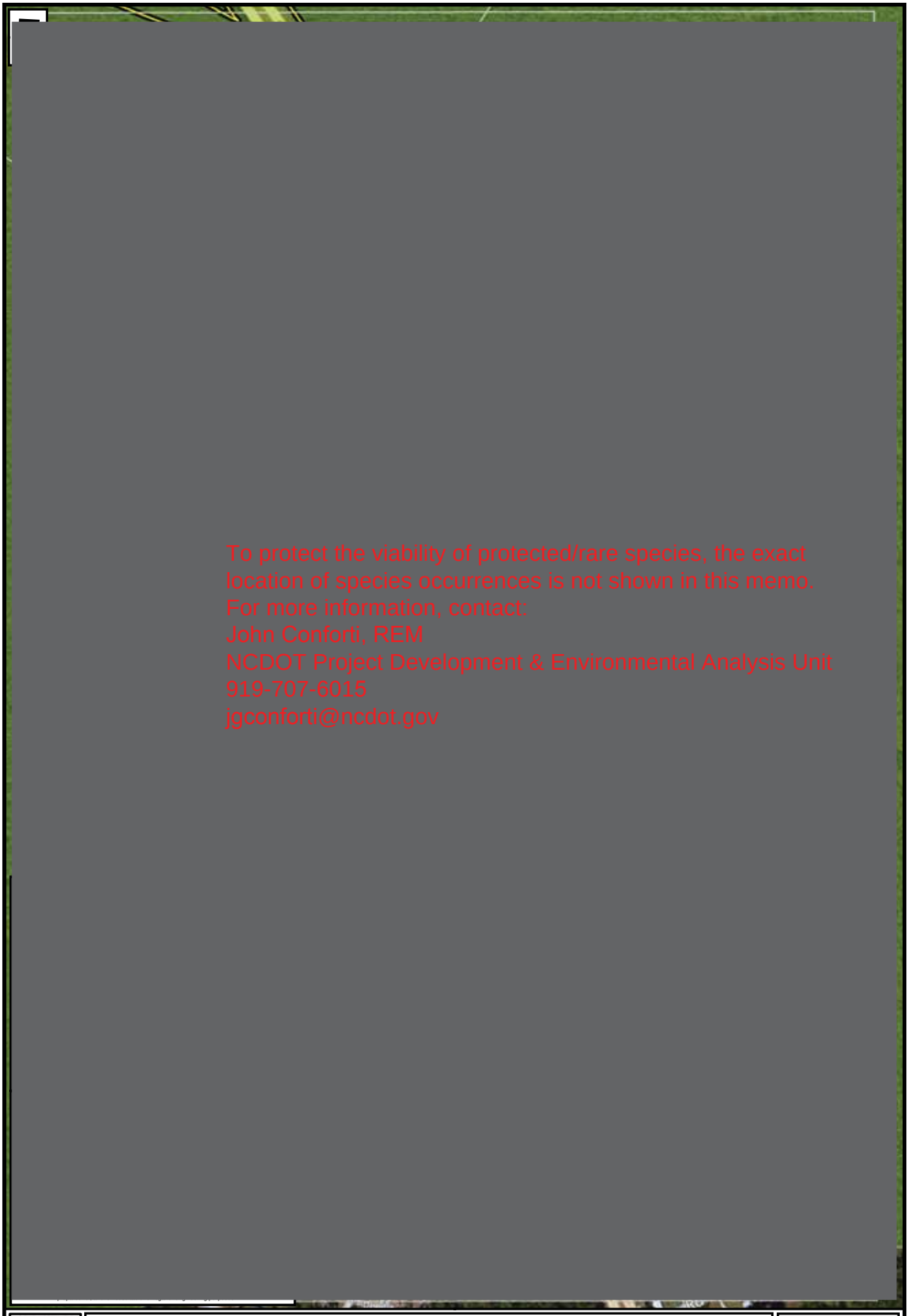

Spring-flowering Goldenrod Assessment

US 70 Havelock Bypass (R-1015)

Craven and Carteret Counties, North Carolina

Project:	ER10060.08
Date:	Dec 2012
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Figure:	**3J**

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For more information, contact:
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jgconforti@ncdot.gov

accuracy are expressed or implied.

Potential Spring-flowering Goldenrod Mitigation Areas

US 70 Havelock Bypass (R-1015)

Craven and Carteret Counties, North Carolina

Project:	ER10060.08
Date:	Dec 2012
Drwn/Chkd:	KT/MS
Figure:	**4**

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ATTACHMENT 8

ENVIRONMENTAL SERVICES, INC.
524 South New Hope Road
Raleigh, North Carolina 27610
919-212-1760 / Facsimile 919-212-1707
www.environmentalservicesinc.com

MEMORANDUM

TO: Rachelle Beauregard

FROM: Matt Smith

DATE: 18 January 2013

RE: US 70 Havelock Bypass (R-1015)
P.O. No. 6300030960
Address USFS Comments on DEIS and PETS Analysis:
Summary of Revised USFS Rare Species Surveys Evaluation
ESI Project No. ER10-060.08

Environmental Services, Inc., (ESI), has been asked by the North Carolina Department of Transportation (NCDOT) to assist in updating information contained in the Draft Environmental Impact Statement (DEIS). This memorandum summarizes updates to the U.S. Forest Service (USFS) rare species analysis presented in Chapter 3 and Chapter 4 of the DEIS. The USFS rare species analysis includes species federally listed as Proposed, Endangered, or Threatened (PET) under the Endangered Species Act, species designated as Sensitive (S) by USFS Region 8, and species considered to be Locally Rare (LR) or Forest Concern (FC) on the Croatan National Forest. The updated PETS species analysis is being presented in a format that can be directly incorporated into Chapter 3 and Chapter 4 of the Final Environmental Impact Statement (FEIS). Section headings, table numbers, and figure numbers included in this memorandum refer to Chapter 3 and Chapter 4 of the DEIS. The USFS rare species figure included in the DEIS was also updated.

Additional surveys were completed during 2012 for USFS rare plant species identified as having suitable habitat within Alternative 3. No additional surveys were completed in 2012 for Alternative 1 or Alternative 2 nor were additional surveys conducted for USFS rare animal species within any of the alternates. The updated PETS species analysis incorporates the evaluation completed for species added to

the USFS rare species lists provided in 2012 and includes presentation of updated potential direct affects, indirect affects, cumulative effects, and proposed mitigative measures for the Alternative 1, Alternative 2, and Alternative 3 of the proposed US 70 Havelock Bypass (R-1015) for proposed incorporation into the FEIS.

Boundaries for National Forest System (NFS) lands were provided by the USFS for use in this analysis. The analysis for USFS rare species is based on the tree clearing limits (slope stake limits plus 15 feet) plus an additional 25 feet.

If you have any questions please feel free to contact me at 910-520-0784. We appreciate the opportunity to have provided assistance to NCDOT with this important project.

Chapter 3

3.5.4.3.3. U.S. Forest Service Rare Species

In addition to plant and animal species receiving protection under the Endangered Species Act, the U.S. Forest Service (USFS) maintains a list of USFS rare species for the Croatan National Forest (CNF) and considers these species when determining impacts to National Forest System (NFS) lands. The USFS rare species analysis includes species federally listed as Proposed, Endangered, or Threatened (PET) under the Endangered Species Act, species designated as Sensitive (S) by USFS Region 8, and species considered to be Locally Rare (LR) or Forest Concern (FC) on the CNF. Since all of the study alternatives cross NSF lands, a special use permit from the USFS will be required to provide the lands for the proposed project. Prior to approving a special use permit for the project, the USFS requires that the project study area be evaluated for USFS rare species. The North Carolina Department of Transportation (NCDOT), Division of Highways, Planning and Environmental Analysis Branch, Natural Environment Section, coordinated with the USFS to determine which USFS rare species were to be evaluated. The surveys and evaluations were conducted by Environmental Services, Inc. and reviewed by NCDOT and the USFS.

Throughout the evaluation, the USFS has been amending and revising its list of rare species as new scientific data regarding species distributions on the CNF becomes available. The USFS identified 30 rare species with a high probability of occurring that were to be evaluated in the Environmental Assessment for the proposed project in 1996. At that time the USFS indicated that 73 USFS rare species were listed for consideration on the CNF. When additional detailed evaluations were initiated in 2002 that list was amended to include 175 species. In January 2005, September 2007, May 2008, October 2010, and February 2012 the USFS further amended the USFS rare species list removing species and requesting that additional species be incorporated into the project analysis. Initial habitat assessments, including field evaluations for the USFS rare species were conducted in 2004 for the species listed at that time. Species surveys requested by the USFS were conducted during the 2005 growing season and results of these surveys were provided to the USFS in December 2006. An evaluation of additional USFS rare species was completed in May 2008 for species added to the USFS rare species lists.

The USFS rare species evaluation presented here includes all of the 198 species on the most recently updated USFS rare species lists provided by USFS in early 2012. These 198 species have been evaluated to determine if suitable habitat is present in the study area. Habitat assessments utilized the detailed habitat descriptions presented in Chapter 3, Section 3.5.2.1 to determine if habitat is present in the study

area. The results of field surveys completed during the 2012 growing season for species determined to have suitable habitat in the study area are presented in Chapter 4, Section 4.1.9.3.3.

Table 3.21a presents the 108 plant species (February 2012 list update) that are currently being evaluated as USFS rare species, and Table 3.21b presents the 90 animal species (February 2011 list update) that are currently being evaluated as USFS species for the CNF. Tables 3.21a and 3.21b list all the evaluated USFS rare species, habitat information for each species, and the potential for suitable habitat in the study area. Species have been assigned a number (1 through 198) to facilitate tracking throughout this analysis.

Table 3.21a. USFS PETS Rare Plant Species for the Croatan National Forest (February 2011 List Update)

Species Number	Scientific Name	Common Name	USFS Status [a]	Habitat Type	Habitat Present (Study Area)
1	*Aeschynomene virginica*	Sensitive jointvetch	T	Tidally influenced marshes and creeks and ditches	No
2	*Agalinis virgata*	Branched gerardia	LR	Savannas and depression ponds	Yes
3	*Agrostis altissima*	Tall bentgrass	LR	Wet savannas	Yes
4	*Andropogon mohrii*	Bog bluestem	LR	Wet savannas	Yes
5	*Arenaria lanuginosa* var. *lanuginosa*	Spreading sandwort	LR	Maritime grasslands and forests, sandy sites	No
6	*Arnoglossum ovatum*	Savanna milkweed	LR	Wet savannas	Yes
7	*Asclepias pedicellata*	Stalked milkweed	LR	Dry savanna and moist flatwoods	Yes
8	*Asplenium heteroresiliens*	Carolina spleenwort	S	Marl, coquina limestone outcrops	No
9	*Calopogon multiflorus*	Many-flower grass pink	S	Savannas and sandhills	Yes
10	*Campylopus carolinae*	Savanna campylopus	S	Savanna	Yes
11	*Cardamine longii*	Long's bittercress	S	Tidal marshes, tidal cypress-gum forests	No
12	*Carex basiantha*	Widow sedge	LR	Marl, mesic forests and bottomlands over calcareous rocks	Yes
13	*Carex calcifugens*	Calcium-fleeing sedge	LR	Evergreen maritime forest, calcareous bluff forest	Yes
14	*Carex emmonsii*	Emmon's sedge	LR	Moist woods	Yes
15	*Carex lupuliformis*	Hop-like sedge	LR	Mesic bottomlands, especially in calcareous or mafic areas	Yes
16	*Cirsium lecontei*	LeConte's thistle	LR	Savannas	Yes
17	*Cladium mariscoides*	Twig-rush	LR	Bog marshes, brackish fens, sandhill seeps	No
18	*Cleistesiopsis bifaria (=Cleistes bifaria)*	Small spreading pogonia	S	Savannas, dry meadows	Yes
19	*Clematis catesbyana*	Coastal virgin's-bower	LR	Dunes, maritime forest edge, dolomite	No
20	*Corallorhiza wisteriana*	Spring coral-root	LR	Moist to dry nutrient-rich forests, especially over limestone, mafic rocks or shell-rich sands	Yes
21	*Coreopsis helianthoides*	Beadle's coreopsis	LR	Swamp, peaty wetlands	Yes
22	*Crocanthemum carolinianum*	Carolina sunrose	LR	Sandhills pinelands and dry savannas	Yes
23	*Cylindrocolea rhizantha*	A liverwort	S	Marl outcrops	No
24	*Cystopteris tennesseensis*	Tennessee bladder-fern	LR	Marl, calcareous rock outcrops	No
25	*Dichanthelium fusiforme*	Spindle-fruited witch grass	LR	Sandy pine or pine-oak forests	Yes
26	*Dichanthelium hirstii*	Hirst's panic grass	S	Cypress savannas	No
27	*Dichanthelium* sp. *9*	Hidden-flowered witch grass	LR	Pocosins, wet meadows, ditchlines	Yes
28	*Dichanthelium spretum*	Eaton's witch grass	LR	Wet sands and peaty bogs, savannas	Yes
29	*Dionaea muscipula*	Venus flytrap	S	Savannas, seepage bogs, pocosin edges with little competition	Yes

[a] E – Endangered; LR- Locally Rare; S – Sensitive; T – Threatened.

Table 3.21a. Continued

Species Number	*Scientific Name*	Common Name	USFS Status [a]	Habitat Type	Habitat Present (Study Area)
30	*Eleocharis parvula*	Littlespike spikerush	LR	Tidal brackish and freshwater marshes	No
31	*Eleocharis robbinsii*	Robbin's spikerush	LR	Ponds, lakes, Carolina bays	No
32	*Eleocharis rostellata*	Beaked spikerush	LR	Tidal brackish and freshwater marshes	No
33	*Elymus virginicus var. halophilus*	Terrell grass	LR	Brackish marsh, maritime forest	No
34	*Eriocaulon aquaticum*	Seven-angled pipewort	LR	Pond or lake margins	Yes
35	*Eurybia spectabilis*	Showy aster	LR	Pine barrens, woodland borders	No
36	*Fissidens hallii*	Hall's pocket moss	S	On bark in cypress-gum swamps	Yes
37	*Frullania donnellii*	A liverwort	S	Ilex bark in marshes	No
38	*Hibiscus aculeatus*	Comfortroot	LR	Bay forests, sand ridges, roadsides	Yes
39	*Isoetes microvela*	Quillwort	S	Emergent or calcareous riverbanks	No
40	*Lachnocaulon beyrichianum*	Southern bogbutton	S	Sandhills	No
41	*Leersia lenticularis*	Catchfly cutgrass	LR	Low moist woods	Yes
42	*Lejeunea bermudiana*	A liverwort	LR	On marl outcrops and on decaying logs in blackwater swamps	Yes
43	*Lejeunea dimorphophylla*	A liverwort	S	On bark in maritime forests	No
44	*Litsea aestivalis*	Pondspice	S	Limesink ponds and other pools	Yes
45	*Lobelia boykinii*	Boykin's lobelia	S	Depression ponds, meadows, clay-based cypress savannas	Yes
46	*Ludwigia alata*	Winged seedbox	LR	Freshwater to brackish marshes	No
47	*Ludwigia linifolia*	Flaxleaf seedbox	LR	Limesink ponds	No
48	*Ludwigia ravenii*	Raven's seedbox	S	Savannas, swamps, marshes, wet open areas	Yes
49	*Ludwigia sphaerocarpa*	Globe-fruit seedbox	LR	Boggy areas, pools, ditches, marshes	Yes
50	*Lysimachia asperulaefolia*	Rough-leaved loosestrife	E	Pocosin/savanna ecotones	Yes
51	*Lysimachia loomisii*	Loomis's loosestrife	S	Moist to wet savannas and pocosin ecotones	Yes
52	*Macbridea caroliniana*	Birds-in-a-nest (Carolina bogmint)	S	Blackwater swamps, savannas	Yes
53	*Malaxis spicata*	Florida adder's mouth	LR	Maritime swamp forest, calcareous mucky outer coastal plain swamps	Yes
54	*Metzgeria unicigera*	A liverwort	S	On bark in maritime forests	No
55	*Minuartia godfreyi*	Godfrey's sandwort	S	Tidal freshwater marshes	No
56	*Myriophyllum laxum*	Loose watermilfoil	S	Limesink ponds, natural lakes	No
57	*Nuphar sagittifolia*	Narrowleaf cowlily	S	Blackwater streams, rivers, and lakes	Yes
58	*Oplismenus hirtellus* ssp. *setarius*	Shortleaf basket grass	LR	Maritime forests, bottomlands	Yes
59	*Oxypolis ternata*	Piedmont cowbane	S	Pine savannas, sandhill seeps	Yes
60	*Parietaria praetermissa*	Large-seed pellitory	S	Shell middens, disturbed sites, maritime forest	No
61	*Parnassia caroliniana*	Carolina grass-of-parnassus	S	Wet savannas	Yes
62	*Paspalum dissectum*	Mudbank crown grass	LR	Mudbanks, open wet areas, wet ditches	Yes
63	*Peltandra sagittifolia*	Spoonflower	LR	Pocosins, wet peat-dominated sites	Yes

[a] E – Endangered; LR- Locally Rare; S – Sensitive; T – Threatened.

Table 3.21a. Continued

Species Number	*Scientific Name*	Common Name	USFS Status [a]	Habitat Type	Habitat Present (Study Area)
64	*Persicaria hirsuta*	Hairy smartweed	LR	Limesink ponds, clay-lined Carolina bays, blackwater stream edges	Yes
65	*Pinguicula pumila*	Small butterwort	LR	Savannas	Yes
66	*Plagiochila ludoviaciana*	A liverwort	LR	On bark in swamps and maritime forests	Yes
67	*Plagiochila miradorensi* var. *miradorensis*	A liverwort	LR	On bark in maritime forests and swamps	Yes
68	*Plantago sparsiflora*	Pineland plantain	S	Wet savannas	Yes
69	*Platanthera integra*	Yellow fringeless orchid	S	Savannas	Yes
70	*Platanthera nivea*	Snowy orchid	LR	Wet savannas	Yes
71	*Polygala hookeri*	Hooker's milkwort	S	Savannas	Yes
72	*Ponthieva racemosa*	Shadow-witch	LR	Blackwater forests and swamps over calcareous rock (marl)	Yes
73	*Pycnanthemum setosum*	Awned mountain-mint	LR	Blackwater swamps	Yes
74	*Quercus austrina*	Bluff oak	LR	Bluff or basic mesic forest	No
75	*Quercus minima*	Dwarf live oak	LR	Pine flatwoods, coastal fringe sandhills	Yes
76	*Rhexia aristosa*	Awned meadow-beauty	S	Clay-lined Carolina bays, limesink ponds	No
77	*Rhynchospora alba*	Northern white beaksedge	LR	Limesink ponds, pocosin openings	No
78	*Rhynchospora breviseta*	Short-bristled beaksedge	S	Wet savannas, may colonize disturbed areas/roadsides	Yes
79	*Rhynchospora harperi*	Harper's beaksedge	LR	Limesink ponds and cypress savannas	No
80	*Rhynchospora macra*	Southern white beaksedge	S	Seepage or sphagnum bogs in frequently burned streamhead pocosins	Yes
81	*Rhynchospora microcarpa*	Southern beaksedge	LR	Limesink ponds, maritime grasslands, clay-lined Carolina bays	No
82	*Rhynchospora pleiantha*	Coastal beaksedge	S	Sandy margins of limesink ponds	No
83	*Rhynchospora thornei*	Thorne's beaksedge	S	Wet savannas	Yes
84	*Sagittaria chapmanii*	Chapman's arrowhead	S	Limesink ponds with drawdown	No
85	*Sagittaria weatherbiana*	Grassleaf arrowhead	S	Fresh to slightly brackish marshes, swamps and ponds	Yes
86	*Schoenoplectus etuberculatus*	Canby's bulrush	LR	On peat in depression ponds, in flowing blackwater streams	Yes
87	*Scirpus lineatus*	Drooping bulrush	LR	Low rich swamp forests over coquina limestone	Yes
88	*Scleria baldwinii*	Baldwin's nutrush	LR	Wet savannas associated with longleaf pine, pond pine, and pondcypress	Yes
89	*Solidago leavenworthii*	Leavenworth's goldenrod	LR	Savannas, clay-based Carolina bays, peaty seeps, pocosin borders	Yes
90	*Solidago pulchra*	Carolina goldenrod	S	Savannas	Yes
91	*Solidago tortiflora*	Twisted-leaf goldenrod	LR	Dry savannas and moist flatwoods	Yes
92	*Solidago verna*	Spring-flowering goldenrod	S	Moist pine savannas, lower slopes in sandhills, roadsides in pinelands	Yes
93	*Solidago villosicarpa*	Coastal goldenrod	S	Maritime, edge of coastal fringe evergreen forest in outer coastal plain	No

[a] E – Endangered; LR- Locally Rare; S – Sensitive; T – Threatened.

Table 3.21a. Continued

Species Number	*Scientific Name*	Common Name	USFS Status [a]	Habitat Type	Habitat Present (Study Area)
94	*Sphagnum cribrosum (=S. macrophyllum* var. *floridanum)*	Florida peatmoss	S	Blackwater streams, ditches	Yes
95	*Sphagnum fitzgeraldii*	Fitzgerald's peatmoss	S	Pocosins and savannas	Yes
96	*Sphagnum torreyanum*	Giant peatmoss	LR	Millponds, beaver ponds	Yes
97	*Spiranthes eatonii*	Eaton's ladies'-tresses	LR	Wet savannas	Yes
98	*Spiranthes lacinata*	Lace-lip ladies'-tresses	LR	Wet savannas	No
99	*Spiranthes longilabris*	Giant spiral orchid	S	Wet savannas	Yes
100	*Sporobolus pinetorum*	Carolina dropseed	S	Wet savannas	No
101	*Stylisma pickeringii* var. *pickeringii*	Pickering's dawnflower	LR	Dry sandy roadbanks, sandhills	Yes
102	*Teloschistes flavicans*	Sunrise lichen	S	Maritime forest	No
103	*Thalictrum macrostylum*	Piedmont meadowrue	S	Bogs, wet woods, tidal freshwater marshes, associated with circumneutral soils and mafic outcrops over olivine	Yes
104	*Tofieldia glabra*	Carolina asphodel	S	Wet pine savannas and sandhill seeps, savanna-pocosin ecotones	Yes
105	*Tridens chapmanii*	Chapman's redtop	LR	Roadside, loamy sands of disturbed longleaf pine woodlands	Yes
106	*Utricularia olivacea*	Dwarf bladderwort	LR	Limesink ponds, beaver ponds	Yes
107	*Xyris floridana (=X. difformis* var. *floridana)*	Florida yellow-eyed grass	LR	Savannas	Yes
108	*Xyris stricta*	A yellow-eyed grass	LR	Savannas, depression ponds, depressional meadows, ditches	Yes

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Table 3.21b. USFS PETS Rare Animal Species for the Croatan National Forest (February 2012 List Update)

Species Number [a]	Scientific Name	Common Name	USFS Status [b]	Habitat Type	Habitat Present (Study Area)
MAMMALS					
109	*Condylura cristata* pop. 1	Star-nosed mole (coastal plain population)	FC	Moist meadows, bogs, swamps, bottomlands	No[c]
110	*Corynorhinus rafinesquii macrotis*	Rafinesque's big-eared bat	FC	Abandoned structures, caves, hollow trees, loose bark trees near wooded areas	Yes
111	*Lasiurus intermedius*	Northern yellow bat	FC	Roosts in Spanish moss and other thick vegetation near water, often in longleaf pine habitats	Yes
112	*Myotis austroriparius*	Southeastern myotis	FC	Roosts in buildings and hollow trees, forages near water	Yes
113	*Neotoma floridana floridana*	Eastern woodrat (coastal plain population)	FC	Lowland deciduous forest with dense palmetto cover, low wet areas, marsh	Yes
114	*Puma concolor couguar*	Eastern cougar	E	Extensive forests and remote areas	No[d]
115	*Sorex* sp. 1	An undescribed shrew	FC	Early successional fields, possibly low pocosin	No[c]
116	*Trichechus manatus*	West Indian manatee	E	Warm waters of estuaries and river mouths	No
BIRDS					
117	*Ammodramus henslowii susurrans*	Eastern Henslow's sparrow	FC	Clearcut pocosins, damp weedy fields	Yes
118	*Botaurus lentiginosus*	American bittern	FC	Freshwater or brackish marshes, lake and pond edges with emergent vegetation	No
119	*Charadrius melodus*	Piping plover	T	Sandy upper beaches	No
120	*Circus cyaneus*	Northern harrier	FC	Marshes, meadows, grasslands	No
121	*Dendroica virens waynei*	Black-throated green warbler (coastal plain population)	FC	Nonriverine wetland forests, especially where white cedar or cypress are mixed with hardwoods	Yes
122	*Falco peregrinus*	Peregrine falcon	S	Cliffs, bay, sound, tidal flats, river mouth, herbaceous wetland	No
123	*Gelochelidon nilotica*	Gull-billed tern	FC	Coastlines, salt marshes, estuaries, sand flats on maritime islands	No
124	*Haliaeetus leucocephalus*	Bald eagle	S	Large bodies of water with mature trees for perching	Yes
125	*Himantopus mexicanus*	Black-necked stilt	FC	Fresh or brackish ponds	Yes

[a] Species numbering continued from Table 3.21a.
[b] E – Endangered; FC – Forest Concern; S – Sensitive; T – Threatened; T(S/A) – Threatened due to similarity of appearance.
[c] No documented occurrence in Craven, Carteret, or Jones Counties per USFS 2010, not carried forward for further evaluation.
[d] Eastern cougar is extirpated from North Carolina, not carried forward for further evaluation.
[e] NCDOT and NCWRC biologists have determined that streams in the project study area are too acidic to provide suitable habitat for freshwater mussels.

Table 3.21b. Continued

Species Number [a]	Scientific Name	Common Name	USFS Status [b]	Habitat Type	Habitat Present (Study Area)
126	*Hydroprogne caspia*	Caspian tern	FC	Seacoasts, bays, estuaries, lakes, marshes, and rivers	No[c]
127	*Laterallus jamaicensis*	Black rail	FC	Salt, brackish, and freshwater marshes; pond borders, wet meadows, grassy swamps	No
128	*Mycteria americana*	Wood stork	E	Freshwater or brackish marshes, swamps, lagoons, ponds, flooded fields, nests in trees over water or on islands	No[c]
129	*Passerina ciris ciris*	Eastern painted bunting	FC	Maritime shrub thickets, forest edges	No
130	*Peucaea aestivalis (=Ammodramus aestivalis)*	Bachman's sparrow	FC	Open pine woods with grassy cover	Yes
131	*Phalacrocorax auritus*	Double-crested cormorant	FC	Lakes, ponds, rivers, lagoons, swamps, and coastal bays with scattered trees for nesting	No
132	*Picoides borealis*	Red-cockaded woodpecker	E	Pine savannas	Yes
133	*Plegadis falcinellus*	Glossy ibis	FC	Forests or thickets on maritime islands	No
134	*Porphyrio martinica*	Purple gallinule	FC	Freshwater ponds and rivers with floating vegetation	No
135	*Sterna dougallii*	Roseate tern	E	Seacoasts, bays, estuaries, sand flats on maritime islands	No
REPTILES AND AMPHIBIANS					
136	*Alligator mississippiensis*	American alligator	T (S/A)	Fresh and brackish marshes, ponds, lakes, rivers, swamps	Yes
137	*Ambystoma tigrinum*	Eastern tiger salamander	FC	Breeds in fish-free semi-permanent ponds; forages adjacent sandy pinelands	No[c]
138	*Crotalus adamanteus*	Eastern diamondback rattlesnake	FC	Pine flatwoods, savannas, pine-oak sandhills	Yes
139	*Eurycea quadridigitata*	Dwarf salamander	FC	Pocosins, Carolina bays, pine flatwoods, savannas, wetland habitats	No[c]
140	*Heterodon simus*	Southern hognose snake	FC	Sandy woods, particularly pine-oak sandhills	Yes
141	*Lampropeltis getula sticticeps*	Outer Banks kingsnake	FC	Maritime forests, thickets, and grasslands on the Outer Banks	No
142	*Malaclemys terrapin*	Northern diamondback terrapin	FC	Coastal marshes, tidal flats, coves, estuaries, lagoons	No[c]
143	*Micrurus fulvius*	Eastern coral snake	FC	Pine-oak sandhill, sandy flatwoods, maritime forests	No[c]
144	*Necturus lewisi*	Neuse River waterdog	S	Rivers and large streams in Neuse and Tar drainages	No
145	*Nerodia sipedon williamengelsi*	Carolina salt marsh snake	S	Seaside, estuaries	No
146	*Ophisaurus mimicus*	Mimic glass lizard	S	Pine savannas	Yes

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[e] NCDOT and NCWRC biologists have determined that streams in the project study area are too acidic to provide suitable habitat for freshwater mussels.

Table 3.21b. Continued

Species Number [a]	Scientific Name	Common Name	USFS Status [b]	Habitat Type	Habitat Present (Study Area_
147	*Pituophis melanoleucus melanoleucus*	Northern pine snake	FC	Dry and sandy woods, mainlyin pine/oak sandhills	Yes
148	*Rana capito*	Carolina gopher frog	S	Dry turkey oak-pine associations, sandy areas in pine savannas	Yes
149	*Rana sylvatica* pop.3	Wood frog (coastal plain population)	FC	Mesic to moist hardwood forests	No
150	*Seminatrix pygaea*	Black swamp snake	FC	Lush vegetation of ponds, ditches, sluggish streams	Yes
INSECTS					
151	*Acronicta perblanda*	Cypress daggermoth	FC	Cypress swamps	Yes
152	*Agrotis carolina*	A dart moth	FC	Open longleaf pine or longleaf pine-oak savanna with pyxie-moss	Yes
153	*Amblyscirtes alternata*	Dusky roadside skipper	FC	Open grassy pine flatwoods, savannas, sandhill ridges	Yes
154	*Amercaenis ridens*	A mayfly	FC	Black River	No
155	*Apamea mixta*	A noctuid moth	FC	Savannas, wet meadows	No[c]
156	*Apantensis* sp. 1 nr. *carlotta*	A tiger moth	FC	Savannas and sandhill seeps	Yes
157	*Atrytone arogos arogos*	Arogos skipper	S	Mesic to boggy reedgrass savannas	Yes
158	*Atrytonopsis loammi*	Loammi skipper	S	Grassy areas near the coast, host plants presumed to be Andropogon grasses	Yes
159	*Atrytonopsis* sp. 1	An undescribed skipper	FC	Dunes and sandy flats	No
160	*Baetopus trishae*	A mayfly	FC	No locality data available	No
161	*Beraea gorteba*	A caddisfly	FC	No locality data available	No
162	*Calephelis virginiensis*	Little metalmark	FC	Grassy fields, savannas, marshes	Yes
163	*Callophrys irus*	Frosted elfin	FC	Grassy openings or burn scars in barrens and savannas, ROW and powerlines	Yes
164	*Chlorochroa dismalia*	Dismal swamp stink bug	FC	Canebrakes	Yes
165	*Cicindela lepida*	Ghost tiger beetle	FC	Sand dunes along northern coast	No
166	*Eotettix pusillus*	Little eastern grasshopper	FC	Sandhills (wet swales?)	Yes
167	*Erynnis martialis*	Mottled duskywing	FC	Upland woods and wooded edges; host plant – New Jersey tea	Yes
168	*Euphyes berryi*	Berry's skipper	FC	Wet prairies, marshes, savannas with pitcher plants	Yes
169	*Euphyes bimacula*	Two-dotted skipper	FC	Wet savannas, bogs, sedge areas near wet woods	Yes
170	*Euphyes dukesi*	Duke's skipper	S	Sedge patches in forested swamps, shaded ditches, woods edge	Yes
171	*Faronta aleada*	A noctuid moth	FC	Maritime grasslands	No

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Table 3.21b. Continued

Species Number [a]	Scientific Name	Common Name	USFS Status [b]	Habitat Type	Habitat Present (Study Area)
172	*Hemipachnobia subporphyrea*	Venus flytrap cutworm moth	S	Large stands of Venus flytraps in wet pine savannas, around pocosins	Yes
173	*Hesperia attalus slossonae*	Dotted skipper	S	Xeric natural communities on sterile white sands (or disturbances within)	No
174	*Hydroperla phormidia*	A stonefly	FC	Lumber River and Pee Dee River	No
175	*Hypomecis buchholzaria*	Buchholz's gray	FC	Fire-maintained glades and pine barrens, xeric scrub-oak	No
176	*Melanoplus attenuatus*	Slender-bodied melanoplus	S	Wet swales in pine woods	Yes
177	*Melanoplus nubilus*	A short-winged melanoplus	S	Flatwoods, savannas, sandhill seeps	Yes
178	*Papilio cresphontes*	Giant swallowtail	FC	Primarily coastal in maritime forests or thickets	No
179	*Perlesta bjostadi*	A stonefly	FC	Little River near Lillington	No
180	*Perlesta leathermani*	A stonefly	FC	Little River, Lumber River, Jordan Creek	No
181	*Plauditus cestus*	A mayfly	FC	No locality data	No
182	*Pteronarcy comstocki*	Spiny salmonfly	FC	No locality data	No
183	*Pyreferra ceromatica*	Anointed sallow moth	FC	Flatwoods and pocosins, ecotones between mesic woodland and bottomlands	Yes
184	*Spartiniphaga carterae*	Carter's noctuid moth	S	Pine barren reed grass, edges of pocosins and wet wiregrass savannas	Yes
185	*Triacanthagyna trifida*	Phantom darner	FC	Slow-flowing streams	Yes
FRESHWATER FISH, MOLLUSKS, AND CRUSTACEANS					
186	*Acipenser brevirostrum*	Shortnose sturgeon	E	Brackish water of large rivers and estuaries; spawns in freshwater areas	No
187	*Acipenser oxyrhynchus*	Atlantic sturgeon	S	Coastal waters, estuaries, large rivers	No
188	*Ambloplites cavifrons*	Roanoke bass	FC	Streams in Neuse and Tar systems	No
189	*Ferrissia hendersoni*	Blackwater ancylid	FC	Mainly margins of Carolina Bay lakes	No[c]
190	*Fundulus confluentus*	Marsh killifish	FC	Fresh to brackish waters along coast	No
191	*Fundulus luciae*	Spotfin killifish	FC	Ponds and pools along coast	No
192	*Lampetra aepyptera*	Least brook lamprey	FC	Tar and Neuse drainages	No[c]
193	*Lasmigona subviridus*	Green floater	S	Tar, Neuse, and Cape Fear systems	No[e]
194	*Lynceus gracilicornis*	Graceful clam shrimp	FC	Temporary ponds, pools, and ditches	Yes
195	*Notropis bifrenatus*	Bridle shiner	FC	Stream near lower Neuse River	Yes
196	*Noturus furiosus*	Carolina madtom	S	Tar and Neuse drainages, small to medium rivers	No
197	*Sphaerium simile*	Grooved fingernail clam	FC	White Oak River	No
198	*Strophitus undulatus*	Creeper	FC	Tar, Neuse, Cape Fear, and other systems	No[e]

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[c] No documented occurrence in Craven, Carteret, or Jones Counties per USFS 2010, not carried forward for further evaluation.
[d] Eastern cougar is extirpated from North Carolina, not carried forward for further evaluation.
[e] NCDOT and NCWRC biologists have determined that streams in the project study area are too acidic to provide suitable habitat for freshwater mussels.

There are 73 USFS rare plant species and 39 USFS rare animal species for which potentially suitable habitat was identified in at least one of the detailed study corridors or within the NFS lands that will be isolated from contiguous NFS lands by a corridor. Potential effects to these species are discussed in Chapter 4, Section 4.1.9.3.

Chapter 4. Environmental Consequences

4.1 Direct Effects

4.1.9.3 Protected Species

4.1.9.3.3 U.S. Forest Service Rare Species

Since all the detailed study alternatives cross National Forest System (NFS) lands, a special use permit from the U.S. Forest Service (USFS) will be required to provide the lands for the proposed project. The USFS must consider impacts to USFS rare species before granting a special use permit for Croatan National Forest (CNF) lands to be converted to highway use. There are 35 USFS rare plant species and 51 USFS rare animal species included on the USFS rare species list (see Tables 3.21a and 3.21b) that were dropped from consideration because no suitable habitat (sandhills, marl outcrops, ocean beach, tidal swamps and marshes, maritime forest, etc.) is present within or in close proximity to any of the study alternatives. No documented occurrences of these species are present within or in close proximity to any of the study alternatives. Table 4.9a lists the 73 USFS rare plant species and Table 4.9b lists the 39 USFS rare animal species that have documented occurrences or for which potential general habitat type is present in at least one of the alternatives.

Table 4.9a. USFS Rare Plant Species for which Potential General Habitat Type Present

Species Number [a]	Common Name	USFS Status [b]	Documented from National Forest System (NFS) Lands within the Croatan NF [c]	Potential Effects							
				Documented on NFS Lands within Project Alternative [c]			Documented on NFS Lands between Project Alternative and Existing US 70 [c]			Potential Direct Impact	Potential Indirect Impact
				Alternative 1	Alternative 2	Alternative 3	Alternative 1	Alternative 2	Alternative 3		
50	Rough-leaved loosestrife	E	Yes	No	No	No	No	No	No	No	No
9	Many-flower grass pink	S	Yes	No	No	No	No	No	No	No	No
10	Savanna campylopus	S	No	No	No	No	No	No	No	No	No
18	Small spreading pogonia	S	Yes	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
29	Venus flytrap	S	Yes	No	No	No	No	No	No	No	No
36	Hall's pocket moss	S	Yes	No	No	No	No	No	No	No	No
44	Pondspice	S	Yes	No	No	No	No	No	No	No	No
45	Boykin's lobelia	S	No	No	No	No	No	No	No	No	No
48	Raven's seedbox	S	Yes	No	No	No	No	No	No	No	No
51	Loomis's loosestrife	S	Yes	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
52	Birds-in-a-nest (Carolina bogmint)	S	No	No	No	No	No	No	No	No	No
57	Narrowleaf cowlily	S	No	No	No	No	No	No	No	No	No
59	Piedmont cowbane	S	Yes	No	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
61	Carolina grass-of-parnassus	S	No	No	No	No	No	No	No	No	No
68	Pineland plantain	S	No	No	No	No	No	No	No	No	No
69	Yellow fringeless orchid	S	Yes	No	**Yes**	No	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
71	Hooker's milkwort	S	Yes	No	No	No	**Yes**	**Yes**	**Yes**	No	**Yes**
78	Short-bristled beaksedge	S	Yes	No	No	No	**Yes**	**Yes**	**Yes**	No	**Yes**
80	Southern white beaksedge	S	Yes	No	No	No	No	No	No	No	No
83	Thorne's beaksedge	S	No	No	No	No	No	No	No	No	No
85	Grassleaf arrowhead	S	No	No	No	No	No	No	No	No	No
90	Carolina goldenrod	S	Yes	No	No	No	**Yes**	**Yes**	**Yes**	No	**Yes**
92	Spring-flowering goldenrod	S	Yes	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
94	Florida peatmoss	S	Yes	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No [d]	**Yes**
95	Fitzgerald's peatmoss	S	Yes	**Yes**	**Yes**	**Yes**	No	No	No	**Yes**	No
99	Giant spiral orchid	S	Yes	No	No	No	No	No	No	No	No
103	Piedmont meadowrue	S	Yes	No	No	No	No	No	No	No	No
104	Carolina asphodel	S	Yes	No	No	No	No	No	No	No	No
2	Branched gerardia	LR	Yes	No	No	No	No	No	No	No	No
3	Tall bentgrass	LR	Yes	No	No	No	No	No	No	No	No
4	Bog bluestem	LR	Yes	No	No	No	**Yes**	**Yes**	**Yes**	No	**Yes**
6	Savanna milkweed	LR	No	No	No	No	No	No	No	No	No
7	Stalked milkweed	LR	Yes	No	No	No	No	No	No	No	No
12	Widow sedge	LR	Yes	No	No	No	No	No	No	No	No
13	Calcium-fleeing sedge	LR	No	No	No	No	No	No	No	No	No
14	Emmon's sedge	LR	Yes	No	No	No	No	No	No	No	No
15	Hop-like sedge	LR	Yes	No	No	No	No	No	No	No	No
16	LeConte's thistle	LR	Yes	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
20	Spring coral-root	LR	No	No	No	No	No	No	No	No	No

[a] Species number corresponds with species number presented in Chapter 3, Table 3.21a.
[b] USFS Status: E – Endangered; LR – Locally Rare; S – Sensitive; T – Threatened; T S/A – Threatened due to Similarity of Appearance.
[c] Documentation based on data provided by USFS, NCNHP, and occurrences documented during field surveys.
[d] The occurrence within the project alternatives is not directly affected based on bridging of the occurrence.

Table 4.9a. Continued.

Species Number [a]	Common Name	USFS Status [b]	Documented from National Forest System (NFS) Lands within the Croatan NF [c]	Potential Effects							
				Documented on NFS Lands within Project Alternative [c]			Documented on NFS Lands between Project Alternative and Existing US 70 [c]			Potential Direct Impact	Potential Indirect Impact
				Alternative 1	Alternative 2	Alternative 3	Alternative 1	Alternative 2	Alternative 3		
21	Beadle's coreopsis	LR	No	No	No	No	No	No	No	No	No
22	Carolina sunrose	LR	Yes	No	No	No	No	No	No	No	No
25	Spindle-fruited witch grass	LR	No	No	No	No	No	No	No	No	No
27	Hidden-flowered witch grass	LR	Yes	No	No	No	No	No	No	No	No
28	Eaton's witch grass	LR	Yes	No	No	No	**Yes**	No	**Yes**	No	**Yes**
34	Seven-angled pipewort	LR	Yes	No	No	No	No	No	No	No	No
38	Comfortroot	LR	Yes	No	No	No	No	No	No	No	No
41	Catchfly cutgrass	LR	No	No	No	No	No	No	No	No	No
42	*Lejeunea bermudiana* (a liverwort)	LR	Yes	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
49	Globe-fruit seedbox	LR	No	No	No	No	No	No	No	No	**No**
53	Florida adder's mouth	LR	Yes	No	No	No	**Yes**	**Yes**	**Yes**	No	**Yes**
58	Shortleaf basket grass	LR	No	No	No	No	No	No	No	No	No
62	Mudbank crown grass	LR	Yes	No	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
63	Spoonflower	LR	Yes	No	No	No	No	No	No	No	No
64	Hairy smartweed	LR	Yes	No	No	No	No	No	No	No	No
65	Small butterwort	LR	Yes	No	No	No	No	No	No	No	No
66	*Plagiochila ludoviaciana* (a liverwort)	LR	Yes	**Yes**	No	No	**Yes**	No	**Yes**	**Yes**	**Yes**
67	*Plagiochila miradorensis* var. *miradorensis* (a liverwort)	LR	No	No	No	No	No	No	No	No	No
70	Snowy orchid	LR	Yes	No	No	No	**Yes**	**Yes**	**Yes**	No	**Yes**
72	Shadow-witch	LR	Yes	No	**Yes**	No	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
73	Awned mountain-mint	LR	Yes	No	No	No	No	No	No	No	No
75	Dwarf live oak	LR	Yes	No	No	No	No	No	No	No	No
86	Canby's bulrush	LR	Yes	No	No	No	No	No	No	No	No
87	Drooping bulrush	LR	Yes	No	No	No	No	No	No	No	No
88	Baldwin's nutrush	LR	Yes	No	No	No	No	No	No	No	No
89	Leavenworth's goldenrod	LR	Yes	No	No	No	No	No	No	No	No
91	Twisted-leaf goldenrod	LR	No	No	No	No	No	No	No	No	No
96	Giant peatmoss	LR	Yes	No	No	No	No	No	No	No	No
97	Eaton's ladies'-tresses	LR	Yes	No	No	No	**Yes**	**Yes**	**Yes**	No	**Yes**
101	Pickering's dawnflower	LR	No	No	No	No	No	No	No	No	No
105	Chapman's redtop	LR	No	No	No	No	No	No	No	No	No
106	Dwarf bladderwort	LR	No	No	No	No	No	No	No	No	No
107	Florida yellow-eyed grass	LR	No	No	No	No	No	No	No	No	No
108	A yellow-eyed grass	LR	Yes	No	No	No	No	No	No	No	No
	Total Species:	**73**	**51**	**8**	**11**	**9**	**19**	**17**	**19**	**11**	**19**

[a] Species number corresponds with species number presented in Chapter 3, Table 3.21a.
[b] USFS Status: E – Endangered; LR – Locally Rare; S – Sensitive; T – Threatened; T S/A – Threatened due to Similarity of Appearance.
[c] Documentation based on data provided by USFS, NCNHP, and occurrences documented during field surveys.
[d] The occurrence within the project alternatives is not directly affected based on bridging of the occurrence.

Table 4.9b. USFS Rare Animal Species for which Potential General Habitat Type Present

Species Number [a]	Common Name	USFS Status [b]	Documented from National Forest System (NFS) Lands within the Croatan NF [c]	Potential Effects							
				Documented on NFS Lands within Project Alternative [c]			Documented on NFS Lands between Project Alternative and Existing US 70 [c]			Potential Direct Impact	Potential Indirect Impact
				Alternative 1	Alternative 2	Alternative 3	Alternative 1	Alternative 2	Alternative 3		
Mammals											
110	Rafinesque's big-eared bat [d]	FC	Yes	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
111	Northern yellow bat	FC	No	No	No	No	No	No	No	No	No
112	Southeastern myotis	FC	Yes	No	No	No	**Yes**	**Yes**	**Yes**	No	**Yes**
113	Eastern woodrat (coastal plain population)	FC	No	No	No	No	No	No	No	No	No
Birds											
132	Red-cockaded woodpecker [e]	E	Yes	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
124	Bald eagle	S	Yes	No	No	No	No	No	No	No	No
117	Eastern Henslow's sparrow	FC	Yes	No	No	No	No	No	No	No	No
121	Black-throated green warbler (coastal plain population)	FC	Yes	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
125	Black-necked stilt	FC	No	No	No	No	No	No	No	No	No
130	Bachman's sparrow	FC	Yes	No	**Yes**	**Yes**	**Yes**	No	**Yes**	**Yes**	**Yes**
Reptiles and Amphibians											
136	American alligator	T (S/A)	Yes	No	No	No	No	No	No	No	No
146	Mimic glass lizard	S	Yes	No	No	No	No	No	No	No	No
148	Carolina gopher frog	S	Yes	No	No	No	No	No	No	No	No
138	Eastern diamondback rattlesnake	FC	Yes	No	No	No	No	No	No	No	No
140	Southern hognose snake	FC	Yes	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
147	Northern pine snake	FC	No	No	No	No	No	No	No	No	No
150	Black swamp snake	FC	Yes	No	No	No	No	No	No	No	No
Insects											
157	Arogos skipper	S	Yes	No	No	No	No	No	No	No	No
158	Loammi skipper	S	No	No	No	No	No	No	No	No	No
170	Duke's skipper	S	No	No	No	No	No	No	No	No	No
172	Venus flytrap cutworm moth	S	Yes	No	No	No	No	No	No	No	No
177	Slender-bodied melanoplus	S	No	No	No	No	No	No	No	No	No
178	A short-winged melanoplus	S	No	No	No	No	No	No	No	No	No
184	Carter's noctuid moth	S	No	No	No	No	No	No	No	No	No
151	Cypress daggermoth	FC	No	No	No	No	No	No	No	No	No
152	*Agrotis carolina* (a dart moth)	FC	Yes	No	No	No	No	No	No	No	No
153	Dusky roadside skipper	FC	Yes	No	No	No	**Yes**	**Yes**	**Yes**	No	**Yes**
156	*Apantensis* sp. 1 nr. *carlotta* (a tiger moth)	FC	Yes	No	No	No	No	No	No	No	No
162	Little metalmark	FC	Yes	No	**Yes**	No	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
163	Frosted elfin	FC	No	No	No	No	No	No	No	No	No
164	Dismal swamp stink bug	FC	Yes	No	No	No	No	No	No	No	No
166	Little eastern grasshopper	FC	No	No	No	No	No	No	No	No	No

[a] Species number corresponds with species number presented in Chapter 3, Table 3.21b.
[b] USFS Status: E – Endangered; FC – Forest Concern; S – Sensitive; T – Threatened; T (S/A) – Threatened due to Similarity of Appearance.
[c] Documentation based on data provided by USFS, NCNHP, and occurrences documented during field surveys.
[d] Occurrence on NFS lands based on NCNHP record for an unspecified observation in Craven County.
[e] Potential direct effects for red-cockaded woodpecker only to foraging habitat, no cavity trees affected.

Table 4.9b. Continued.

Species Number [a]	Common Name	USFS Status [b]	Documented from National Forest System (NFS) Lands within the Croatan NF [c]	Potential Effects							
				Documented on NFS Lands within Project Alternative [c]			Documented on NFS Lands between Project Alternative and Existing US 70 [c]			Potential Direct Impact	Potential Indirect Impact
				Alternative 1	Alternative 2	Alternative 3	Alternative 1	Alternative 2	Alternative 3		
167	Mottled duskywing	FC	No	No	No	No	No	No	No	No	**No**
168	Berry's skipper	FC	Yes	No	No	No	**Yes**	**Yes**	**Yes**	No	**Yes**
169	Two-dotted skipper	FC	Yes	No	No	No	No	No	No	No	No
183	Anointed sallow moth	FC	Yes	No	No	No	No	No	No	No	No
185	Phantom darner	FC	No	No	No	No	No	No	No	No	No
Freshwater Fish, Mollusks, & Crustaceans											
194	Graceful clam shrimp	FC	No	No	No	No	No	No	No	No	No
195	Bridle shiner	FC	Yes	No	No	No	No	No	No	No	No
	Total Species:	**39**	**25**	**4**	**6**	**5**	**8**	**8**	**9**	**6**	**9**

[a] Species number corresponds with species number presented in Chapter 3, Table 3.21b.
[b] USFS Status: E – Endangered; FC – Forest Concern; S – Sensitive; T – Threatened; T (S/A) – Threatened due to Similarity of Appearance.
[c] Documentation based on data provided by USFS, NCNHP, and occurrences documented during field surveys.
[d] Occurrence on NFS lands based on NCNHP record for an unspecified observation in Craven County.
[e] Potential direct effects for red-cockaded woodpecker only to foraging habitat, no cavity trees affected.

Potential effects to the three species listed under the Endangered Species Act, rough-leaved loosestrife, red-cockaded woodpecker, and American alligator, have been discussed previously under Federally-Protected Species in Chapter 4, Section 4.1.9.3.1 and are not addressed separately here.

There are 61 of the 73 USFS rare plant species and 33 of the 39 USFS rare animal species included in Tables 4.9a and 4.9b due to the presence of potential habitat identified for these species in at least one of the alternates, but for which no documented occurrences of these species are present in any of the alternates, or in many cases on NFS lands. The field surveys conducted in 2003-2004 included a floristic inventory that documented several new plant species records for the CNF, however, no occurrences of these 61 USFS rare plant species were identified at that time. Animal surveys that included light trapping for moths, mist netting for bats, and terrestrial surveys for reptiles, amphibians, and birds were conducted in 2005 and did not document any occurrences of these 33 USFS rare animal species. Additional surveys were completed during 2012 for USFS rare plant species identified as having suitable habitat within Alternative 3. No additional surveys were completed in 2012 for Alternative 1 or Alternative 2 nor were additional surveys conducted for USFS rare animal species within any of the alternates. The amount of affected potentially suitable habitat for these species is very small in comparison to the amount of potentially suitable habitat available on the CNF. It is unlikely that the loss of habitat as a result of

constructing any of the alternates will result in a loss of viability for these 61 USFS rare plant and 33 USFS rare animal species on the CNF.

Twelve USFS rare plant species and six USFS rare animal species have documented occurrences in at least one of the alternates and are being evaluated for potential direct effects (Table 4.10). The number of documented occurrences on NFS lands is also presented. Documented occurrences of USFS rare species are derived from data provided by the USFS and the N.C. Natural Heritage Program (NCNHP), supplemented by ESI survey data for species not tracked by NCNHP. Occurrences of rare species tracked in the NCNHP database are referred to as Element Occurrences (EOs).

Table 4.10. Summary of USFS Rare Species Directly Affected

Species Number [a]	Common Name	USFS Status [b]	National Forest System (NFS) Lands within the Croatan NF		Direct Effects								
					Alternative 1			Alternative 2			Alternative 3		
			Number of Occurrences	Occurrence coverage [d] (acres)	Potential Habitat [c] (acres)	Number of Occurrences	Occurrence Coverage [d] (acres)	Potential Habitat [c] (acres)	Number of Occurrences	Occurrence Coverage [d] (acres)	Potential Habitat [c] (acres)	Number of Occurrences	Occurrence Coverage [d] (acres)
Plants													
18	Small spreading pogonia	S	4	NA	107	1	NA	132.9	1	NA	154.9	1	NA
51	Loomis's loosestrife	S	>50	NA	117.3	1 [e]	NA	144.5	1 [e]	NA	165.2	1 [e]	NA
59	Piedmont cowbane	S	4	5.0	4.9	0	0	7.9	1	1.1	7.9	1	1.1
69	Yellow fringeless orchid	S	8	4,781.3	4.9	0	0	7.9	1	<0.1	7.9	0	0
92	Spring-flowering goldenrod	S	36	320.2	168.8	6	8.1	191.8	8	9.4	220.3	7	23.5
94	Florida peatmoss	S	3	Bridging planned for the area of the occurrence crossed by all 3 alternatives would result in no direct impacts anticipated.									
95	Fitzgerald's peatmoss	S	11	NA	4.9	1	NA	7.9	1	NA	7.9	1	NA
16	LeConte's thistle	LR	12	28.0	4.9	1	0.2	7.9	3	1.9	7.9	3	1.9
42	*Lejeunea bermudiana* (a liverwort)	LR	8	623.5	6.6	3	0.8	4.1	1	0.5	9.4	3	0.6
62	Mudbank crown grass	LR	4	5.9	1.1	0	0	2	2	1.7	2.1	2	1.7
66	*Plagiochila ludoviaciana* (a liverwort)	LR	2	0.1	6.6	1	0.1	4.1	0	0	9.4	0	0
72	Shadow-witch	LR	10	125.4	6.6	0	0	4.1	1	2.5	9.4	0	0
Mammals													
110	Rafinesque's big-eared bat	FC	1	64,914.0	6.6	1	6.6	4.1	1	4.1	9.4	1	9.4
Birds													
132	Red-cockaded woodpecker	E	Direct effects for red-cockaded only to foraging habitat, no cavity trees affected. A detailed analysis of affects to red-cockaded woodpecker is presented in Section 4.1.9.3.1 (Federally Protected Species).										
121	Black-throated green warbler (coastal plain population)	FC	7	4,323.0	26.7	1	13.7	32.3	1	13.7	30.3	1	13.7
130	Bachman's sparrow	FC	18	797.7	102.1	0	0	125	2	1.1	147	2	0.9
Reptiles and Amphibians													
140	Southern hognose snake	FC	4	11,111.0	65.3	1	13.0	87.3	1	22.4	113.8	1	17.9
Insects													
162	Little metalmark	FC	7	2,936.0	4.9	0	0	7.9	1	1.6	7.9	0	0
Total Number of Occurrences [f]:			**>186**			**17**			**26**			**24**	

[a] Species number corresponds with species number presented in Chapter 3, Tables 3.21a and 3.21b.
[b] USFS Status: E – Endangered; FC – Forest Concern; LR – Locally Rare; S – Sensitive.
[c] Potential habitat based on vegetative communities presented in Chapter 3, Section 3.5.2.1.
[d] Occurrence coverage area based on NCNHP data base records and/or additional information provided by USFS.
[e] One or more EO's not defined, dependably found in suitable habitat.
[e] Exclusive of red-cockaded woodpecker, which is treated under a separate analysis.

Twelve USFS rare plant species and six USFS rare animal species have documented occurrences in at least one of the alternates. Potential effects to red-cockaded woodpecker have been addressed previously under Federally-Protected Species in Chapter 4, Section 4.1.9.3.1 and are not addressed separately here. Direct effects to these twelve USFS rare plant species and remaining five USFS rare animal species are discussed below. Seven of the USFS rare plant species and none of the USFS rare animal species are listed as Sensitive (S) on NFS lands, and the remaining five USFS rare plant species and five USFS rare animal species as listed as Locally Rare (LR) or Forest Concern (FC) on NFS lands.

Small Spreading Pogonia (*Cleistesiopsis bifaria* [=*Cleistes bifaria*]) - S

This species is known from four occurrences documented on NFS lands in the CNF. These occurrences each consist of a few widely scattered individuals but areas of occupied habitat have not been established for these occurrences. This species is not tracked by NCNHP and occurrence data were not available from the USFS so the distribution of this species on NFS lands within the project alternatives is based on surveys conducted by ESI. One occurrence of this species would be directly affected by all three alternatives.

Loomis's Loosestrife (*Lysimachia loomisii*) - S

This species is known from more than 50 occurrences on NFS lands in the CNF (personal communication, G. Kauffman, USFS). This species is not tracked by NCNHP and specific occurrence data were not available from the USFS so the distribution of this species on NFS lands within the CNF is based on the habitat evaluation conducted by ESI. No documented occurrences of this species are mapped within any of the three alternatives. However, incidental observations of this species within the powerline corridors, wet pine flatwoods, and open areas within the streamhead pocosins during the 2003-2004 field surveys indicate that this species is relatively common and is presumed present in suitable habitat within all three alternatives. This species was not evaluated as a USFS rare species at that time and detailed locations and population estimates are not available.

Piedmont Cowbane (*Oxypolis ternata*) – S

This species is known from nine occurrences documented on NFS lands in the CNF. This species is not tracked by NCNHP and occurrence data were not available from the USFS so the distribution of this species on NFS lands within the project alternatives is based on surveys conducted by ESI. One occurrence would be directly affected by Alternative 2 and Alternative 3. Population estimates are not available for this occurrence. This occurrence covers approximately 5.0 acres and approximately 1.1 acre of this occurrence would be directly affected by Alternative and Alternative 3. Alternative 1 would not directly affect this species.

Yellow Fringeless Orchid (*Platanthera integra*) - S

This species is known from eight occurrences documented on NFS lands in the CNF, but USFS reports that one roadside occurrence is apparently extirpated and one other may be extirpated from a disturbed borrow site in a savanna. One occurrence of this species would be directly affected by Alternative 2. This occurrence is mapped as covering approximately 6.6 acres and is estimated to have approximately 21

individual plants distributed within two mapped polygons that are 1.9 acres and 4.6 acres in size. One mapped polygon (1.9 acres) would be directly affected by Alternative 2. Less than 0.1 acre (<0.1%) of this occurrence would be directly affected by Alternative 2. Neither Alternative 1 nor Alternative 3 directly affects this species.

Spring-flowering Goldenrod (*Solidago verna*) – S

NCNHP records, which have been updated to include NCDOT's pre-2012 survey efforts, indicated spring-flowering goldenrod is known from 36 EOs that are mapped as covering approximately 320.2 acres of occupied habitat documented on NFS lands in the CNF. Recent data provided by the USFS shows that 6 of these occurrences (mapped as covering 4 acres) have not been relocated during recent survey attempts. Previous estimates for NFS lands in the CNF range from 5,663 to 14,738 individual plants within an estimated 320.2 acres of occupied habitat.

A detailed evaluation was completed in 2012 for spring-flowering goldenrod in mapped polygons that would be directly affected by Alternative 3. For this study 1,174 individual plants were counted within 4.8 acres of occupied habitat directly sampled. The areas directly sampled included portions of occupied habitat in powerline rights-of-way and roadsides, as well as in forested habitats. The results of the direct counts from the sampled areas were used to estimate the number of individuals present within the US 70 Havelock Bypass study area. Within the US 70 Havelock Bypass study area, there are 138 acres of occupied habitat that include an estimated 94,000 individual spring-flowering goldenrod plants.

- Alternative 1 would directly affect 8.1 acres of occupied habitat on NFS lands and estimated 5,400 individual spring-flowering goldenrod plants. This impact represents approximately 6% of occupied habitat within NFS lands within the Alternatives study area and 6% of the estimated population within NFS lands within the Alternatives study area.
- Alternative 2 would directly affect 9.4 acres of occupied habitat on NFS lands and estimated 6,300 individual spring-flowering goldenrod plants. This impact represents approximately 7% of occupied habitat within NFS lands within the Alternatives study area and 7% of the estimated population within NFS lands within the Alternatives study area.
- Alternative 3 would directly affect 23.5 acres of occupied habitat on NFS lands and estimated 11,400 individual spring-flowering goldenrod plants. This impact represents approximately 17% of occupied habitat within NFS lands within the Alternatives study area and 12% of the estimated population within NFS lands within the Alternatives study area.

Florida Peatmoss (*Sphagnum cribrosum*) - S

This species is known from three occurrences documented on NFS lands in the CNF. The 2012 evaluation documented that the occurrence of this species crossed by all three alternatives extends outside the study area and is more extensive upstream of the alternatives study area. It is not anticipated that any of the alternatives would directly affect the occurrence crossed by the alternatives based on bridging proposed in the area of the ditch in which it occurs and no hydrological alterations proposed for the ditch.

Fitzgerald's Peatmoss (*Sphagnum fitzgeraldii*) - S

This species has been recently relocated by USFS in some historical sites as well as new sites across the CNF and is likely more common than previously determined. This species is known from eleven occurrences documented on NFS lands in the CNF. One occurrence of this species would be directly affected by all three alternatives. Areal extent and population estimates are not available for this occurrence.

LeConte's Thistle (*Cirsium lecontei*) - LR

There are a total of 12 occurrences recorded by NCNHP for this species on NFS lands in the CNF, of which one is an occurrence encompassing seven of the other documented EOs. A field review of these EOs during the 2012 growing season determined that four EOs are considered to be historic occurrences either with no suitable habitat present or vague location descriptions that may not be on NFS lands. The remaining eight distinct EOs were observed to support suitable habitat for this species and LeConte's thistle was observed to be present associated with four of these EOs. One occurrence would be directly affected by all three alternatives in its entirety. This occurrence is mapped as covering approximately 0.2 acre and approximately 31 individual stems were observed distributed within three occupied habitat polygons in 2005. No individuals were observed within these three polygons during the 2012 field review. One separate additional occurrence that is composed of two polygons would be directly affected by Alternative 2 and Alternative 3. Alternative 1 would not directly affect this occurrence. This occurrence is mapped as covering a total of approximately 8.5 acres and approximately 21 individual stems were observed in 2009 distributed within two polygons that are mapped as approximately 8.4 acres and 0.1 acre in size, and 8 individual stems were observed within these polygons during the 2012 field review. Approximately 1.7 acres (20%) of the 8.4 acre polygon would be directly affected by Alternative 2 and Alternative 3.

A Liverwort (*Lejeunea bermudiana*) - LR

NCDOT surveys in 2012 resulted in documentation of two new occurrences for this species on NFS lands in the CNF, including one representing a new watershed, Island Creek. This species is now known from eight occurrences documented within four watersheds (Deep Swamp, Island Creek, Tucker Creek, and Southwest Prong Slocum Creek) on NFS lands in the CNF. This species was observed in three watersheds during a field review during the 2012 growing season. The occurrence in Deep Swamp is a vague historic record that could not be verified and may not be on NFS lands. One occurrence in the Tucker Creek watershed would be directly affected in its entirety by all three alternatives. Approximately 0.5 acre of habitat identified for this occurrence, with a total coverage by this species consisting of a few square inches on individual tree bases, would be directly affected within the Tucker Creek watershed. One separate additional occurrence in the Southwest Prong Slocum Creek watershed would be directly affected by Alternative 1. This occurrence similarly includes several trees over an area of approximately 0.5 acre, with a total coverage by this species consisting of a few square inches on individual tree bases. Approximately 0.3 acre (60%) of this occurrence would be directly affected by Alternative 1. Neither alternative 2 nor Alternative 3 directly affect this occurrence. One separate additional occurrence in the Southwest Prong Slocum Creek watershed would be directly affected by Alternative 3. This occurrence is approximately 1.0 acre and is composed of two occupied habitat polygons each approximately 0.5 acre in size that include coverage by this species of a few square inches on the bases of several trees. Approximately 0.1 acre (20.0%) of one of the 0.5-acre occupied habitat polygons within this occurrence would be directly affected by Alternative 3. This represents an impact to approximately 20% of the affected polygon and 5% of the occurrence. Neither Alternative 1 nor Alternative 2 would directly affect this occurrence.

Mudbank Crown Grass (*Paspalum dissectum*) - LR

This species is known from seven ponds mapped as three separate occurrences documented by NCNHP on NFS lands in the CNF, which along with another occurrence on private lands are also combined by NCNHP into a single EO. This species was observed at each of the three NFS occurrences during a field review of these EOs during the 2012 growing season. One occurrence would be directly affected by Alternative 2 and Alternative 3. This occurrence consists of two polygons that are mapped as covering a total of approximately 3.9 acres. Alternative 2 and Alternative 3 would directly impact approximately 1.7 acres (90%) of the total 1.9 acres within one of these polygons. All seven culms observed in 2012 within this polygon are in the area that would be directly affected. The other polygon within this occurrence would not be directly affected and was observed to include two culms in 2012. The other two NFS occurrences with larger observed populations of mudbank crown grass, estimated at over 1,070 culms in

2012 for these two occurrences, would not be directly affected by Alternative 2 or Alternative 3. Alternative 1 does not directly affect this species.

A Liverwort (*Plagiochila ludoviciana*) - LR

This species is now known from two occurrences documented within the Southwest Prong Slocum Creek watershed on NFS lands in the CNF, including one new occurrence documented by the 2012 survey. One occurrence of this species that is mapped as covering approximately 0.1 acre and includes multiple trees with a total coverage by this species of approximately one square foot on the tree bases would be directly affected in its entirety by Alternative 1. Neither Alternative 2 nor Alternative 3 would directly affect this species.

Shadow-witch (*Ponthieva racemosa*) - LR

This species is known from 10 occurrences documented on NFS lands in the CNF. One occurrence of this species would be directly affected by Alternative 2. This occurrence is mapped as covering approximately 14.7 acres and includes an estimated 800 individual plants. Approximately 2.5 acres (17.0%) of this occurrence would be directly affected by Alternative 2. During field reviews on 22 July 2008 and 6 May 2009 the highest concentration of individuals within this occurrence was observed in the northeast corner of this occurrence adjacent to Greenfield Heights Blvd. This portion of the occurrence would not be directly affected by Alternative 2. Neither Alternative 1 nor Alternative 3 would directly affect this species.

Rafinesque's Big-eared Bat (*Corynorhinus rafinesquii*) - FC

This species is known from one potential occurrence on NFS lands in the CNF. The occurrence of this species would be directly affected by all three alternatives. NCNHP has designated the accuracy of this occurrence as very low. A very low accuracy occurrence characterization is described by NHP as one with less than 5 percent of the area occupied. NCNHP records state that this occurrence is based on an observation of this species at an unspecified location in Craven County. There are approximately 6.6 acres of potential occupied habitat within Alternative 1, 4.1 acres of potentially occupied habitat within Alternative 2, and 9.4 acres of potentially occupied habitat within Alternative 3.

Bachman's Sparrow (*Aimophila aestivalis*) – FC

This species is known from 18 occurrences documented as EOs in NCNHP records for NFS lands in the CNF. Two NCNHP documented occurrences of this species would be directly affected by Alternative 2 and Alternative 3. These occurrences are mapped as covering approximately 23.2 acres in total and

represent the identification of one singing bird in the location of each occurrence. These occurrences are composed of three occupied habitat polygons that are each 7.7 acres. Approximately 1.1 acres (4.7%) of one occupied habitat polygon within these occurrences would be affected by Alternative 2 and approximately 0.9 acre (3.9%) of one occupied habitat polygon within these occurrences would be affected by Alternative 3.

Black-throated Green Warbler (Coastal Plain Population) (*Dendroica virens waynei*) - FC

This species is known from seven occurrences documented as EOs in NCNHP records for NFS lands in the CNF. One NCNHP mapped occurrence of this species would be directly affected by all three alternatives. This occurrence is mapped as covering approximately 45.9 acres and represents the identification of three singing male birds in the location of the occurrence. Approximately 13.7 acres (29.8%) of this occurrence would be directly affected by the three alternatives.

Southern Hognose Snake (*Heterodon simus*) - FC

This species is known from four occurrences documented on NFS lands in the CNF. One occurrence of this species would be directly affected by all three alternatives. This is an historic occurrence that NCNHP has designated as low in accuracy. A low accuracy occurrence characterization is described by NHP as one with between 5% and 20% of the area occupied. There are approximately 65.3 acres of potentially occupied habitat within Alternative 1, 87.3 acres of potentially occupied habitat within Alternative 2, and 113.8 acres of potentially occupied habitat within Alternative 3. These areas of potentially occupied habitat are characterized predominately as mesic pine flatwoods, mesic pine plantations, and mesic powerline corridors. However, these communities may be considered to provide low probability of occurrence compared to the dry pine-oak woodlands that this species typically inhabits.

Little Metalmark (*Calephelis virginiensis*) - FC

This species is known from seven occurrences documented on NFS lands in the CNF. One occurrence of this species would be directly affected by Alternative 2. This occurrence is mapped as covering approximately 17.9 acres and represents the observation of one adult butterfly. Approximately 1.6 acres (8.9%) of this occurrence will be directly affected by Alternative 2. Neither Alternative 1 nor Alternative 3 would directly affect this species.

Excluding red-cockaded woodpecker, which has been evaluated separately, in terms of the number of USFS rare species that would be directly affected, Alternative 1 would directly affect 10 USFS rare species, Alternative 2 would directly affect 15 USFS rare species, and Alternative 3 would directly affect

12 USFS rare species. Alternate 1 would directly affect the least number of known occurrences with 17, while Alternate 2 would directly affect the most with 26, and Alternate 3 would directly affect 24. Excluding red-cockaded woodpecker foraging habitat, Alternate 1 contains the least amount of mapped USFS rare species occurrence coverage with 42.5 acres that would be directly affected, Alternate 2 contains 60.1 acres that would be directly affected, and Alternate 3 contains the most mapped USFS rare species occurrence coverage with 70.7 acres that would be directly affected. Indirect and cumulative effects to USFS rare species are addressed in Section 4.3.3.

4.3 Indirect and Cumulative Effects – Natural Environment

4.3.3 Indirect Effects – USFS Rare Species

The indirect effect evaluation includes USFS rare species that have documented occurrences and/or unoccupied suitable habitat located on NFS lands between an alternative and existing US 70. These areas would be isolated from contiguous NFS lands by the project. Such isolation increases the difficulty of managing these areas using periodic prescribed burns and will be considered an indirect effect by the USFS if the use of periodic prescribed burns cannot be continued. Some USFS rare species included in the indirect effects evaluation occur in mature swamp forest and peatland forest communities that are not managed using periodic prescribed burns. Other potential indirect effects could result from NCDOT management of the project right-of-way. NCDOT applies herbicides within the right-of-way to assist in the management of turf grasses and the control of weeds and non-native invasive plant species. Herbicide usage within the right-of-way has the potential to affect populations of USFS rare plant species and wildlife that feed on those plants.

Each of the alternatives would result in separation of parcels of NFS land from contiguous NFS lands. Alternative 2 has the potential to isolate the least amount of NFS lands with 712 acres. Alternative 1 and Alternative 3 have the potential to isolate greater amounts of NFS lands with 1,877 acres and 1,239 acres, respectively. Alternative 1 and Alternative 3 each have the potential to indirectly affect 28 USFS rare species, while Alternative 2 has the potential to indirectly affect 25 USFS rare species (Table 4.11).

USFS rare species with potential indirect effects can be divided into two broad categories based on generalized habitat requirements for discussing potential for indirect effects and possible minimization measures: 1) species that occur in open fire-maintained habitats; and 2) species that occur in mature swamp forest and/or peatland forest habitats (Table 4.11).

Table 4.11. Summary of USFS Rare Species Indirectly Affected

Habitat Group	Species Number [a]	Common Name	USFS Status [b]	Indirect Effects		
				Alternative 1	Alternative 2	Alternative 3
Fire Maintained	18	Small spreading pogonia	S	Yes	Yes	Yes
	51	Loomis's loosestrife	S	Yes	Yes	Yes
	59	Piedmont cowbane	S	Yes	Yes	Yes
	69	Yellow fringeless orchid	S	Yes	Yes	Yes
	71	Hooker's milkwort	S	Yes	Yes	Yes
	78	Short-bristled beaksedge	S	Yes	Yes	Yes
	90	Carolina goldenrod	S	Yes	Yes	Yes
	92	Spring-flowering goldenrod	S	Yes	Yes	Yes
	4	Bog bluestem	LR	Yes	Yes	Yes
	16	LeConte's thistle	LR	Yes	Yes	Yes
	28	Eaton's witch grass	LR	Yes	No	Yes
	62	Mudbank crown grass	LR	Yes	Yes	Yes
	70	Snowy orchid	LR	Yes	Yes	Yes
	97	Eaton's ladies'-tresses	LR	Yes	Yes	Yes
	130	Bachman's sparrow	FC	Yes	No	Yes
	132	Red-cockaded woodpecker	E	Yes	Yes	Yes
	140	Southern hognose snake	FC	Yes	Yes	Yes
	153	Dusky roadside skipper	FC	Yes	Yes	Yes
	162	Little metalmark	FC	Yes	Yes	Yes
	188	Berry's skipper	FC	Yes	Yes	Yes
Swamp Forest / Peatland Forest	94	Florida peatmoss	S	Yes	Yes	Yes
	42	*Lejeunea bermudiana* (A liverwort)	LR	Yes	Yes	Yes
	53	Florida adder's mouth	LR	Yes	Yes	Yes
	66	*Plagiochila ludoviciana* (A liverwort)	LR	Yes	No	Yes
	72	Shadow-witch	LR	Yes	Yes	Yes
	110	Rafinesque's big-eared bat	FC	Yes	Yes	Yes
	112	Southeastern myotis	FC	Yes	Yes	Yes
	121	Black-throated green warbler	FC	Yes	Yes	Yes

[a] Species number corresponds with species number presented in Chapter 3, Tables 3.21a and 3.21b.
[b] USFS Status: E – Endangered; FC – Forest Concern; LR – Locally Rare; S – Sensitive.

The most important consideration for minimizing indirect effects to USFS rare species that occur in fire-maintained habitats would be to allow for the temporary closure of the bypass to allow prescribed burns to be conducted. NCDOT has agreed to allow the US 70 Havelock Bypass to be closed under general conditions outlined with USFS to allow the USFS to conduct prescribed burns within these isolated areas. Based on continued prescribed burning in these areas, potential indirect effects from this project would be minimal. Additional measures that will minimize indirect effects include avoiding planting of aggressive non-native species for re-vegetation, avoiding placing staging areas within 200 ft of plant species

occurrences where practicable, avoiding heavy equipment access, especially during wet periods, and minimizing the use of herbicides and pesticides.

The swamp forest and peatland forest habitats do not rely on fire to the same extent for habitat management. The main considerations in these areas would be to minimize alterations to light penetration and hydrology. Clearing will be avoided within 200 ft of plant species occurrences where practicable. Additional measures that will minimize indirect effects include avoiding the planting of aggressive non-native species for re-vegetation and minimizing the use of herbicides and pesticides.

Habitat fragmentation can affect plant and animal populations in both fire maintained and swamp forest/ peatland communities through isolation of plant populations and less mobile animal populations. More mobile animal species may experience increased mortality associated with crossing roadways.

Isolation of populations caused by habitat conversion, habitat fragmentation, wildlife exclusion fencing and traffic reduces gene flow, leading to inbreeding and other deleterious effects, including a reduced ability to adapt/evolve to changing conditions. Isolated populations are more subject to local extirpation due to fluctuating demographics or catastrophic environmental events (such as drought), since they cannot be bolstered or repopulated from adjacent organisms. These effects may be minimized at the large bridge crossings, which will allow for wildlife passage beneath the bypass.

Secondary growth along existing roads in the project vicinity may further exacerbate fragmentation and isolation of populations. Fragmentation, population isolation, forest edge effects and wildlife mortality due to vehicle collisions may be less pronounced for Alternative 2 than for Alternative 1 or 3, due to Alternative 2's proximity to the Town of Havelock and the edge of NFS land. Additional information on habitat fragmentation is found in Section 4.1.8.1 Biotic Communities and Wildlife.

4.3.4 Cumulative Effects

USFS Rare Species

Other activities proposed on NFS lands have the potential to affect USFS rare species directly affected by the US 70 Havelock Bypass. These activities include the improvements to US 17 (STIP project R-2514) and timber management projects for various compartments on the CNF.

The USFS has recently completed or is proposing various timber management projects in the vicinity of the US 70 Havelock Bypass alternatives. The USFS provided NCDOT with a list of recent and proposed projects for the period 2008-2014 within a 2-mile radius of the US 70 Havelock Bypass alternatives. These timber management projects are generally located in areas of mesic to hydric pine flatwoods and focus on thinning activities which will reduce midstory and canopy coverage in these areas. Several timber management projects are located adjacent to swamp forest communities and will alter the canopy and midstory density along the edges of these communities. These timber management projects have the potential to affect known occurrences and potentially suitable habitat for USFS rare species that are also being directly affected by the US 70 Havelock Bypass project.

- Rafinesque's big-eared bat may occur in swamp forest communities associated with 18 timber management projects (identified by USFS as FID numbers 1, 4, 6, 7, 15, 18, 23, 24, 25, 34, 35, 36, 37, 38, 39, 40, 41, and 46) that are crossed by at least one project alternative. No negative effects are anticipated to this species from these forest management activities provided that timber management activities avoid swamp forest communities and no roosting trees are removed.
- Spring-flowering goldenrod occurs in open pineland communities associated with 13 timber management projects (identified by USFS as FID numbers 7, 15, 23, 24, 25, 34, 35, 36, 37, 38, 39, 40, and 41) that are crossed by at least one project alternative. Thinning activities in these communities may result in positive effects on the habitat for this species by creating openings in denser woodlands and reducing competition from woody species.
- Southern hognose snake occurs in xeric open pineland communities associated with eight timber management projects (identified by USFS as FID numbers 15, 18, 23, 24, 25, 35, 37, and 38) that are crossed by at least one project alternative. Thinning activities in these communities may result in positive effects on the habitat for this species by creating openings in denser woodlands.
- Yellow fringeless orchid occurs in open pineland communities associated with one timber management project (identified by USFS as FID number 15) that is crossed by Alternative 2. Thinning activities in these communities may result in positive effects on the habitat for this species by creating openings in denser woodlands and reducing competition from woody species.
- Little metalmark occurs in open pineland communities associated with one timber management project (identified by USFS as FID number 18) that is crossed by Alternative 2. Thinning activities in these communities may result in positive effects on the habitat for this species by creating openings in denser woodlands.
- Shadow-witch occurs in swamp forest communities associated with one timber management

project (identified by USFS as FID number 38) that is crossed by Alternative 2. Thinning activities adjacent to the swamp forest communities may result in minor effects to the habitat for this species by increasing light penetration and altering the swamp forest ecotones within the adjacent swamp forest communities.

NCDOT is proposing improvements to US 17 (R-1514B, C, D) from south of the Town of Belgrade to north of the Jones/Craven County line. The proposed improvements include bypasses of the Towns of Maysville and Pollocksville with a widening section that connects the bypasses. The widening section includes approximately 108 acres of NFS lands on the Croatan National Forest. The NFS lands affected by the project include part of the existing US 17 facility. One USFS rare plant species would be directly affected by the US 17 improvements project, spring-flowering goldenrod. This occurrence occupies a total of 13.0 acres, including areas located on USFS lands within the CNF and areas located within the existing US 17 right-of-way adjacent to private property. Approximately 12.8 acres of this spring-flowering goldenrod occurrence would be directly affected as a result of this project, which includes approximately 9.9 acres (98%) of the 10.1 acres of habitat occupied on USFS lands in the CNF. This occurrence is estimated to include over 4,700 individual plants and it is estimated that approximately 3,584 individual plants may be directly impacted on NFS lands and an additional 1,050 individual plants may be directly impacted with the US 17 right-of-way adjacent to private property.

NCDOT is the current landowner and steward for an approximately 4,035-acre property containing the Croatan Mitigation Bank (CMB) (formerly known as the Croatan Wetland Mitigation Bank). In addition to providing compensatory wetlands and stream mitigation the CMB would also have a beneficial cumulative effect by reducing fragmentation of NFS lands in the CNF, as well as increasing the acres of available USFS rare species habitat and the number of USFS rare species occurrences in the CNF once the land transfer occurs. This property is located within the CNF in close proximity to the proposed US 70 Havelock Bypass project. In 2008, NCDOT completed a preliminary evaluation of the CMB to assess the potential for current use by, and potential to provide habitat opportunity for, USFS rare species. Restoration of the wetland and stream systems on this property was completed during 2001 and 2002 and wetland restoration success criteria monitoring was completed in 2007. The wetland and stream credits generated by the CMB are expected to provide compensatory mitigation for wetland impacts associated with the US 70 Havelock Bypass and other NCDOT projects.

The CMB Mitigation Banking Instrument (MBI) states that the NCDOT will manage the property through completion of the monitoring period and approved closeout of the mitigation components.

NCDOT intends to transfer the 4,035-acre property containing the CMB to the USFS to offset the loss and fragmentation of NFS lands by the US 70 Havelock Bypass. The NCDOT has developed a Memorandum of Understanding (MOU) with the U.S. Army Corps of Engineers (USACE) and USFS (Agreement No. 02-MOU-11081100-034) that requires that the USFS preserve all natural areas, and prohibit all use of the property inconsistent with its use as a mitigation property, including any activity that would materially alter the biological integrity or functional and educational value of wetlands within the Bank site, consistent with the mitigation plan. Maintenance of the CMB would be assumed by the USFS after the site is transferred from the NCDOT to the USFS, which is expected to occur following release of the available credits and final certification of the site by the Interagency Review Team (EcoScience and Axiom Environmental 2009).[i] Maintenance of roadways, culverts, habitat, and forest stands for fire risk will occur as prescribed in the MOU as well as consistent with the USFS Forest Plan. The CMB property provides opportunity to increase the number of known USFS rare species occurrences on NFS lands in the CNF when the property in transferred to the USFS. Transfer of this property would also provide the opportunity for USFS to manage appropriate portions of the property for USFS rare species habitat provided the management activities are consistent with the MOU and the LRMP.

Mitigation Measures

In addition to measures described to avoid and minimize potential affects to USFS rare species, mitigative measures may be needed for some species to offset direct and indirect effects associated with the US 70 Havelock Bypass. Proposed mitigative measures include measures to facilitate prescribed burns on fragmented NFS lands, manage herbicide use for right-of-way maintenance, and for the USFS rare species that may be directly or indirectly affected, identify new populations that are on protected lands not impacted by the project or that can be protected. If no other mitigation measures are available the loss of individuals may be mitigated by the relocation of affected populations to protected sites.

Each alternative would fragment NFS lands that are currently being managed using periodic prescribed burns. Fragmentation may affect the use of prescribed burning as a management tool on NFS lands. The USFS has previously stated that the US 70 Havelock Bypass will need to be closed in order to maintain prescribed burning for NFS lands between the US 70 Havelock Bypass and existing US 70. NCDOT has agreed to close the US 70 Havelock Bypass under general conditions outlined with USFS to accommodate prescribed burning.

NCDOT has initiated efforts to begin mitigating the potential impacts to USFS rare species through efforts to identify new populations of USFS rare species on NFS lands and other areas within the CNF that can be protected.

In 2008 NCDOT conducted a preliminary habitat and USFS rare species evaluation of the Croatan Mitigation Bank (CMB), an in-holding located within the boundaries of the CNF to assess the potential for current use by, and as potential mitigation for USFS rare species. The topography of the CMB is essentially flat with minimal slope to the north that is more prominent at the northern end of the site. A few very low ridges generally parallel the main access road maintained through the site. Soils on the CMB can be divided into two basic classes, loamy soils with substantial amounts of clay in their lower horizons and organic soils with profiles formed in accumulations of decayed plant material. Soil series mapped for the CMB include: Bayboro, Croatan, Dare, Dorovan, Goldsboro, Leaf, Leon, Lynchburg, Masontown, Muckalee, Murville, Pantego, and Rains. Thirteen general vegetative communities were identified on the CMB including: swamp forest (small stream), pine flatwoods (hydric, mesic, transitional), successional/ruderal habitat (grass-sedge, shrub-scrub), powerline corridor (hydric), non-riverine wet hardwood forest, non-riverine swamp/bay forest, lake ridge pine forest, pond, hydric pine plantation, hydric pine savanna, upland hardwood forest, pine/hardwood forest, rural/urban modifications.

It does not appear that savanna has been an important habitat type in the overall natural vegetation of the CMB for many years. This may mean that seed or diaspore sources for many savanna species are absent. Evidence of fire within the CMB habitats is present, but it is not common or widespread. Management of habitat with fire, specifically those habitats which can develop into some sort of savanna, is the most effective tool available for maintaining a fire sub-climax vegetation type. With the implementation of frequent fire, some occurrences of Successional/Ruderal Habitat, including wet shrub-scrub and wet grass-sedge variants, can be managed in the form of savanna habitat. The approximately 355 acres of these habitats are considered potentially most valuable for management of many of the USFS rare species. However, most of the savanna types at the CMB would be wet with intermittent or seasonal standing water. Potential for mesic savanna with largely emergent soils at the CMB is limited.

Fire may also be an important tool in returning hydric Pine Flatwoods or transitional Pine Flatwoods to a fire sub-climax vegetation type. It appears that the hydric Pine Flatwoods have been deeply burned in the past, possibly during only a few events. Dominants in this habitat complex are widely scattered trees and an open tall shrub stratum quite capable of supporting several important rare species. The hydric Pine Flatwoods mapped at the CMB in the extreme northwestern portion of the mitigation site total

approximately 37 acres and should be assessed carefully for potential restoration to Pine Savanna. Since this forest type will slowly change without recurrent fire, this tool should be considered in its management.

The possibility of considering the CMB for management as a fire sub-climax mitigation area would allow for additional USFS rare species mitigation opportunities beyond those available on the CMB without management. In general, those USFS rare species with a reasonable capability of using wet, currently unmanaged, savanna available in one habitat complex in the northern end and one complex near the southern end of the CMB could be expected to be present. Management of habitat using fire would increase the numbers of USFS rare species for which mitigation measures might be attempted. A few other species that utilize swamp forest habitats, both small stream and nonriverine/bay forest types, can be expected to utilize or continue to utilize the CMB; active management of these habitats is not expected to be necessary for these species.

Four USFS rare species with potential direct affects associated with the proposed project have been documented on the CMB. These species are Florida peatmoss, Loomis's loosestrife, Rafinesque's big-eared bat, and black-throated green warbler. Two additional USFS rare species, American alligator and southeastern bat are also present on the CMB. Bald eagle has been observed on the CMB, but nesting of this species has not been confirmed.

During the 2008 growing season, surveys were undertaken within portions of the CNF not affected by the US 70 Havelock Bypass project to attempt to identify additional occurrences of specific USFS rare species of concern not previously documented by USFS or in NCNHP records. Non-targeted USFS rare species identified during the course of the surveys were also documented. Also at the request of USFS, known occurrences of several potentially affected USFS rare species were also reviewed to determine if they continued to exist. Specific areas surveyed within the CNF for new occurrences of USFS rare species were selected based on a combination of ecological factors including: soil type, vegetative community type, frequency of fire management, hydrology, slope aspect, forest age, and known occurrences of other rare species.

During the course of these 2008 surveys two new occurrences of Fitzgerald's peatmoss, one new occurrence of Hooker's milkwort, one new occurrence of shadow-witch, one new occurrence of Venus flytrap, and three new occurrences of Piedmont cowbane were identified. Additional occurrences of twining screwstem (*Bartonia paniculata paniculata*) and a bird dropping moth (*Lithacodia* sp.), species

that have since been removed from the USFS rare species list for the CNF, were also identified during these surveys.

During the 2012 growing season, surveys were undertaken within portions of the CNF not directly affected by the US 70 Havelock Bypass project to attempt to identify additional occurrences of a liverwort (*Lejeunea bermudiana*). Specific areas surveyed within the CNF were selected based on a combination of ecological factors including: soil type, vegetative community type, frequency of fire management, hydrology, slope aspect, forest age, and known occurrences of other rare species. Non-targeted USFS rare species identified during the course of the surveys were also documented. During the course of these 2012 surveys two new occurrences of a liverwort (*Lejeunea bermudiana*) and one new occurrence of a liverwort (*Plagiochila ludoviciana*) were identified.

Additional mitigative measures will be implemented by NCDOT to minimize effects from management activities. Where practicable, NCDOT will avoid planting of aggressive non-native species for re-vegetation and erosion control. Centipede grass (*Eremochloa ophiuroides*) is the preferred species for roadside planting since it reduces the frequency of mowing and the need to apply herbicides. For sensitive areas located on National Forest System (NFS) lands NCDOT will coordinate with the USFS to identify native species and non-aggressive non-natives that can be utilized for erosion control, re-vegetation, and interchange plantings. One of the species being considered is wire grass (*Aristida stricta*), a clumping grass native to the fire maintained pine lands in the vicinity of the project. Additional species being considered include savanna hairgrass (*Muhlenbergia expansa*), short-bearded plume grass (*Saccharum brevibarbe*), and creeping little bluestem (*Schizachyrium scoparium*).

Brush control within the highway right-of-way will be necessary for the long-term maintenance of roadside shoulders and medians. Brush control along the bypass will be conducted with either herbicide or mechanical means. Herbicide usage is anticipated to be an important and necessary part of right-of-way maintenance and will be conducted in accordance with USFS-approved methods to minimize potential effects to USFS rare plant species on NFS lands crossed by the project.

NCDOT personnel will follow strict guidelines for the use of herbicides on NFS lands crossed by the project. For all areas of NFS lands crossed by the project, herbicides will be used according to manufacturer's label direction for rates, concentrations, exposure times, and application methods. Only formulations approved for aquatic use would be applied in or adjacent to jurisdictional wetlands and streams, in accordance with label directions.

Additional precautions will be implemented for herbicide use in close proximity to USFS rare plant species occurrences to minimize the potential for herbicide drift. Buffers will be established extending 60 feet from known USFS rare plant occurrences. Management within USFS rare species buffers will be primarily through mowing. If herbicide application is determined to be necessary within USFS rare plant species buffers, plants will be flagged or otherwise identified to minimize accidental exposure while conducting spot treatments. The potential for herbicide drift will be greatly reduced with spot treatments (relative to broad-scale or aerial application). Techniques that could be used include spraying foliage using a hand-held wand or backpack sprayer, basal bark and stem treatments using spraying or painting (wiping) methods, cut surface treatments (spraying or wiping), and woody stem injections.

Additional measures that can be implemented:

1) All guidelines and mitigation measures presented in Forest Manual 2150, *Pesticide-Use Management and Coordination*, and Forest Service Handbook 2109.14, *Pesticide Use Management and Coordination Handbook*, would be followed.
2) Equipment, boots, and clothing would be cleaned thoroughly before moving from treatment sites to ensure that seeds or other propagules are not transported to other sites.
3) Fueling or oiling of mechanical equipment would occur away from aquatic habitats.
4) Application of herbicides adjacent to stream edges and banks will be directed away from the stream and will be conducted using a hand sprayer.
5) Retain native vegetation and limit soil disturbance as much as possible.
6) Following treatments, exposed soils would be promptly revegetated to avoid colonization by non-native invasive plants or potential soil erosion. Only approved seed mixtures and weed seed-free mulch would be used.

If general efforts to mitigate for the loss of individual USFS rare plant species are not feasible, then an alternative mitigation option may be considered for establishing new occurrences in appropriate habitat using seeds, propagules, or transplanting of individual plants at the request of the USFS.

- Loomis's loosestrife, small spreading pogonia, piedmont cowbane, yellow fringeless orchid, shadow-witch, Fitzgerald's peatmoss, and mudbank crowngrass are not anticipated to require specific mitigation; however, if specific mitigation for these species is required then NCDOT will work with the USFS to develop appropriate mitigation strategies.
- Spring-flowering goldenrod generates from seeds under suitable habitat conditions.[i] Direct

affects to this species may be mitigated through a combination of relocation of affected populations to unaffected suitable habitat or collecting seeds or propagules from affected populations to use in establishing new populations in unaffected suitable habitat. NCDOT is proposing to collect seeds from the areas to be affected by Alternative 3 and distributing the seeds into an area of the CNF where the species does not currently occur but where there is appropriate habitat. On-site mitigation in the vicinity of the RCW foraging partition north of Sunset Rd and west of Alternative 3 is proposed in a report, Recommended mitigation plan for *Solidago verna* in Craven Co., North Carolina; Havelock Bypass, R-1015,[ii] prepared by Dr. Jon Stucky and Miranda Fleming for NCDOT in 2006. The on-site area proposed for establishing spring-flowering goldenrod is identified as the Wolf Pit Branch Road Area. Additional areas with mitigation potential for use in establishing new populations on NFS lands of spring-flowering goldenrod were reviewed outside of the Alternatives study area in case additional mitigation areas would be requested by the USFS to help offset project related impacts. Several areas identified along Middle Little Road and South Little Road may have potential to be utilized as offsite mitigation areas for establishing spring-flowering goldenrod. These Little Road Areas are located off Catfish Lake Road (SR 1100) west of the Alt. 3 study area. Suitable soils and hydrologic conditions are expected to be present within portions of the 770 acres preliminarily identified. It may also be feasible to establish spring-flowering goldenrod where suitable soils and hydrologic conditions occur along selected roadsides and mesic inclusions present within the Croatan Mitigation Bank (CMB). Mitigation measures will be coordinated with USFS prior to implementation.

- LeConte's thistle is a biennial member of the aster family that occurs in open pine savannas.[iii] Managing for open savanna habitat through seasonal mowing of powerline rights-of-way and prescribed burning of forest habitats is important to maintaining suitable open habitat for this species. Implementation of measures agreed to between NCDOT and USFS would minimize viability concerns resulting from indirect impacts that could arise from construction and/or maintenance activities. If additional mitigation is required by USFS for direct impacts, a measure agreed to between NCDOT and USFS to offset viability concerns could include collecting seeds from viable EOs for use in supplementing existing EOs where suitable habitat occurs but numbers of individuals are low or individuals have not been recently documented.
- The remaining USFS rare plant species include two species of liverwort (*Lejeunea bermudiana* and *Plagiochila ludoviaciana*) that are directly affected. The likelihood of successfully establishing these species through the collection of individual plants or propagules from areas directly affected and transplanting them to sites in unaffected suitable habitat is not well known.

NCDOT surveys have resulted in documentation of additional occurrences on NFS lands in the CNF that would not be directly affected by the project. NCDOT will coordinate with the USFS to develop appropriate mitigation measures for these species if needed.

Impacts to USFS rare animal species are not likely to be direct loss of individuals, but rather the loss of occupied habitat and habitat fragmentation. Mitigating the loss of occupied habitat may be achieved through measures to minimize habitat impacts and through improvement of other habitat areas.

- Rafinesque's big-eared bat is most often associated with old-growth bottomland hardwood swamp forests. The forest stand characteristic that is thought to be most important is the presence of a preponderance of large diameter trees with cavities. The direct loss of habitat (Swamp Forest, Large Stream) by each alternative is small in comparison to the available habitat on NFS lands. In addition, clearing of trees within the Southwest Prong Slocum Creek floodplain should be minimized in proximity to the bridge in order to minimize effects to the habitat for this species.
- Black-throated green warbler is a summer resident generally found in non-riverine swamp forests, bay forests, pond pine woodlands, and less frequently streamhead pocosins with mature overstory. The severe wetness of the soils in these habitats results in these areas being subjected to fires less frequently than the adjacent pine flatwoods and pine savannas. The direct loss of habitat by each alternative is small in comparison to the available habitat on NFS lands.
- Bachman's sparrow is a summer resident in open to moderately open pine flatwoods with dense covering of grasses and sparse shrub and understory vegetation. Southern hognose snake generally occurs in dry pine-oak woodlands with xeric areas of sand or porous sandy loams (Braswell and Palmer, 1995). Little metalmark is a small butterfly that generally occurs in open pine flatwoods and savannas with a diversity of grasses and herbs. In the CNF these habitats are often found in powerline rights-of-way and frequently burned pinelands. Continued use of fire and mowing for habitat management is important in maintaining the open character of the habitat for these species and allowing individuals displaced by project construction to disperse into unoccupied suitable habitat.

Conclusions

USFS Rare Species - Since all the detailed study alternatives cross National Forest System (NFS) lands, a special use permit from the U.S. Forest Service (USFS) will be required to provide the lands for the

proposed project. The USFS must consider impacts to their list of rare species before granting a special use permit for Croatan National Forest (CNF) lands to be converted to highway use. Potential affects summarized here are based on the clearing limits (slope stake limits plus 15 feet on each side) for the alternative alignment plus an additional 25 feet to each side.

Alternative 1

Excluding red-cockaded woodpecker, which has been evaluated separately, Alternative 1 would directly affect approximately 42.5 acres mapped for 17 known occurrences of 10 USFS rare species. Alternative 1 has the potential to indirectly affect 1,877 acres of NFS lands through fragmentation and the reduction in the ability to manage the land by periodic prescribed burns. The indirectly affected NFS lands contain known occurrences for 28 USFS rare species.

Four Sensitive species may have at least one occurrence directly affected by Alternative 1. Construction of Alternative 1 may impact individuals or occupied habitat for four Sensitive plant species, Fitzgerald's peatmoss, Loomis's loosestrife, small spreading pogonia, and spring-flowering goldenrod, but with implementation of the minimization measures proposed and appropriate mitigation measures, if required, is not likely to lead to loss of viability for these species on NFS lands.

Six Locally Rare or Forest Concern species have at least one occurrence that would be directly affected by Alternative 1. One Locally Rare liverwort species, *Plagiochila ludoviciana*, is only known from two occurrences on NFS lands in the CNF and one of these occurrences would be directly affected in its entirety by Alternative 1. Construction of Alternative 1 would cause the elimination of one of these occurrences and in the absence of appropriate mitigation measures would result in a loss of viability for this species on NFS lands in the CNF. Alternative 1 may also affect another liverwort, *Lejeunea bermudiana*, based on impacts to the limited number of known occurrences this impact may result in a loss of viability for this species on NFS lands in the CNF. An additional occurrence documented in 2012 within the Island Creek watershed on NFS lands reduces the potential for a loss of viability for this species. NCDOT would continue to coordinate with the USFS to develop appropriate mitigation to avoid loss of viability this species. Construction of Alternative 1 may also impact individuals or occupied habitat for four additional Locally Rare or Forest Concern species, Leconte's thistle, Rafinesque's big-eared bat, black-throated green warbler, and southern hognose snake, but with implementation of the minimization measures proposed and appropriate mitigation measures, if required, would not be likely to lead to loss of viability for these species on NFS lands in the CNF.

For the USFS rare species that would be indirectly affected by this alternative, implementation of the minimization measures proposed and appropriate mitigation measures, if required, would not likely lead to loss of viability for these species.

Alternative 2

Excluding red-cockaded woodpecker, which has been evaluated separately, Alternative 2 would directly affect approximately 60.1 acres mapped for 26 known occurrences of 15 USFS rare species. Alternative 2 has the potential to indirectly affect 712 acres of NFS lands through fragmentation and the reduction in the ability to manage the land by periodic prescribed burns. The indirectly affected NFS lands contain known occurrences for 25 USFS rare species.

Six Sensitive species may have at least one occurrence directly affected by Alternative 2. Construction of Alternative 2 may impact individuals or occupied habitat for Six Sensitive plant species, Fitzgerald's peatmoss, Piedmont cowbane, small spreading pogonia, Loomis's loosestrife, yellow fringeless orchid, and spring-flowering goldenrod, but with implementation of the minimization measures proposed and appropriate mitigation measures, if required, is not likely to lead to loss of viability for these species on NFS lands.

Nine Locally Rare or Forest Concern species have at least one occurrence that would be directly affected by Alternative 2. Alternative 2 may affect the liverwort, *Lejeunea bermudiana*, based on impacts to the limited number of known occurrences this impact may result in a loss of viability for this species on NFS lands in the CNF. An additional occurrence documented in 2012 within the Island Creek watershed on NFS lands reduces the potential for a loss of viability for this species. NCDOT would continue to coordinate with the USFS to develop appropriate mitigation to avoid loss of viability this species. Construction of Alternative 2 may also impact individuals or occupied habitat for eight additional Locally Rare species, Leconte's thistle, mudbank crown grass, shadow-witch, Rafinesque's big-eared bat, Bachman's sparrow, black-throated green warbler, southern hognose snake, and little metalmark, but with implementation of the minimization measures proposed and appropriate mitigation measures, if required, would not be likely to lead to loss of viability for these species on NFS lands in the CNF.

For the USFS rare species that would be indirectly affected by this alternative, implementation of the minimization measures proposed and appropriate mitigation measures, if required, would not likely lead to loss of viability for these species.

Alternative 3

Excluding red-cockaded woodpecker, which has been evaluated separately, Alternative 3 would directly affect approximately 60.1 acres mapped for 24 known occurrences of 12 USFS rare species. Alternative 3 has the potential to indirectly affect 1,239 acres of NFS lands through fragmentation and the reduction in the ability to manage the land by periodic prescribed burns. The indirectly affected NFS lands contain known occurrences for 28 USFS rare species.

Five Sensitive species have at least one occurrence directly affected by Alternative 3. Construction of Alternative 3 may impact individuals or occupied habitat for five Sensitive plant species, Fitzgerald's peatmoss, Piedmont cowbane, small spreading pogonia, Loomis's loosestrife, and spring-flowering goldenrod, but with implementation of the minimization measures proposed and appropriate mitigation measures, if required, is not likely to lead to loss of viability for these species on NFS lands.

Seven Locally Rare or Forest Concern species have at least one occurrence that would be directly affected by Alternative 3. Alternative 3 may affect the liverwort, *Lejeunea bermudiana,* based on impacts to the limited number of known occurrences this impact may result in a loss of viability for this species on NFS lands in the CNF. An additional occurrence documented in 2012 within the Island Creek watershed on NFS lands reduces the potential for a loss of viability for this species. NCDOT would continue to coordinate with the USFS to develop appropriate mitigation to avoid loss of viability this species. Construction of Alternative 3 may also impact individuals or occupied habitat for six additional Locally Rare species, Leconte's thistle, mudbank crown grass, Rafinesque's big-eared bat, Bachman's sparrow, black-throated green warbler, and southern hognose snake, but with implementation of the minimization measures proposed and appropriate mitigation measures, if required, would not be likely to lead to loss of viability for these species on NFS lands in the CNF.

For the USFS rare species that would be indirectly affected by this alternative, implementation of the minimization measures proposed and appropriate mitigation measures, if required, would not likely lead to loss of viability for these species.

[i] EcoScience Corporation and Axiom Environmental, Incorporated. 2009. Croatan Mitigation Bank Addendum to the NCDOT UMBI. Report prepared for NCDOT, January 2009. 16 pp + appendices.

[ii] Stucky, J.M. and M. Fleming, 2006. Recommended mitigation plan for *Solidago verna* in Craven Co., North Carolina; Havelock Bypass, R-1015. Research project conducted for NCDOT, No. HWY-0733.

[iii] Radford, A.E., H.E. Ahles, and C.R. Bell. 1968. Manual of the Vascular Flora of the Carolinas. University of North Carolina Press, Chapel Hill, NC. 1183 pp.

ATTACHMENT 9

ENVIRONMENTAL SERVICES, INC.
524 South New Hope Road
Raleigh, North Carolina 27610
919-212-1760 / Facsimile 919-212-1707
www.environmentalservicesinc.com

MEMORANDUM

TO: Mary Frazer

FROM: Matt Smith

DATE: 29 August 2013

RE: US 70 Havelock Bypass (R-1015)
P.O. No. 6300030960
Address USFS Comments on DEIS and PETS Analysis:
Summary of Evaluation for Mudbank Crowngrass (*Paspalum dissectum*)
ESI Project No. ER10-060.08

Background

In their review of the Draft Environmental Impact Statement (DEIS) for the US 70 Havelock Bypass project (Figure 1), the U.S. Forest Service (USFS) identified the need for additional information on project-related impacts for mudbank crowngrass (*Paspalum dissectum*) to more fully assess potential viability concerns resulting from project implementation (Figure 2).

Mudbank crowngrass is listed as a Sensitive species by the USFS, is state listed as Endangered, and does not have a designation by the U.S. Fish and Wildlife Service (USFWS). Based on these listings, the USFS is required to assess potential impacts to the species resulting from actions by the USFS, such as granting an easement for the US 70 Havelock Bypass, to determine whether the action threatens the viability of the species on National Forest System (NFS) lands in the Croatan National Forest (CNF).

Environmental Services, Inc., (ESI), has been asked by the North Carolina Department of Transportation (NCDOT) to complete an evaluation of impacts to this species associated with Alternative 3 of the proposed US 70 Havelock Bypass (R-1015) (Figure 1). The study area for Alternative 3 is referred to as the Alt. 3 study area in this evaluation. The area encompassed by all the alternatives for the US 70 Havelock Bypass is referred to as the Alternatives study area in this evaluation (Figure 2).

The impact assessment for this species is based on the following:

- The evaluation presented here utilizes Element Occurrence (EO) data obtained from the N.C. Natural Heritage Program (NCNHP) in April 2012, supplemented by site evaluations conducted by ESI in 2012.

- Boundaries for NFS lands were provided by the USFS for use in this evaluation. Only EOs, or portions of EOs, on NFS lands are of concern for the viability determination for NFS lands on the CNF.
- Direct impacts are based on the tree clearing limits (slope stake limits plus 15 feet) plus an additional 25 feet.
- Indirect impacts were considered for EO areas located on NFS lands between Alternative 3 and existing US 70 based on consideration that different post-project habitat management techniques may be required by USFS for areas isolated from larger, contiguous NFS lands by the project. Additional concerns identified for consideration of indirect impacts include construction or maintenance actions by NCDOT in the vicinity of rare plants EOs on NFS lands that could have negative impacts on the rare plants or the suitability of their habitat. These actions could include the type of roadside vegetation proposed for use by NCDOT in the project right-of-way, location of construction staging areas, soil compaction or rutting caused by heavy equipment resulting in localized changes in hydrology, and use of herbicides and pesticides.
- Cumulative impacts were considered for identified actions on NFS lands that could affect this species. Because the USFS concern for this species is for maintaining continued viability on NFS lands in the CNF, actions off NFS lands were not considered for determining whether an action will affect the viability of this species on NFS lands. Actions proposed on NFS lands are subject to independent review by USFS to assess potential effects to the continued viability of this species on NFS lands in the CNF. No other NCDOT projects have been identified that would directly or indirectly impact this species on NFS lands. One project has been identified with potential for cumulative effects; a project proposed by Duke Energy Progress for replacing the overhead ground wire and selected poles within an existing transmission line corridor right-of-way located along approximately five miles of NFS lands in the CNF. The Duke Energy Progress project right-of-way includes occurrences for this species and the proposed actions have the potential to affect this species. This project is currently being evaluated to determine the effects to this species, which are expected to be minimal based on the types of activities being proposed. No other actions being considered by USFS on NFS lands have been identified that would directly or indirectly impact this species. As such, no significant cumulative impacts were identified for this species.

A summary of the evaluation presented here will be incorporated into Chapter 4 of the Final Environmental Impact Statement (FEIS).

Mudbank Crowngrass (*Paspalum dissectum*)

Mudbank crowngrass is a perennial grass that occurs colonially in shallow water, marshy areas, and wet open places. Seed heads are produced on stems referred to as culms. This species is most prevalent in muds or peats of ponds after water levels recede during dry periods.[i] On the CNF this species has been documented in ephemeral ponds located within powerline rights-of-way. Powerline rights-of-way are managed by a combination of mowing by the powerline easement holder and prescribed burns conducted by the USFS. Management for this species, including mowing, that minimizes competition from woody species appears to be important in maintaining open habitat for this species. Sites that are mowed in the late spring and early summer prior to the sites being inundated with water may provide more open habitat conditions.

All the known occurrences of mudbank crowngrass within the limits of the CNF are encompassed by a single parent EO (11 on Figure 2) designated by the NCNHP. This parent EO consists of four other EOs, each with a unique identifying EO number assigned by NCNHP. Three of these EOs are located wholly or in part on NFS lands within the CNF (7, 12, and 13 on Figures 2 and 3) and one EO on private lands (10 on Figures 2 and 3). The scope of work for the mudbank crowngrass evaluation is the result of meetings with NCDOT and the USFS and evaluates direct and indirect impacts on mudbank crowngrass occurrences in the Alt. 3 study area for the US 70 Havelock Bypass.

Methods for Assessment

Each of the four EOs within the parent EO was visited in an attempt to document the continued presence of suitable habitat and individuals of mudbank crowngrass within each area. This information will be used to assist in the evaluation of the direct and indirect impacts associated with Alternative 3 of the US 70 Havelock Bypass on the viability of mudbank crowngrass on NFS lands within the CNF.

The initial step in the evaluation was to determine the number of unique polygons identified in NCNHP files that make up the different assigned EOs. Four discrete polygons were identified wholly or partially on NFS lands within the CNF. One additional polygon not on NFS lands but in close proximity to the sites on NFS lands was also evaluated because it is included in the parent EO. Each polygon was evaluated in the field to confirm continued presence of mudbank crowngrass and to obtain population estimates and density of culms. Surveys for mudbank crowngrass were undertaken on October 1, 2012. The surveys were conducted by an experienced team of biologists led by Matt Smith with support from David DuMond. At the time of the evaluation the ephemeral ponds were inundated and culms were identified by the presence of seed heads emergent from the water.

Surveys of each polygon consisted of two biologists walking transects within the habitat encompassed by NCNHP EO polygons. Individual stems of mudbank crowngrass were counted in areas with small areas of coverage by colonies of this species. In areas with large coverage by colonies of this species, individual stem counts were not undertaken but approximate population size was estimated based on the size of the areas covered by the colonies.

Results of Assessment

The results of the surveys of EOs identified by NCNHP are presented in Table 1 along with a summary of NCNHP data for the most recent observations of each EO. All the known mudbank crowngrass occurrences in the CNF, including those on private lands are part of a single parent EO (11 on Figure 3). Because other EO numbers have been assigned as well to individual polygons encompassed by this parent EO, including two polygons comprising a single EO (7 on Figure 3), each individual polygon identified in NCNHP records has been assigned a number (Polygon #) for this evaluation to facilitate tracking and analysis. Because the parent EO includes polygons on private lands as well as NFS lands, and the polygons are all in the same general area, the results of the assessment also include the observations for the polygons, or portions of polygons, on private lands as well as NFS lands.

Table 1. Results of Mudbank Crowngrass Surveys.

NCNHP Data					ESI 2012 Survey Results			
EO #		EO Status	Last Observed	# Plants (Last Observed)	Polygon #	# Plants Observed		Habitat Quality
						NFS Lands	Private Lands	
11[a]	7	extant	10/8/2010	275	7a	7	NA	Open maintained powerline ROW
					7b	2	NA	Open maintained powerline ROW
	10	extant	10/8/2010	375	10 [b]	NA	0	Open maintained powerline ROW
	12	extant	10/14/2010	50	12	1,000 [c]	NA	Open maintained powerline ROW
	13	extant	10/14/2010	30	13	70 [c]	930 [c]	Open maintained powerline ROW
				Total: 730		Total: 1,079 (approx.)	Total: 930 (approx.)	

[a] EO 11 includes EO # 7, 10, 12, 13 2.

[b] Polygon is not located on NFS lands.

[C] The number of plants reported is an estimate based on the size of the coverage areas of the large, dense colonies observed.

EOs on the CNF were reviewed during the 2012 flowering season to document if suitable habitat is present and if individuals of mudbank crowngrass still occur within the EO boundaries.

- EO 7 consists of two polygons (Polygon 7a and Polygon 7b on Figure 3) located within depressions within a maintained powerline right-of-way on NFS lands.
    - Polygon 7a was inundated at the time of evaluation and the vegetation present was dominated by woody species. Seven individual seed heads of mudbank crowngrass were observed along the sides of vehicular ruts that crossed the depressions that were generally free of other competing vegetation.
    - Polygon 7b was inundated at the time of evaluation and the vegetation present was dominated by woody species. Two individual seed heads of mudbank crowngrass were observed along the sides of vehicular ruts that crossed the depressions that were generally free of other competing vegetation.
- EO 10 consists of a single polygon (Polygon 10 on Figure 3) located in a powerline right-of-way on private property in close proximity to NF lands boundaries. Several depressions were observed that were inundated at the time of the field evaluation. These depressions were composed of a mix of shrubby vegetation with infrequent areas dominated by herbaceous vegetation, primarily along vehicle ruts. No individuals of mudbank crowngrass were observed

during this evaluation. However, it is possible that this species is still present in low numbers since the habitat is still present and previous reviews have identified this species at this location.

- EO 11 is a parent EO and was not evaluated separately since it is made up of EOs 7, 10, 12, and 13 which are being evaluated separately.
- EO 12 consists of a single polygon (Polygon 12 on Figure 3) located in a powerline right-of-way on NFS lands. A large depression is present at this site with large areas of open habitat not vegetated by woody species. At the time of the field evaluation this area was inundated with water depths in some areas exceeding 4 feet. Mudbank crowngrass was observed as a number of large colonies with emergent seed heads present. The colonies ranged in area from a few square feet up to over 1,000 square feet. Based on the difficulty in counting individual stems in the dense colonies, the population size was estimated based on the overall coverage of the colonies, and was estimated at approximately 1,000 individuals.
- EO 13 consists of a single polygon (Polygon 13 on Figure 3) located in a powerline right-of-way. A small portion of the polygon, approximately 7%, is on NFS lands, with the remainder, approximately 93%, extending onto private property. Large depressions are present at this site with large areas of open habitat not vegetated by woody species. At the time of the field evaluation this area was inundated with water depths in some areas exceeding 4 feet. Mudbank crowngrass was observed as a number of large colonies with emergent seed heads present on both the NFS portion of the polygon and on the private lands portion. The colonies ranged in area from a few square feet up to over 1,000 square feet. Based on the difficulty in counting individual stems in the dense colonies, the population size was estimated based on the overall coverage of the colonies, and was estimated at approximately 1,000 individuals. Because the plants were present on both the NFS lands and private lands portions of the polygon and appeared to be relatively evenly distributed throughout, the estimated number of culms on NFS lands was based on the percentage of the polygon occurring on NFS lands.

There are four polygons (Polygons 7a, 7b, 12, and 13 on Figure 3) recorded for mudbank crowngrass wholly or partially on NFS lands within the CNF. This species was confirmed as present within all four of these polygons during the 2012 survey season. One additional polygon (Polygon 10 on Figure 3) on private lands within close proximity to these polygons on NFS lands was also reviewed. Polygon 10 was found to contain suitable habitat for this species but no individuals of mudbank crowngrass were observed. The habitat areas reviewed for this species is located in maintained powerline rights-of-way that are subject to management by a combination of mowing by the powerline easement holder and periodic prescribed burns conducted by the USFS. The timing of management and seasonal rainfall variations that restrict woody vegetation development and extend periods of inundation may affect the expression of this species within these polygons. It is likely that larger areas of mudbank crowngrass coverage are observable in years that do not favor the growth of competing woody vegetation.

Summary of Impacts

- This evaluation indicates that mudbank crowngrass is still present in 4 polygons on NFS lands. A total of 1,079 individual mudbank crowngrass plants were estimated as present on NFS lands during the 2012 survey within these polygons. These four polygons collectively cover 5.8 acres of occupied habitat documented on NFS lands in the CNF.

- Alternative 3 directly affects EO 7. EO 7 consists of two polygons that total 3.9 acres. Alternative 3 will directly impact approximately 1.7 acres of the total 1.9 acres within Polygon 7a of this EO. All seven culms observed within Polygon 7a are in the area that will be directly affected. The other polygon (7b) within this EO will not be directly affected.

- An additional 4.2 acres of occupied habitat on NFS lands are in areas subject to indirect impact consideration for Alternative 3 including an additional 2.2 acres of EO 7. This includes Polygons 7b and 12 in their entirety, and approximately 7% of Polygon 13. The 2012 survey estimated that approximately 1,072 culms are present on NFS lands that may be subject to indirect impacts. These culms were observed within the powerline right-of-way which is currently being managed by a combination of mowing by the utility company operating the lines within the right-of-way and periodic prescribed burns conducted by the USFS. No changes in management of the powerline right-of-way by mowing are expected to result from project implementation, reducing the concerns for indirect impacts. However, the ability for the USFS to conduct periodic prescribed burns in these powerline areas will need to be continued. Potential indirect impacts that could result from construction or maintenance activities can be minimized through measures previously proposed by NCDOT regarding management agreements with USFS for the areas subject to potential indirect impacts. Measures discussed to reduce the likelihood for adverse effects to these areas include:
    - Allow for the temporary closure of the bypass to allow the USFS to conduct periodic prescribed burns;
    - Prior to construction, NCDOT will coordinate with the USFS to identify occurrences of USFS rare plant species near the project construction limits and put up protective orange fencing to be removed after completion of construction;
    - Avoid placing staging areas within 250 feet of USFS rare plant species occurrences, where practicable;
    - Avoid placing heavy equipment within powerline corridors outside of the project's direct impact area without prior approval from the USFS;
    - Require contractors to pressure wash all off-road equipment prior to being brought into the CNF construction areas;
    - Prior to construction NCDOT, in coordination with the USFS, will locate and flag areas of non-native invasive plant species for removal during construction;
    - Avoid planting of aggressive non-native species for re-vegetation;
    - Utilize rolled matting for erosion control and revegetation on NFS lands;
    - Avoid use of broadcast sprays for herbicides and pesticides on NFS lands; and
    - Minimize the use of herbicides and pesticides.

Conclusions and Recommendations

The US 70 Havelock Bypass (R-1015) Alternative 3 will result in unavoidable direct impacts to mudbank crowngrass and has the potential for indirect impacts. Alternative 3 directly affects approximately 1.7 acres and 7 culms of mudbank crowngrass identified within one occupied habitat polygon. An additional 4.2 acres and 1,072 culms estimated during the 2012 survey are located on NFS lands in areas subject to indirect impact consideration. A project proposed by Duke Energy Progress has a study area that includes occurrences for this species and has the potential to affect this species. This project is currently being

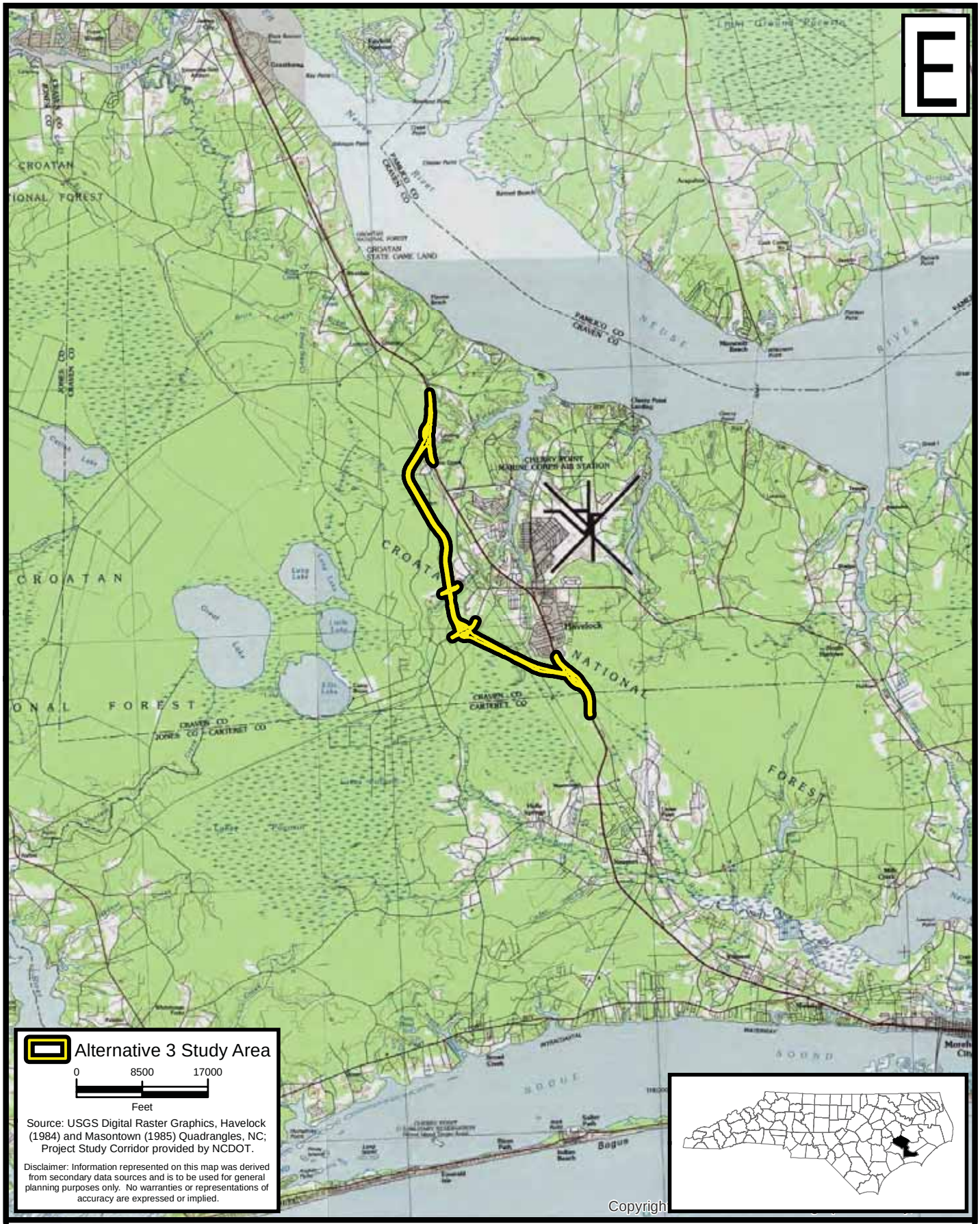
evaluated to determine the effects this species. The cumulative impacts for this project are not available at this time but are expected to be minimal based on the types of activities proposed. No additional cumulative impacts from other USFS or NCDOT projects on NFS lands on the CNF have been identified.

Based on the limited direct impact to this species for Alternative 3, the direct impacts are not likely to result in a loss of viability on NFS lands within the CNF. The area subject to consideration for indirect impacts represents the remainder of the population and areal extent of mudbank crowngrass known to occur on NFS lands in the CNF. However, the project is not expected to result in changes that would prevent the utility company from continued mowing to maintain the powerline right-of-way and measures are in place to allow the USFS to continue conducting prescribed burns in the areas in which these EOs are found, reducing the threat for indirect impacts. Other potential concerns for indirect impacts that could result from project construction and maintenance activities can be minimized through appropriate measures.

Implementation of measures agreed to between NCDOT and USFS would minimize viability concerns resulting from indirect impacts that could arise from construction and/or maintenance activities. These measures include: allow for the temporary closure of the bypass to allow the USFS to conduct periodic prescribed burns; prior to construction, NCDOT will coordinate with the USFS to identify occurrences of USFS rare plant species near the project construction limits and put up protective orange fencing to be removed after completion of construction; avoid placing staging areas within 250 feet of USFS rare plant species occurrences, where practicable; avoid placing heavy equipment within powerline corridors outside of the project's direct impact area without prior approval from the USFS; require contractors to pressure wash all off-road equipment prior to being brought into the CNF construction areas; prior to construction NCDOT, in coordination with the USFS, will locate and flag areas of non-native invasive plant species for removal during construction; avoid planting of aggressive non-native species for re-vegetation; Utilize rolled matting for erosion control and revegetation on NFS lands; avoid use of broadcast sprays for herbicides and pesticides on NFS lands; and minimize the use of herbicides and pesticides. If mitigation is required by USFS for direct impacts, a measure agreed to between NCDOT and USFS to offset viability concerns could include collecting seeds from viable EOs for use in supplementing existing EOs where suitable habitat occurs but numbers of individuals are low or individuals have not been recently documented.

With the implementation of appropriate measures to reduce concerns for indirect impacts, the US 70 Havelock Bypass (R-1015) Alternative 3 project is not likely to cause a loss of viability for mudbank crowngrass on NFS lands in the CNF.

[i] Godfrey, G.K., and J.W. Wooten. 1979. Aquatic and Wetland Plants of the Southeastern United States: Monocotyledons. The University of Georgia Press, Athens, GA. 712 pp.



Project Location

US 70 Havelock Bypass (R-1015)

Craven and Carteret Counties, North Carolina

Project:	ER10060.08
Date:	Aug 2013
Drwn/Chkd:	KT/MS
Figure:	1

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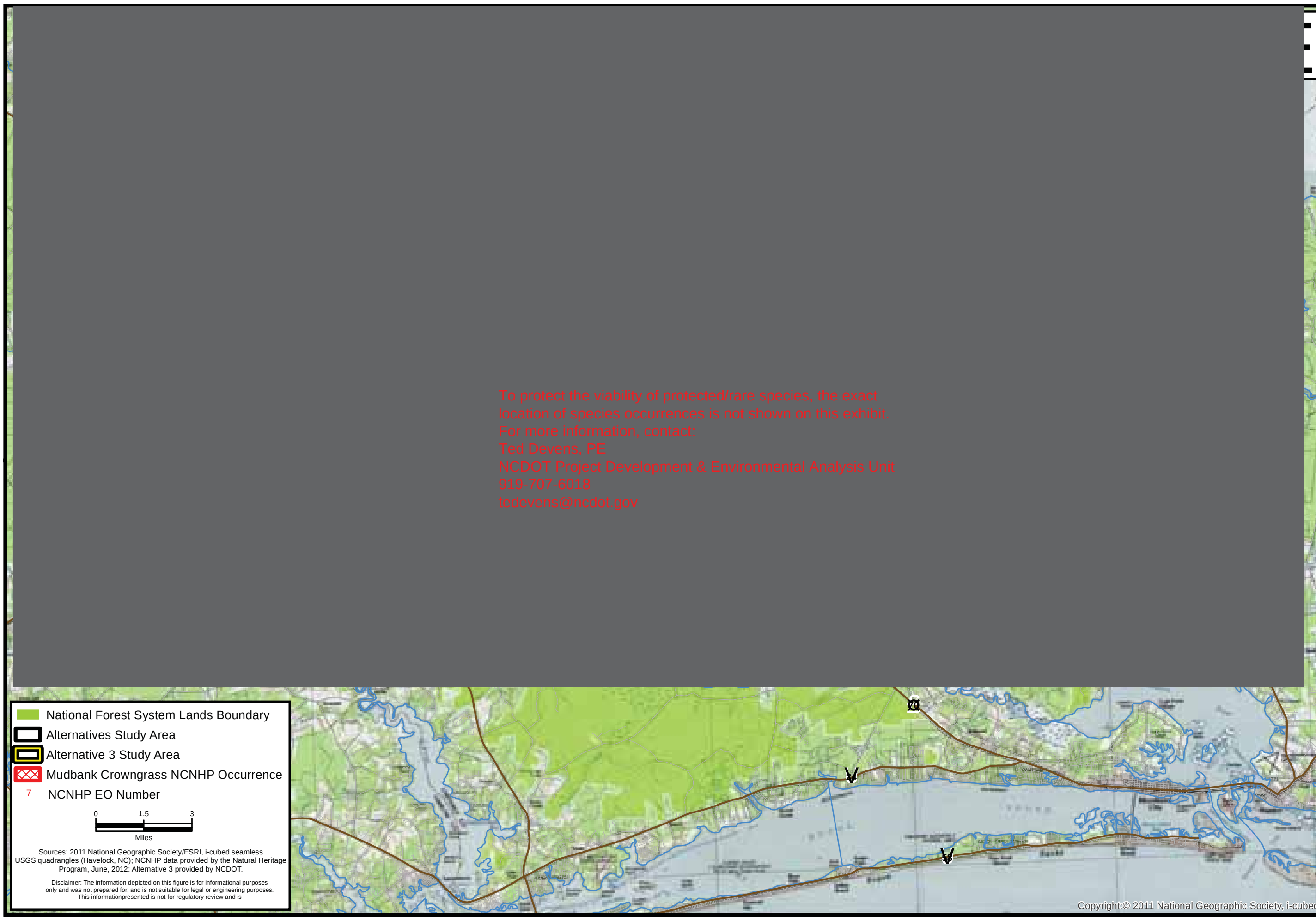
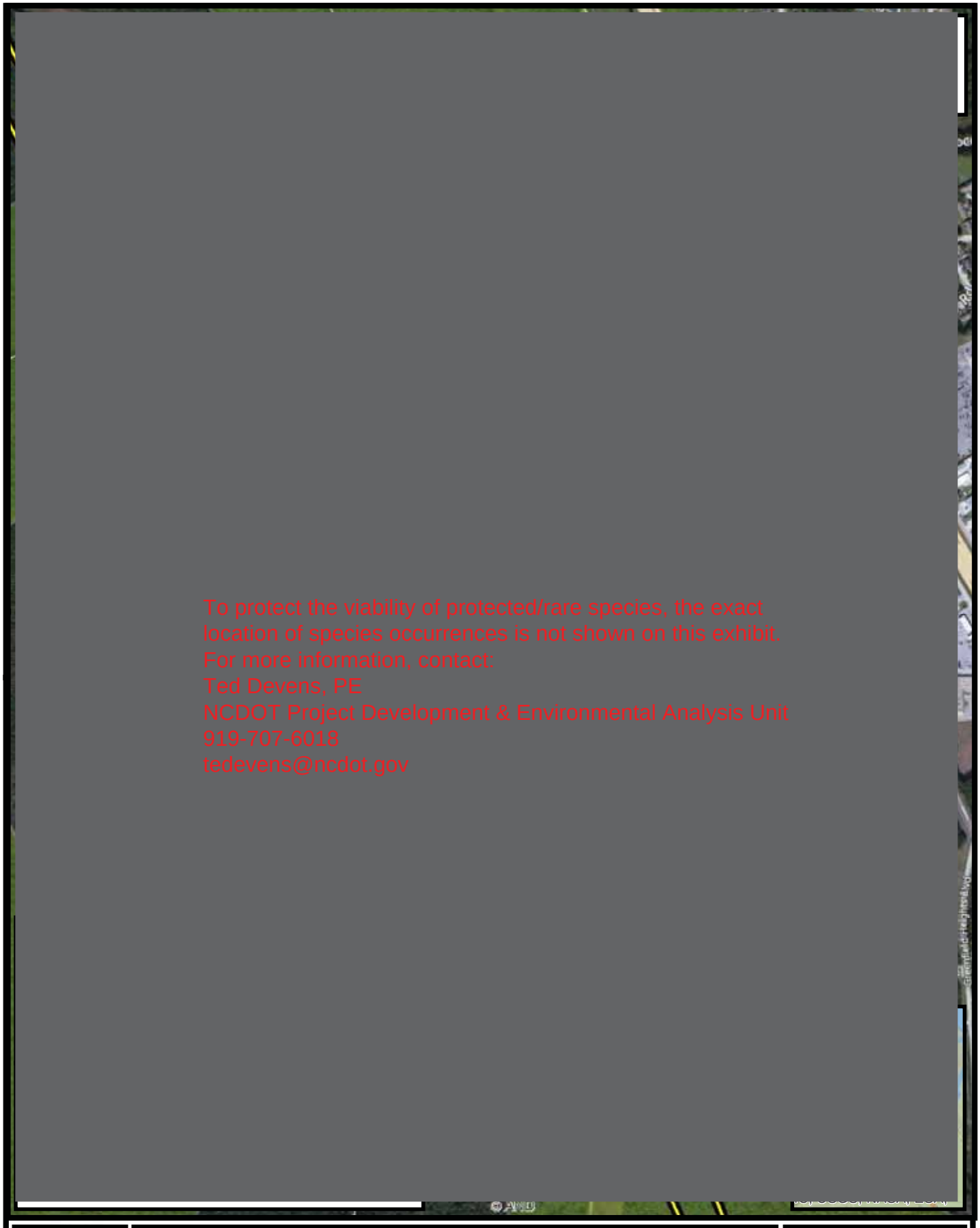


Mudbank Crowngrass Occurrences Across the Croatan National Forest

US 70 Havelock Bypass (R-1015)

Craven and Carteret Counties, North Carolina

Project:	ER10060.08
Date:	Aug 2013
Drwn/Chkd:	KT/MKS
Figure:	2



Mudbank Crowngrass Assessment - Occurrences

US 70 Havelock Bypass (R-1015)

Craven and Carteret Counties, North Carolina

Project:	ER10060.08
Date:	Aug 2013
Drwn/Chkd:	KT/MS
Figure:	**3**

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ATTACHMENT 10

ENVIRONMENTAL SERVICES, INC.
524 South New Hope Road
Raleigh, North Carolina 27610
919-212-1760 / Facsimile 919-212-1707
www.environmentalservicesinc.com

MEMORANDUM

TO: Mary Frazer

FROM: Matt Smith

DATE: 29 August 2013

RE: US 70 Havelock Bypass (R-1015)
P.O. No. 6300030960
Address USFS Comments on DEIS and PETS Analysis:
Summary of Evaluation for Summer Species: LeConte's thistle (*Cirsium lecontei*), short-bristled beaksedge (*Rhynchospora breviseta*), and yellow fringeless orchid (*Platanthera integra*)
ESI Project No. ER10-060.08

Background

In their review of the Draft Environmental Impact Statement (DEIS) for the US 70 Havelock Bypass project (Figure 1), the U.S. Forest Service (USFS) identified the need for additional information on project-related impacts for LeConte's thistle (*Cirsium lecontei*), short-bristled beaksedge (*Rhynchospora breviseta*), and yellow fringeless orchid (*Platanthera integra*) to more fully assess potential viability concerns resulting from project implementation (Figure 2).

LeConte's thistle is listed as a Locally Rare species by the USFS, is state listed as Significantly Rare - Peripheral, and does not have a designation by the U.S. Fish and Wildlife Service (USFWS). Short-bristled beaksedge is listed as a Sensitive species by the USFS, is state listed as Significantly Rare – Peripheral, and does not have a designation by the USFWS. Yellow fringeless orchid is listed as a Sensitive species by the USFS, is state listed as Threatened, and does not have a designation by the USFWS. Based on these listings, the USFS is required to assess potential impacts to the species resulting from actions by the USFS, such as granting an easement for the US 70 Havelock Bypass, to determine whether the action threatens the viability of the species on National Forest System (NFS) lands in the Croatan National Forest (CNF).

Environmental Services, Inc., (ESI), has been asked by the North Carolina Department of Transportation (NCDOT) to complete an evaluation of impacts to each of these species associated with Alternative 3 of the proposed US 70 Havelock Bypass (R-1015) (Figure 1). The study area for Alternative 3 is referred to as the Alt. 3 study area in this evaluation.

Impact assessments for these three species were based on the following:

- The evaluations presented here utilize Element Occurrence (EO) data obtained from the N.C. Natural Heritage Program (NCNHP) in April 2012, supplemented by site evaluations conducted by ESI in 2012.
- Boundaries for NFS lands were provided by the USFS for use in this evaluation. Only EOs, or portions of EOs, on NFS lands are of concern for the viability determination for NFS lands on the CNF.
- Direct impacts are based on the tree clearing limits (slope stake limits plus 15 feet) plus an additional 25 feet.
- Indirect impacts were considered for EO areas located on NFS lands between Alternative 3 and existing US 70 based on consideration that different post-project habitat management techniques may be required by USFS for areas isolated from larger, contiguous NFS lands by the project. Additional concerns identified for consideration of indirect impacts include construction or maintenance actions by NCDOT in the vicinity of rare plants EOs on NFS lands that could have negative impacts on the rare plants or the suitability of their habitat. These actions could include the type of roadside vegetation proposed for use by NCDOT in the project right-of-way, location of construction staging areas, soil compaction or rutting caused by heavy equipment resulting in localized changes in hydrology, and use of herbicides and pesticides.
- Cumulative impacts were considered for identified actions on NFS lands that could affect these species. Because the USFS concern for these species is for maintaining continued viability on NFS lands in the CNF, actions off NFS lands were not considered for determining whether an action will affect the viability of these species on NFS lands. Actions proposed on NFS lands are subject to independent review by USFS to assess potential effects to the continued viability of these species on NFS lands in the CNF. One project has been identified with potential for cumulative effects for all species included in this analysis; a project proposed by Duke Energy Progress for replacing the overhead ground wire and selected poles within an existing transmission line corridor right-of-way located along approximately 5 miles of NFS lands in the CNF. The Duke Energy Progress project right-of-way includes occurrences for all of the species included in this analysis and the proposed actions have the potential to affect these species. This project is currently being evaluated to determine the effects to these species, which are expected to be minimal based on the types of activities being proposed. One additional action has been identified with consideration for cumulative effects to yellow-fringeless orchid, a wildlife improvement project completed in the summer of 2003 and subsequent damage from ATV's that resulted in a loss of habitat and number of individuals observed to one EO (EO 7) for yellow-fringeless orchid. No other NCDOT projects have been identified that would directly or indirectly impact these species on NFS lands. No other actions being considered by USFS on NFS lands have been identified that would directly or indirectly impact these species. As such, no significant cumulative impacts were identified for these species.

A summary of the evaluations presented here will be incorporated into Chapter 4 of the Final Environmental Impact Statement (FEIS).

LeConte's Thistle (*Cirsium lecontei*)

LeConte's thistle is a biennial member of the aster family that occurs in open pine savannas.[i] Managing for open savanna habitat through seasonal mowing and prescribed burning of powerline rights-of-way and prescribed burning of forest habitats is important to maintaining suitable open habitat for this species. On the CNF the USFS undertakes prescribed burns on NFS lands in accordance with the Forest Management Plan for the Croatan National Forest. Powerline rights-of-way are managed by a combination of mowing by the powerline easement holder and prescribed burns conducted by the USFS. Under favorable habitat conditions biennial plants spend their first year in a vegetative state and in their second year they will flower and set seed followed by the death of the plants.[ii] If habitat conditions are not favorable individual plants may not flower or set seed during its two-year life cycle. If a population does not set seed then this species may not persist at a given location. If population sizes are small and/or all of the plants present in a population are part of the same two-year life cycle it is possible to not find plants at a site where plants were found in the previous year based on the difficulty of detecting non-flowering individuals under dense herbaceous or shrub growth habitat conditions. If suitable habitat is still present it is possible that seeds may be persistent at these sites.

The scope of work for the LeConte's thistle evaluation is the result of meetings with NCDOT and the USFS and evaluates direct and indirect impacts on LeConte's thistle occurrences in the Alt. 3 study area for the US 70 Havelock Bypass. There are 12 EOs tracked by NCNHP on NFS lands within the CNF, including four EOs that represent historic records and one EO that is a parent EO (Figure 3). The parent EO (28) incorporates EOs 5, 24, 26, and 27 in their entirety and is not evaluated separately. The different alternatives evaluated for the US 70 Havelock Bypass project area (referred to as the Alternatives study area in this evaluation) includes portions of 5 EOs: 5, 24, 26, 27, and 29. Alternative 3 directly impacts portions of EOs 26 and 29. Each of the EOs consists of one to several discreet polygons. Several of these polygons would have been considered occupied habitat polygons at the time of discovery and reporting to NCNHP, but several mapped EOs are attempts to encompass general areas identified in historic records but without detailed location information.

Methods for Assessment

There are a total of 11 EOs (excluding 1 parent EO) for this species on NFS lands within the CNF, but recent surveys reportedly have failed to relocate this species within several of these EOs (Gary Kauffman, personal communication, 8 February 2012). Each of the 11 EOs was visited in an attempt to re-document the presence of suitable habitat and individuals of LeConte's thistle within the EO. This information will be used to assist in the evaluation of the direct and indirect impacts associated with Alternative 3 of the US 70 Havelock Bypass on the viability of LeConte's thistle on NFS lands within the CNF.

The initial step in the evaluation was to determine the number of unique polygons identified in NCNHP files that make up the eleven EOs. Seventeen discrete polygons were identified on NFS lands within the CNF. Each polygon was evaluated in the field to confirm continued presence of LeConte's thistle and to obtain population estimates and density of individual plants. Surveys for LeConte's thistle were undertaken on July 16-18 and August 6, 2012. The surveys were conducted by an experienced team of biologists led by Matt Smith with support from David DuMond. Individual plants were identified across a range of growth stages, including non-flowering immature plants and plants in all stages of flowering,

including individuals in various stages of seed maturity. The majority of plants observed consisted of plants with evidence of flowering during the 2012 season.

Surveys of each polygon consisted of two biologists walking transects within the habitat encompassed by NCNHP EO polygons. Individual stems of LeConte's thistle were counted to determine the number of plants present within each polygon. Sub-polygons were approximated using GPS to estimate coverage of LeConte's thistle (shown as "clusters" on Figures 3a – 3g) within each occupied habitat polygon surveyed.

Results of Assessment

The results of the surveys of EOs identified by NCNHP are presented in Table 1 along with a summary of NCNHP data for the most recent observations of each EO. Because several EOs include multiple mapped polygons, each individual polygon identified in NCNHP records has been assigned a number (Polygon #) for this evaluation to facilitate tracking and analysis.

Table 1. Results of LeConte's Thistle Surveys.

NCNHP Data				ESI 2012 Survey Results		
EO #	**EO Status**	**Last Observed**	**# Plants (Last Observed)**	**Polygon #**	**# Plants Observed**	**Habitat Quality**
5 [b]	Historic	7/19/1958	1 [a]	5	0	Maintained roadside
8	Historic	10/17/1975	1 [a]	8	0	Dense pine plantation
12	Extant	9/4/1995	1	12	0	Open maintained powerline ROW, very wet
17	Extant	8/26/2009	0	17a	0	Pine forest with dense shrubs
			2	17b	0 (1 outside polygon)	Open pine forest with scattered shrubs
20	Historic	8/9/1939	1 [a]	20	0	Maintained roadside, pocosin
23	Historic	8/4/1949	2	23	0	Vague historic record, insufficient data to locate specific occurrence reported
24 [b]	Extant	9/1/2005	55	24a	11 (4 outside polygon)	Open maintained powerline ROW
				24b	6 (7 outside polygon)	Open maintained powerline ROW
				24c	25	Open maintained powerline ROW
26 [b]	Extant	8/11/2009	21	26a	0 (3 outside polygon)	Open maintained powerline ROW
				26b	5	Open maintained powerline ROW
27 [b]	Extant	7/15/2004	5	27	0	Open maintained powerline ROW
29	Extant	8/23/2005	2	29a	0	Open maintained powerline ROW
			17	29b	0	Open maintained powerline ROW
			12	29c	0	Open maintained powerline ROW
32	Extant	9/5/2005	1	32	1 [b]	Open maintained powerline ROW
			Total: 121		Total: 63	

[a] NCNHP records state that the species was documented but location referenced is non-specific.

[b] Based on survey records provided by John Fussell on April 10, 2013

[c] NCNHP records include the Parent EO 28 that includes EOs 5, 24, 26, and 27 in their entirety. The parent EO 28 is not evaluated separately.

EOs on the CNF were reviewed during the 2012 flowering season to document if suitable habitat is present and if individuals of LeConte's thistle still occur within the EO boundaries.

- EO 5 is an historic record with a non-specific location reference along US 70 (Figure 3). Suitable habitat was not determined to be present within the limited extent of NFS lands contained within this EO (Figure 3e). No LeConte's thistle plants were observed within or near this EO.
- EO 8 is an historic record along Catfish Lake Road (Figure 3). Suitable habitat was not determined to be present within this EO. No LeConte's thistle plants were observed within or near this EO.
- EO 12 is located in a powerline right-of-way adjacent to Catfish Lake Rd (Figure 3b). No LeConte's thistle plants were observed within or near this EO. The habitat in the vicinity of this EO appears to be too wet to support suitable habitat for LeConte's thistle. NCNHP records indicate one plant was observed in 1995 at this location. There is low probability that LeConte's thistle is still present at this site based on current habitat conditions and only one plant previously documented for this EO.
- EO 17 is composed of two polygons (Figure 3a). One polygon (Polygon 17a) has a dense shrub component and is unlikely to support suitable habitat for this species. No LeConte's thistle plants were observed within or near Polygon 17a. The other polygon (Polygon 17b) is located in an area of open pine flatwoods that has been recently burned. No LeConte's thistle plants were observed within Polygon 17b but ESI observed one LeConte's thistle plant in close proximity to Polygon 17b (identified as Cluster N on Figure 3a).
- EO 20 is an historic record with a non-specific location reference (Figure 3). Suitable habitat was not determined to be present within this EO.
- EO 23 is an historic record with a non-specific location reference (Figure 3). This EO is described as generally being from a "location east of Newport" where two specimens were collected in 1949. Based on the ambiguity of the exact location, NCNHP files depict this EO as a large polygon with a low probability of occurrence within any given portion of the polygon. Only a small amount of NFS lands are contained in the northeastern portion of this general location polygon. Due to the non-specific location reference, limited extent of NFS lands along the margin of the large EO polygon, low probability that this EO is on NFS lands, and the age of the record, ESI did not attempt to survey this EO for continued presence of LeConte's thistle.
- EO 24 is composed of three occupied habitat polygons (Figure 3c). Eleven LeConte's thistle plants were observed within Polygon 24a (identified as Clusters C, D, E, and F on Figure 3c) and an additional 4 were observed outside of the boundaries of this polygon (identified as Cluster P on Figure 3c). Six LeConte's thistle plants were observed within Polygon 24b (identified as Clusters G and L on Figure 3c) and an additional seven plants were observed outside of the boundaries of this polygon (identified as Clusters J, K, and M on Figure 3c). Twenty-five LeConte's thistle plants were observed within Polygon 24c (identified as Clusters H and I on Figure 3c).
- EO 26 is composed of two polygons (Figure 3d). No LeConte's thistle plants were observed within Polygon 26a, but 3 plants were observed outside of the boundaries for Polygon 26a (Cluster B on Figure 3d). Five LeConte's thistle plants were observed within Polygon 26b (identified as Cluster A on Figure 3d).
- EO 27 is located in a powerline right-of-way (Figure 3e). No LeConte's thistle plants were observed within or near EO 27. NCNHP records indicate five LeConte's thistle plants were

observed scattered across the powerline right-of-way in 2004. The site appears to contain suitable habitat and it is possible that LeConte's thistle is still present at this site but were not flowering and not detected during the 2012 survey.

- EO 29 is located in a powerline right-of-way with suitable habitat appearing to be present (Figure 3f). No LeConte's thistle plants were observed within or near this EO. The species was last observed at this site in 2005. While plants may not have been observed during the 2012 survey effort, suitable habitat is present within this EO and it is possible that this biennual species could be observed in future alternate years.
- EO No. 32 is located in a powerline right-of-way with suitable habitat appearing to be present (Figure 3g). This site was heavily disturbed in 2003 in order to create a wildlife food plot with restoration efforts implemented soon after. One Leconte's thistle plant was observed by John Fussell in 2012 (as reported to NCDOT in 2013) within this EO. Suitable habitat is present within this EO and it is possible that greater numbers could be observed in alternate years.

There are a total of 11 EOs (excluding 1 parent EO) recorded for LeConte's thistle on NFS lands within the CNF. Four EOs are considered to be historic occurrences with unsuitable habitat present for three of these (EOs 5, 8, and 20) and one historic record (EO 23) described from a vague location that may not be on NFS lands. It is unlikely that this species is present within the historic EOs that could be identified as being on NFS lands based on absence of suitable habitat. One additional EO (12) appears to be too wet to provide suitable habitat for this species and it is unlikely that this species is still present within this EO. Two EOs (27 and 29) include suitable habitat for this species but no individuals were observed during the 2012 survey effort. The remaining four EOs (17, 24, 26, and 32) have suitable habitat and individuals of LeConte's thistle were observed within or near the boundaries of the EO. Based on the 2012 evaluation, it appears that four of the 11 EOs for LeConte's thistle on NFS lands within the CNF have been confirmed as still extant and may be considered viable based on evidence of reproduction. Suitable habitat conditions were identified for two of the EOs in which no LeConte's thistle plants were observed in 2012. This biennial species could still be extant in these three EOs but not detected in the 2012 evaluation due to possible off-year flowering cycle, which is supported by documentation in two of these areas in recent alternate years.

Summary of Impacts

- This evaluation indicates that LeConte's thistle is still present in four EOs (17, 24, 26, and 32) and may still occur in low numbers in an additional two EOs (27 and 29) containing suitable habitat. A total of 63 individual LeConte's thistle plants were observed during the 2012 survey within four of these EOs. These six areas collectively cover 24.8 acres of occupied or potentially occupied habitat documented on NFS lands in the CNF.

- Alternative 3 directly affects EO 26 and EO 29. EO 26 is composed of two polygons that total 8.5 acres. One polygon will not be affected. Approximately 1.7 acres of the other polygon will be directly affected. Individual LeConte's thistle plants observed within this polygon occur to the north and south of the area to be directly impacted but no plants were observed within the direct impact area. EO 29 is composed of three polygons that total 0.2 acre and Alternative 3 will impact it in its entirety. No individuals of LeConte's thistle were observed within this EO during the 2012 survey, however, 31 individuals of this biennual species were observed in 2005 and this

occurrence may comprise individuals that flower in alternate years. Direct impacts to the habitat of the EOs may be able to be mitigated by collecting seeds to supplement existing populations on NFS lands. Seed collection will be conducted in coordination with the USFS in accordance with a seed collection permit for this species issued to NCDOT. Although no individual plants of LeConte's thistle were documented within the direct impact area during the 2012 surveys, seed collection may be possible from plants within EOs (including 24, 26, and 29) where the population size is large enough to support seed collection efforts.

- An additional 13.4 acres of reported occurrence are in areas subject to indirect impact consideration for Alternative 3 including an additional 6.0 acres of EO 26. The entire 5.9 acres of EO 24 are in an area subject to indirect impact consideration. The 2012 survey documented 8 individual plants in the area of EO 26 that may be subject to indirect impacts and 53 individual plants in the area of EO 24 that may be subject to indirect impacts. These individual plants were observed within the powerline right-of-way which is currently being managed by a combination of mowing by the utility company operating the lines within the right-of-way and periodic prescribed burns conducted by the USFS. No changes in management of the powerline right-of-way by mowing are expected to result from project implementation, reducing the concerns for indirect impacts. However, the ability for the USFS to conduct periodic prescribed burns in these powerline areas will need to be continued. Potential indirect impacts that could result from construction or maintenance activities can be minimized through measures previously proposed by NCDOT regarding management agreements with USFS for the areas subject to potential indirect impacts. Measures discussed to reduce the likelihood for adverse effects to these areas include:
    - Allow for the temporary closure of the bypass to allow the USFS to conduct periodic prescribed burns;
    - Prior to construction, NCDOT will coordinate with the USFS to identify occurrences of USFS rare plant species near the project construction limits and put up protective orange fencing to be removed after completion of construction;
    - Avoid placing staging areas within 250 feet of USFS rare plant species occurrences, where practicable;
    - Avoid placing heavy equipment within powerline corridors outside of the project's direct impact area without prior approval from the USFS;
    - Require contractors to pressure wash all off-road equipment prior to being brought into the CNF construction areas;
    - Prior to construction NCDOT, in coordination with the USFS, will locate and flag areas of non-native invasive plant species for removal during construction;
    - Avoid planting of aggressive non-native species for re-vegetation;
    - Utilize rolled matting for erosion control and revegetation on NFS lands;
    - Avoid use of broadcast sprays for herbicides and pesticides on NFS lands; and
    - Minimize the use of herbicides and pesticides.

<u>Conclusions and Recommendations</u>

The US 70 Havelock Bypass (R-1015) Alternative 3 will result in unavoidable direct impacts to LeConte's thistle habitat and has the potential for indirect impacts. Alternative 3 directly affects

approximately 1.9 acres of two mapped LeConte's thistle EOs, but no individual plants were observed during the 2012 survey in the habitat area directly impacted. However, because this species is a biennual and part of the population may be difficult to detect during non-flowering years, direct impacts may be assumed based on presence of plants of this species elsewhere within the mapped EOs and presence of suitable habitat within the portion of the EOs in the direct impact area. An additional 13.4 acres and 61 individual plants observed during the 2012 survey are located in areas subject to indirect impact consideration.

The total population on NFS lands in the CNF is difficult to determine based on a single year survey due to the biennual nature of this species. The 63 individual plants of LeConte's thistle documented on NFS lands in the 2012 survey (61 in the Alternatives study area, 2 elsewhere) represent the minimum population size. A larger number of individual plants (110) have been documented in EOs on NFS lands in recent years (2005 and/or 2009) in areas that appear to contain suitable habitat, including one EO where none were documented as flowering in 2012. The EO (24) with the largest documented number of individual LeConte's thistle in both the 2012 survey (53 individuals) and a previous survey in 2009 (55 individuals), is not directly impacted by Alternative 3, but is in an area subject to consideration for indirect impacts. A project proposed by Duke Energy Progress has a study area that includes occurrences for this species and has the potential to affect this species. This project is currently being evaluated to determine the effects to this species. The cumulative impacts for this project are not available at this time but are expected to be minimal based on the types of activities proposed. No cumulative impacts from other USFS or NCDOT projects on NFS lands on the CNF have been identified.

Based on the limited direct impact to habitat within existing EOs, and no known direct impact to individuals of this species, the direct impacts for Alternative 3 are not likely to result in a loss of viability on NFS lands within the CNF. The area subject to consideration for indirect impacts represents a relatively large percentage of the population and areal extent of Leconte's thistle recently documented as extant or potentially extant on NFS lands in the CNF. However, the project is not expected to result in changes that would prevent the utility company from continued mowing to maintain the powerline right-of-way and measures are in place to allow the USFS to continue conducting prescribed burns in the areas in which these EOs are found, reducing the threat for indirect impacts. Other potential concerns for indirect impacts that could result from project construction and maintenance activities can be minimized through appropriate measures.

Implementation of measures agreed to between NCDOT and USFS would minimize viability concerns resulting from indirect impacts that could arise from construction and/or maintenance activities. These measures include: allow for the temporary closure of the bypass to allow the USFS to conduct periodic prescribed burns; prior to construction, NCDOT will coordinate with the USFS to identify occurrences of USFS rare plant species near the project construction limits and put up protective orange fencing to be removed after completion of construction; avoid placing staging areas within 250 feet of USFS rare plant species occurrences, where practicable; avoid placing heavy equipment within powerline corridors outside of the project's direct impact area without prior approval from the USFS; require contractors to pressure wash all off-road equipment prior to being brought into the CNF construction areas; prior to construction NCDOT, in coordination with the USFS, will locate and flag areas of non-native invasive plant species for removal during construction; avoid planting of aggressive non-native species for re-

vegetation; Utilize rolled matting for erosion control and revegetation on NFS lands; avoid use of broadcast sprays for herbicides and pesticides on NFS lands; and minimize the use of herbicides and pesticides. As mitigation for direct impacts to offset viability concerns, NCDOT has agreed to collect seeds from viable EOs for use in supplementing existing EOs where suitable habitat occurs but numbers of individuals are low or individuals have not been recently documented.

With the implementation of appropriate measures to reduce concerns for indirect impacts, the US 70 Havelock Bypass (R-1015) Alternative 3 project is not likely to cause a loss of viability for LeConte's thistle on NFS lands in the CNF.

Short-bristled Beaksedge (*Rhynchospora galeana*)

Short-bristled beaksedge is a perennial sedge in the genus *Rhynchospora* that occurs in open pine savannas.[i] Managing for open savanna habitat through seasonal mowing and prescribed burning of powerline rights-of-way and prescribed burning of forest habitats is important to maintaining suitable habitat for this species. On the CNF the USFS undertakes prescribed burns in accordance with the Forest Management Plan for the Croatan National Forest. Powerline rights-of-way are managed by a combination of mowing by the powerline easement holder and prescribed burns conducted by the USFS. Confirmation of species within this genus requires presence of mature fruiting structures (nutlets).

The scope of work for the short-bristled beaksedge evaluation is the result of meetings with NCDOT and the USFS and evaluates direct and indirect impacts on short-bristled beaksedge occurrences in the Alt. 3 study area for the US 70 Havelock Bypass. There are 7 EOs on NFS lands within the CNF. Alternative 3 has the potential to affect EO 27, which is mapped by NCNHP as two polygons (Figure 4). One mapped polygon, the southern polygon on Figure 4, would have direct impacts associated with Alternative 3 as well as potential for indirect impacts. The other polygon, the northern polygon on Figure 4, is located in an area subject to indirect impact consideration for Alternative 3. The USFS has identified a viability concern for this species based on only 7 EOs on NFS lands in the CNF and EO 27 is the largest EO on NFS lands in the CNF. Additional evaluation of this EO was completed to determine if impacts to this EO will have a detrimental effect on the viability of this species on the CNF.

Methods and Results of Assessment

ESI reviewed NCNHP records to obtain information about past documentation for the affected EO. NCNHP records indicate that EO 27 was documented in August 2005 and reported by John Fussell. This EO is currently represented by two polygons in NCNHP files and the southern polygon is crossed by Alternative 3. The validity and status of the southern polygon for EO 27 came under doubt based on a recent email communication between John Fussell and NCDOT (22 August 2012, personal communication) in which John Fussell indicated that he had not observed this species in the southern polygon area and that to his recollection this area does not seem to support suitable habitat for this species. The site visits on 16-18 July 2012 and 6 August 2012 by ESI biologists Matt Smith and David DuMond confirmed that the area occupied by the southern polygon for the mapped EO does not appear to support suitable habitat for this species.

ESI met with Suzanne Mason, NCNHP, on 10 September 2012 to review the files for the short-bristled beaksedge occurrence (EO 27) that is in the NCNHP database. After reviewing the source report from

John Fussell and the two polygons associated with this EO in the database it appears that this EO may need to be revised in NCNHP files. The original report submitted by John Fussell that is the data source for this EO describes finding 850 individuals within the powerline right-of-way adjacent to FSR 3086 within the Havelock Station Flatwoods and Powerline Corridor Natural Heritage Area which generally correlates with the northern polygon (Figure 4). The report does not make reference to observing short-bristled beaksedge in the vicinity of the powerline crossing and Scott Road, the location corresponding to the southern polygon in NCNHP files for this EO (Figure 4). This is consistent with the recent communication from John Fussell where he indicates that he did not believe this area supports suitable habitat for this species and that he had not identified short-bristled beaksedge in this area. It appears that in the absence of mapping provided for the reported occurrence, NCNHP interpreted the original source report to include all of the powerline rights-of-way on NFS land within the Havelock Station Flatwoods and Powerline Natural Area. Based on NCNHP's review of the original source report and John Fussell's communications with NCDOT, NCNHP determined that the southern polygon was not part of the original reported occurrence and should be corrected in the NCNHP database. Coordination among NCNHP, NCDOT and John Fussell is ongoing to confirm the southern polygon is invalid and will be corrected in NCNHP files. Based on this file correction, there would be no direct impacts to short-bristled beaksedge from Alternative 3. The northern polygon for this EO is in an area subject to indirect impact consideration.

The northern polygon for EO 27 is located in a maintained powerline right-of-way. Habitat conditions were unusually shrubby at the time of the 2012 field evaluation since the powerline right-way had not been mowed recently. Under these conditions, as well as droughty conditions early in the growing season, short-bristled beaksedge may only be present in a non-reproductive, vegetative state this year. No flowering or fruiting individuals of short-bristled beaksedge were observed, however, vegetative material from the genus *Rhynchospora* was observed throughout the northern polygon. Based on the 2012 field evaluation this species is likely persisting in the northern polygon based on the recent record (2005) and is more likely to be confirmable in a year when mowing occurs prior to the flowering season for this species, reducing competition, and allowing individual plants to successfully produce inflorescences and nutlets. This species was subsequently observed within the northern polygon during field surveys conducted by ESI biologists in July 2013.

Summary of Impacts

No direct impacts to short-bristled beaksedge are now expected to occur based on the anticipated correction to NCNHP files for the August 2005 record documenting EO 27. This corrected EO is in an area subject to indirect impact consideration. The impact assessment for indirect impacts is based on the 2005 NCNHP records for this species.

- Approximately 44.2 acres (100% of the northern polygon) of this EO are in an area subject to indirect impact consideration for Alternative 3. This EO contains an estimated 850 individual short-bristled beaksedge plants, the largest known population on NFS lands in the CNF. No changes in management of the powerline right-of-way by mowing are expected to result from project implementation, reducing the concerns for indirect impacts. However, the ability for the USFS to conduct periodic prescribed burns in these powerline areas will need to be continued. Potential indirect impacts that could result from construction or maintenance activities can be minimized through measures previously proposed by NCDOT regarding management agreements

with USFS for the areas subject to potential indirect impacts. Measures discussed to reduce the likelihood for adverse effects to these areas include:

- Allow for the temporary closure of the bypass to allow the USFS to conduct periodic prescribed burns;
- Prior to construction, NCDOT will coordinate with the USFS to identify occurrences of USFS rare plant species near the project construction limits and put up protective orange fencing to be removed after completion of construction;
- Avoid placing staging areas within 250 feet of USFS rare plant species occurrences, where practicable;
- Avoid placing heavy equipment within powerline corridors outside of the project's direct impact area without prior approval from the USFS;
- Require contractors to pressure wash all off-road equipment prior to being brought into the CNF construction areas;
- Prior to construction NCDOT, in coordination with the USFS, will locate and flag areas of non-native invasive plant species for removal during construction;
- Avoid planting of aggressive non-native species for re-vegetation;
- Utilize rolled matting for erosion control and revegetation on NFS lands;
- Avoid use of broadcast sprays for herbicides and pesticides on NFS lands; and
- Minimize the use of herbicides and pesticides.

Conclusions and Recommendations

With correction of NCHNP's record for short-bristled beaksedge EO 27, the US 70 Havelock Bypass (R-1015) Alternative 3 will not result in direct impacts to short-bristled beaksedge but has the potential to result in indirect impacts. A project proposed by Duke Energy Progress has a study area that includes occurrences for this species and has the potential to affect this species. This project is currently being evaluated to determine the effects to this species. The cumulative impacts for this project are not available at this time but are expected to be minimal based on the types of activities proposed. No cumulative impacts from other USFS or NCDOT projects on NFS lands in the CNF have been identified.

The project is not expected to result in changes that would prevent the utility company from continued mowing to maintain the powerline right-of-way in which EO 27 is found, reducing the threat for indirect impacts. Other potential concerns for indirect impacts that could result from project construction and maintenance activities can be minimized through appropriate measures. Implementation of measures agreed to between NCDOT and USFS would minimize viability concerns resulting from indirect impacts that could arise from construction and/or maintenance activities. These measures include: allow for the temporary closure of the bypass to allow the USFS to conduct periodic prescribed burns; prior to construction, NCDOT will coordinate with the USFS to identify occurrences of USFS rare plant species near the project construction limits and put up protective orange fencing to be removed after completion of construction; avoid placing staging areas within 250 feet of USFS rare plant species occurrences, where practicable; avoid placing heavy equipment within powerline corridors outside of the project's direct impact area without prior approval from the USFS; require contractors to pressure wash all off-road equipment prior to being brought into the CNF construction areas; prior to construction NCDOT, in coordination with the USFS, will locate and flag areas of non-native invasive plant species for removal during construction; avoid planting of aggressive non-native species for re-vegetation; utilize rolled

matting for erosion control and revegetation on NFS lands; avoid use of broadcast sprays for herbicides and pesticides on NFS lands; and minimize the use of herbicides and pesticides.

With the implementation of appropriate measures to reduce concerns for indirect impacts, the US 70 Havelock Bypass (R-1015) Alternative 3 project is not likely to cause a loss of viability for short-bristled beaksedge on NFS lands in the CNF.

Yellow Fringeless Orchid (*Platanthera integra*)

Yellow-fringeless orchid is a perennial that occurs in open pine savannas.[i] Managing for open savanna habitat through seasonal mowing and prescribed burning of powerline rights-of-way and prescribed burning of forest habitats is important to maintaining suitable habitat for this species. On the CNF the USFS undertakes prescribed burns in accordance with the Forest Management Plan for the Croatan National Forest. Powerline rights-of-way are managed by a combination of mowing by the powerline easement holder and prescribed burns conducted by the USFS.

The scope of work for the yellow fringeless orchid evaluation is the result of meetings with NCDOT and the USFS and evaluates direct and indirect impacts on yellow fringeless orchid occurrences in the Alt. 3 study area for the US 70 Havelock Bypass. There are 7 NCNHP EOs on NFS lands within the CNF (Figure 4). The US 70 Havelock Bypass Alternatives study area includes EO 23 which is composed of two polygons (Figure 4). This EO is not directly impacted by Alternative 3. However, this EO is located within an area subject to indirect impact consideration for Alternative 3.

Methods and Results of Assessment

ESI reviewed NCNHP records to obtain information about past documentation for the affected EO. NCNHP records indicate that EO 23 was last observed in August 2007 by John Fussell and 21 individual plants were reported at that time within a powerline right-of-way. This EO was visited by ESI biologists Matt Smith and David DuMond on 6 August 2012 to assess the habitat and to document the distribution and density of individuals within this EO.

The two polygons for EO 23 are located within a powerline right-of-way with scattered dense areas of woody shrubs. Approximately 1 person-hour of search time was spent within the northern polygon and 2 person-hours of search time were spent within the southern polygon. No yellow fringeless orchid plants were observed in either polygon. Habitat conditions for both polygons were unusually shrubby at the time of the field evaluation since the powerline right-way had not been mowed this season. It is possible that this species is present within these polygons in low numbers or not expressed vegetatively because of dense shrub vegetation or droughty conditions during the early part of the growing season. Updated population estimates were not able to be conducted since the habitat has not been recently mowed and the density of shrubs has likely caused this species to lie dormant this season.

Summary of Impacts

No direct impacts will occur to EO 23. This EO is in an area subject to indirect impact consideration.

- No changes in management of the powerline right-of-way by mowing are expected to result from project implementation, reducing the concerns for indirect impacts. However, the ability for the USFS to conduct periodic prescribed burns in these powerline areas will need to be continued.

Potential indirect impacts that could result from construction or maintenance activities can be minimized through measures previously proposed by NCDOT regarding management agreements with USFS for the areas subject to potential indirect impacts. Measures discussed to reduce the likelihood for adverse effects to these areas include:

- Allow for the temporary closure of the bypass to allow the USFS to conduct periodic prescribed burns;
- Prior to construction, NCDOT will coordinate with the USFS to identify occurrences of USFS rare plant species near the project construction limits and put up protective orange fencing to be removed after completion of construction;
- Avoid placing staging areas within 250 feet of USFS rare plant species occurrences, where practicable;
- Avoid placing heavy equipment within powerline corridors outside of the project's direct impact area without prior approval from the USFS;
- Require contractors to pressure wash all off-road equipment prior to being brought into the CNF construction areas;
- Prior to construction NCDOT, in coordination with the USFS, will locate and flag areas of non-native invasive plant species for removal during construction;
- Avoid planting of aggressive non-native species for re-vegetation;
- Utilize rolled matting for erosion control and revegetation on NFS lands;
- Avoid use of broadcast sprays for herbicides and pesticides on NFS lands; and
- Minimize the use of herbicides and pesticides.

Conclusions and Recommendations

The US 70 Havelock Bypass (R-1015) Alternative 3 will not result in direct impacts to yellow fringeless orchid. One EO (23) is located in an area subject to consideration for indirect impacts. A project proposed by Duke Energy Progress has a study area that includes EO 23 for this species and has the potential to affect this EO. This project is currently being evaluated to determine the effects to this species. The cumulative impacts for this project are not available at this time but are expected to be minimal based on the types of activities proposed. A wildlife habitat improvement project completed in the summer of 2003 in the Little Road savanna population (EO 7) resulted in a loss of habitat and individuals of this species within EO 7. Mitigation measures at the site have since restored the habitat but the number of individuals is still low (approximately 10) compared to earlier counts that were as high as 200 individuals. No cumulative impacts from other USFS or NCDOT projects on NFS lands in the CNF have been identified.

The project is not expected to result in changes that would prevent the utility company from continued mowing to maintain the powerline right-of-way or to interfere with the ability of the USFS to conduct periodic prescribed burns in the area in which EO 23 is found, reducing the threat for indirect impacts. Other potential concerns for indirect impacts that could result from project construction and maintenance activities can be minimized through appropriate measures. Implementation of measures agreed to between NCDOT and USFS would minimize viability concerns resulting from indirect impacts that could arise from construction and/or maintenance activities. These measures include: allow for the temporary closure of the bypass to allow the USFS to conduct periodic prescribed burns; prior to construction, NCDOT will coordinate with the USFS to identify occurrences of USFS rare plant species near the

project construction limits and put up protective orange fencing to be removed after completion of construction; avoid placing staging areas within 250 feet of USFS rare plant species occurrences, where practicable; avoid placing heavy equipment within powerline corridors outside of the project's direct impact area without prior approval from the USFS; require contractors to pressure wash all off-road equipment prior to being brought into the CNF construction areas; prior to construction NCDOT, in coordination with the USFS, will locate and flag areas of non-native invasive plant species for removal during construction; avoid planting of aggressive non-native species for re-vegetation; Utilize rolled matting for erosion control and revegetation on NFS lands; avoid use of broadcast sprays for herbicides and pesticides on NFS lands; and minimize the use of herbicides and pesticides.

With the implementation of appropriate measures to reduce concerns for indirect impacts, the US 70 Havelock Bypass (R-1015) Alternative 3 project is not likely to cause a loss of viability for yellow fringeless orchid on NFS lands in the CNF.

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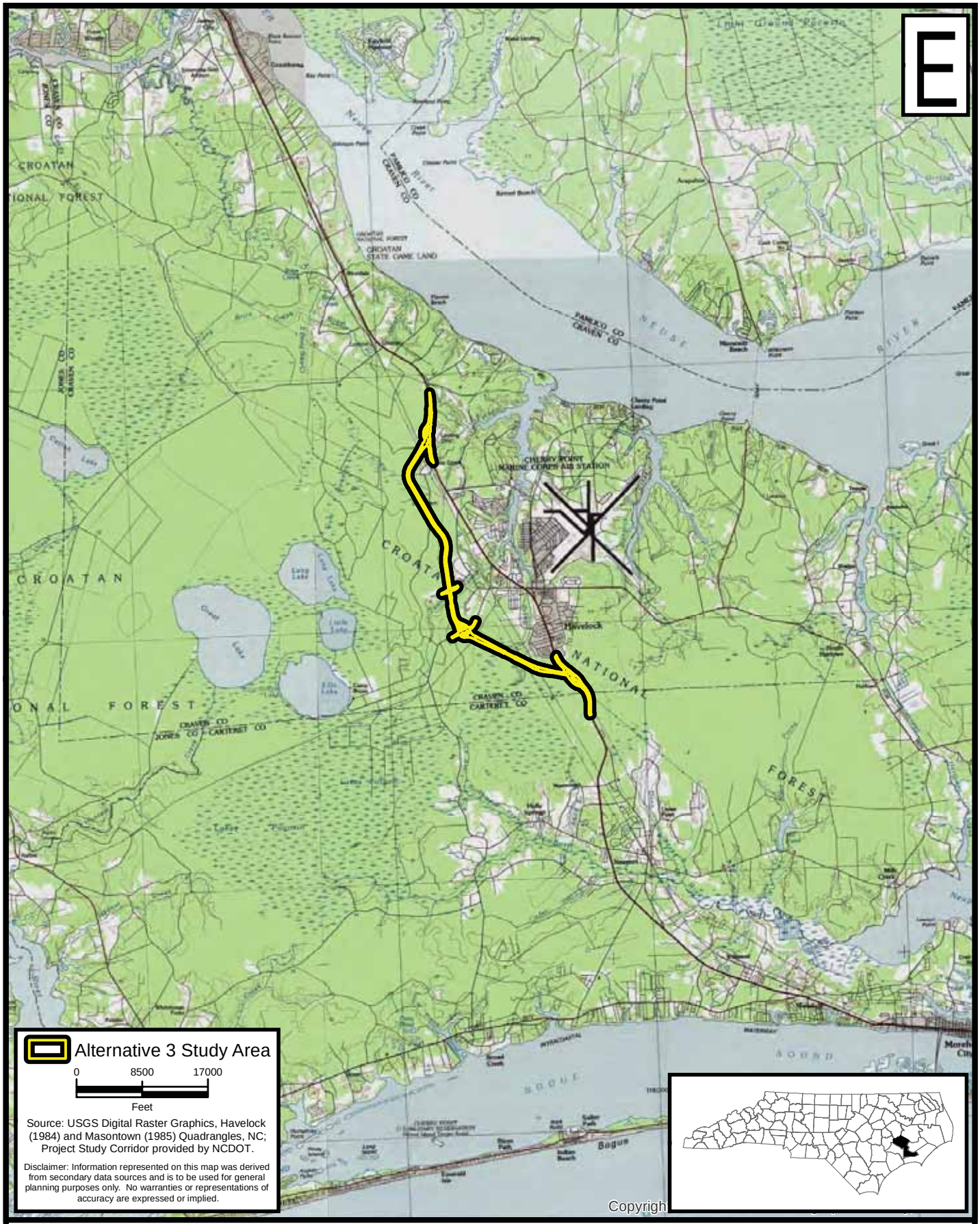
[i] Radford, A.E., H.E. Ahles, and C.R. Bell. 1968. Manual of the Vascular Flora of the Carolinas. University of North Carolina Press, Chapel Hill, NC. 1183 pp.

[ii] Harris, J.G. and M.W. Harris. 1997. Plant Identification Terminology: An illustrated Glossary. Spring Lake Publishing, Spring Lake, UT. 197 pp.



Project Location

US 70 Havelock Bypass (R-1015)

Craven and Carteret Counties, North Carolina

Project:	ER10060.08
Date:	Aug 2013
Drwn/Chkd:	KT/MS
Figure:	1

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Project Location -NCNHP Summer Species Across the Croatan National Forest

US 70 Havelock Bypass (R-1015)

Craven and Carteret Counties, North Carolina

Project:	ER10060.08
Date:	Aug 2013
Drwn/Chkd:	KT/MKS
Figure:	2

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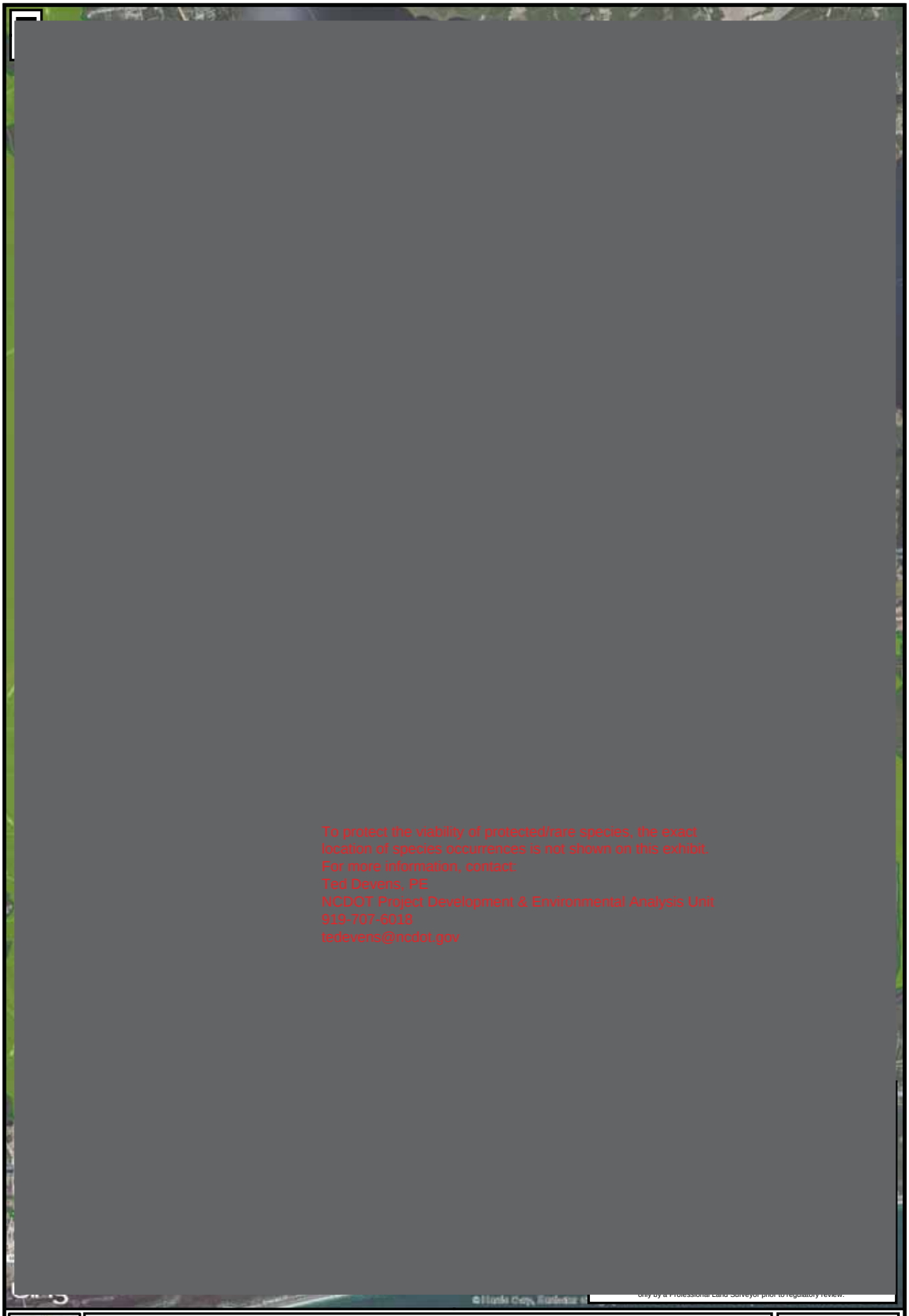

LeConte's Thistle Assessment Overview

US 70 Havelock Bypass (R-1015)

Craven and Carteret Counties, North Carolina

Project:	ER10060.08
Date:	Aug 2013
Drwn/Chkd:	KT/MKS
Figure:	3

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regulatory review.

LeConte's Thistle Assessment - NCNHP Element Occurrences

US 70 Havelock Bypass (R-1015)

Craven and Carteret Counties, North Carolina

Project:	ER10060.08
Date:	Aug 2013
Drwn/Chkd:	KT/MKS
Figure:	**3a**

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LeConte's Thistle Assessment - NCNHP Element Occurrences

US 70 Havelock Bypass (R-1015)

Craven and Carteret Counties, North Carolina

Project:	ER10060.08
Date:	Aug 2013
Drwn/Chkd:	KT/MKS
Figure:	**3b**

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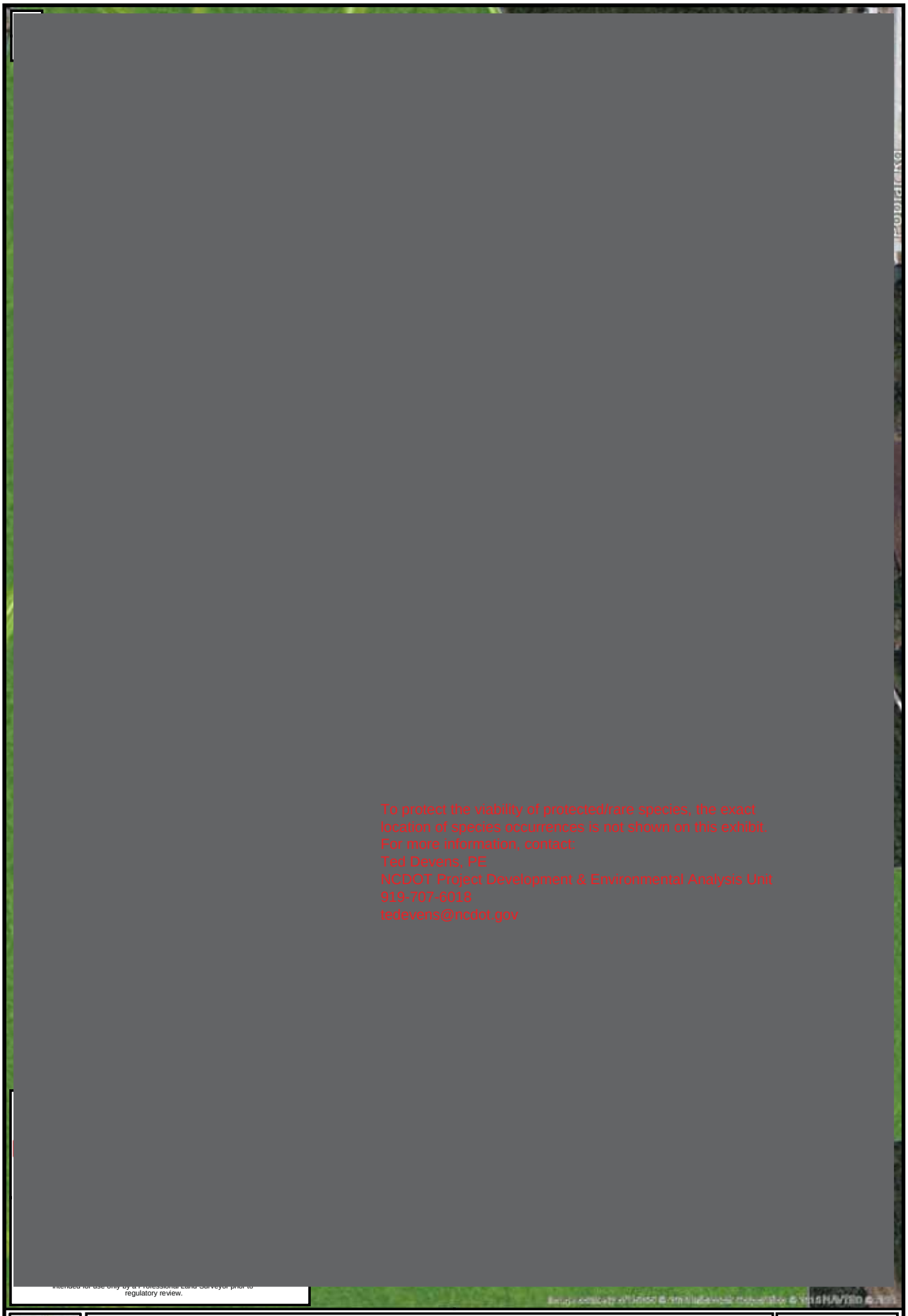

Intended for use only by a PE Professional Land Surveyor prior to regulatory review.

LeConte's Thistle Assessment - NCNHP Element Occurrences

US 70 Havelock Bypass (R-1015)

Craven and Carteret Counties, North Carolina

Project:	ER10060.08
Date:	Aug 2013
Drwn/Chkd:	KT/MKS
Figure:	**3c**

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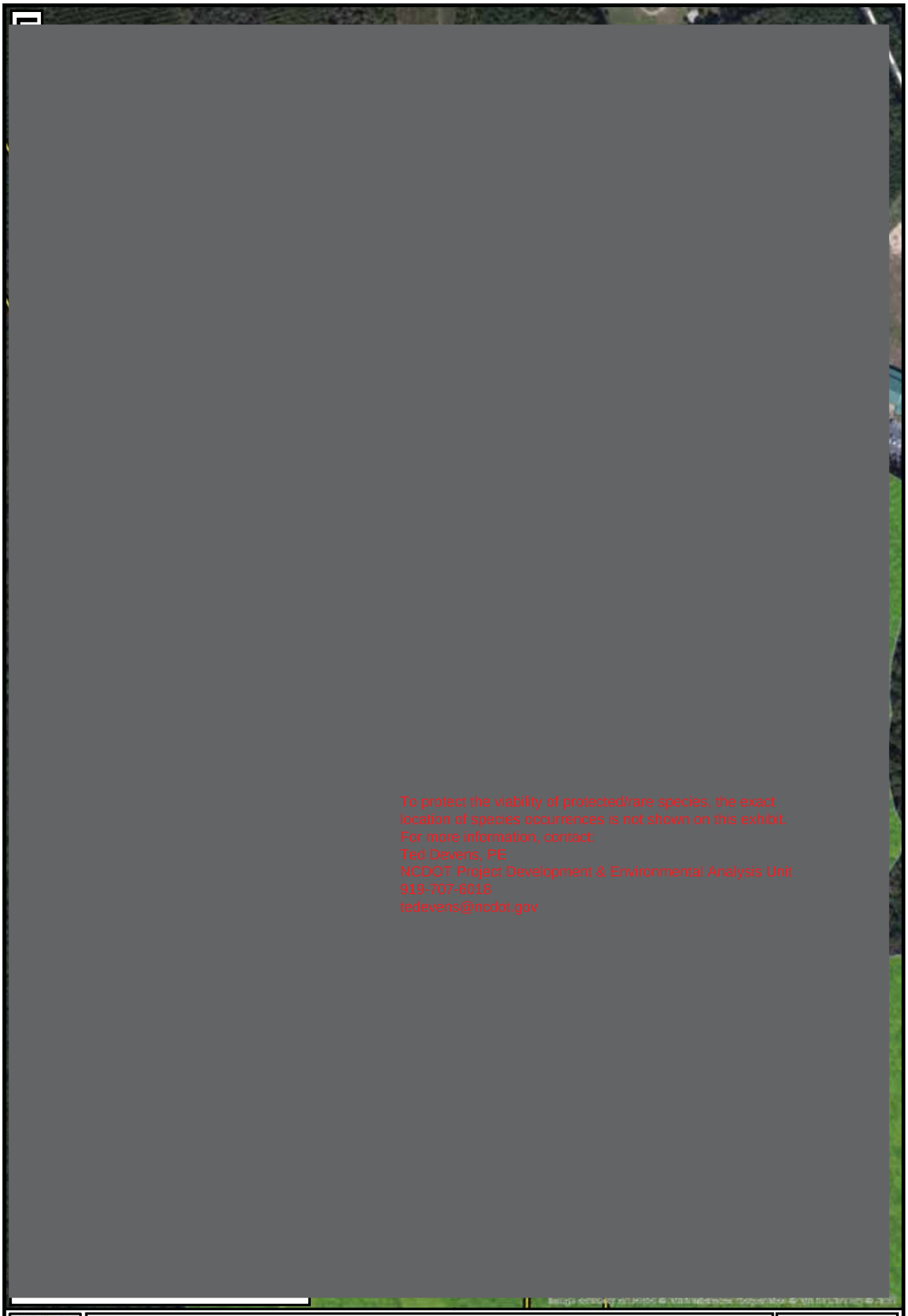

To protect the viability of protected/rare species, the exact location of species occurrences is not shown on this exhibit. For more information, contact:
Tod Devens, PE
NCDOT Project Development & Environmental Analysis Unit
919-707-6018
tedevens@ncdot.gov

LeConte's Thistle Assessment - NCNHP Element Occurrences

US 70 Havelock Bypass (R-1015)

Craven and Carteret Counties, North Carolina

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Date:	Aug 2013
Drwn/Chkd:	KT/MKS
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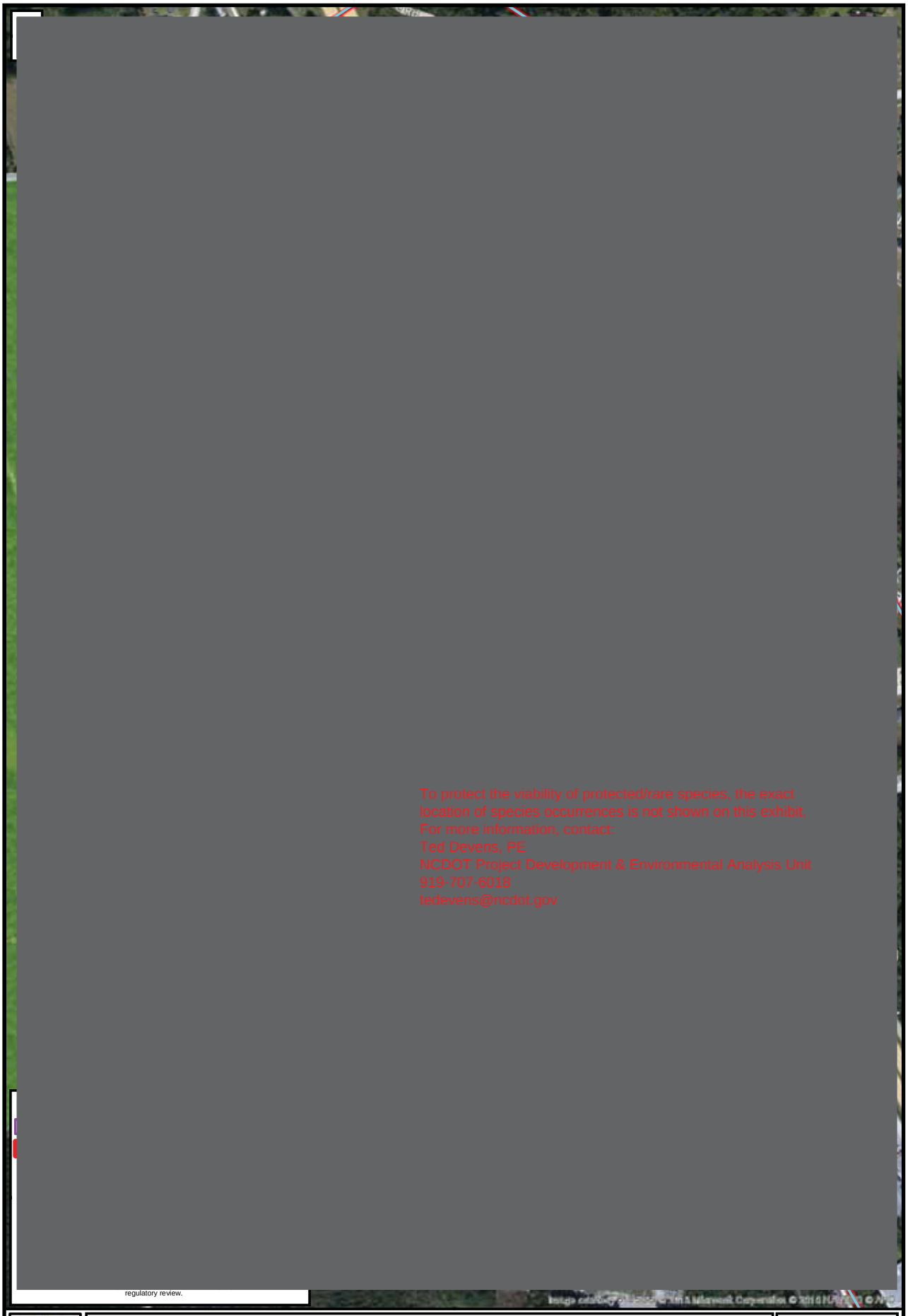

LeConte's Thistle Assessment - NCNHP Element Occurrences

US 70 Havelock Bypass (R-1015)

Craven and Carteret Counties, North Carolina

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Date:	Aug 2013
Drwn/Chkd:	KT/MKS
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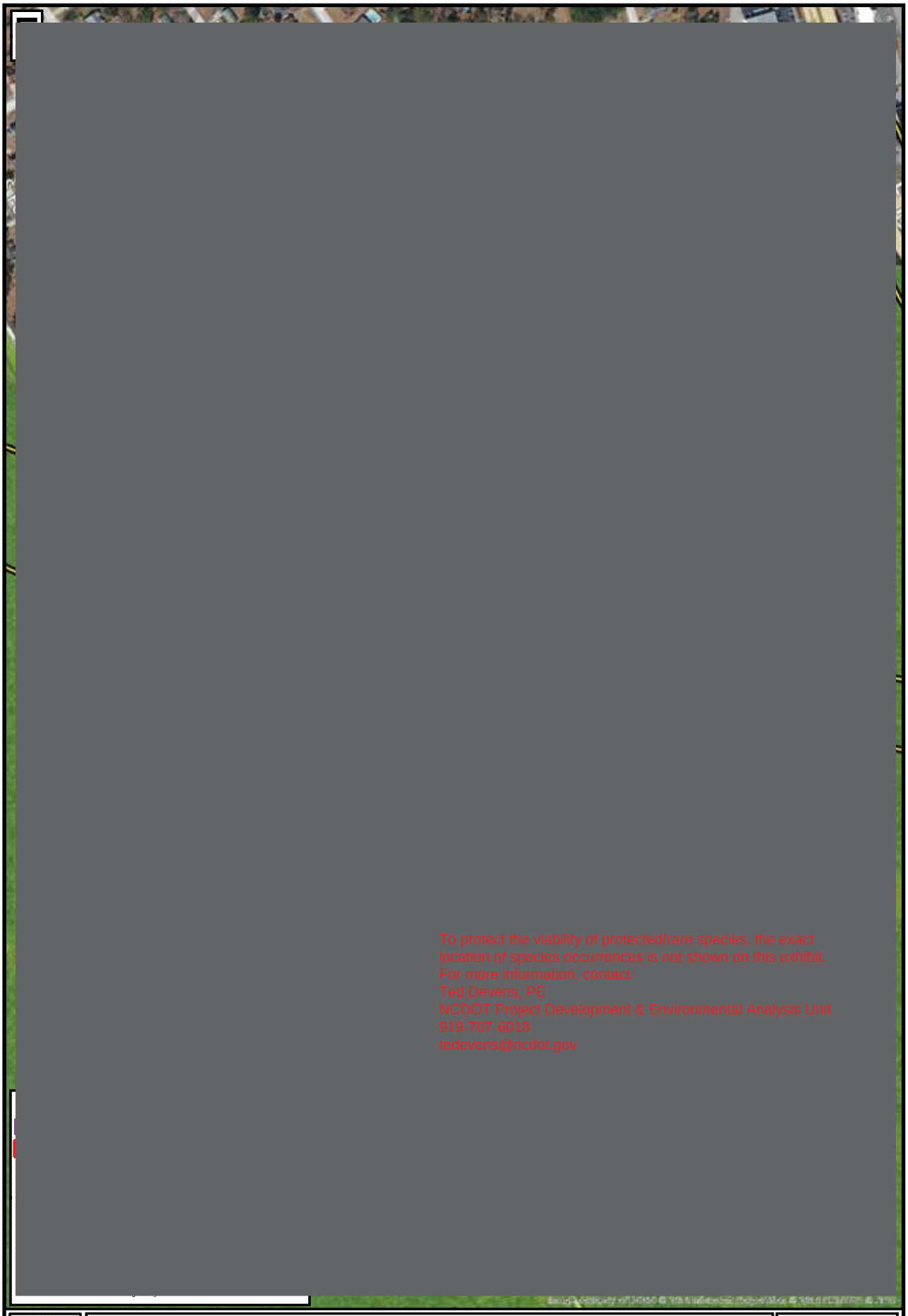

LeConte's Thistle Assessment - NCNHP Element Occurrences

US 70 Havelock Bypass (R-1015)

Craven and Carteret Counties, North Carolina

Project:	ER10060.08
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Drwn/Chkd:	KT/MKS
Figure:	3f

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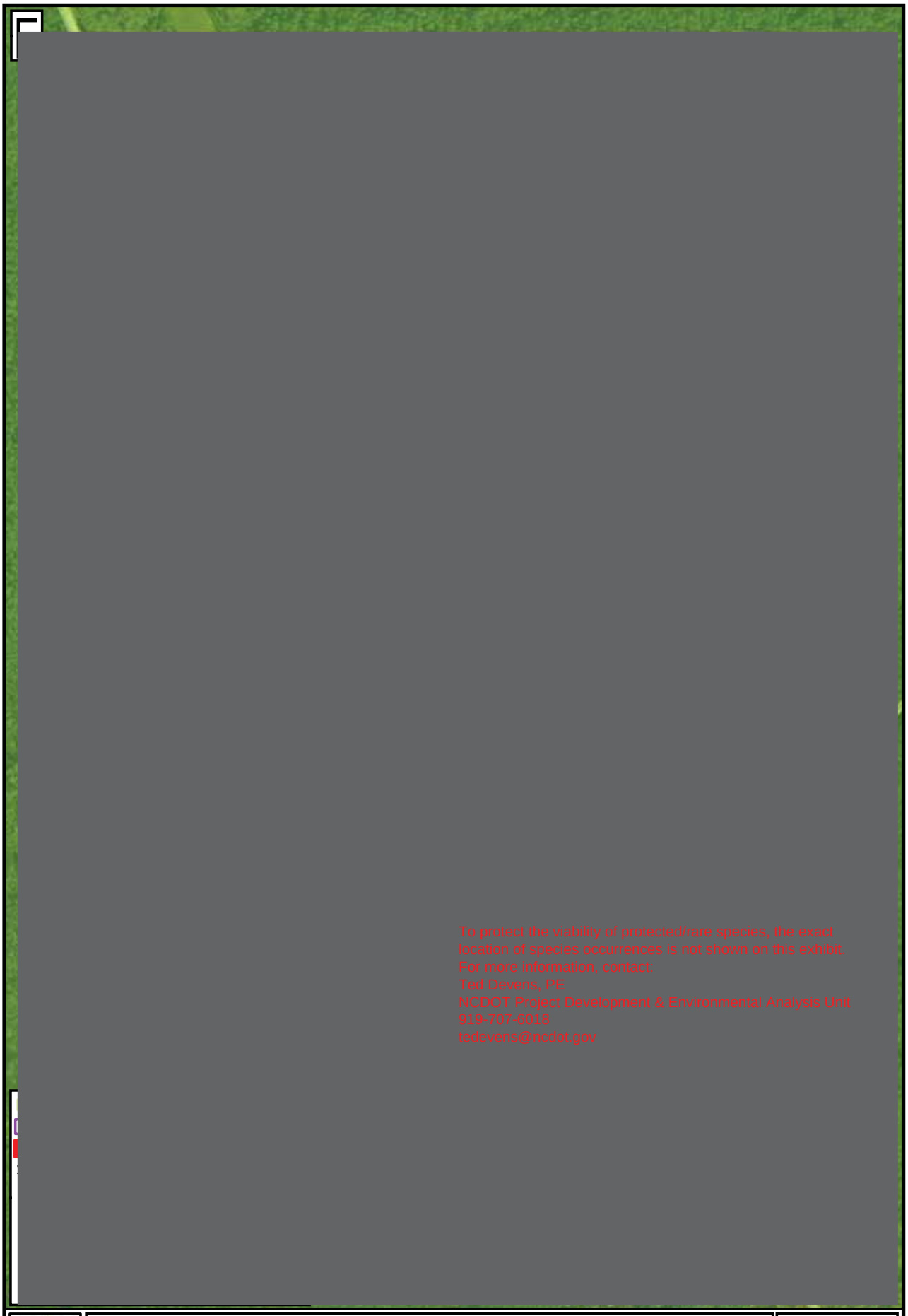

LeConte's Thistle Assessment - NCNHP Element Occurrences

US 70 Havelock Bypass (R-1015)

Craven and Carteret Counties, North Carolina

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Date:	Aug 2013
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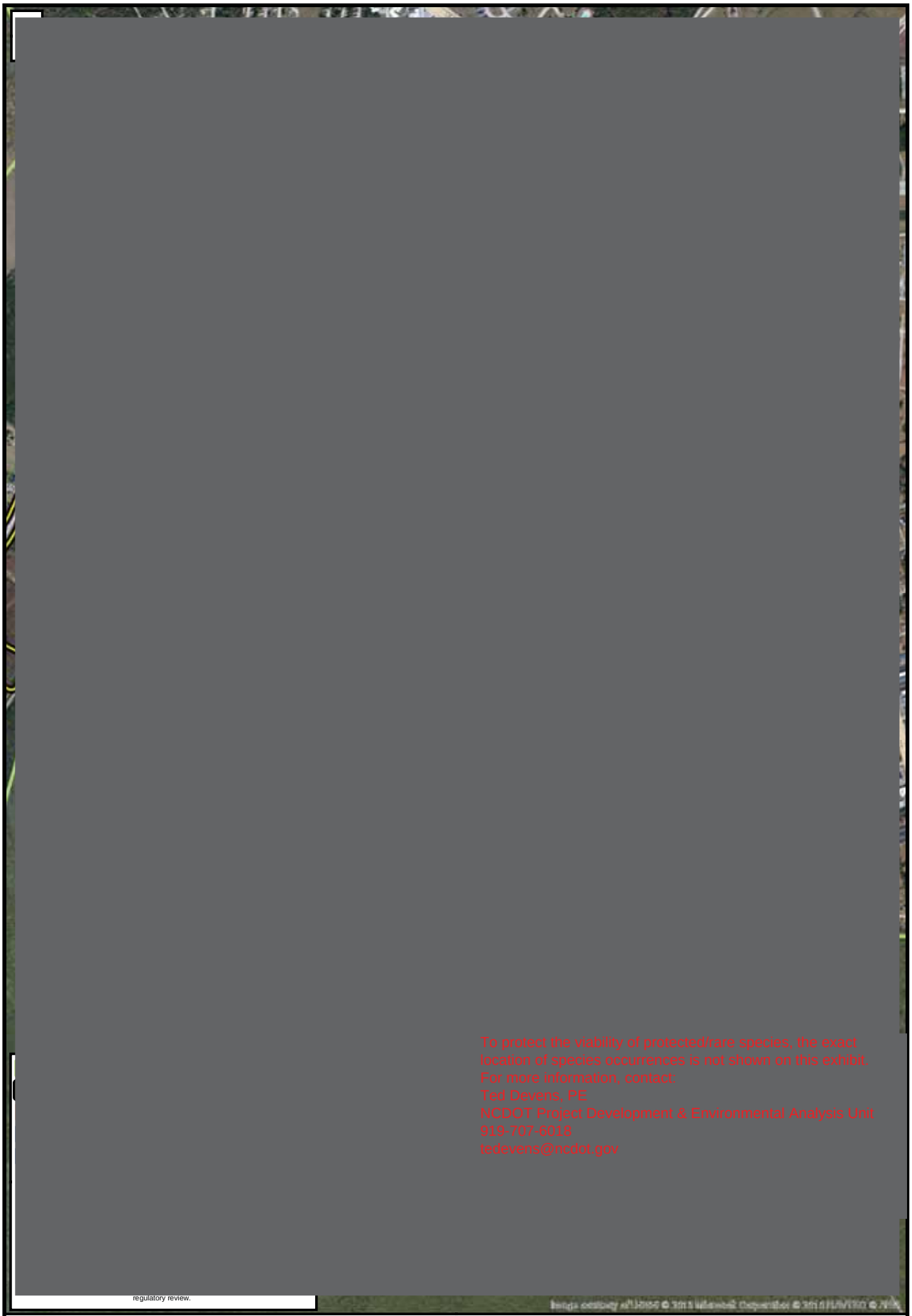

To protect the viability of protected/rare species, the exact location of species occurrences is not shown on this exhibit. For more information, contact:
Ted Devens, PE
NCDOT Project Development & Environmental Analysis Unit
919-707-6019
tedevens@ncdot.gov

regulatory review.

Yellow Fringeless Orchid and Short-bristled Beaksedge Assessment Overview

US 70 Havelock Bypass (R-1015)

Craven and Carteret Counties, North Carolina

Project:	ER10060.08
Date:	Aug 2013
Drwn/Chkd:	KT/MKS
Figure:	**4**

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ATTACHMENT 11

ENVIRONMENTAL SERVICES, INC.
524 South New Hope Road
Raleigh, North Carolina 27610
919-212-1760 / Facsimile 919-212-1707
www.environmentalservicesinc.com

MEMORANDUM

TO: **Mary Frazer**

FROM: **Matt Smith**

DATE: **14 October 2013**

RE: **US 70 Havelock Bypass (Rare Plant Species Mitigative Measures Support)**
Non-native Invasive species Analysis
T.I.P. No. R-1015
Consulting P. O. 63000033859
ESI Project No. ER12-050.06

Environmental Services, Inc., (ESI), has been asked by the North Carolina Department of Transportation (NCDOT) to assist in completing an analysis for Alternative 3 of the US 70 Havelock Bypass (R-1015) of Non-Native Invasive Plant Species (NNIS) listed by the U.S. Forest Service (USFS) as occurring or potentially occurring within the Croatan National Forest (CNF). The analysis for potential NNIS plant effects was confined to a study area defined as the proposed tree clearing limits (slope stake limits plus 15 feet) plus an additional 25 feet. This area covers those areas proposed for disturbance that may be susceptible to new infestiations of NNIS plants and those areas adjacent to the study area that may act as a source of infestation. This analysis will assist in addressing concerns for indirect effects that could result from growth of these species along the proposed bypass project. Mitigation measures proposed by NCDOT to minimize potential indirect effects are also included.

Methods

The NNIS plant evaluation was conducted in accordance with protocols provided by the USFS. ESI visited the study area for Alternative. 3 in September 2013 to identify infestations of NNIS species. Infestations identified for species listed in Tables 1 and 2 were recorded using a GPS device. Infestation of less than or equal to 10x10 meters in area are represented by a point. Larger infestations (those exceeding 10x10 m) are represented by a polygon. The percent cover, or aerial extent, of each invasive exotic plant has been estimated within each mapped infestation.

Not all non-native naturalized plant species, such as dandelion (*Taraxacum officinale*) or ox-eye daisy (*Leucanthemum vulgare*), are tracked by the USFS. Most USFS previous surveys have concentrated on those non-native plants known to be invasive in the Piedmont or coastal plain and those species that can be successfully controlled on the CNF. As such *Microstegium vimineum*, the most abundant NNIS previously recorded in other portions of the CNF is not currently being tracked. Table 1 includes species considered by the USFS to be present in the Piedmont or Coastal Plain and invasive across the Croatan National Forest that are currently being recorded. Table 2 includes NNIS plant species known to occur adjacent to the CNF which have the potential to spread to the CNF from nearby infestations. The list of NNIS plant species is subject to change as new plant threats are identified by the USFS.

T**able 1.** Croatan National Forest – NNIS plant species.

Scientific Name	**Common Name**
Lespedeza cuneata	Sericea Lespedeza
Lespedeza bicolor	Bicolor Lespedeza
Albizia julibrissin	Mimosa
Ligustrum sinense	Chinese Privet
Rosa multiflora	Multiflora Rose
Ailanthus altissima	Tree-of-Heaven
Miscanthus sinensis	Chinese Silver Grass
Lonicera maacki or *morrowii*	Amur or Morrow's Honeysuckle
Lonicera japonica	Japanese Honeysuckle
Sorghum halepense	Johnson Grass
Arthraxon hispidus	Basket Grass
Elaeagnus umbellata	Autumn Olive
Pueraria montana var. *lobata*	Kudzu
Hedera helix var. *helix*	English Ivy
Vinca minor	Periwinkle
Kummerowia striata	Japanese-clover
Youngia japonica	Asiatic Hawk's-beard
Wisteria sinensis	Chinese Wisteria
Verbena brasiliensis	Brazilian Vervain

Table 2. NNIS plant species infestations near the Croatan National Forest.

Scientific Name	**Common Name**
Imperata cylindrica	Cogon Grass
Persicaria perfoliata	Mile-a-minute
Cayratia japonica	Bushkiller
Pyrus calleryana	Bradford Pear
Solanum viarum	Tropical Soda Apple
Centaurea stoebe ssp. *micranthos*	Spotted Knapweed
Commelina communis	Common Dayflower

Existing Conditions

Surveys for NNIS plant species were undertaken in September 2013 for the species listed in Tables 1 and 2. Figures 2a-2l depict the locations of NNIS plants observed in the study area. Ten species considered to be invasive by the USFS were found to occur on NFS lands on the CNF within the study area. Table 3 lists NNIS infestations identified for the study area for Alt. 3.

Table 3. NNIS plant species infestations identified in the study area for Alternative 3.

Scientific Name	Common Name	Site No.	Figure Number	Community Type [a]	Percent Cover	Area (acres)	Total Area (acres)
Lespedeza cuneata	Sericea Lespedeza	1	2i	M, PCm	75	0.77	4.66
		2	2h	PFm	75	0.02	
		3	2g	M	75	0.08	
		4	2g	M	75	0.35	
		5	2g	M	25	<0.02	
		6	2g	M	75	0.09	
		7	2g	M	75	0.33	
		8	2f	M, PCm	75	0.36	
		9	2e	M	75	0.15	
		10	2d	M	75	0.21	
		11	2j	M	75	0.20	
		12	2l	M	50	0.80	
		13	2k	M	50	<0.02	
		14	2k	M	25	<0.02	
		15	2k	PFm, M, PCm	75	0.43	
		16	2k	M	50	0.68	
		17	2a	M	50	<0.02	
		18	2a	M, PCm	50	<0.02	
		19	2a	M	75	0.09	
Lespedeza bicolor	Bicolor Lespedeza	1	2g	PFm, M	75	1.86	2.81
		2	2g	PFm, M	75	0.47	
		3	2g	M, PCm	75	0.44	
		4	2f	M, PCm	50	0.02	
		5	2k	M	50	<0.02	
Albizia julibrissin	Mimosa	1	2g	M	75	<0.02	0.24
		2	2d	PFm	75	<0.02	
		3	2d	M	50	<0.02	
		4	2d	M	50	<0.02	
		5	2l	M	50	0.02	
		6	2l	M	50	<0.02	
		7	2l	M	50	<0.02	
		8	2l	M	50	<0.02	
		9	2l	M	50	<0.02	
		10	2k	M	50	<0.02	
		11	2a	M, PFm	75	<0.02	
		12	2a	M	75	<0.02	
Ligustrum sinense	Chinese Privet	1	2g	PFm	75	0.06	0.66
		2	2g	M	50	<0.02	
		3	2g	M	75	<0.02	
		4	2g	PFm, M	75	0.09	
		5	2g	M	50	<0.02	

Scientific Name	Common Name	Site No.	Figure Number	Community Type [a]	Percent Cover	Area (acres)	Total Area (acres)
		6	2d	M	25	<0.02	
		7	2d	M	25	<0.02	
		8	2l	M	50	<0.02	
		9	2k	M	75	<0.02	
		10	2k	M	75	0.02	
		11	2k	M	75	<0.02	
		12	2k	M	50	0.02	
		13	2c	PFh	75	0.12	
		14	2c	PFh	50	0.09	
		15	2c	M	50	0.02	
		16	2a	M	50	<0.02	
		17	2a	M	50	<0.02	
		18	2a	M	50	<0.02	
		19	2f	M	75	<0.02	
Rosa multiflora	Multiflora Rose	1	2g	M	50	<0.02	0.12
		2	2g	PFm	50	<0.02	
		3	2g	PFm	50	<0.02	
		4	2g	PFm	50	<0.02	
		5	2l	PFh	25	<0.02	
		6	2k	M	50	<0.02	
Lonicera japonica	Japanese Honeysuckle	1	2k	M	50	<0.02	0.16
		2	2k	M	50	<0.02	
		3	2k	M	50	<0.02	
		4	2k	M	50	0.02	
		5	2k	M	50	<0.02	
		6	2c	PFh	50	<0.02	
		7	2c	M	50	<0.02	
		8	2a	M	50	<0.02	
Sorghum halepense	Johnson Grass	1	2g	M	75	<0.02	<0.02
Hedera helix var. *helix*	English Ivy	1	2l	M	50	<0.02	<0.02
Wisteria sinensis	Chinese Wisteria	1	2l	PFh	50	<0.02	1.21
		2	2l	M	75	0.04	
		3	2k	PFh	75	0.84	
		4	2k	PFh	75	0.29	
		5	2k	M	75	<0.02	
Verbena brasiliensis	Brazilian Vervain	1	2b	M	75	<0.02	0.57
		2	2a	M	75	<0.02	
		3	2a	M	75	<0.02	
		4	2a	M	75	<0.02	
		5	2a	M	75	<0.02	
		6	2b	M	75	<0.02	
		7	2b	M	50	<0.02	
		8	2e	M	75	0.14	
		9	2g	M	50	0.27	
		10	2a	M	50	<0.02	

[a] Community Types: M = Rural/Urban Modifications; PFh = Pine Flatwoods, hydric; PFm = Pine Flatwoods, mesic; SR = Successional/Ruderal Habitat; PCm = Powerline Corridor, mesic

Multiple infestations were documented for eight of the ten species of USFS listed NNIS plant species identified in the study area, with single infestations documented for the remaining two species. The NNIS plant species with the most numerous infestations encountered were sericea lespedeza (*Lespedeza cuneata*) and Chinese privet (*Ligustrum sinense*) with 19 infestations documented for each species, mimosa (*Albizia julibrissin*) with 12, and Brazilian vervain (*Verbena brasiliensis*) with 10. The remaining six species each had between one and eight infestations documented within the study area.

Sericea lespedeza infestations represent the greatest coverage by a single species (4.66 acres) followed by bicolor lespedeza (*Lespedeza bicolor*) (2.81 acres) and Chinese wisteria (*Wisteria sinensis*) (1.21 acres). The remaining species were encountered as smaller infestations, with cumulative infestations of the other seven species totaling less than 1.0 acre each.

All ten of these NNIS plant species were observed primarily in existing disturbed habitats on NFS lands along woodland borders adjacent to roads and bordering NFS lands boundaries adjacent to disturbed habitats. Since many of the NFS lands, including powerline rights-of-way, in the study area are subjected to frequent prescribed burns the number of infestations outside of roads and other boundary areas is greatly diminished. However, several species were found to have spread into adjacent habitats, most notably Chinese privet, multiflora rose (*Rosa multiflora*), and Chinese wisteria, and to a lesser extent sericea lespedeza, bicolor lespedeza, mimosa, and Japanese honeysuckle (*Lonicera japonica*).

The sites within the study area with the largest incidence of NNIS plants were along Sunset Rd (Figure 2g) and in the vicinity of the solid waste transfer facility (Figure 2k). Smaller infestations were noted on forest service roads (Figures 2d, 2e, 2f, 2i, and 2j), along US 70 south of Havelock (Figures 2a-2c), and adjacent to residential properties bordering NFS lands (Figures 2h and 2l).

One large infestation of bicolor lespedeza adjacent to Sunset Rd (Site 1, Figure 2g) represents the largest coverage area of a single NNIS plant species in the study area (1.86 acres) and appears to be spreading. The Chinese wisteria infestation (Site 3, Figure 2k) in the vicinity of the solid waste transfer facility (0.84 acre) is large in size and in close proximity to additional infestations (Sites 4 and 5, Figure 2k) of this species with a high potential for spreading.

Effects of Alternative 3 on Invasive Plant Species

Without intervention, these NNIS plant species are expected to increase in the study area. It is expected that with no control efforts along the existing road shoulders and other existing disturbed habitats the infestations will continue to spread within these areas and potentially into adjacent natural areas. While some of these areas may eventually be controlled with prioritized forest-wide NNIS plant species control work, there is nothing proposed within the vicinity of the study area in the foreseeable future.

The proposed action will construct US 70 Havelock Bypass Alternative 3 on new location across NFS lands. Ground disturbance and the increased light conditions resulting from road construction may increase the amount of area suitable for NNIS plant species in the study area (Trombulak and Frissell 2000). The areas disturbed by road construction as well as the future road shoulders and maintained

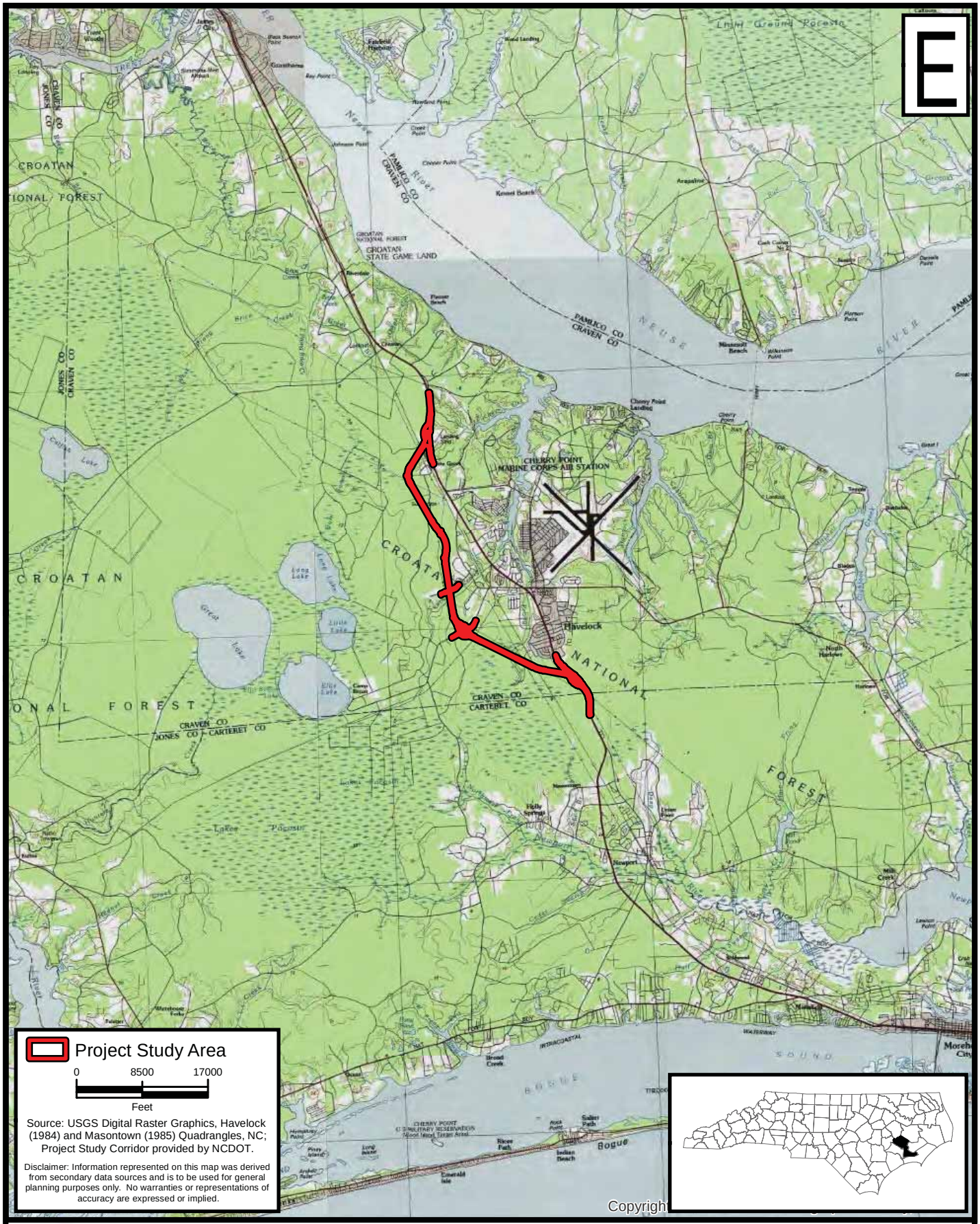
ROW of the completed project cound serve as potential areas for spread of NNIS plant species on NFS lands.

In coordination with the USFS, NCDOT has developed mitigation measures to minimize the spread of NNIS plant species on NFS lands within the CNF associated with the construction and maintenance of the US 70 Havelock Bypass.

- To prevent the spread of non-native invasive plant species on NFS lands, NCDOT will require contractors to pressure wash all off-road equipment, including cranes, graders, pans, excavators, and loaders, prior to being brought in the CNF construction areas.
- To control the spread of non-native invasive plant species on NFS lands, NCDOT, in coordination with the USFS, will locate and flag areas of non-native invasive plant species within the study area for Alt, 3 of the US 70 Havelock Bypass. If any of these areas are within areas of proposed fill, those areas will be cleared and grubbed, and the material disposed of outside the limits of the CNF. If non-native invasive plant species are located in areas of proposed cuts then the material and actual thickness of root mat or other defined amount will be disposed of outside the limits of the CNF.
- In consultation with the USFS, seed mixes of native grasses and forbs or non-aggressive, non-natives will be used on NFS lands for erosion control and revegetation.
- NCDOT will utilize rolled matting for erosion control and revegetation on NFS lands.
- NCDOT will coordinate with the USFS on a landscaping plan for NFS lands. The plan will detail appropriate native seeding mixes for erosion control and site specific control methods for invasive species, including a suite of acceptable herbicides for the corridor and adjacent natural habitats. The plan will also outline a plan for ongoing coordination between NCDOT and USFS personnel to maintain vegetation diversity and ensure no long-term impacts to rare species along the bypass corridor.

With the implementation of the mitigation measures developed by NCDOT, in coordination with the USFS, the threat of spread of NNIS plants on NFS lands associated with the construction and maintenance of the US 70 Havelock Bypass is expected to be minimimal.

Trombulak, S.C. and C.A. Frissell, 2000. Review of the Ecological Effects of Roads on Terrestrial and Aquatic Communities. Conservation Biology, Vol. 14(1), 18-30.



Project Location

US 70 Havelock Bypass

Craven and Carteret Counties, North Carolina

T.I.P. R-1015

Project:	ER12050.06
Date:	Oct 2013
Drwn/Chkd:	KT/MS
Figure:	1

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Non-native Invasive Plant Species Occurrences

US 70 Havelock Bypass

Carteret and Craven Counties, North Carolina

T.I.P. R-1015

Project:	ER12050.06
Date:	Oct 2013
Drwn/Chkd:	KT/MKS
Figure:	2

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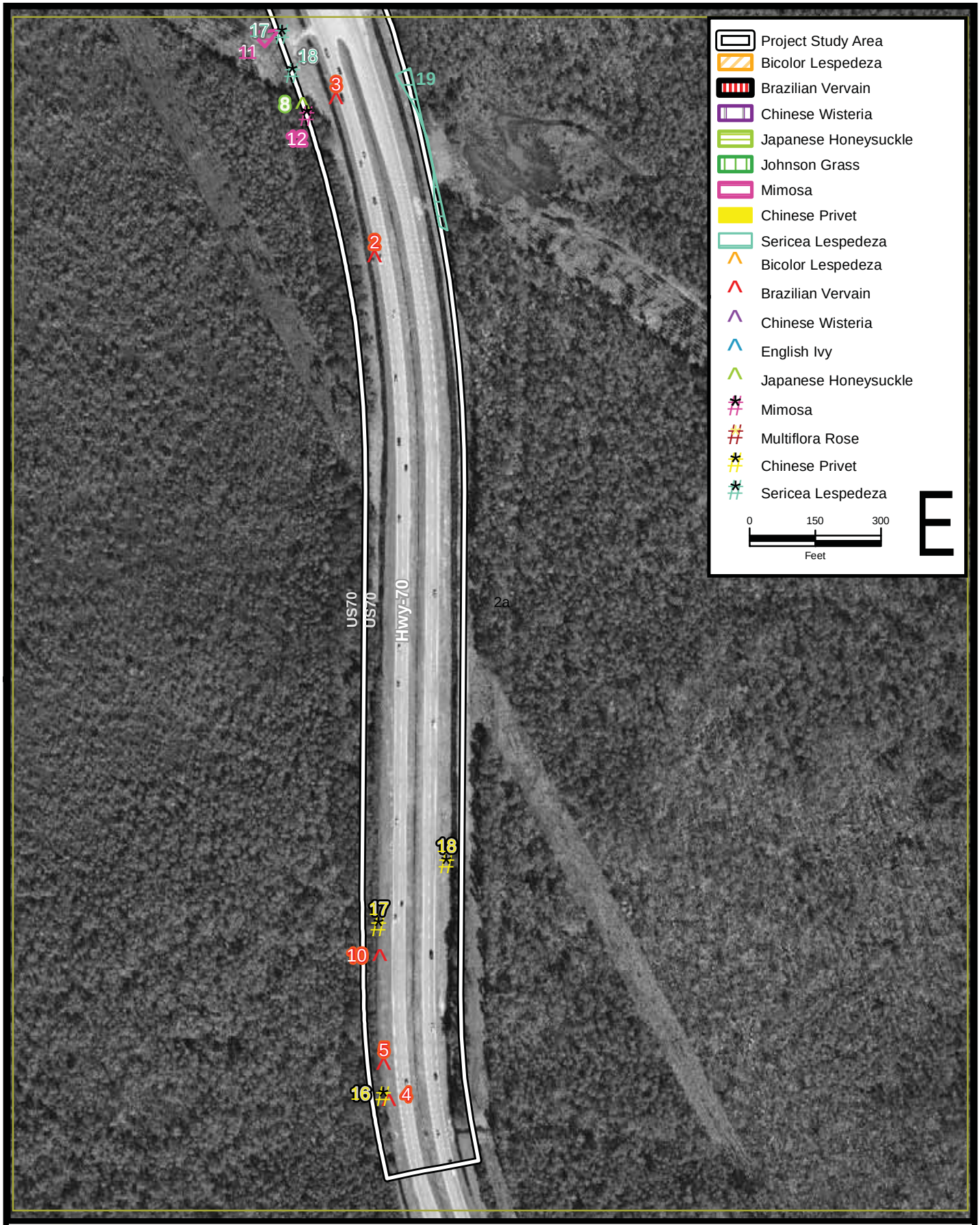

Non-native Invasive Plant Species Occurrences - Details

US 70 Havelock Bypass

Carteret and Craven Counties, North Carolina

T.I.P. R-1015

Project:	ER12050.06
Date:	Oct 2013
Drwn/Chkd:	KT/MS
Figure:	**2a**

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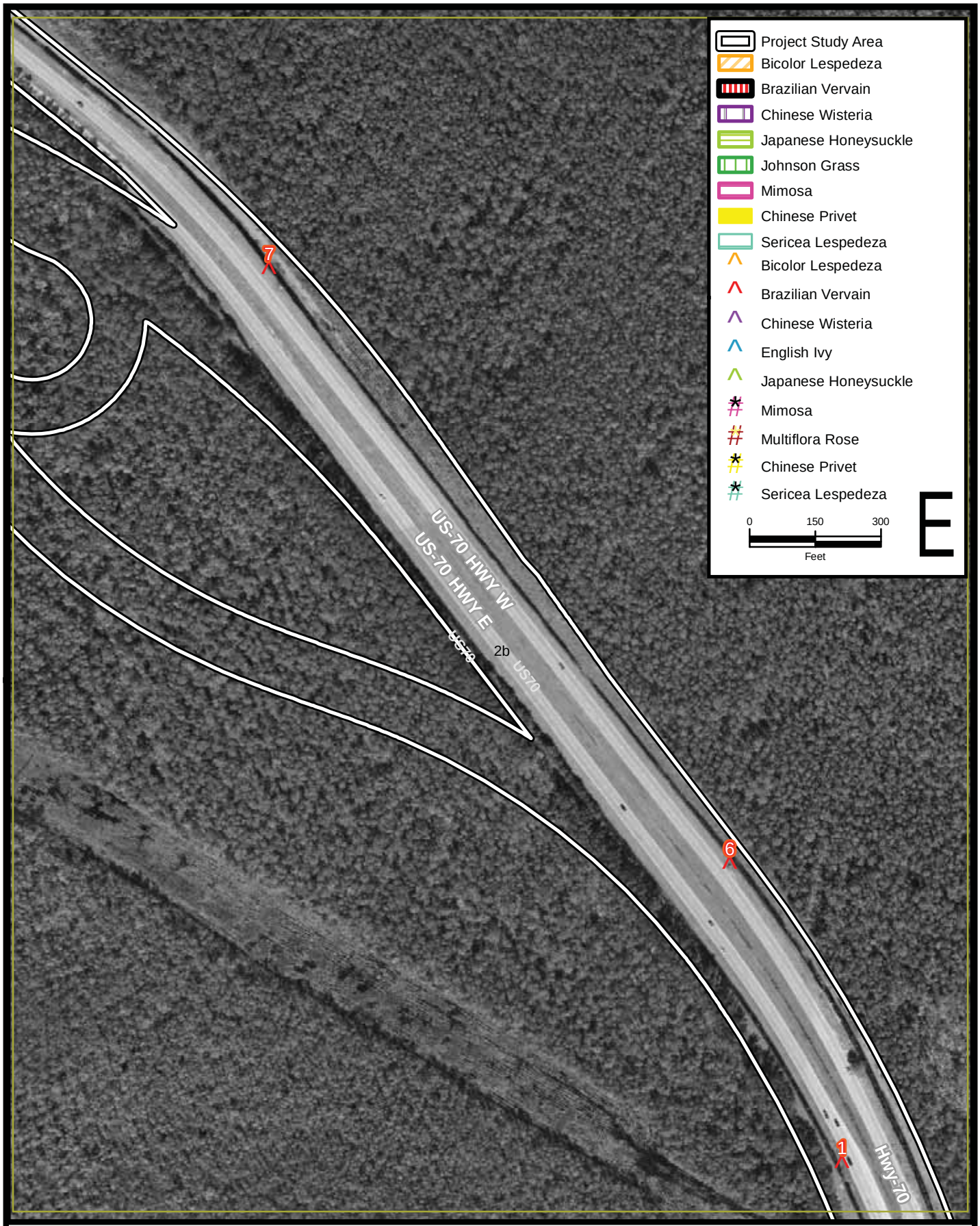

Non-native Invasive Plant Species Occurrences - Details

US 70 Havelock Bypass

Carteret and Craven Counties, North Carolina

T.I.P. R-1015

Project:	ER12050.06
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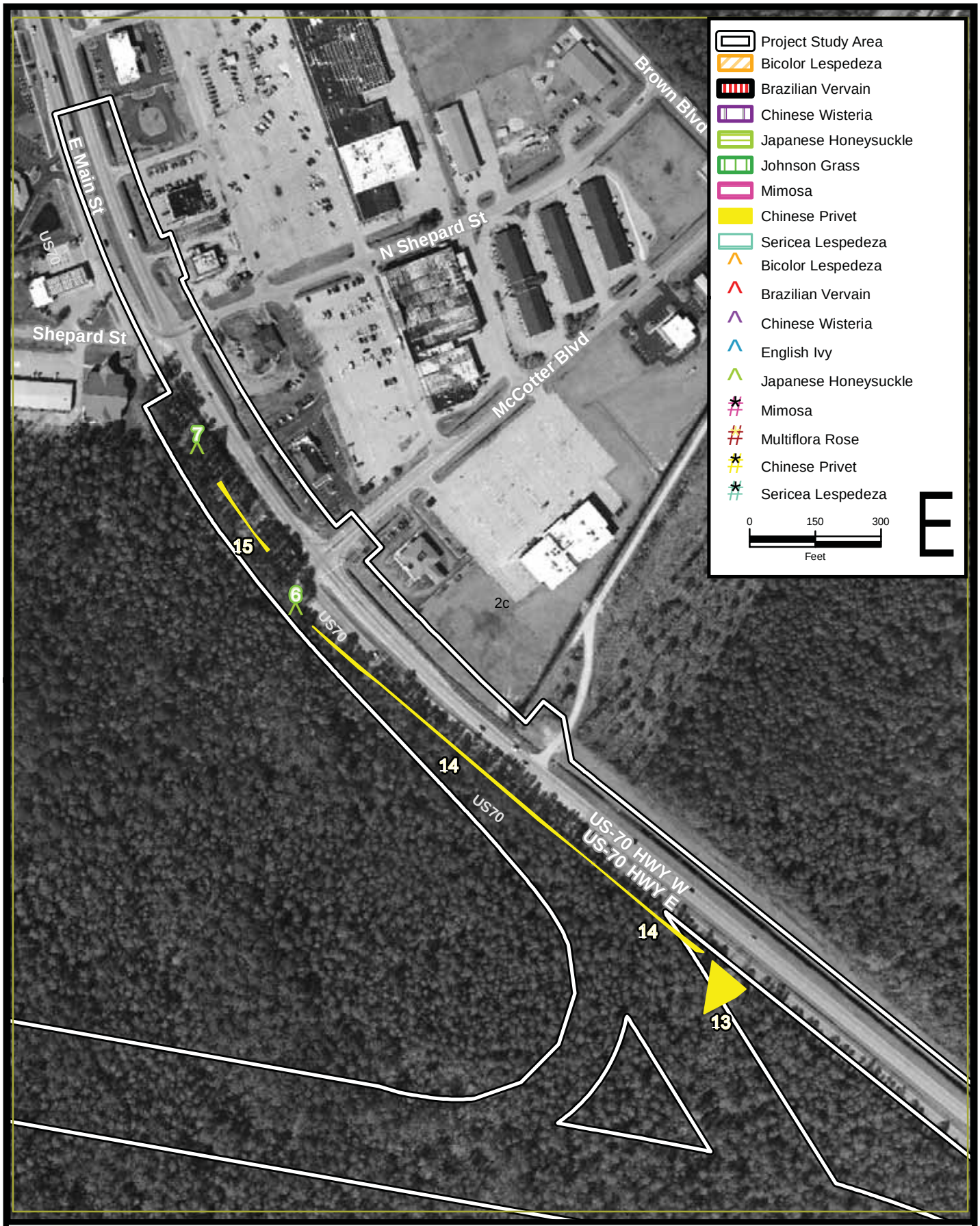

Non-native Invasive Plant Species Occurrences - Details

US 70 Havelock Bypass

Carteret and Craven Counties, North Carolina

T.I.P. R-1015

Project:	ER12050.06
Date:	Oct 2013
Drwn/Chkd:	KT/MS
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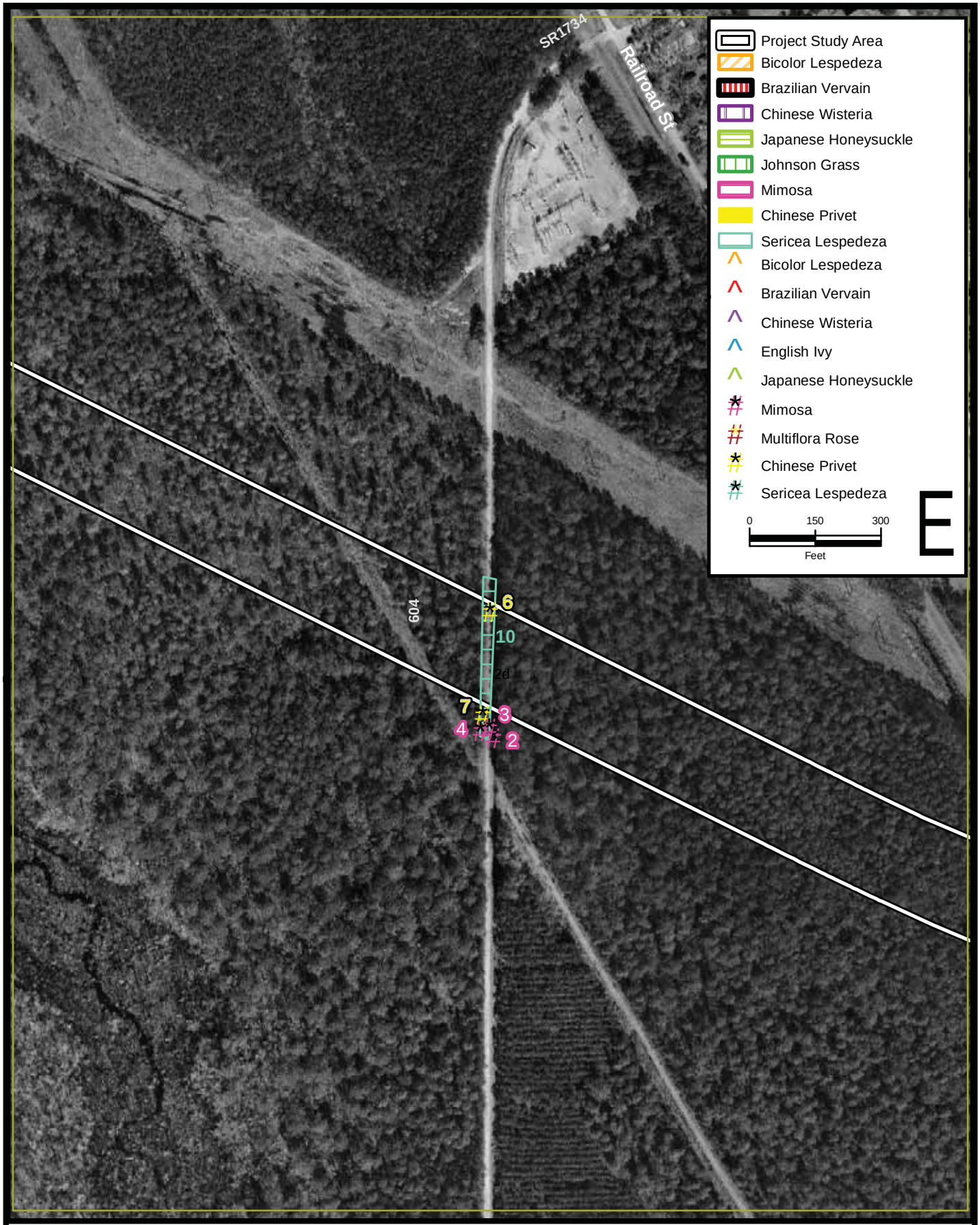

Non-native Invasive Plant Species Occurrences - Details

US 70 Havelock Bypass

Carteret and Craven Counties, North Carolina

T.I.P. R-1015

Project:	ER12050.06
Date:	Oct 2013
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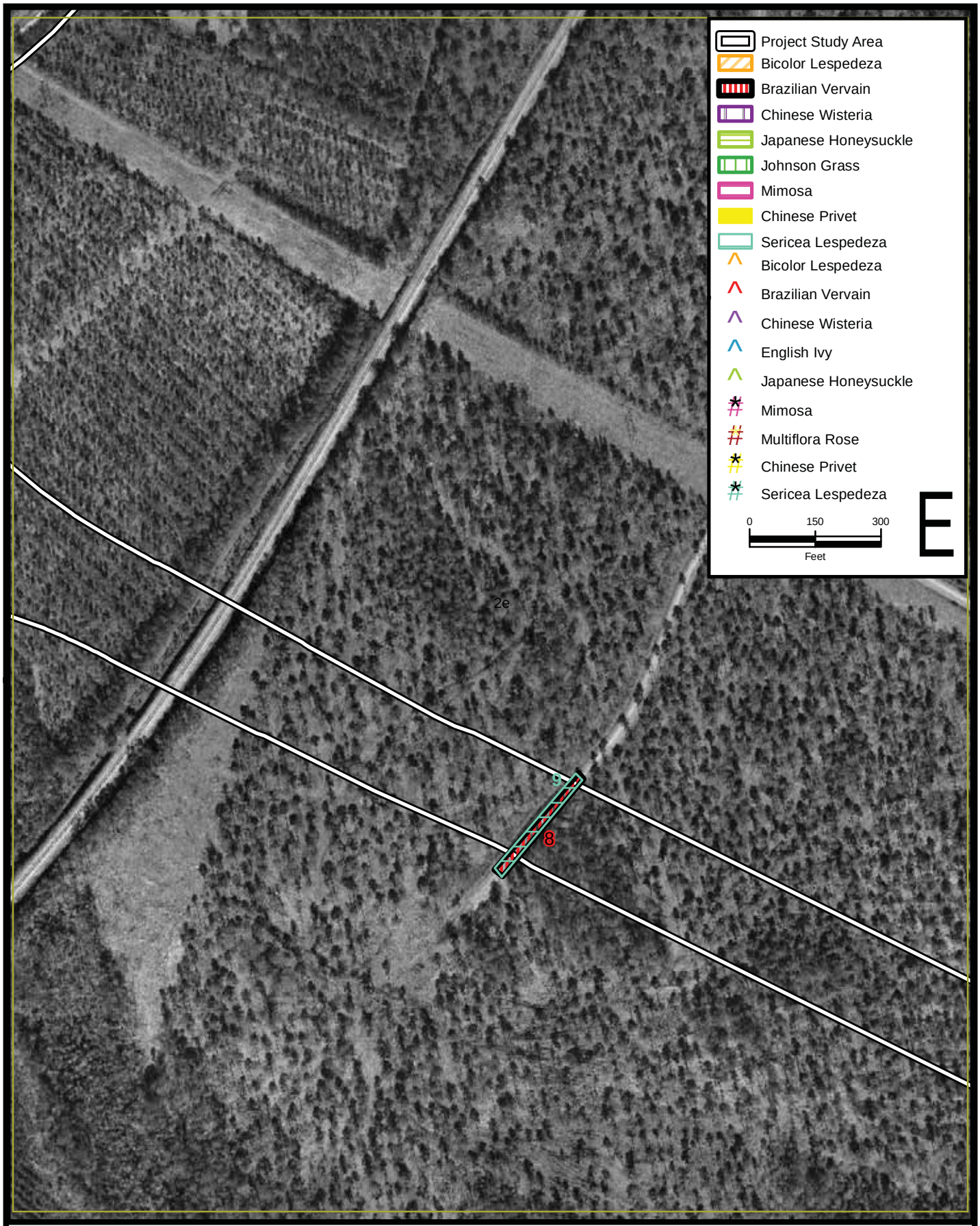

Non-native Invasive Plant Species Occurrences - Details

US 70 Havelock Bypass

Carteret and Craven Counties, North Carolina

T.I.P. R-1015

Project:	ER12050.06
Date:	Oct 2013
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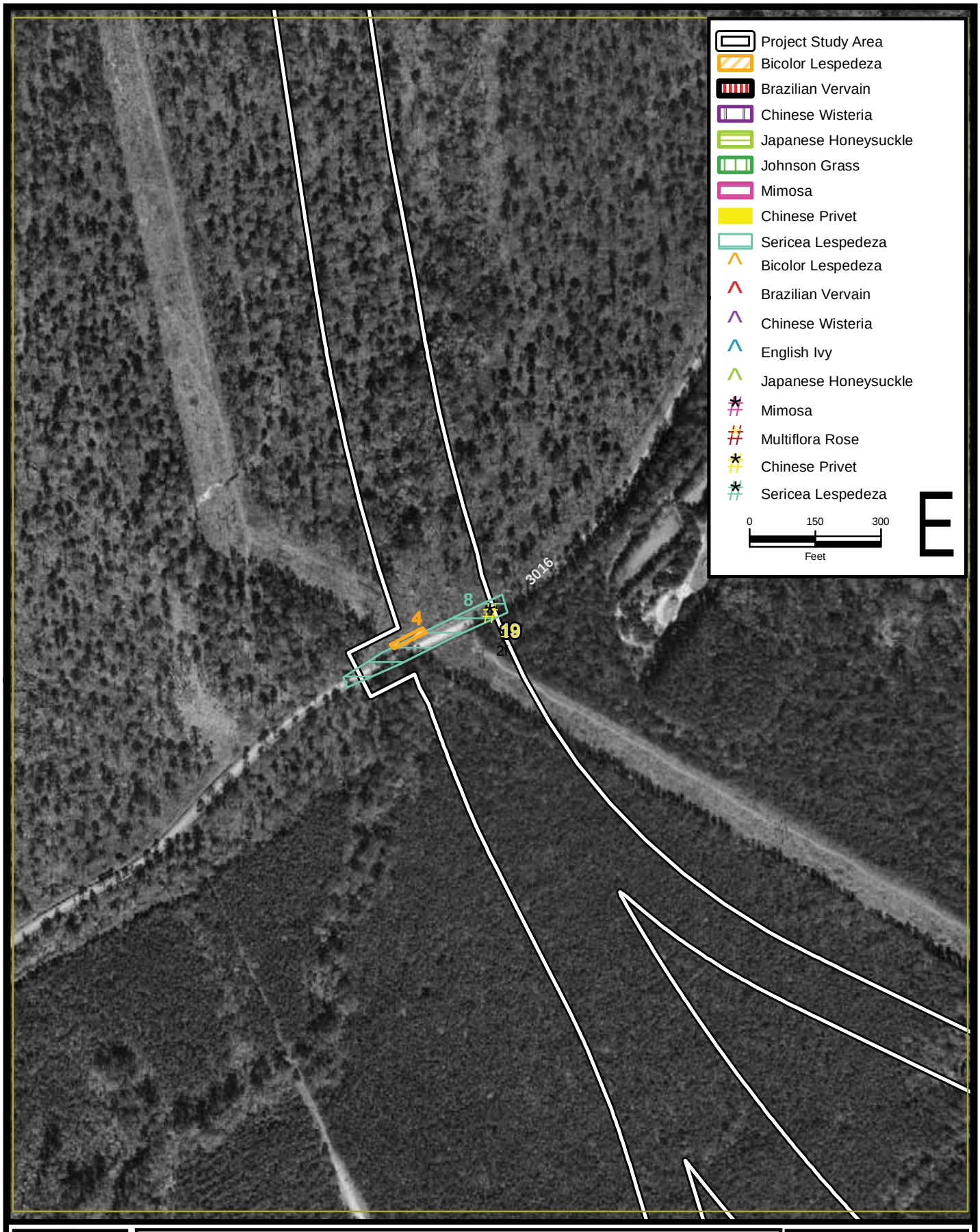

Non-native Invasive Plant Species Occurrences - Details

US 70 Havelock Bypass

Carteret and Craven Counties, North Carolina

T.I.P. R-1015

Project:	ER12050.06
Date:	Oct 2013
Drwn/Chkd:	KT/MS
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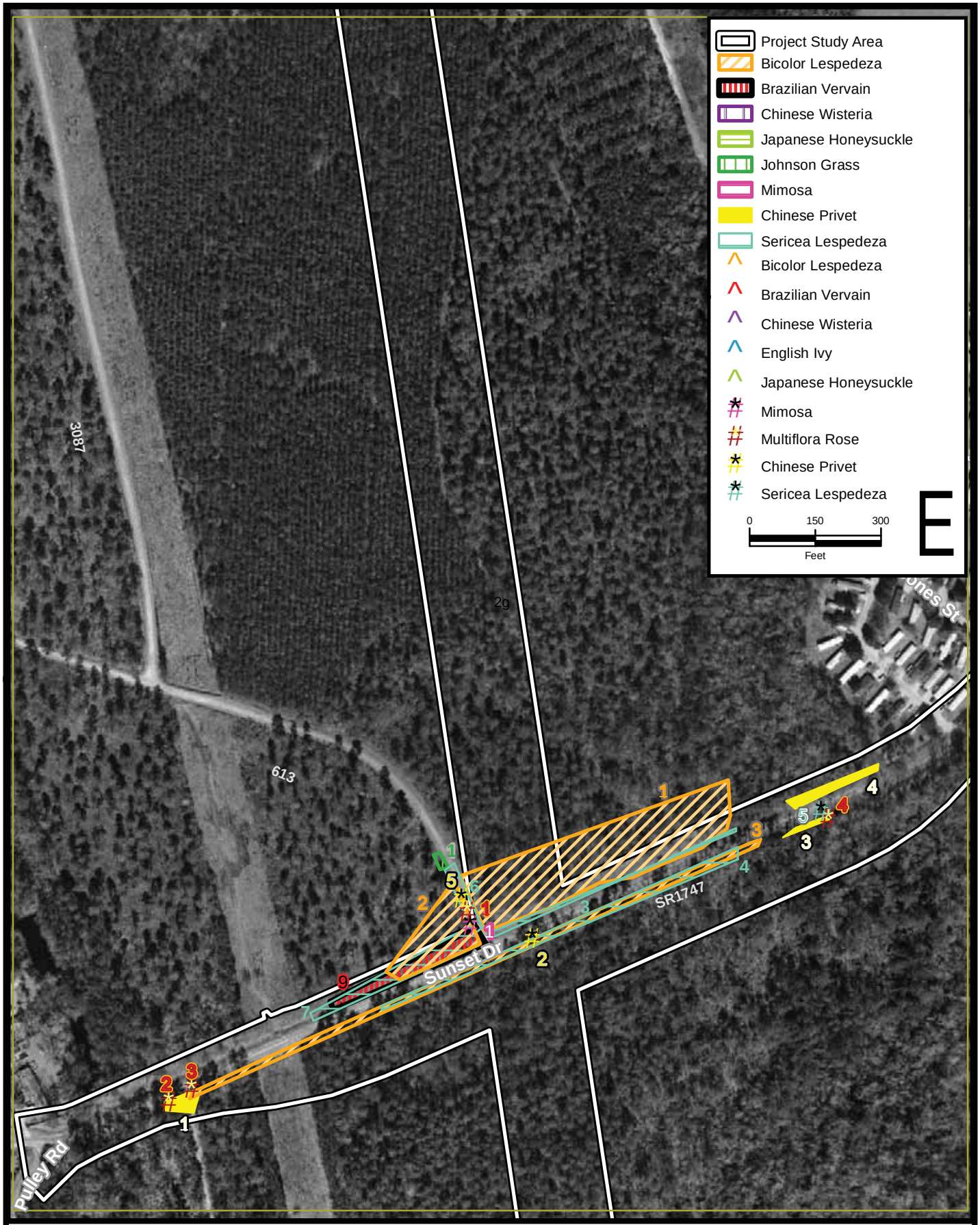

Non-native Invasive Plant Species Occurrences - Details

US 70 Havelock Bypass

Carteret and Craven Counties, North Carolina

T.I.P. R-1015

Project:	ER12050.06
Date:	Oct 2013
Drwn/Chkd:	KT/MS
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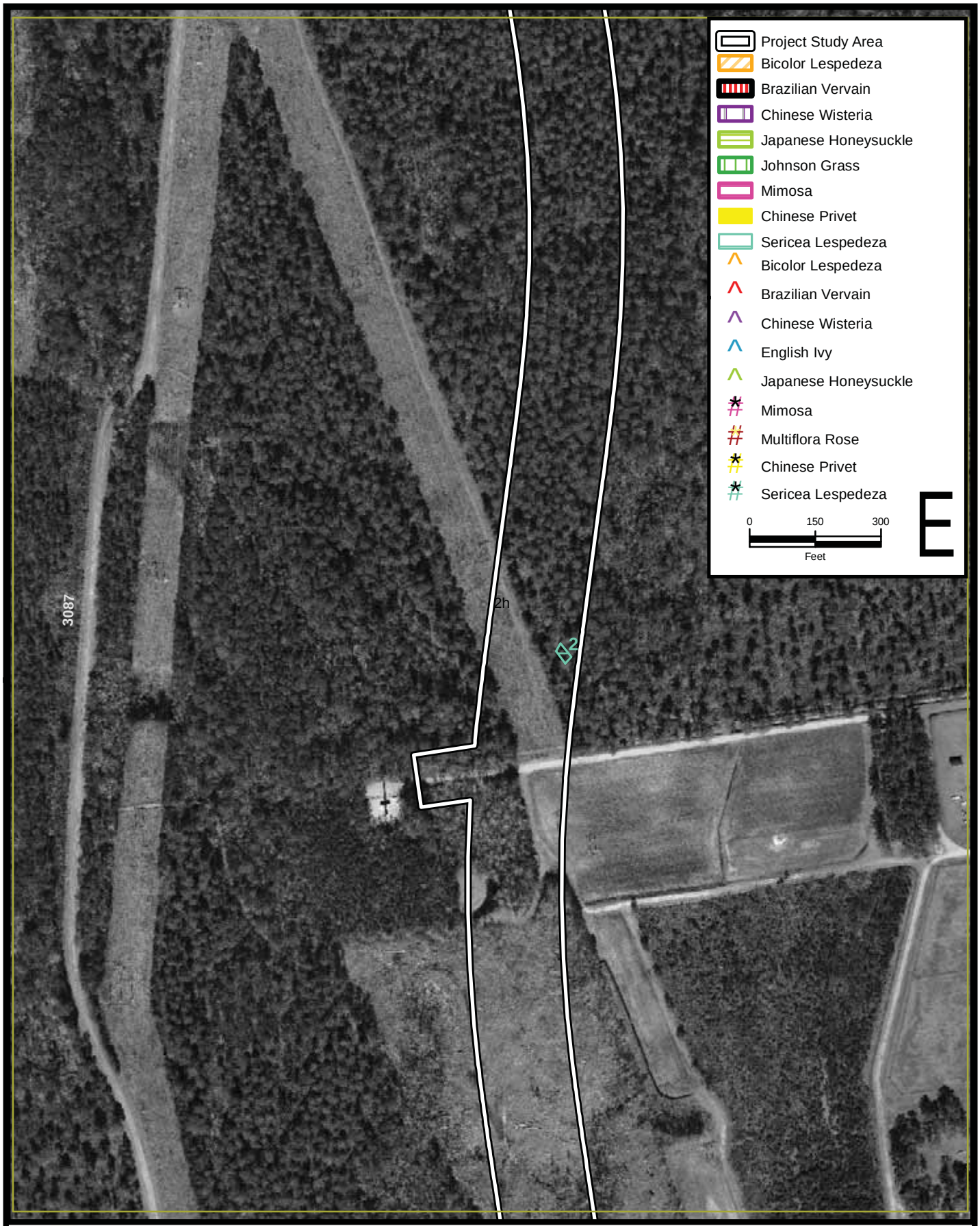

Non-native Invasive Plant Species Occurrences - Details

US 70 Havelock Bypass

Carteret and Craven Counties, North Carolina

T.I.P. R-1015

Project:	ER12050.06
Date:	Oct 2013
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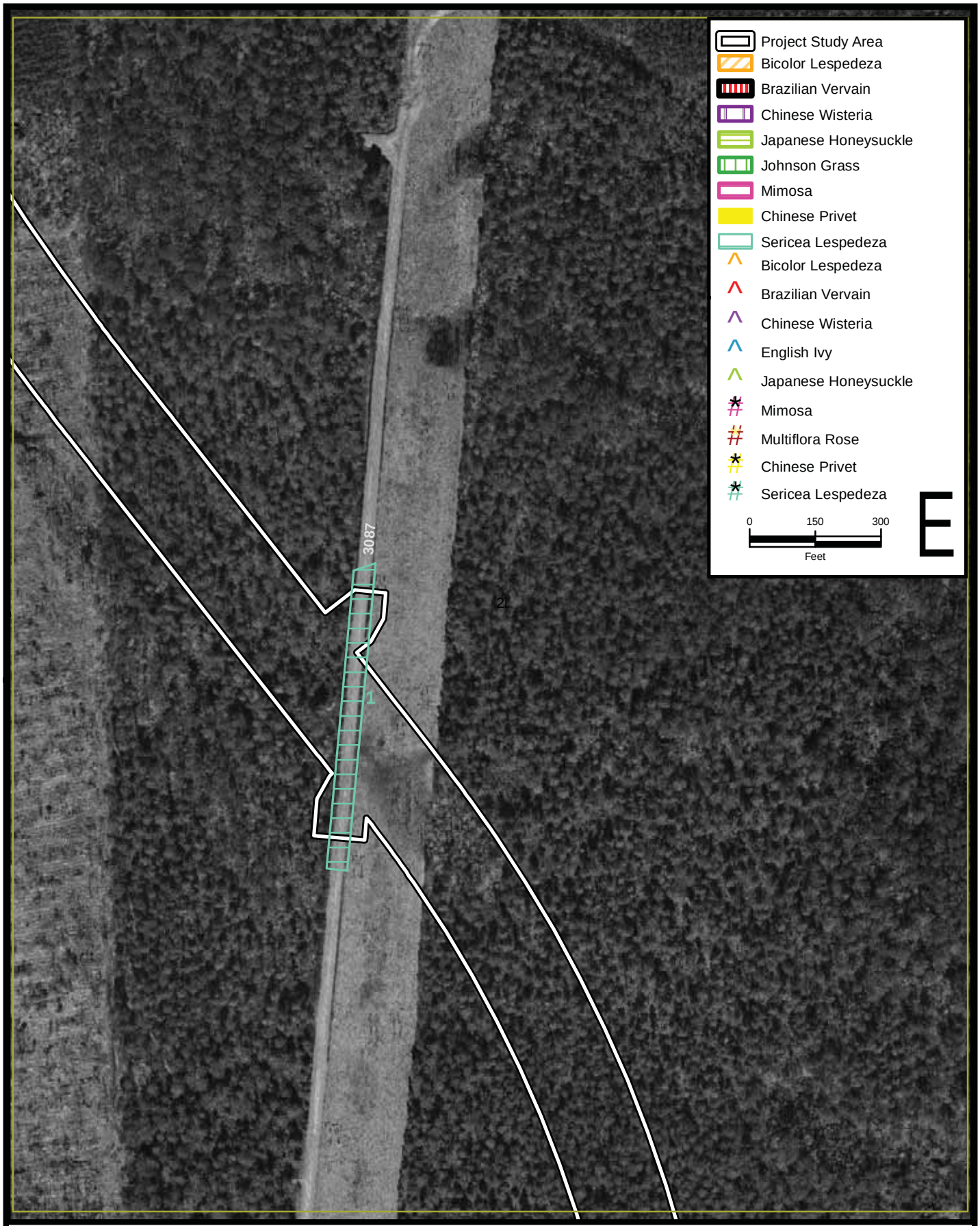

Non-native Invasive Plant Species Occurrences - Details

US 70 Havelock Bypass

Carteret and Craven Counties, North Carolina

T.I.P. R-1015

Project:	ER12050.06
Date:	Oct 2013
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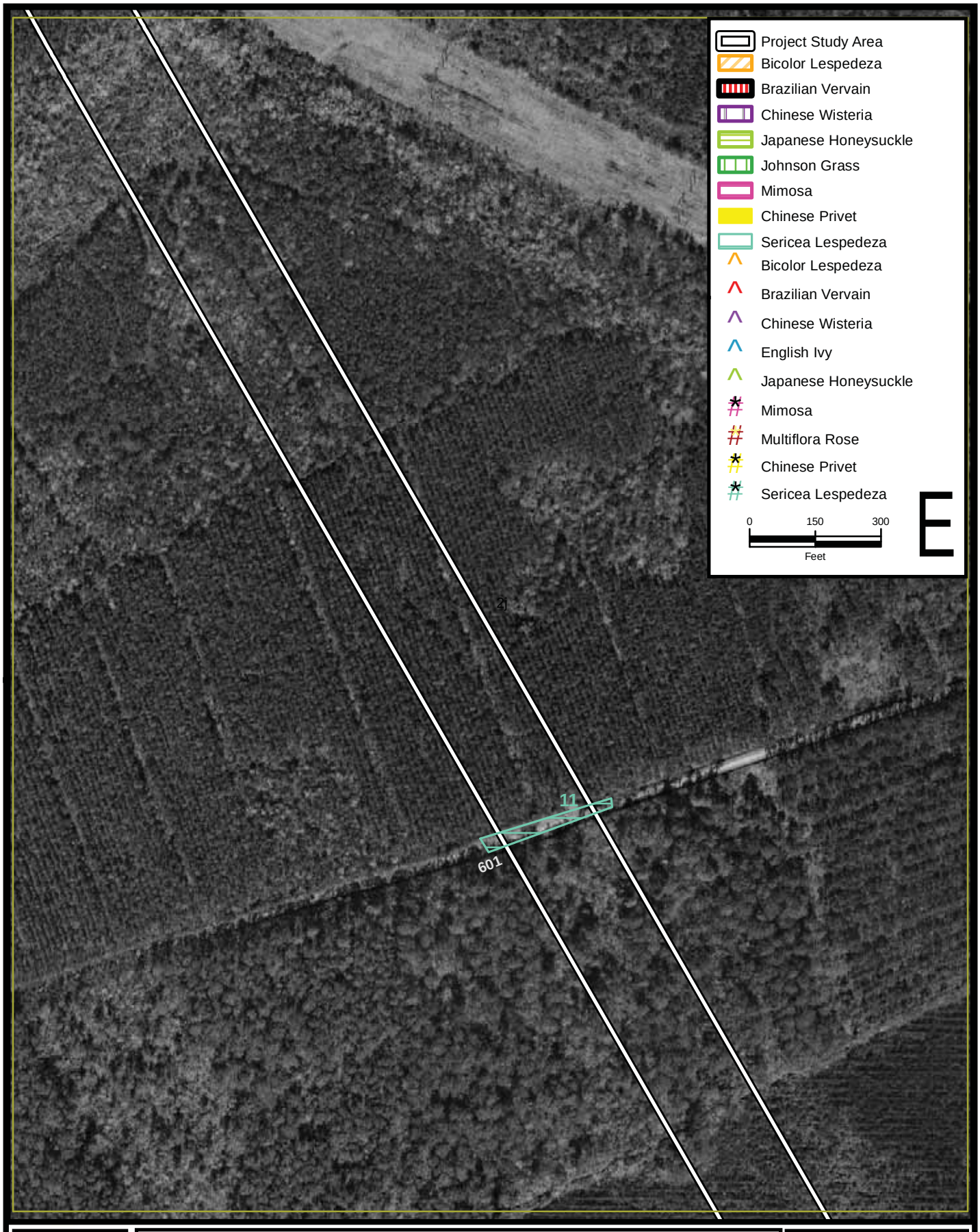

Non-native Invasive Plant Species Occurrences - Details

US 70 Havelock Bypass

Carteret and Craven Counties, North Carolina

T.I.P. R-1015

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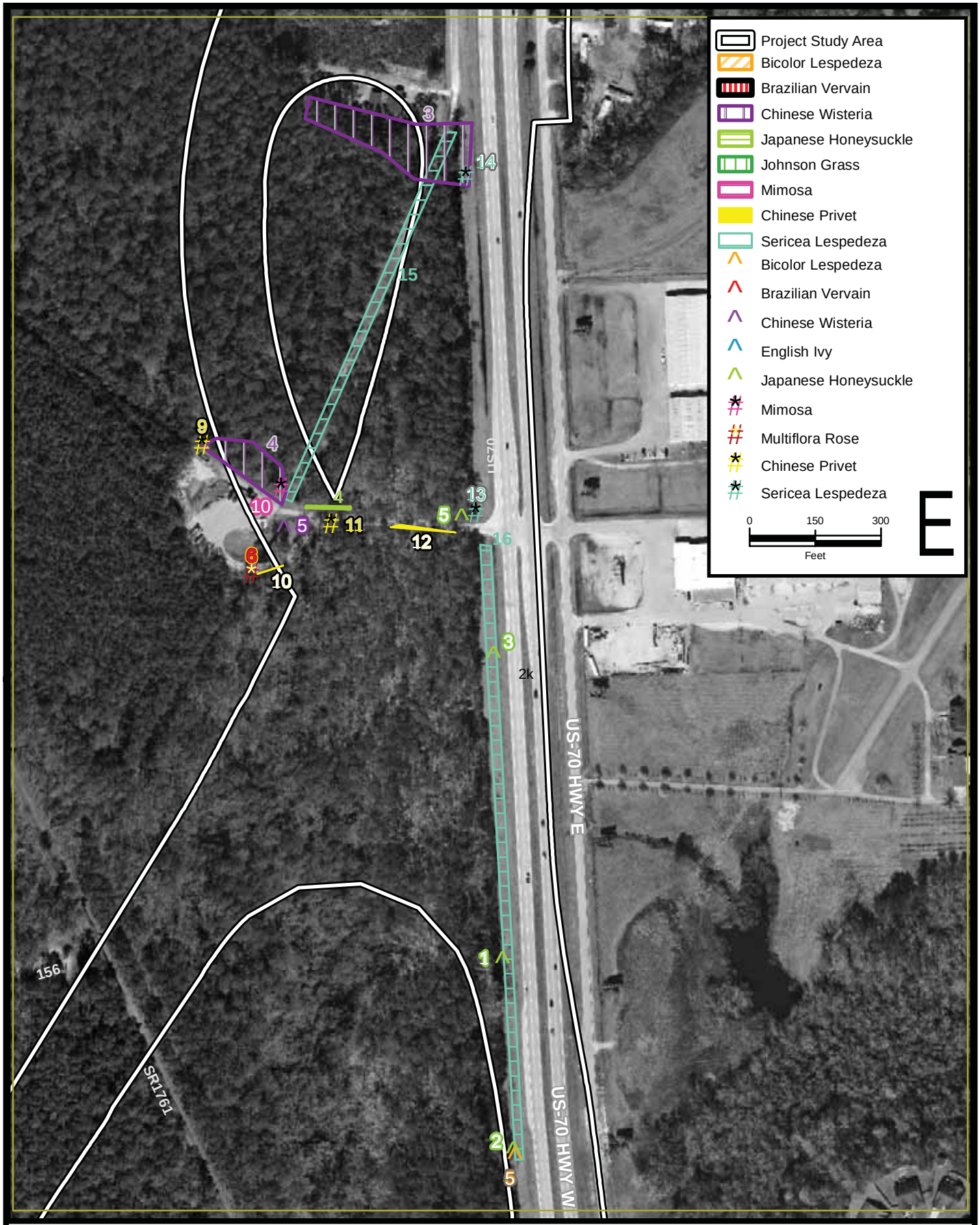

Non-native Invasive Plant Species Occurrences - Details

US 70 Havelock Bypass

Carteret and Craven Counties, North Carolina

T.I.P. R-1015

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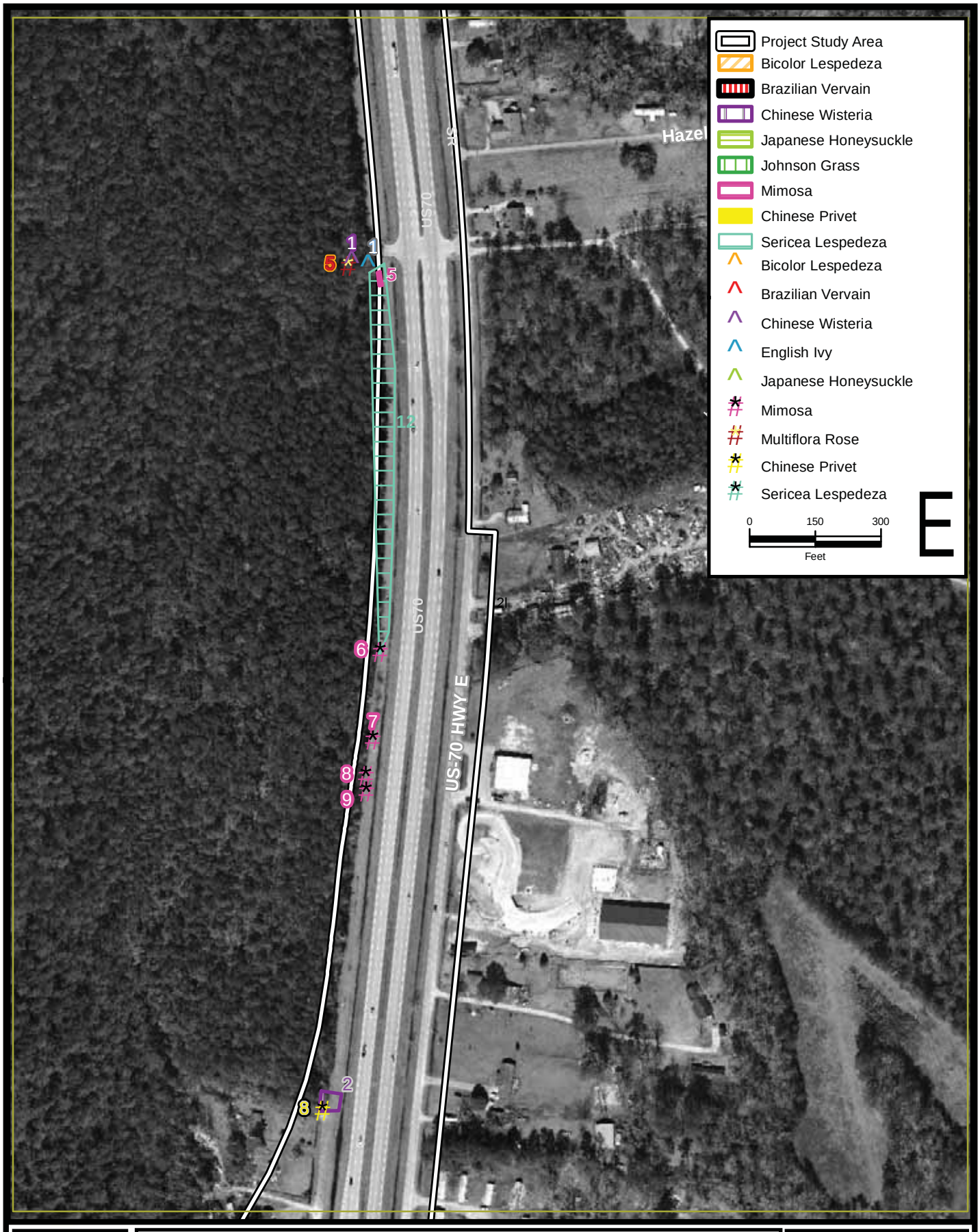

Non-native Invasive Plant Species Occurrences - Details

US 70 Havelock Bypass

Carteret and Craven Counties, North Carolina

T.I.P. R-1015

Project:	ER12050.06
Date:	Oct 2013
Drwn/Chkd:	KT/MS
Figure:	2I

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ATTACHMENT 12

ENVIRONMENTAL SERVICES, INC.
524 South New Hope Road
Raleigh, North Carolina 27610
919-212-1760 / Facsimile 919-212-1707
www.environmentalservicesinc.com

MEMORANDUM

TO: Mary Frazer

FROM: Matt Smith

DATE: 27 November 2013

RE: US 70 Havelock Bypass (R-1015)
Consulting P.O. No. 6300030960 / 63000033859
Address USFS Comments on DEIS and PETS Analysis:
Summary of Evaluation for Bryophyte Species: Two liverworts (*Lejeunea bermudiana* and *Plagiochila ludoviciana*) and Florida peatmoss (*Sphagnum cribrosum*)
ESI Project No. ER10-060.08 / ER12-050.06

Background

In their review of the Draft Environmental Impact Statements (DEIS) for the US 70 Havelock Bypass project (Figure 1), the U.S. Forest Service (USFS) identified the need for additional information on project-related impacts for *Lejeunea bermudiana* (a liverwort) and Florida peatmoss (*Sphagnum cribrosum*) to more fully assess potential viability concerns resulting from project implementation (Figure 2). A third bryophyte, *Plagiochila ludoviciana* (a liverwort), was not identified in USFS comments as requiring additional information but is included here based on documentation in 2012 and 2013 in the direct impact and indirect impact areas that was not previously known or considered for impacts from the US 70 Havelock Bypass project at the time of the DEIS (see Figure 2).

- *Lejeunea bermudiana* (a liverwort) is listed as Locally Rare by the USFS and is state listed as Significantly Rare - Peripheral, but does not have a designation by the U.S. Fish and Wildlife Service (USFWS).
- *Plagiochila ludoviciana* (a liverwort) is listed as Locally Rare by the USFS and is state listed as Significantly Rare - Peripheral, but does not have a designation by the USFWS.
- Florida peatmoss is listed as a Sensitive species by the USFS and is state listed as a Watch List (W7) species, but does not have a designation by the USFWS.

Based on these listings, the USFS is required to assess potential impacts to the species resulting from actions by the USFS, such as granting an easement for the US 70 Havelock Bypass, to determine whether the action threatens the viability of the species on National Forest System (NFS) lands in the Croatan National Forest (CNF).

Environmental Services, Inc. (ESI), has been asked by the North Carolina Department of Transportation (NCDOT) to complete an evaluation of impacts to each of these species associated with Alternative 3 of the proposed US 70 Havelock Bypass (R-1015) (Figure 1). The study area for Alternative 3 is referred to as the Alt. 3 study area in this evaluation. The area encompassed by all the alternatives for the US 70 Havelock Bypass is referred to as the Alternatives study area in this evaluation (Figure 2). The Alternatives study area is noted on Figure 2 to demonstrate the extent of area that has been relatively extensively surveyed by biologists for NCDOT for these rare bryophytes for the Havelock Bypass project, which has resulted in documentation for a substantial number of the occurrences now known on NFS lands in the CNF.

Impact assessments for these three bryophyte species were based on the following:

- The evaluations presented here utilize Element Occurrence (EO) data obtained from the N.C. Natural Heritage Program (NCNHP) in April 2012 with updates through October 2013, supplemented by additional liverwort surveys conducted by ESI biologists David DuMond and Matt Smith in 2012 and 2013. The evaluation for Florida peatmoss includes data obtained from the USFS and ESI surveys because this species is not tracked in the NCNHP database.
- Boundaries for NFS lands were provided by the USFS for use in this evaluation. Only occurrences or portions of occurrences on NFS lands are of concern for the viability determination for NFS lands on the CNF.
- Direct impacts are based on the tree clearing limits (slope stake limits plus 15 feet) plus an additional 25 feet.
- Potential indirect impacts were evaluated for occurrence areas located on NFS lands between Alternative 3 and existing US 70 based on consideration that different post-project habitat management techniques may be required by USFS for areas isolated from larger, contiguous NFS lands by the project. Additional concerns identified for consideration of indirect impacts include construction or maintenance actions by NCDOT in the vicinity of rare plant occurrences on NFS lands that could have negative impacts on the rare plants or the suitability of their habitat. These actions could include the type of roadside vegetation proposed for use by NCDOT in the project right-of-way, location of construction staging areas, soil compaction or rutting caused by heavy equipment resulting in localized changes in hydrology, and use of herbicides and pesticides. In addition, potential indirect impacts considered for bryophytes included the potential for changes in light and wind penetration resulting in increased desiccation in a zone outside the ROW adjacent to areas where tree clearing will create forest canopy openings inside the ROW.
- Cumulative impacts were considered for identified actions on NFS lands that could affect these species. Because the USFS concern for these species is for maintaining continued viability on NFS lands in the CNF, actions off NFS lands were not considered for determining whether an action will affect the viability of these species on NFS lands. Actions proposed on NFS lands are subject to independent review by USFS to assess potential effects to the continued viability of these species on NFS lands in the CNF. One project identified for consideration for cumulative effects for Florida peatmoss included in this analysis is a project proposed by Duke Energy Progress for replacing the overhead ground wire and selected poles within an existing transmission line corridor right-of-way located along approximately 5 miles of NFS lands in the CNF. Based on the assessment conducted for the Duke Energy Progress project, the Florida

peatmoss occurrence will be avoided by utility project activities. Based on avoidance of impacts, none of the bryophyte species included in the present evaluation will be affected by the utility project and there will be no contribution to cumulative effects on these three species. The potential future widening of the Atlantic and East Carolina Railroad from a single track to multiple tracks may result in cumulative impacts to Florida peatmoss Site #1 in the ditches adjacent to the railway, should the widening occur. Potential affects to Florida peatmoss would need to be evaluated as part of the planning process for the railway project. Other projects considered for potential cumulative effects include thinning operations completed by the USFS adjacent to Southwest Prong Slocum Creek and Tucker Creek in the vicinity of occurrences of *Lejeunea bermudiana* and *Plagiochila ludoviciana*. The results of these thinning operations were reviewed in the field in 2013 to evaluate potential for indirect effects from increased light and wind penetration in a zone adjacent to the action areas. These thinning operations were determined to have not resulted in effects that would contribute to additional significant adverse effects to the bryophyte occurrences of concern. No other NCDOT projects have been identified that would directly or indirectly impact these species on NFS lands. No other actions being considered by USFS on NFS lands have been identified that would directly or indirectly impact these species. As such, no significant cumulative impacts were identified for these species at this time.

A summary of the evaluations presented here will be incorporated into Chapter 4 of the Final Environmental Impact Statement (FEIS).

A Liverwort (*Lejeunea bermudiana*)

Lejeunea bermudiana is a rare species of leafy liverwort documented from North Carolina in only two areas in the outer Coastal Plain. Croatan National Forest (CNF) in Craven and Jones Counties is the only recently verified location for this species in the state, where it reaches its northern-most natural distribution limit. Liverworts are nonvascular, nonflowering plants that are small to tiny, requiring microscopic analysis for species confirmation. Liverworts typically occur closely attached to soil, rock, bark or rotten wood substrates in moist habitats that are often heavily shaded. Surveys for this species conducted on the CNF indicate that *Lejeunea bermudiana* typically occurs on the bark at the base of mature hardwood trees within a narrow zone on the edges of swamp forest communities that flood on an infrequent basis.

Prior to the present evaluation, there were five NCNHP EOs, comprising three populations, known to occur, or possibly occur, on NFS lands within the CNF (Figure 2), associated with three stream systems.

- Deep Creek. EO 2 is an historic occurrence last observed in 1953 and described as the "base of trees in Deep Swamp approximately 1-2 miles south of Harlowe, NC and 1 mile west of NC 101" in the southeastern portion of the CNF. This occurrence could not be confirmed in 2012. The general location of this historic occurrence was visited, but the potential habitat area could not be accessed due to the presence of gated and posted private property. Based on level of accuracy identified by NCNHP mapping for the EO, and review of mapping for NFS land boundaries, this occurrence, if still extant, may not occur on NFS lands.
- Southwest Prong Slocum Creek. There are three EOs (4, 5, and 6) identified in the Southwest Prong Slocum Creek watershed (Figure 2-3), which collectively comprise a single population.

EO 4 consists of two separate mapped sample locations with confirmed *Lejeunea bermudiana*, while EOs 5 and 6 each consist of single confirmed sample locations. Two additional sample locations within this watershed with confirmed *Lejeunea bermudiana* were identified in 2012 between the two mapped sample locations constituting EO 4.

- Tucker Creek. There is one EO (8) in the Tucker Creek watershed (Figure 2-2). Two additional sample locations within this watershed with confirmed *Lejeunea bermudiana* were identified in 2013 south of the mapped sample location constituting EO 8.

Alternative 3 directly affects the populations of *Lejeunea bermudiana* in the Southwest Prong Slocum Creek and Tucker Creek watersheds. The scope of work for the present *Lejeunea bermudiana* evaluation is the result of meetings with NCDOT and the USFS. The present evaluation considers direct effects on *Lejeunea bermudiana* occurrences in the Alt. 3 study area as well as indirect effects that may result from the US 70 Havelock Bypass project and potential cumulative effects resulting from other applicable projects on the CNF, as well as factors in the results of additional surveys conducted by NCDOT for this species in 2012-2013.

Methods for Assessment

Prior to 2012, there were only two populations of this species recently documented as occurring on NFS lands within the CNF and one additional EO that represents an historic occurrence that could not be confirmed and may not be on NFS lands. As a result, there were basically two watersheds with occurrences of *Lejeunea bermudiana* confirmed on NFS lands in the CNF, both of which would have direct impacts associated with Alternative 3 (Figure 2). As a mitigative measure for reducing the relative impacts to this species on NFS lands within these stream systems, USFS requested that NCDOT consider an effort to see if new occurrences could be found on NFS lands within relatively unstudied areas of the CNF outside the Alternatives study area.

The initial step in the evaluation was to identify areas on NFS lands in the CNF that have potentially suitable habitat. Surveys were conducted in 2012 in seven watersheds that were identified as potentially providing suitable habitat based on a desktop evaluation of general watershed characteristics. These areas include Island Creek, Black Swamp Creek, Hunter's Creek, Hadnot Creek, Holston Creek, an unnamed tributary to Tucker Creek, and several tributaries to Brice's Creek. Surveys were also conducted in 2013 in ten additional watersheds including Mill Creek, West Prong Mortens Mill Pond, King Creek, Gum Branch, Still Gut Creek, Little John Creek, Cahooque Creek, Pettiford Creek, Northwest Prong Newport River, and Southwest Prong Newport River.

Each of these areas was evaluated in the field and liverwort samples were collected from several areas for detailed evaluation. When the site evaluations identified liverwort assemblages containing the suspected target species or known or presumed associated species, samples were taken from selected trees for laboratory identification. GPS data were recorded for sample locations.

Results of Assessment

The areas reviewed in seven watersheds (Hunter's Creek, Hadnot Creek, Holston Creek, Brice's Creek, Mill Creek, Northwest Prong Newport River, and Southwest Prong Newport River) were determined to not provide suitable habitat due to a combination of factors including recent prescribed burns, lack of

mature hardwood trees, presence of open canopy, and/or evidence of frequent flooding and inundation or saline influences. Potentially suitable habitat was identified as present in Island Creek, Black Swamp Creek, the unnamed tributary to Tucker Creek, West Prong Mortens Mill Pond, King Creek, Gum Branch, Still Gut Creek, Little John Creek, Cahooque Creek, and Pettiford Creek. No *Lejeunea bermudiana* was present in samples evaluated from Black Swamp Creek, the unnamed tributary to Tucker Creek, West Prong Mortens Mill Pond, Little John Creek, and Gum Branch.

Lejeunea bermudiana was confirmed present in samples collected in Island Creek (Figure 2-1), an unnamed tributary to Cahooque Creek (Figure 2-4), Still Gut Creek (Figure 2-4), King Creek (Figure 2-5) and Pettiford Creek (Figure 2-6) watersheds. These five watersheds represent new locations documented by NCDOT for this species in 2012-2103 and result in five new EOs on NFS lands in the CNF, all of which are outside the Alternatives study area. Documentation for these new occurrences will be submitted to NCNHP, which is expected to designate these sites with new EO numbers.

In addition, the 2012-2013 surveys resulted in *Lejeunea bermudiana* confirmed from additional sample locations in the two watersheds in which it was previously known. During the 2012 field surveys this species was also identified from two liverwort samples collected to confirm the continued presence of *Lejeunea bermudiana* within the area evaluated for potential indirect impacts associated with Alternative 3; these two new confirmed sample locations are situated between the two mapped sample locations comprising EO 4 (Figure 2-3). During the 2013 field surveys this species was also identified from two liverwort samples collected to confirm the continued presence of *Lejeunea bermudiana* adjacent to the area recently thinned by the USFS in the Tucker Creek watershed. These two new confirmed *Lejeunea bermudiana* sample locations are situated south of the mapped sample location comprising EO 8 (Figure 2-2).

The forested uplands to the east of the documented sites in the Tucker Creek watershed (Figure 2-2) have been thinned by the USFS as part of forest management for these stands. This area was evaluated during the 2013 surveys to determine if these activities had altered suitable habitat in this watershed. Thinning within these stands occurred within 250 feet of occupied sites and has resulted in increased light penetration for the large trees located along the edge of the floodplain that provide both occupied and potentially suitable habitat for this species. Within a zone adjacent to the thinned stands, the bryophyte assemblages appeared to be somewhat diminished compared to previous conditions and the effects of the increased light and wind penetration may be expected to result in further diminishment until increased shading results from regrowth of denser vegetation in the thinned areas. However, because the bryophyte assemblages were noted as persisting though diminished, the zone of influence did not appear to extend more than 250 feet beyond the thinned edge, and because the bryophyte assemblages in this zone have persisted through previous timbering and thinning operations in the adjacent stands, these thinning operations were determined to have not resulted in effects that would contribute to additional significant adverse effects to the bryophyte occurrences of concern. The existing US 70 roadway is located approximately 350 feet east of these *Lejeunea bermudiana* occurrences.

The forested uplands adjacent to Gray Road and Sunset Road in the Slocum Creek watershed (Figure 2-3) have been managed by the USFS using a combination of thinning and prescribed burning in recent years, with prescribed burning occurring in 2013. This area was evaluated during the 2013 surveys to determine

if these activities had altered suitable habitat in this watershed. Neither the thinning or prescribed burns affected habitat within 250 feet of the large trees located along the edge of the floodplain that provide both occupied and potentially suitable habitat for this species. However, apparent drying of bryophyte flora was observed on trees along the south side of the creek during surveys in 2012. It is not clear if this is the result of recent droughts or a combination of other factors. The effects of the thinning operations in the stands adjacent to this area are expected to be temporary as the thinned forest regenerates.

The results of an evaluation of habitat conditions for *Lejeunea bermudiana* at the locations where this species has now been documented on NFS lands in the CNR indicate that the occurrences of *Lejeunea bermudiana* appear to be strongly associated with three major landscape features within the CNF: 1) well developed palustrine forests along streams, 2) incised floodplains paralleled by erosion scarps with relatively abrupt topographic gradients, 3) colluvial/alluvial loamy organic soils likely adjacent to exposed or unexposed occurrences of marine limestone (marl) deposits. Other important parameters influencing where *Lejeunea bermudiana* may be found appear to involve atmospheric humidity, substrate moisture, light penetration and air movement through the forest. These characteristics may all be relative to functions of stem density, degree of canopy closure and stream flow variables. Also noted in the watersheds of occupied sites is the presence of two vascular plant species that seem to connote surface or near-surface presence of limestone. These species are dwarf palmetto (*Sabal minor*) in mucky areas of the flood plain and umbrella tree (*Magnolia tripetala*) along upland slopes. Additionally, since *Lejeunea bermudiana* was only found at the bases of the largest trees, roughly 2 to 4 feet DBH (diameter at breast height, or 4.5 feet above the ground), and not on younger or smaller trees during the surveys conducted for this project, the age and basal configurations of substrate trees are also assumed to be of importance. Based on surveys conducted in the CNF, the presence of large trees (old trees) appears to be important to the presence of *Lejeunea bermudiana* in occupied habitat. Although the relationship between occupation by *Lejeunea bermudiana* and age /size of substrate species has not been numerically defined, the loss of large trees from an occupied habitat system, even without removal of other habitat characteristics, potentially could affect the suitability of the habitat to support this species, resulting in potential indirect effects.

Along many of the streams where *Lejeunea bermudiana* has been documented on the CNF, there is a substantial bluff system paralleling sides of a floodplain, as can be seen in the LiDAR base mapping in Figures 2-1 through 2-6. This bluff system has been created as debris and flowing water slowly carved downward into marine deposits that now constitute the bulk of the upland landscape. Organic and other materials are deposited, sorted, and moved along these floodplain channels. Alluvium combined with colluvial materials from side slopes has contributed to a mixture of sediments along the lower portions of the side slopes as well as within active stream channels. The side slopes consist of a mix of sands, organic silts and minerals dissolved by groundwater from exposed or unexposed limestone formations. Margins of most streams supporting *Lejeunea bermudiana* on the CNF do not have outcrops of marl. However, at Island Creek outcrops of limestone can be seen along portions of the channel. Based on the sample locations on which it has been found in the CNF, *Lejeunea bermudiana* appears to require largely permanent surface exposure on basal bark of living trees above the zone subject to frequent flooding. Below the point along a flooding gradient where bald cypress (*Taxodium distichum*) and/or swamp black gum (*Nyssa biflora*) become dominant species, *Lejeunea bermudiana* was not found during site surveys, and the species was not found on cypress stems during the surveys. Hydrologic changes that affect

current fluvial geomorphological processes in an occupied habitat system could result in habitat losses and potential indirect effects.

Substrate occupied by *Lejeunea bermudiana* in the CNF seems to exist in two optimum forms. Along portions of Southeast Prong Slocum Creek substrate occurs most abundantly where exposed major roots of tulip poplar (*Liriodendron tulipifera*) seem to provide optimum habitat. These tulip poplar root systems were found to occur on trees generally in excess of 20 inches DBH from which large exposed roots often extend laterally several yards from the bases of the trees. All portions of this exposed root system, including the base of the tree, often support substantial growths of *Lejeunea bermudiana* along with numerous other species of liverworts and mosses. These exposed lateral roots of tulip poplars occur lower along the topographic (and moisture) gradient. Tulip poplar root habitat occurs extensively along both north and south sides of Southwest Prong Slocum Creek and extends generally from the Alt. 3 study area downstream (eastward) to Greenfield Heights Boulevard between Sunset Road and Gray Road (Figure 2-3).

In addition to occupying extensively exposed tulip poplar root substrate, *Lejeunea bermudiana* was also found to occupy cork or bark substrates that may often be found slightly more up slope. Bases of some species of hardwood trees with considerable size appear to offer somewhat more limited areas of optimum substrate. Such substrate has been noted mostly on large trees with fluted bases. Species which can apparently supply such substrate are swamp chestnut oak (*Quercus michauxii*), tulip poplar, sweet gum (*Liquidambar styraciflua*), swamp black gum, and white oak (*Quercus alba*). Generally, occupied trees were also of large size (20 to 40 in DBH). Organic debris at the base of trees, where bark and soil begin to mix, can also support growths of *Lejeunea bermudiana* under ideal growing conditions.

Summary of Impacts

- With the documentation of the presence of *Lejeunea bermudiana* in Island Creek, Pettiford Creek, Still Gut Creek, an unnamed tributary of Cahooque Creek, and King Creek, this evaluation indicates that *Lejeunea bermudiana* has now been confirmed as present in seven watersheds (Tucker Creek, Southwest Prong Slocum Creek, Cahooque Creek, Still Gut Creek, King Creek, Pettiford Creek, and Island Creek) on NFS lands in the CNF. An additional historic occurrence documented in 1953 in Deep Swamp could not be verified and may not be on NFS lands. The US 70 Havelock Bypass project would result in impacts to only two of the seven watersheds with known occurrences of this species on NFS lands in the CNF.

- Alternative 3 directly affects two watersheds that include EOs for this species.
    - Within the Tucker Creek watershed, Alternative 3 directly affects EO 8 in its entirety, including the new confirmed sample locations documented in 2013. The occurrences in this watershed have been impacted by recent forest management activities (thinning) resulting in increased light penetration, but because the Havelock Bypass project would result in presumed loss of this population, the forest management activities would not contribute to significant adverse cumulative effects.
    - Within the West Prong Slocum Creek watershed, Alternative 3 directly affects a portion of the population. The portion of the population represented by EO 4 could be directly affected by removal of one tree with confirmed occurrence, as well as other trees not

sampled within the ROW clearing limits that could potentially harbor this species. The documented distribution of this species within this watershed extends approximately 3,000 feet upstream and 3,400 feet downstream of the potential impact to EO 4 associated with Alt. 3; however, the distribution of this species within this watershed is limited to suitable trees in appropriate hydrologic zones and is likely discontinuous. The portions of the population represented by EOs 5 and 6 are not directly affected. The proposed project could result in loss of a portion of this population, but is not expected to result in a complete loss of the population in the West Prong Slocum Creek watershed from direct impacts.

Within the West Prong Slocum Creek watershed, Alternative 3 may result in indirect effects to a portion of the population. Indirect effects from clearing of forest canopy in the ROW may be expected to extend up to 250 feet outside the ROW, which could result in effects to additional occupied habitat within the portion of the population represented by EO 4, including the two new confirmed sample locations documented in 2012. The portions of the population represented by EOs 5 and 6 are outside the zone considered for potential indirect effects from increased light penetration. Other potential indirect impacts that could result from construction or maintenance activities can be avoided or minimized through measures previously proposed by NCDOT for the areas subject to potential indirect impacts.

Conclusions and Recommendations

The US 70 Havelock Bypass (R-1015) Alternative 3 will result in unavoidable direct impacts to *Lejeunea bermudiana* and additional areas occupied by *Lejeunea bermudiana* are subject to consideration for indirect impacts. The direct impacts for Alternative 3 may lead to a loss of the population in Tucker Creek and a portion of the population in Southwest Prong Slocum Creek. With appropriate measures to minimize threats from indirect impacts, the US 70 Havelock Bypass project is not expected to result in loss of the remaining portion of the population in Southwest Prong Slocum Creek. No significant adverse cumulative impacts from other projects were identified.

Because the loss of one of two populations and partial loss of the second population known prior to 2012 on NFS lands in the CNF resulting from the US 70 Havelock Bypass project could lead to viability concerns, mitigation measures were required to reduce the threat for a loss of viability for *Lejeunea bermudiana* on NFS lands in the CNF. Because this species is cryptic and not widely studied or easily documented, the identification of new populations of this species in secure locations elsewhere on NFS lands is considered by the USFS to be an important mitigation measure. Five new populations of *Lejeunea bermudiana* have been identified in 2012-2013 on behalf of USFS by NCDOT on NFS lands in the CNF. These newly discovered occurrences are located in stream systems well outside the area affected by the US 70 Havelock Bypass project.

Implementation of additional mitigation measures agreed to between NCDOT and USFS would minimize potential for loss of the remaining portion of the Southwest Prong Slocum Creek from indirect impacts. These mitigation measures include:

- Prior to construction, NCDOT will coordinate with the USFS to identify occurrences of USFS rare plant species near the project construction limits and put up protective orange fencing to be removed after completion of construction;

- Avoid placing staging areas within 250 feet of USFS rare plant species occurrences, where practicable;
- Avoid placing heavy equipment within powerline corridors outside of the proposed slope stakes without prior approval from the USFS;
- Require contractors to pressure wash all off-road equipment prior to being brought into the CNF construction areas;
- Prior to construction NCDOT, in coordination with the USFS, will locate and flag areas of non-native invasive plant species for removal during construction;
- Avoid planting of aggressive non-native species for re-vegetation;
- Utilize rolled matting or weed free mulch for erosion control and revegetation on NFS lands;
- Avoid use of broadcast sprays for herbicides and pesticides on NFS lands;
- Minimize the use of herbicides and pesticides; and
- NCDOT Division 2 forces will work with USFS staff on a periodic basis to control the presence of priority species of non-native plants along the Havelock bypass easement on CNF. NCDOT will also work on adjacent NCDOT ROW to prevent the encroachment of priority non-natives on to CNF. In turn, USFS will work cooperatively with NCDOT to identify and effectively control prioritized non-native invasive plant species.

With the identification of five new populations by NCDOT on NFS lands in the CNF in watersheds not subject to effects by the US 70 Havelock Bypass project and the implementation of the additional mitigation measures to minimize potential for indirect effects to the remaining portion of the population in Southwest Prong Slocum Creek, the US 70 Havelock Bypass (R-1015) Alternative 3 project may result in loss of one population (Tucker Creek) and partial loss of one population (Southwest Prong Slocum Creek), but is not likely to cause a loss of viability for *Lejeunea bermudiana* on NFS lands in the CNF.

A liverwort (*Plagiochia ludoviciana*)

Plagiochila ludoviciana is a liverwort that has been reported across all three provinces (mountains, piedmont, and coastal plain) of North Carolina. Recent taxonomic decisions may result in this species more properly being referred to as *Plagiochila ruddiana* by the scientific community, but to avoid confusion with past evaluations for the US 70 Havelock Bypass project, the name *Plagiochila ludoviciana* will continue to be used for the present evaluation. The presence of this species on NFS in the CNF was confirmed during surveys by NCDOT of the Alternatives study area. This species has been documented in areas as a frequent habitat associate of *Lejeunea bermudiana* on NFS lands in the CNF and general habitat conditions are described under the section for that species.

Prior to 2012, there was only one NCNHP EO (17) documented on NFS lands within the CNF (Figure 2-3), resulting from surveys conducted by NCDOT. This EO is in the Southwest Prong Slocum Creek watershed west of Alternative 3. At the time the DEIS was issued, no direct or indirect effects were anticipated for this occurrence based on the selection of Alternative 3 as the preferred alternative. However, the 2012 and 2013 field surveys to determine the extent of potential direct and indirect effects to *Lejeunea bermudiana* resulted in identifying new occurrences of *Plagiochila ludoviciana* in the CNF, including in areas subject to both direct and indirect effect consideration as well as in a new watershed not subject to effects from the project.

Plagiochila ludoviciana has now been documented on NFS lands from 5 liverwort samples collected within three separate watersheds on the CNF (Figure 2). The new occurrences documented in the 2012 and 2013 surveys have not yet been assigned EO numbers by NCNHP.

- Southwest Prong Slocum Creek. This watershed contains the original EO (17) documented on the CNF. This original documented occurrence was not in an area subject to direct impacts and was well outside the area of consideration for indirect impacts. During the 2012 field surveys this species was identified from two liverwort samples collected within the area evaluated for potential indirect impacts associated with Alternative 3 while confirming the presence of *Lejeunea bermudiana* (Figure 2-3). These new documented sample locations for *Plagiochila ludoviciana* are located downstream from the Alt. 3 study area and are approximately 4,000 feet northeast of the original EO for this species on NFS lands in the CNF, and would be considered part of the same population. It is likely that this species is present on additional trees that provide suitable habitat within the Southwest Prong Slocum Creek watershed that have not been sampled.
- Tucker Creek. *Plagiochila ludoviciana* was documented in 2013 from a liverwort sample collected within the Tucker Creek watershed (Figure 2-2) while assessing the area for potential indirect impacts to *Lejeunea bermudiana* associated with a USFS thinning project. The site documented within the Tucker Creek watershed is located in an area evaluated for direct impacts and represents new information not previously considered for impacts for associated with Alternative 3. The documented sample location for the Tucker Creek site is represented by a single tulip poplar that has recently been hit by lightning and is in the process of sloughing of large areas of bark. This tree may not survive this lightning strike. Based on distribution of *Lejeunea bermudiana* within this watershed, *Plagiochila ludoviciana* is anticipated to be similarly distributed.
- Pettiford Creek. During the 2013 field surveys this species was documented from liverwort samples collected within Pettiford Creek watershed (Figure 2-6) as part of the mitigation measures surveys for *Lejeunea bermudiana*. This occurrence will not be directly or indirectly affected by the US 70 Havelock Bypass project.

Alternative 3 may directly or indirectly affect the populations of *Plagiochila ludoviciana* in the Southwest Prong Slocum Creek and Tucker Creek watersheds. The present evaluation considers direct effects on *Plagiochila ludoviciana* occurrences in the Alt. 3 study area as well as indirect effects that may result from the US 70 Havelock Bypass project and potential cumulative effects resulting from other applicable projects on the CNF.

Methods for Assessment

New surveys targeting Plagiochila ludoviciana were not conducted in 2012-2013, but this species was found incidental to surveys for *Lejeunea bermudiana*. Based on co-occurrences of *Plagiochila ludoviciana* with *Lejeunea bermudiana* at sites where *Plagiochila ludoviciana* has been documented so far, it is likely that *Plagiochila ludoviciana* may also be found in association with *Lejeunea bermudiana* at other sites in the CNF where *Lejeunea bermudiana* was documented in 2012-2013. Because *Plagiochila ludoviciana* occupies similar habitat and is expected to be similarly distributed, the assessment of effects to *Plagiochila ludoviciana* is based on the assessment presented for *Lejeunea bermudiana*.

Results of Assessment

Plagiochila ludoviciana has now been documented from three watersheds on NFS lands within the CNF, Southwest Prong Slocum Creek, Tucker Creek, and Pettiford Creek. In each case it was found in similar habitat and in several cases co-occurring with *Lejeunea bermudiana*. Based on known occurrences and habitats, it is likely that *Plagiochila ludoviciana* would be found in association with *Lejeunea bermudiana* at other sites in the CNF. In addition to Pettiford Creek (Figure 2-6), where *Plagiochila ludoviciana* was documented co-occurring with *Lejeunea bermudiana*, *Plagiochila ludoviciana* is also expected to be present but undetected by the 2012-2013 surveys that documented *Lejeunea bermudiana* in the other watersheds unaffected by the US 70 Havelock Bypass, including Island Creek (Figure 2-1), an unnamed tributary to Cahooque Creek (Figure 2-4), Still Gut Creek (Figure 2-4), and King Creek (Figure 2-5) watersheds. Effects to *Plagiochila ludoviciana* are expected to be similar to effects described for *Lejeunea bermudiana*.

Summary of Impacts

- Alternative 3 directly affects one watershed that includes a documented sample location containing this species. Within the Tucker Creek watershed, Alternative 3 directly affects this occurrence in its known entirety. This occurrence is located on a tree that has been damaged by a recent lightning strike and is sloughing off large areas of bark, with the tree expected to succumb to the lightning damage. However, this species may occur on other suitable, unsampled trees present in the direct impact area. The occurrence in this watershed also has been impacted by recent forest management activities (thinning) resulting in increased light penetration, but because the Havelock Bypass project would result in presumed loss of this population, the forest management activities would not contribute to significant adverse cumulative effects.

- Occupied habitat in the form of mature hardwood trees within the West Prong Slocum Creek watershed is in an area that is subject to consideration for indirect effects by Alternative 3. Patches of this species were observed on tree trunks within the area under consideration for indirect effects. Potential indirect impacts that could result from construction or maintenance activities can be minimized through measures previously proposed by NCDOT for the areas subject to potential indirect impacts.

Conclusions and Recommendations

The US 70 Havelock Bypass (R-1015) Alternative 3 will result in unavoidable direct impacts to *Plagiochila ludoviciana* and an additional area occupied by *Plagiochila ludoviciana* is subject to consideration for indirect impacts. The direct impacts for Alternative 3 may lead to a loss of the population in Tucker Creek and Alternative 3 may result in indirect effects to the population in Southwest Prong Slocum Creek. With appropriate measures to minimize threats from indirect impacts, the US 70 Havelock Bypass project is not expected to result in loss of the population in Southwest Prong Slocum Creek. No significant adverse cumulative impacts from other projects were identified.

Mitigation measures would reduce the threat for a loss of the occurrence of *Plagiochila ludoviciana* in the Southwest Prong Slocum Creek watershed on NFS lands in the CNF. Implementation of mitigation

measures agreed to between NCDOT and USFS would minimize viability concerns that could result from indirect impacts. These mitigation measures include:

- Prior to construction, NCDOT will coordinate with the USFS to identify occurrences of USFS rare plant species near the project construction limits and put up protective orange fencing to be removed after completion of construction;
- Avoid placing staging areas within 250 feet of USFS rare plant species occurrences, where practicable;
- Avoid placing heavy equipment within powerline corridors outside of the proposed slope stakes without prior approval from the USFS;
- Require contractors to pressure wash all off-road equipment prior to being brought into the CNF construction areas;
- Prior to construction NCDOT, in coordination with the USFS, will locate and flag areas of non-native invasive plant species for removal during construction;
- Avoid planting of aggressive non-native species for re-vegetation;
- Utilize rolled matting or weed free mulch for erosion control and revegetation on NFS lands;
- Avoid use of broadcast sprays for herbicides and pesticides on NFS lands;
- Minimize the use of herbicides and pesticides; and
- NCDOT Division 2 forces will work with USFS staff on a periodic basis to control the presence of priority species of non-native plants along the Havelock bypass easement on CNF. NCDOT will also work on adjacent NCDOT ROW to prevent the encroachment of priority non-natives on to CNF. In turn, USFS will work cooperatively with NCDOT to identify and effectively control prioritized non-native invasive plant species.

The identification of new populations of this species in secure locations on NFS lands is an important mitigation measure and one new population of *Plagiochila ludoviciana* has already been identified on behalf of USFS by NCDOT on NFS lands in the CNF in a watershed unaffected by the US 70 Havelock Bypass project. This new, unaffected occurrence was documented in 2013 in the Pettiford Creek watershed in association with *Lejeunea bermudiana*. Based on co-occurrences of *Plagiochila ludoviciana* with *Lejeunea bermudiana* at sites where *Plagiochila ludoviciana* has been documented so far, it is likely that *Plagiochila ludoviciana* may also be found in association with *Lejeunea bermudiana* at other sites in the CNF where *Lejeunea bermudiana* was documented in 2012-2013.

With the implementation of appropriate measures to reduce indirect impacts, the US 70 Havelock Bypass (R-1015) Alternative 3 project is not likely to cause a loss of viability for *Plagiochila ludoviciana* on NFS lands in the CNF.

Florida Peatmoss (*Sphagnum cribrosum*)

Florida peatmoss has been documented in eight counties in the coastal plain of North Carolina, including all three counties of the CNF based on updated information provided by the USFS for the CNF. Florida peatmoss is found along the margins of acidic lakes and cypress-gum ponds as well as wet depressions in pine flatwoods and savannas.[i, ii] This species may also be found in ditches and utility rights-of-way adjacent to these habitats and slowly meandering, shallow, black water streams.

There are 11 documented occurrences of Florida peatmoss on NFS lands in the CNF that represent 6 populations (Gary Kaufman personal communication, 2013). One of these populations occurs in the vicinity of the US 70 Havelock Bypass and consists of three individual sites with documented presence of Florida peatmoss. One additional site within the area, not on NFS lands, has been documented on NCDOT's Croatan Wetland Mitigation Bank near Havelock. These Havelock sites are depicted in Figure 2. The other populations on NFS lands occur along Little Road (multiple sites), Hunter Holston Road, Hadnot Road, and Catfish Lake Road.

In the vicinity of the US 70 Havelock Bypass Alternatives study area, only one Florida peatmoss site (Site #1 on Figure 2) is in the Alt. 3 study area and subject to consideration for direct impacts as well as indirect impacts. One Florida peatmoss site (Site #2 on Figure 2) is located in a depression in a maintained powerline ROW outside the area of potential direct impact, but within the area for consideration for indirect impacts. The third Florida peatmoss site in the project vicinity (Site #4 on Figure 2) is located in a depression in a maintained powerline ROW approximately 600 feet south of the Alt. 3 study area and is outside the area considered for direct or indirect effects.

The scope of work for the Florida peatmoss evaluation is the result of meetings with NCDOT and the USFS. The present evaluation considers direct effects on Florida peatmoss occurrences in the Alt. 3 study area as well as indirect effects that may result from the US 70 Havelock Bypass and potential cumulative effects resulting from other applicable projects on the CNF.

Methods for Assessment

The present assessment focused on determining potential direct and indirect effects to Florida peatmoss Site #1, potential indirect effects to Florida Peatmoss Site #2, as well as potential cumulative effects to this species on the CNF.

The only occurrence in the Alt. 3 study area (Florida Peatmoss Site #1) is in a ditch adjacent to a railroad corridor that is proposed to be bridged by Alternative 3 (Figure 3). This area is subject to consideration for direct effects from construction, as well as indirect effects. The additional portion of this occurrence in the ditch downstream of the Alt. 3 study area is located in an area also subject to consideration for indirect effects by Alternative 3. The previous limits of this occurrence were established at the boundaries of the Alternatives study area during previous NCDOT surveys for this project. To better understand the impact to this occurrence, USFS requested that NCDOT consider resurveying this occurrence to determine the full extent of this occurrence outside the Alt. 3 study area. This occurrence was reinvestigated in the field on 16 July 2012 by ESI biologists Matt Smith and David DuMond. The survey consisted of walking adjacent to the ditch upstream and downstream of the Alt. 3 study area until no Florida peatmoss was observed.

Results of Assessment

Florida Peatmoss Site #1 is located in a ditch adjacent to a railroad ROW (Figure 3). The railroad ROW appears to be maintained by a combination of periodic mowing and annual application of herbicides. The ditch adjacent to the railroad is gradually sloped and the water was observed to flow from the southeast to the northwest through the Alt. 3 study area. The 2012 survey documented that Florida peatmoss is present within the ditch (Florida Peatmoss Site #1) for approximately 2,500 feet upstream of the Alt. 3

study area (Figure 3), expanding the known extent of this occurrence and reducing the relative proportion of this occurrence within the Alt. 3 study area. Florida peatmoss becomes increasingly dense in the ditch to the southeast of the powerline right-of-way with the greatest densities observed upstream of the Alt. 3 study area. This species also becomes increasingly uncommon and eventually disappears from the ditch moving downstream from the powerline right-of-way towards Creek Rd approximately 580 feet downstream of the Alt. 3 study area (Figure 3). It appears that the Florida peatmoss observed in the ditch within the Alt. 3 study area is associated with a larger population located in the pocosin southeast of the Alt. 3 study area.

Although Florida Peatmoss Site #1 is being bridged, bridge construction will likely result in a direct impact to the portion of this occurrence located within the Alt. 3 study area. Construction of the new bridges may necessitate access roads and temporary track crossings on both sides of the embankment to provide an area for crane set-up. Structure recommendations for this bridge crossing show future tracks on either side of the existing track. If additional track is built, it may result in cumulative impacts in and adjacent to the bridge crossing, but the likelihood of track expansion is not reasonably foreseeable at this time. The railroad's annual vegetation spraying program extends up to 20 feet out in each direction from the centerline of the track. The spraying program has likely had some cumulative effects over time and will continue to do so, but the continued occurrence of the Florida peatmoss in spite of the spraying seems to indicate that the effects have not been significantly adverse.

The powerline ROW containing Florida Peatmoss Site #2 is managed by a combination of mowing by the powerline easement holder and prescribed burns conducted by the USFS. One project identified for consideration for cumulative effects for Florida peatmoss included in this analysis is a project proposed by Duke Energy Progress for replacing the overhead ground wire and selected poles within the existing transmission line corridor ROW that includes Florida Peatmoss Site #2. Based on the assessment conducted for the Duke Energy Progress project, the Florida peatmoss occurrence will be avoided by utility project activities. There were no cumulative effects identified for Florida peatmoss based on avoidance of impacts to Site #2 by the Duke Energy Progress project, and no other foreseeable projects identified that significantly affect other Florida peatmoss occurrences.

<u>Summary of Impacts</u>

- This evaluation indicates that the occurrence of Florida peatmoss within the Alt. 3 study area (Florida Peatmoss Site #1) is more extensive upstream above the impact area than previously documented and that the majority of this occurrence occurs in an area that is neither directly nor indirectly affected by Alternative 3 (Figure 3).

- Alternative 3 directly affects a portion of one occurrence of Florida peatmoss (Site #1). Approximately 0.03 acre of Florida Peatmoss Site #1 is located within approximately 466 feet of ditch adjacent to the railroad where the Alt. 3 study area crosses the ditch and railroad with a bridge. An additional 0.11 acre of this occurrence is located upstream of the Alt. 3 study area will not be affected by Alternative 3.

- Two occurrences are located in areas subject to consideration for potential indirect impacts associated with Alternative 3. This species was confirmed present in these occurrences;

individual plant counts are not practicable for bryophyte species and total population was not determined.

- Approximately 0.04 acre of Florida Peatmoss Site #1 is located in an area for consideration of potential indirect effects by Alternative 3. Potential indirect effects include shading associated with the bridge crossing.
- An additional occurrence (Florida Peatmoss Site #2) is located in another area subject to consideration for indirect impacts by Alternative 3. Florida Peatmoss Site #2 is not anticipated to be affected by Alternative 3 due to its distance (approximately 3,300 feet east) from the Alt. 3 study area, with no changes in management of the powerline right-of-way in which it occurs expected to occur as a result of the project or as a result of the proposed Duke Energy Progress overhead ground wire replacement project. The proposed Duke Energy Progress project avoids impacts to Site #2 and would not contribute to cumulative effects.

- If additional railroad track is built in the future at Florida Peatmoss Site #1, it may result in cumulative impacts. Track expansion is not foreseeable at this time, however.

- The railroad's annual vegetation spraying program has probably had some cumulative effects at Florida Peatmoss Site #1 but the effects do not seem significantly adverse.

- NCDOT commissioned an assessment of the potential for Croatan Wetland Mitigation Bank (CWMB) habitats to support USFS rare species in 2007 which resulted in the documentation of a previously unknown occurrence of Florida peatmoss (Florida Peatmoss Site #3 on Figure 2). The planned transfer by NCDOT to USFS of the tract occupied by the CWMB would add this occurrence to NFS lands.

- Measures previously proposed by NCDOT for areas subject to consideration for potential indirect impacts would reduce the likelihood for adverse effects to these areas.

Conclusions and Recommendations

The US 70 Havelock Bypass (R-1015) Alternative 3 will result in unavoidable direct impacts to Florida peatmoss as a result of the proposed bridging of the railroad ditch where this species occurs in the Alt. 3 study area (Florida Peatmoss Site #1 on Figure 3). The portion of this occurrence in the ditch downstream from the proposed ROW is subject to consideration for indirect impacts. The documented extent of this occurrence on NFS lands was substantially expanded by the NCDOT survey in 2012. With the new documentation that the majority of this occurrence extends a considerable distance farther upstream of Alternative 3, only approximately 0.03 acre of the 0.21-acre known extent for Florida Peatmoss Site #1 is being directly impacted and approximately 0.04 acre of this occurrence is in the ditch downstream of the ROW and subject to consideration for indirect impacts. Cumulative impacts associated with the potential future widening of the Atlantic and East Carolina Railroad from a single track to multiple tracks may occur at Florida peatmoss Site #1 if railway construction alters the ditches adjacent to the railway. Potential affects to Florida peatmoss will need to be evaluated as part of the planning process for the railway project, should it occur. Currently it the rail expansion is not reasonably foreseeable. No cumulative impacts from the Duke Energy Progress project, USFS, or NCDOT projects

on NFS lands in the CNF have been identified for this occurrence of for any of the other five known occurrences on NFS lands in the CNF.

The project is not expected to result in changes that would prevent the utility company and/or railroad from continued mowing to maintain the right-of-way in which these occurrences are found, reducing the threat for indirect impacts. Other potential concerns for indirect impact that could result from project construction and maintenance activities can be minimized through appropriate measures. Implementation of measures agreed to between NCDOT and USFS would minimize from the potential for adverse indirect impacts. These measures include:

- Prior to construction, NCDOT will coordinate with the USFS to identify occurrences of USFS rare plant species near the project construction limits and put up protective orange fencing to be removed after completion of construction;
- Avoid placing staging areas within 250 feet of USFS rare plant species occurrences, where practicable;
- Avoid placing heavy equipment within powerline corridors outside of the proposed slope stakes without prior approval from the USFS;
- Require contractors to pressure wash all off-road equipment prior to being brought into the CNF construction areas;
- Prior to construction NCDOT, in coordination with the USFS, will locate and flag areas of non-native invasive plant species for removal during construction;
- Avoid planting of aggressive non-native species for re-vegetation;
- Utilize rolled matting or weed free mulch for erosion control and revegetation on NFS lands;
- Avoid use of broadcast sprays for herbicides and pesticides on NFS lands;
- Minimize the use of herbicides and pesticides; and
- NCDOT Division 2 forces will work with USFS staff on a periodic basis to control the presence of priority species of non-native plants along the Havelock bypass easement on CCNF. NCDOT will also work on adjacent NCDOT ROW to prevent the encroachment of priority non-natives on to CNF. In turn, USFS will work cooperatively with NCDOT to identify and effectively control prioritized non-native invasive plant species.

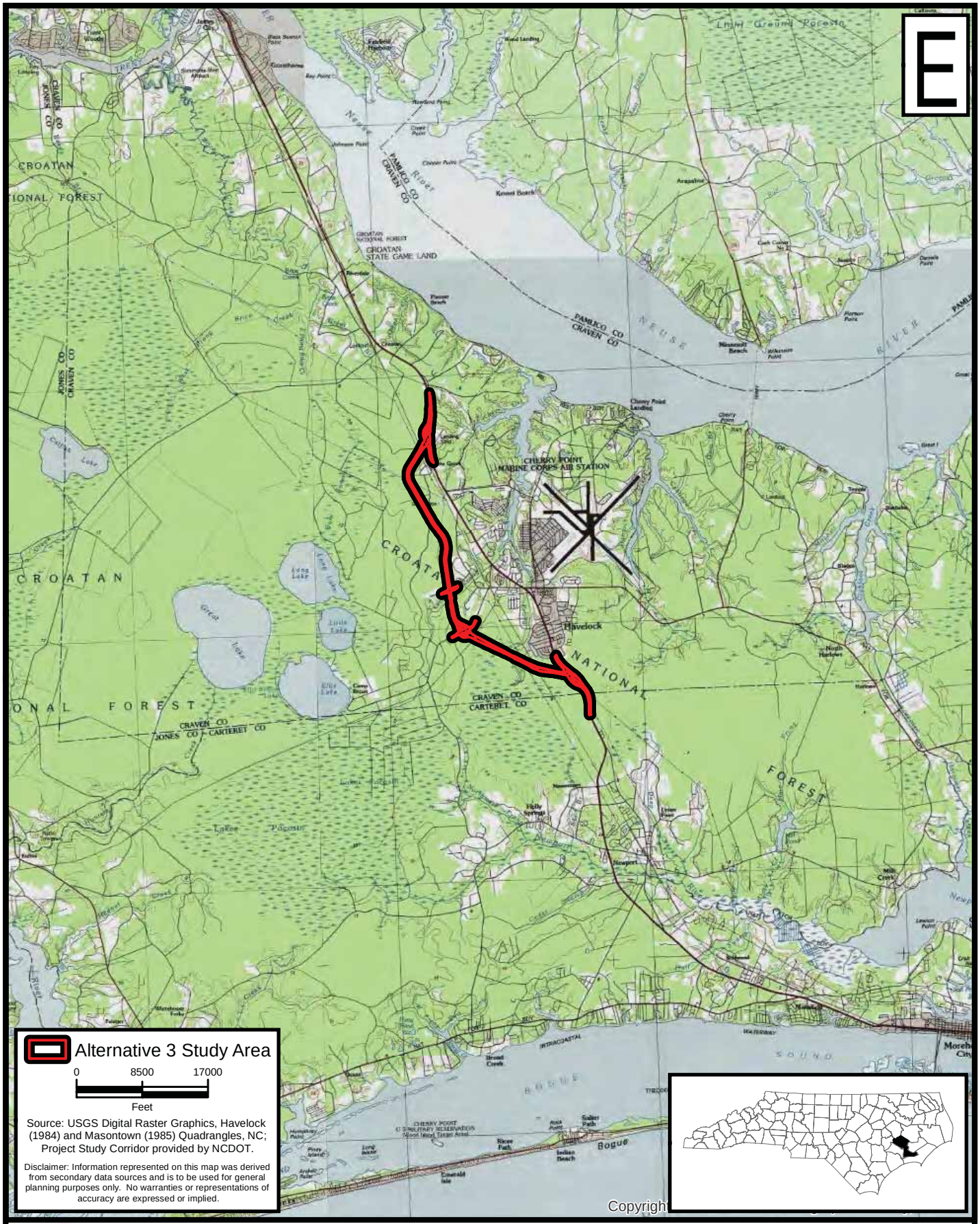
One new occurrence of Florida peatmoss (Site #3) was identified on the CWMB as part of a previous evaluation by NCDOT in 2007. When this tract is transferred to the USFS from NCDOT, then it would add an additional occurrence to the existing occurrences known from NFS lands on the CNF and could be considered a mitigative measure.

Based on the occurrence of six populations of Florida peatmoss on NFS lands in the CNF, potential direct impacts to approximately 14 percent of the only population in the proposed Alt. 3 ROW, no direct effects to any of the other five populations, implementation of mitigation measures to minimize potential for indirect effects to the populations in or near the US 70 Havelock Bypass (R-1015) Alt. 3 study area, and no foreseeable or significantly adverse cumulative effects identified at this time, the project is not likely to cause a loss of viability for Florida peatmoss on NFS lands in the CNF.

[i] Anderson, L.E., A.J. Shaw, and B. Shaw. 2009. Peat Mosses of the Southeastern United States. New York

Botanical Garden Press, New York. 110 pp.

[ii] Duke University Herbarium. http://biology.duke.edu/bryology/raremoss2005/raremoss_files/page0018.htm accessed October 2012.



Project Location

US 70 Havelock Bypass (R-1015)

Craven and Carteret Counties, North Carolina

Project:	ER12050.06
Date:	Oct 2013
Drwn/Chkd:	KT/MS
Figure:	1

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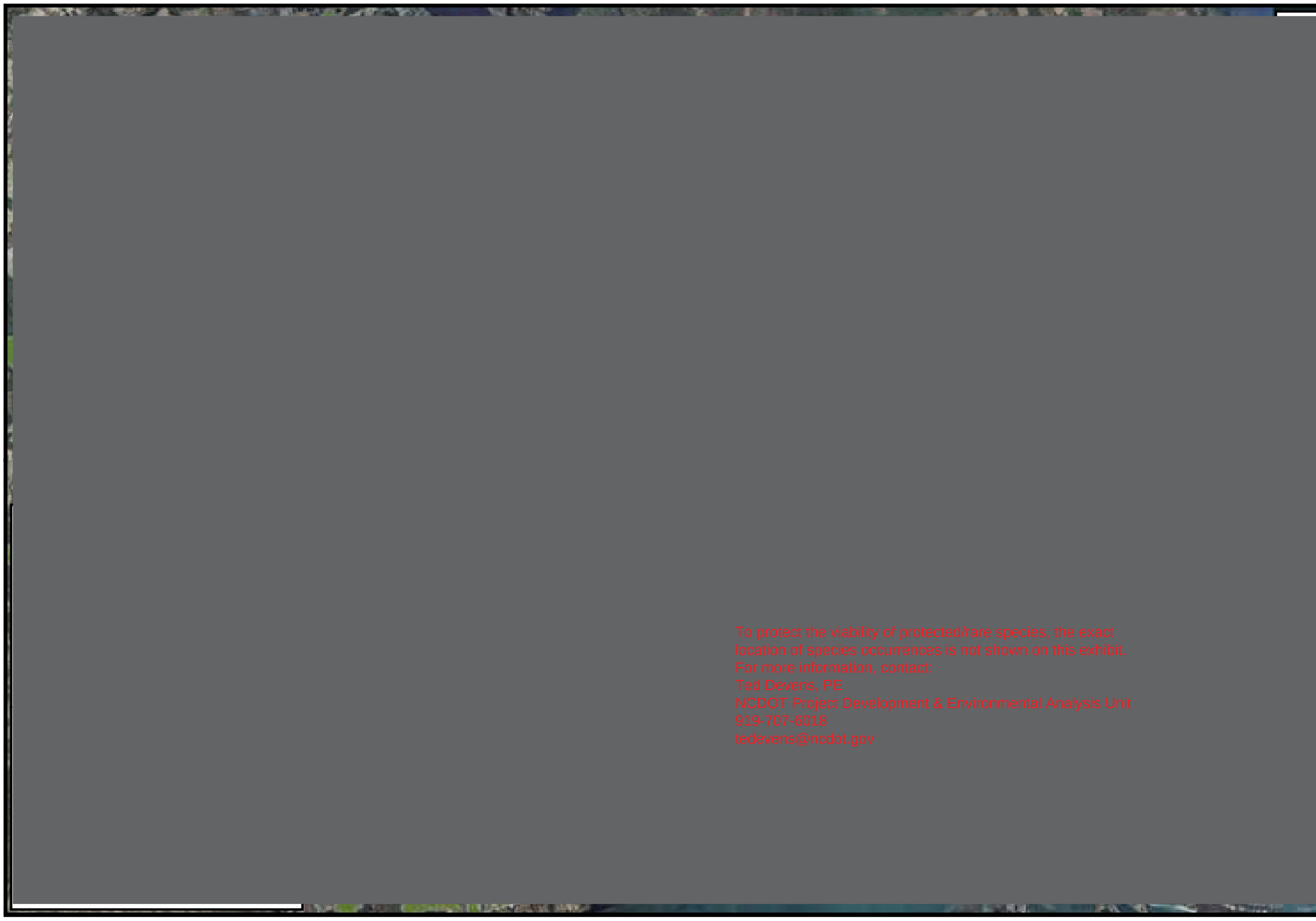

Rare Bryophyte Occurrences Across the Croatan National Forest

US 70 Havelock Bypass (R-1015)

Craven and Carteret Counties, North Carolina

Project:	ER12050.06
Date:	Nov 2013
Drwn/Chkd:	KT/MKS
Figure:	**2**

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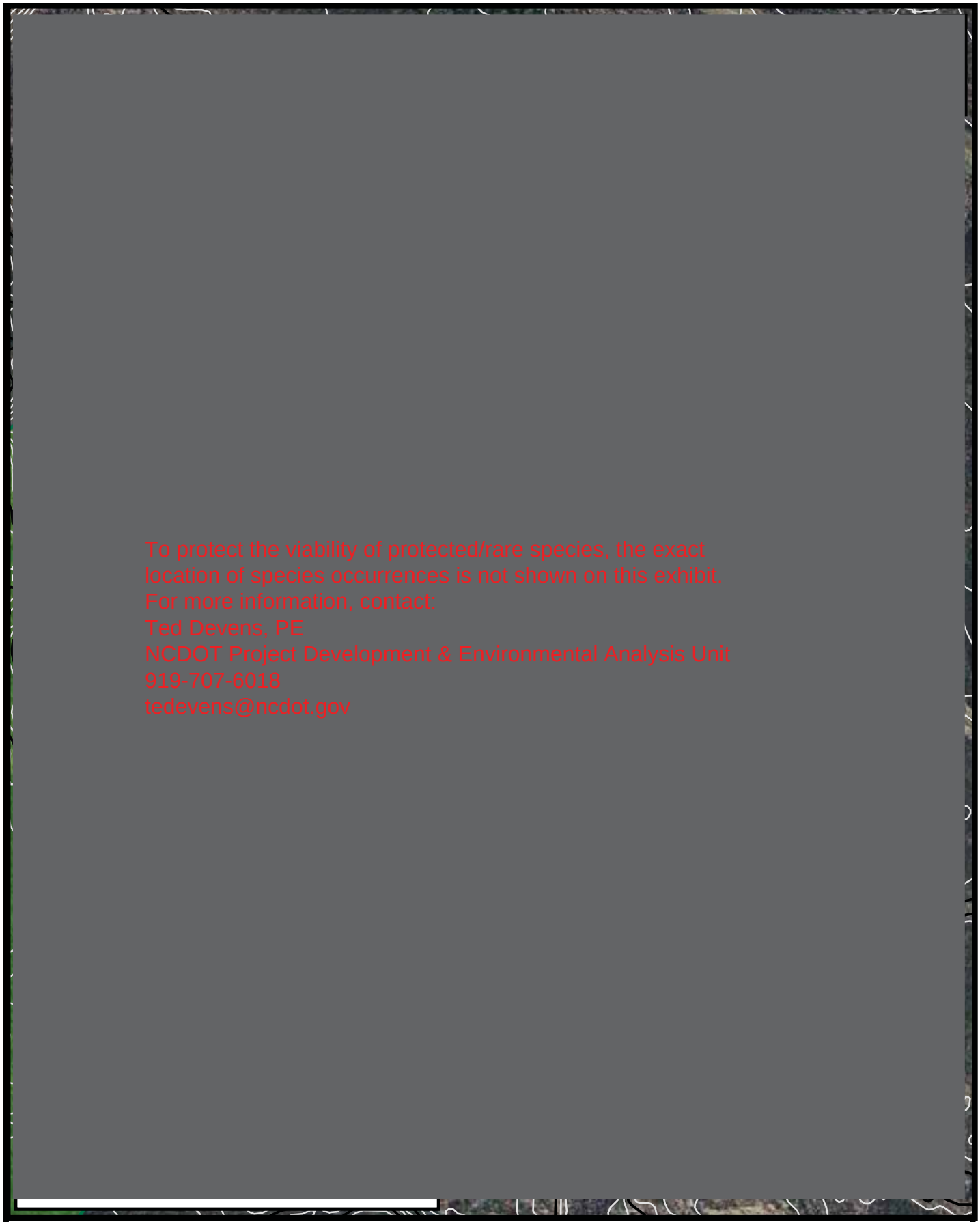

Lejeunea bermudiana Assessment - Island Creek Drainage

US 70 Havelock Bypass (R-1015)

Craven and Carteret Counties, North Carolina

Project:	ER12050.06
Date:	Oct 2013
Drwn/Chkd:	KT/MS
Figure:	**2 - 1**

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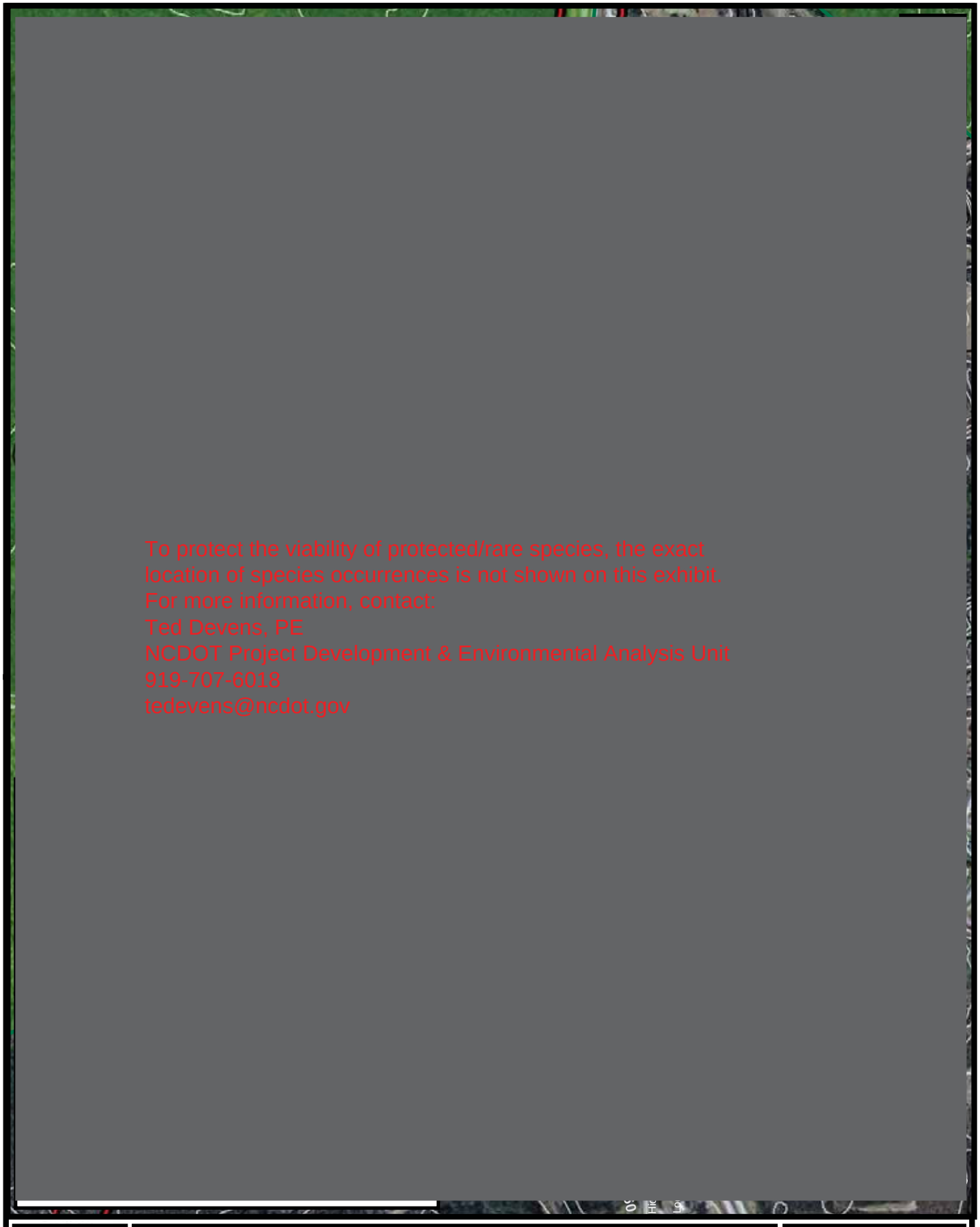

Lejeunea bermudiana Assessment - Tucker Creek Drainage

US 70 Havelock Bypass (R-1015)

Craven and Carteret Counties, North Carolina

Project:	ER12050.06
Date:	Oct 2013
Drwn/Chkd:	KT/MS
Figure:	**2 - 2**

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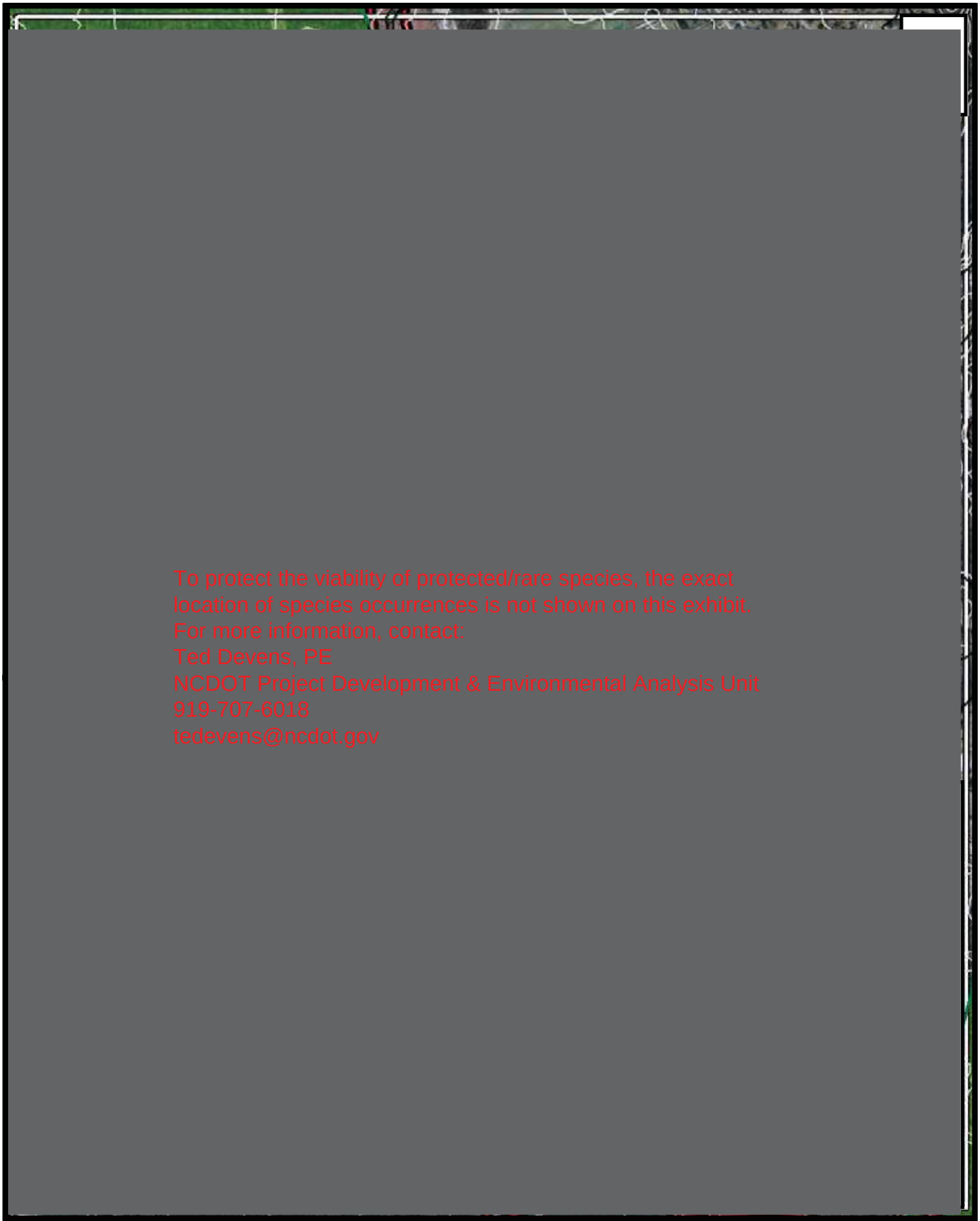

Lejeunea bermudiana Assessment - Slocum Creek Drainage

US 70 Havelock Bypass (R-1015)

Craven and Carteret Counties, North Carolina

Project:	ER12050.06
Date:	Oct 2013
Drwn/Chkd:	KT/MS
Figure:	**2- 3**

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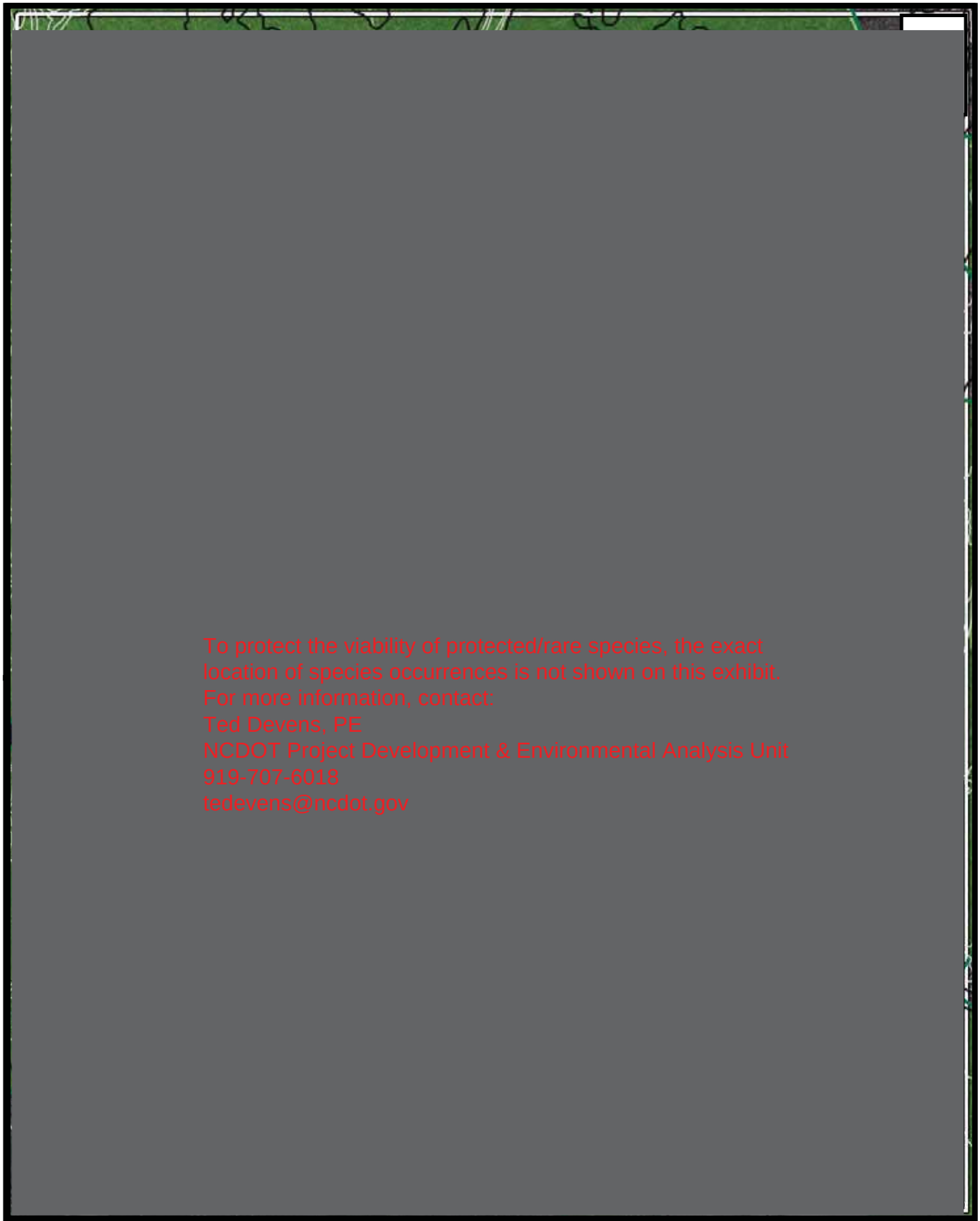

Lejeunea bermudiana Assessment - Still Gut and Cohoogue Creek Drainage

US 70 Havelock Bypass (R-1015)

Craven and Carteret Counties, North Carolina

Project:	ER12050.06
Date:	Oct 2013
Drwn/Chkd:	KT/MS
Figure:	**2- 4**

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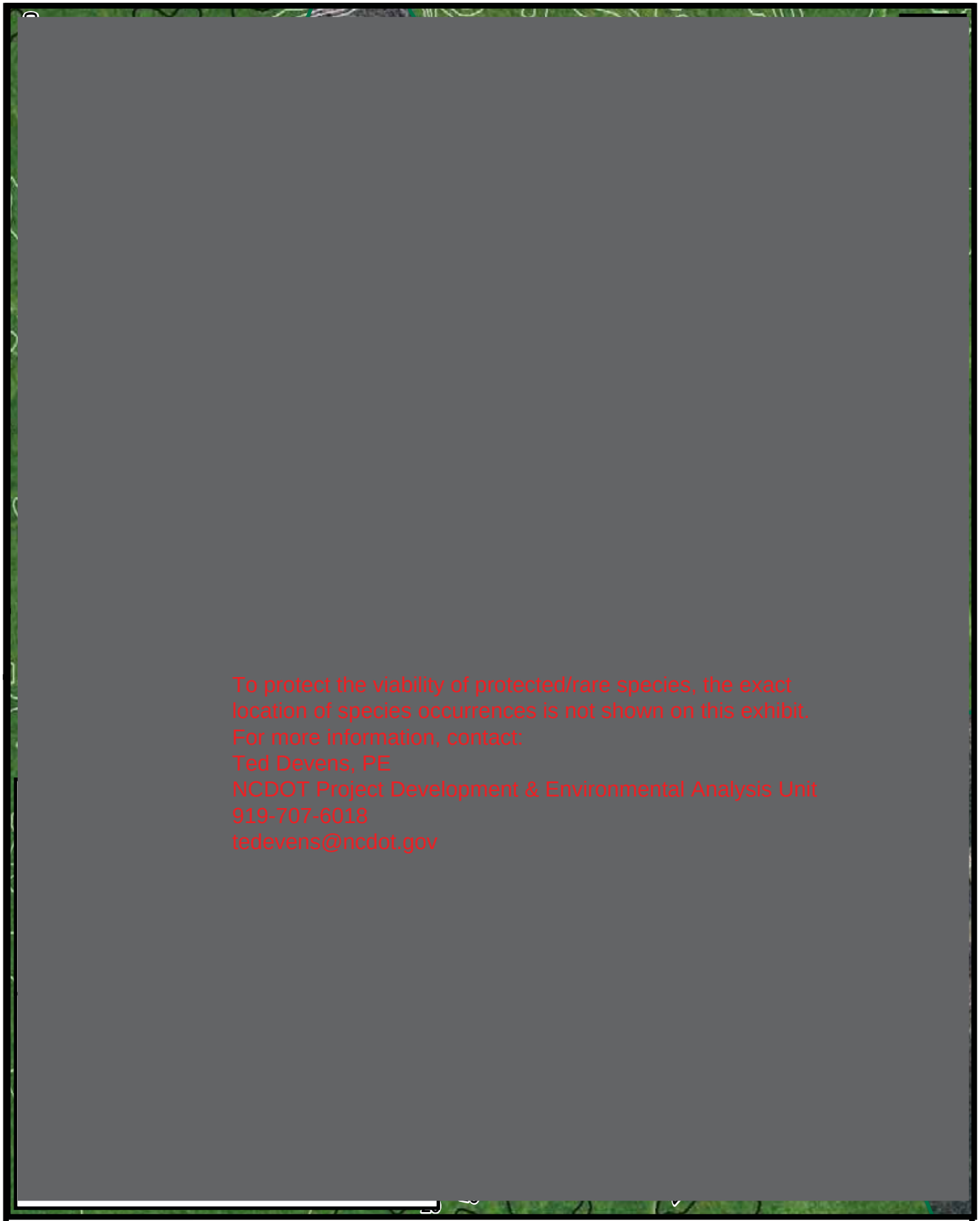

Lejeunea bermudiana Assessment - King Creek Drainage

US 70 Havelock Bypass (R-1015)

Craven and Carteret Counties, North Carolina

Project:	ER12050.06
Date:	Oct 2013
Drwn/Chkd:	KT/MS
Figure:	**2 - 5**

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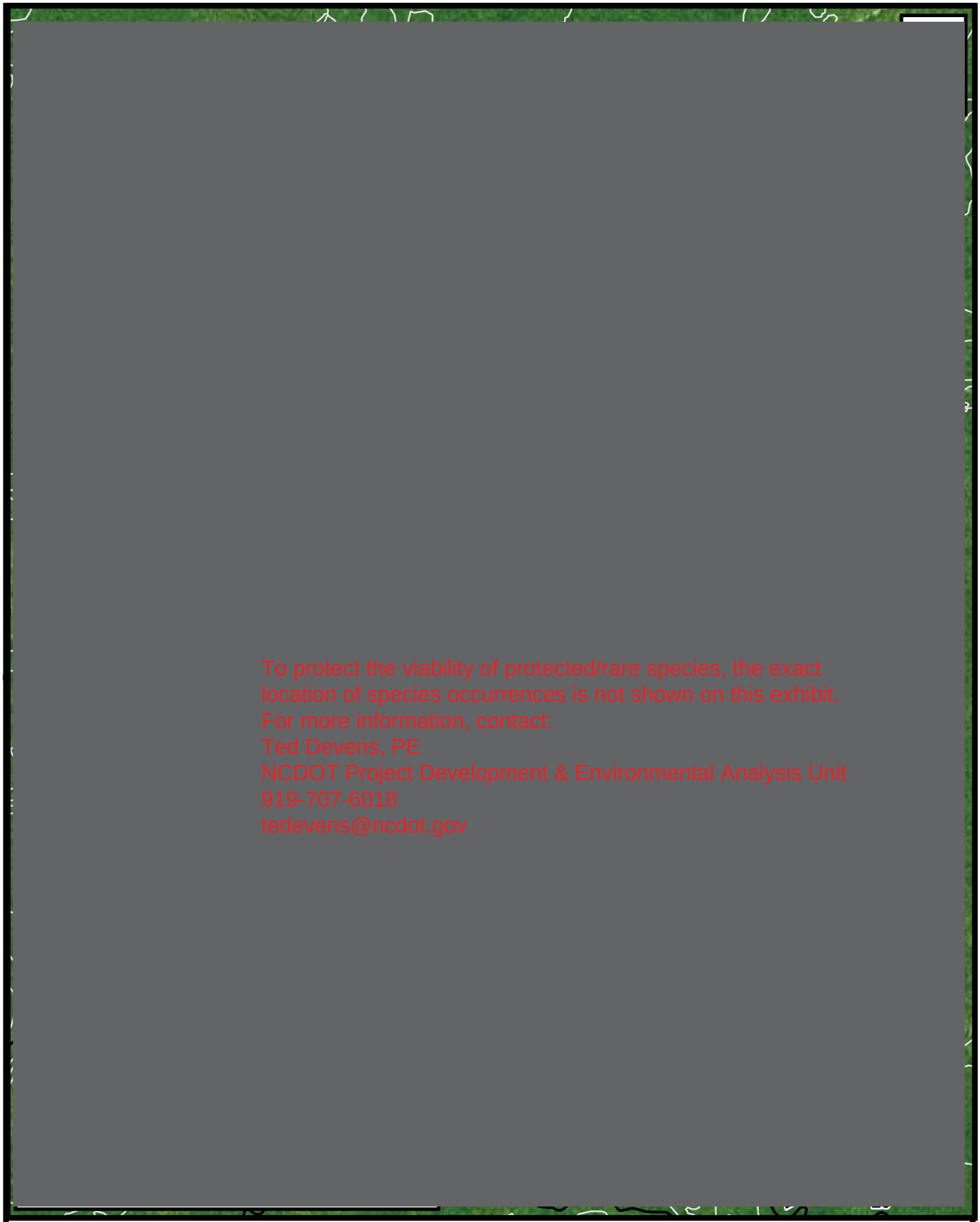

Lejeunea bermudiana Assessment - Pettiford Creek Drainage

US 70 Havelock Bypass (R-1015)

Craven and Carteret Counties, North Carolina

Project:	ER12050.06
Date:	Oct 2013
Drwn/Chkd:	KT/MS
Figure:	**2 - 6**

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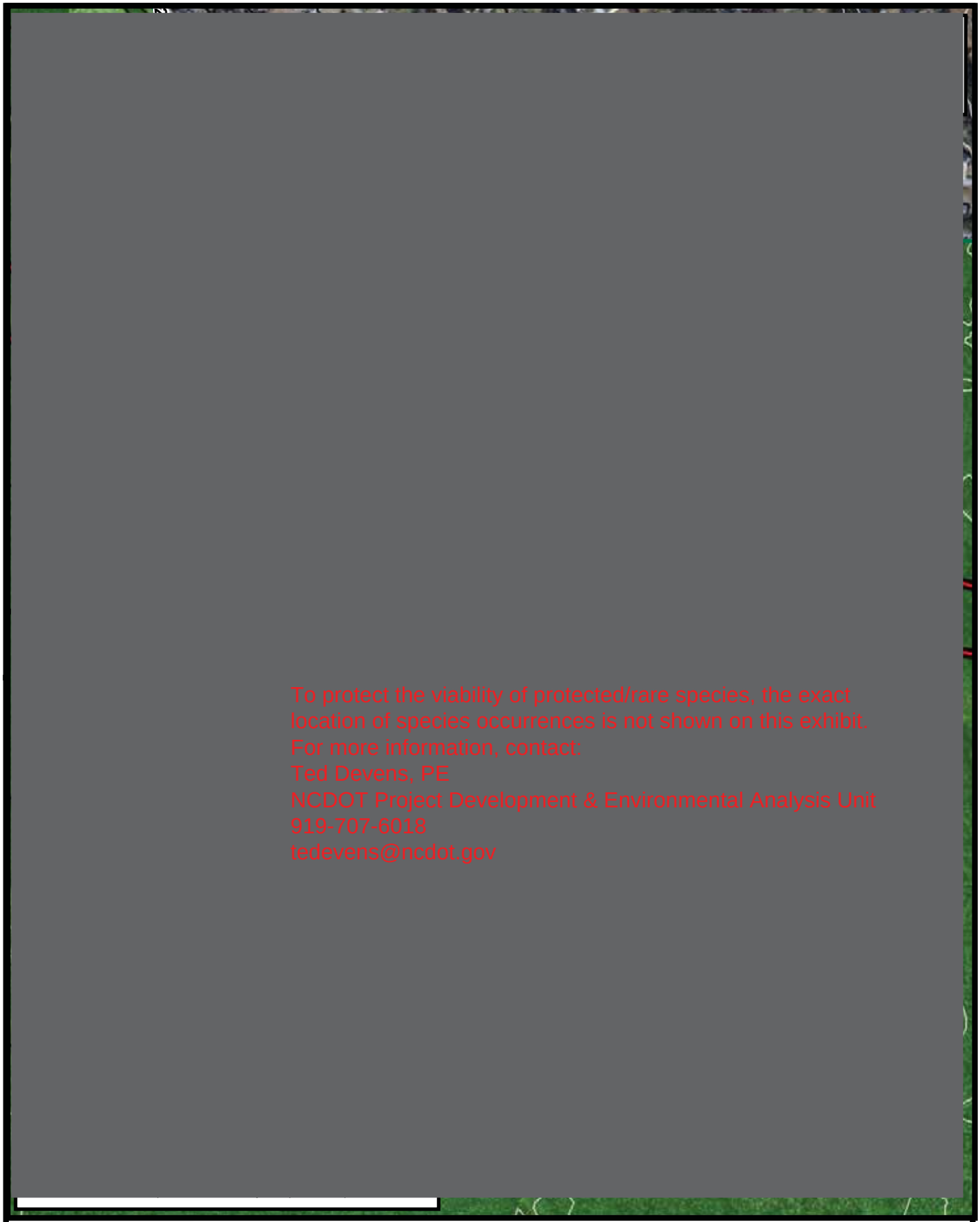

Rare Bryophyte Occurrences - Sphagnum cribrosum

US 70 Havelock Bypass (R-1015)

Craven and Carteret Counties, North Carolina

Project:	ER12050.06
Date:	Oct 2013
Drwn/Chkd:	KT/MS
Figure:	**3**

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ATTACHMENT 13

ENVIRONMENTAL SERVICES, INC.
524 South New Hope Road
Raleigh, North Carolina 27610
919-212-1760 / Facsimile 919-212-1707
www.environmentalservicesinc.com

MEMORANDUM

TO: Mary Frazer

FROM: Matt Smith

DATE: 26 June 2014

RE: US 70 Havelock Bypass (R-1015)
P.O. No. 6300036892
Rare Plant Mitigation Measures: Summary of Evaluation for Awned Mountain-mint (*Pycnanthemum setosum*)
ESI Project No. ER12-050.13

Background

In their review of the Biological Evaluation Report (BE) for the US 70 Havelock Bypass project, the U.S. Forest Service (USFS) identified the need for additional information on project-related impacts for Awned Mountain-mint (*Pycnanthemum setosum*) to more fully assess potential viability concerns resulting from project implementation.

Awned Mountain-mint is listed as a Locally Rare species by the USFS for the Croatan National Forest (CNF), is listed as Significantly Rare – Throughout by the North Carolina Natural Heritage Program (NCNHP), and does not have a designation by the U.S. Fish and Wildlife Service (USFWS). Based on the Locally Rare listing for the CNF, the USFS is required to assess potential impacts to the species resulting from actions by the USFS, such as granting an easement for the US 70 Havelock Bypass, to determine whether the action threatens the viability of the species on National Forest System (NFS) lands in the CNF.

Environmental Services, Inc., (ESI), has been asked by the North Carolina Department of Transportation (NCDOT) to complete an evaluation of impacts to this species associated with three alternatives considered for the proposed US 70 Havelock Bypass (R-1015) (Figure 1). The area encompassed by all three alternatives for the US 70 Havelock Bypass is referred to as the Alternatives study area in this evaluation. The scope of work for the Awned Mountain-mint evaluation is the result of meetings between NCDOT and the USFS.

Impact assessments for this species were based on the following:

- The evaluations presented here utilize Element Occurrence (EO) data obtained from the N.C. Natural Heritage Program (NCNHP) in April 2014, supplemented by site evaluations conducted by ESI in June 2014.
- Boundaries for NFS lands were provided by the USFS for use in this evaluation. Only EOs, or portions of EOs, on NFS lands are of concern for the viability determination for NFS lands on the CNF.
- Direct impacts for each alternative are based on the tree clearing limits (slope stake limits plus 15 feet) plus an additional 25 feet.
- Indirect impacts were considered for EO areas located on NFS lands between the alternative direct impact areas and existing US 70 based on consideration that different post-project habitat management techniques may be required by USFS for areas isolated from larger, contiguous NFS lands by the project. Additional concerns identified for consideration of indirect impacts include construction or maintenance actions by NCDOT in the vicinity of rare plants EOs on NFS lands that could have negative impacts on the rare plants or the suitability of their habitat. These actions could include the type of roadside vegetation proposed for use by NCDOT in the project right-of-way, location of construction staging areas, soil compaction or rutting caused by heavy equipment resulting in localized changes in hydrology, and use of herbicides and pesticides.
- Cumulative impacts were considered for identified actions on NFS lands that could affect this species. Because the USFS concern for this species is for maintaining continued viability on NFS lands in the CNF, actions off NFS lands were not considered for determining whether an action will affect the viability of this species on NFS lands. Actions proposed on NFS lands are subject to independent review by USFS to assess potential effects to the continued viability of this species on NFS lands in the CNF. No NCDOT projects have been identified that would directly or indirectly impact this species on NFS lands. No actions being considered by USFS on NFS lands have been identified that would directly or indirectly impact this species. As such, no significant cumulative impacts were identified for this species.

A summary of the evaluation presented here will be incorporated into Chapter 4 of the Final Environmental Impact Statement (FEIS) and the BE.

Awned Mountain-mint (*Pycnanthemum setosum*)

Awned Mountain-mint is a perennial member of the mint family that occurs in damp to wet fields, old fields, clearings, and forest borders in sandy soils.[i] These areas are often in associated with openings in blackwater swamps.[ii] On the CNF this species has been documented from two locations (Figure 2a): a powerline right-of-way near the proposed US 70 Havelock Bypass western interchange with existing US 70 (EO 5); and a bluff adjacent to Holston Creek in the western portion of the CNF (EO 3). The habitat associated with each of these differs, however both sites are located in association with blackwater swamps.

Methods and Results of Assessment

There are two EOs reported for Awned Mountain-mint on NFS lands within the CNF, but recent surveys have failed to relocate this species within one of these EOs (EO 3) (Gary Kauffman, personal communication, 19 February 2014). Each of the three alternatives evaluated for the US 70 Havelock

Bypass project area include a portion of EO 5, possibly the only extant occurrence of this species reported from NFS lands in the CNF. This evaluation focuses on the EO (EO 5) that is located in the Alternatives study area, to determine the approximate boundaries of this EO for purposes of determining direct and indirect impacts, and to estimate the number of individual plants that are located within the direct and indirect impact areas; no projects were identified that would contribute to cumulative impacts to this species on NFS lands in the CNF. Awned Mountain-mint EO 5 is located in an area with a project footprint common to all three alternatives; therefore impacts for each alternative will be the same and separate detailed analyses are not provided for each alternative.

Surveys for Awned Mountain-mint were undertaken on 3 June 2014 by an experienced team of biologists led by Matt Smith with support from Kevin Markham. Surveys consisted of two biologists walking transects within the habitat encompassed by the NCNHP EO polygon, as well as adjacent areas on NFS lands with similar habitat conditions.

Individual Awned Mountain-mint plants were identified across a range of growth stages, including non-flowering immature plants and plants in all stages of flowering. Although typically not expected to be in full flower until late June, two plants were noted in flower on the survey date and numerous others were noted as budding and appeared ready to begin flowering.

The extent of habitat occupied by Awned Mountain-mint was approximated using GPS to delineate the concentrations of plants encountered. Five discrete concentrations of plants were identified, separated by breaks in habitat in which no Awned Mountain-mint was identified. Each of these five areas is identified as a sub-polygon of EO 5 on Figure 2b.

Stem counts for Awned Mountain-mint were made in areas with limited number of individual plants, and in larger areas with sparse densities of scattered individuals. To avoid trampling plants in larger and more densely populated occupied habitat, counts were made for a subsample which was then applied to visually assess the remaining extent of areal coverage to estimate the number of plants present.

The results of the survey are presented in Table 1 along with a summary of NCNHP data for the most recent observations of the EO. Because several sub-polygons were identified outside of the EO and areas where no plants were identified within portions of the NCNHP EO, each individual polygon identified by ESI has been assigned a number (Sub-polygon #) for this evaluation to facilitate tracking and analysis (Figure 2b).

Table 1. Results of the June 2014 Awned Mountain-mint Survey.

NCNHP Data					June 2014 Survey Results			
EO #	**EO Status**	**Last Observed**	**Area (acres)**	**# Plants (Last Observed)**	**Sub-Polygon #**	**Area (acres)**	**# Plants Observed**	**Habitat Quality**
5	Extant	7/2012	2.06	250	1	0.09	50 [c]	Open maintained powerline ROW, wet
					2	1.30 [b]	1,020 [b,c]	Open maintained powerline ROW, wet
NA [a]					3	0.02	11	FS Road ditch bank
NA [a]					4	0.76	3,200 [c]	Open maintained powerline ROW, wet
NA [a]					5	0.01	12	FS Road ditch bank
			2.06	Total: 250		2.18	Total: 4,300 [c]	

[a] Sub-polygon is located outside of the area of the mapped NCNHP EO but likely close enough to be considered part of this occurrence.

[b] Estimated 800 plants identified within an area of approximately 0.26 acre with higher density than the surrounding occupied habitat, as depicted in Figure 2b; remaining estimated 220 plants at lower density in remainder of delineated area.

[c] Estimated.

The powerline in the vicinity of EO 5 includes a mix of hydrological conditions ranging from very wet areas dominated by sedges (*Carex* spp.) to much drier habitats with a mix of species including White Colic Root (*Aletris farinosa*) and Leopard's-bane (*Arnica acaulis*). Awned Mountain-mint was generally observed in mesic to wetter areas located between these extremes. The survey resulted in the identification of five sub-polygons delineated for Awned Mountain-mint in the vicinity of the EO including three sub-polygons north and west of the boundaries of the original EO (Figure 2b). These five sub-polygons total approximately 2.18 acres and include an estimated approximately 4,300 individual plants.

Summary of Impacts

- This evaluation indicates that Awned Mountain-mint EO 5 covers a slightly larger area and includes a larger number of plants than previously estimated and that the distribution of plants extends farther outside of the area being considered for direct and indirect effects than previously depicted. The five sub-polygons identified in June 2014 total approximately 2.18 acres and include an estimated approximately 4,300 plants.

- EO 5 is directly affected by a shared portion of Alternative 3, Alternative 2, and Alternative 1. Approximately 0.52 acre of occupied habitat (including 0.15 acre identified with higher density concentration) that includes an estimated 500 individual plants that will be directly affected. Direct impacts to this EO may be able to be mitigated by collecting seeds to establish new populations or supplement existing populations on NFS lands. Seed collection will be conducted in coordination with the USFS in accordance with a seed collection permit for this species issued to NCDOT.

An additional 0.10 acre of EO 5 containing an estimated 50 individual plants is located in an area subject to indirect impact consideration for a shared portion of Alternative 3, Alternative 2, and Alternative 1.

These individual plants were observed within the powerline right-of-way which is currently being managed by a combination of mowing by the utility company operating the lines within the right-of-way and periodic prescribed burns conducted by the USFS. No changes in management of the powerline right-of-way by mowing are expected to result from project implementation, reducing the concerns for indirect impacts. However, the ability for the USFS to conduct periodic prescribed burns in these powerline areas will need to be continued. Implementation of mitigation measures agreed to between NCDOT and USFS for rare plants would minimize viability concerns that could result from indirect impacts. These mitigation measures include:

- Allow for the temporary closure of the bypass to allow the USFS to conduct periodic prescribed burns;
- Prior to construction, NCDOT will coordinate with the USFS to identify occurrences of USFS rare plant species near the project construction limits and put up protective orange fencing to be removed after completion of construction;
- Avoid placing staging areas within 250 feet of USFS rare plant species occurrences, where practicable;
- Avoid placing heavy equipment within powerline corridors outside of the proposed slope stakes without prior approval from the USFS;
- Minimize the use of herbicides; and
- NCDOT Division 2 forces will work with USFS staff on a periodic basis to control the presence of priority species of non-native plants along the Havelock bypass easement on CNF. NCDOT will also work on adjacent NCDOT ROW to prevent the encroachment of priority non-natives on to CNF. In turn, USFS will work cooperatively with NCDOT to identify and effectively control prioritized non-native invasive plant species. If spraying herbicides to control non-native invasive plant species within 10 feet of awned mountain mint, place barriers, such as an appropriately sized cardboard sheet adjacent to the mountain mint

In coordination with the USFS, NCDOT has developed mitigation measures to minimize the spread of NNIS plant species on NFS lands within the CNF associated with the construction and maintenance of the US 70 Havelock Bypass.

- To prevent the spread of non-native invasive plant species on NFS lands, NCDOT will require contractors to pressure wash all off-road equipment, including cranes, graders, pans, excavators, and loaders, prior to being brought in the CNF construction areas.
- To control the spread of non-native invasive plant species on NFS lands, NCDOT, in coordination with the USFS, will locate and flag areas of non-native invasive plant species within the study area for Alternative 3 of the US 70 Havelock Bypass. If any of these areas are within areas of proposed fill, those areas will be cleared and grubbed, and the material disposed of outside the limits of the CNF. If non-native invasive plant species are located in areas of proposed cuts then the material and actual thickness of root mat or other defined amount will be disposed of outside the limits of the CNF.
- In consultation with the USFS, seed mixes of native grasses and forbs or non-aggressive, non-natives will be used on NFS lands for erosion control and revegetation.
- NCDOT will utilize rolled matting or weed-free mulch for erosion control and revegetation on NFS lands.

- NCDOT will coordinate with the USFS on a landscaping plan for NFS lands. The plan will detail appropriate native seeding mixes for erosion control and site specific control methods for invasive species, including a suite of acceptable herbicides for the corridor and adjacent natural habitats. The plan will also outline a plan for ongoing coordination between NCDOT and USFS personnel to maintain vegetation diversity and ensure no long-term impacts to rare species along the bypass corridor.

With the implementation of the mitigation measures developed by NCDOT, in coordination with the USFS, the threat of spread of NNIS plants on NFS lands associated with the construction and maintenance of the US 70 Havelock Bypass is expected to be minimal.

Conclusions and Recommendations

Awned Mountain-mint has been reported from two EOs on NFS lands within the CNF. One EO (EO 5) is affected by the US 70 Havelock Bypass (R-1015) and the other EO (EO 3) is not affected by the project but has not been relocated during recent surveys.

The June 2014 survey resulted in refinement and expansion of the known area occupied by Awned Mountain-mint in the vicinity of EO 5, including addition of an area on NFS lands covering approximately 0.76 acre containing a dense concentration estimated at approximately 3,200 plants located outside the areas subject to direct or indirect impacts. In addition, two smaller roadside areas totaling approximately 0.03 acre and containing 23 plants were also identified on NFS lands outside the areas subject to direct or indirect impacts. The June 2014 survey resulted in documentation of a total of approximately 4,300 Awned Mountain-mint plants dispersed in varying densities and covering an area of approximately 2.18 acres of occupied habitat within five sub-polygons comprising the expanded EO 5.

The US 70 Havelock Bypass (R-1015) Alternative 3, Alternative 2, and Alternative 1 will result in the same unavoidable direct impacts to Awned Mountain-mint and the project has the potential for the same indirect impacts for each alternative. Approximately 0.52 acre (including 0.15 acre identified with higher density concentration) containing an estimated 500 individual plants will be directly affected. This represents approximately 24 percent of the occupied habitat identified for this EO, but only approximately 12 percent of the individual plants within this EO. An additional 0.10 acre containing an estimated 50 individual plants is located in an area subject to indirect impact consideration, which represents less than 5 percent of the areal coverage and approximately 1 percent of the estimated number of plants. The majority of the individual plants documented in June 2014, approximately 3,750 plants or 87 percent of the plants estimated to comprise this EO, are located outside the areas identified as subject to direct or indirect impacts. No cumulative impacts from other USFS or NCDOT projects on NFS lands on the CNF have been identified.

Based on the direct impact to occupied habitat and loss of individuals associated with EO 5, the direct impacts for the project are a concern based on this EO possibly being the only extant occurrence of this species on NFS lands in the CNF. However with the documentation in June 2014 of additional areas and large numbers of plants on NFS lands in the CNF outside the direct impact area and area subject to indirect impacts, and implementation of seed collection from the impacted occurrence to help establish new populations or supplement existing populations as mitigation for the direct impact, the direct impact

resulting from the project is not likely to result in a loss of viability on NFS lands within the CNF. The area subject to consideration for indirect impacts represents a relatively small percentage of the population and areal extent of Awned Mountain-mint documented as extant on NFS lands in the CNF. The project is not expected to result in changes that would prevent the utility company from continued mowing to maintain the powerline right-of-way and measures are in place to allow the USFS to continue conducting prescribed burns in the areas in which this EO is found, reducing the threat for indirect impacts. Other potential concerns for indirect impacts that could result from project construction and maintenance activities can be minimized through appropriate measures.

Implementation of measures agreed to between NCDOT and USFS would minimize viability concerns resulting from indirect impacts that could arise from construction and/or maintenance activities. As mitigation for direct impacts to offset viability concerns, NCDOT has agreed to collect seeds from the direct impact area for use in supplementing existing populations or establishing new populations where suitable habitat occurs on NFS lands.

With the implementation of appropriate measures to reduce concerns for indirect impacts, neither implementation of Alternative 3, Alternative 2, nor Alternative 1 of the proposed US 70 Havelock Bypass (R-1015) project is likely to cause a loss of viability for Awned Mountain-mint on NFS lands in the CNF.

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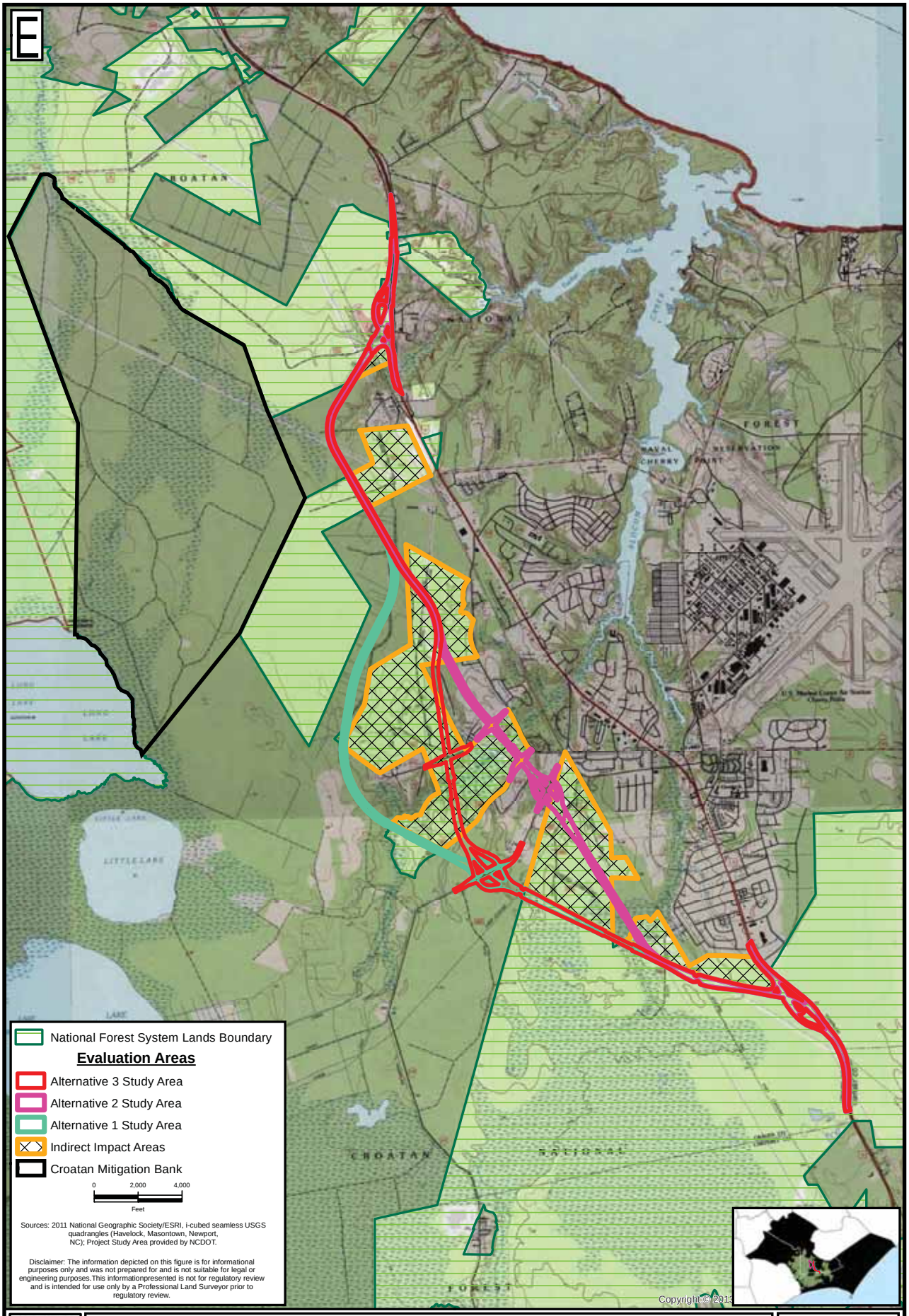
[i] The Flora of Virginia Project. Digital Atlas of the Virginia Flora. http://vaplantatlas.org/index.php?do=start (Accessed 13 June 2014).

[ii] Finnigan, J.T. 2012. Natural Heritage Program List of Rare Plant Species of North Carolina 2012. N.C. Natural Heritage Program, Raleigh, NC. 134 pp.



Project Location and Alternatives

US 70 Havelock Bypass

Croatan National Forest, North Carolina

T.I.P. R-1015

Project:	ER12050.13
Date:	June 2014
Drwn/Chkd:	KT/MKS
Figure:	1

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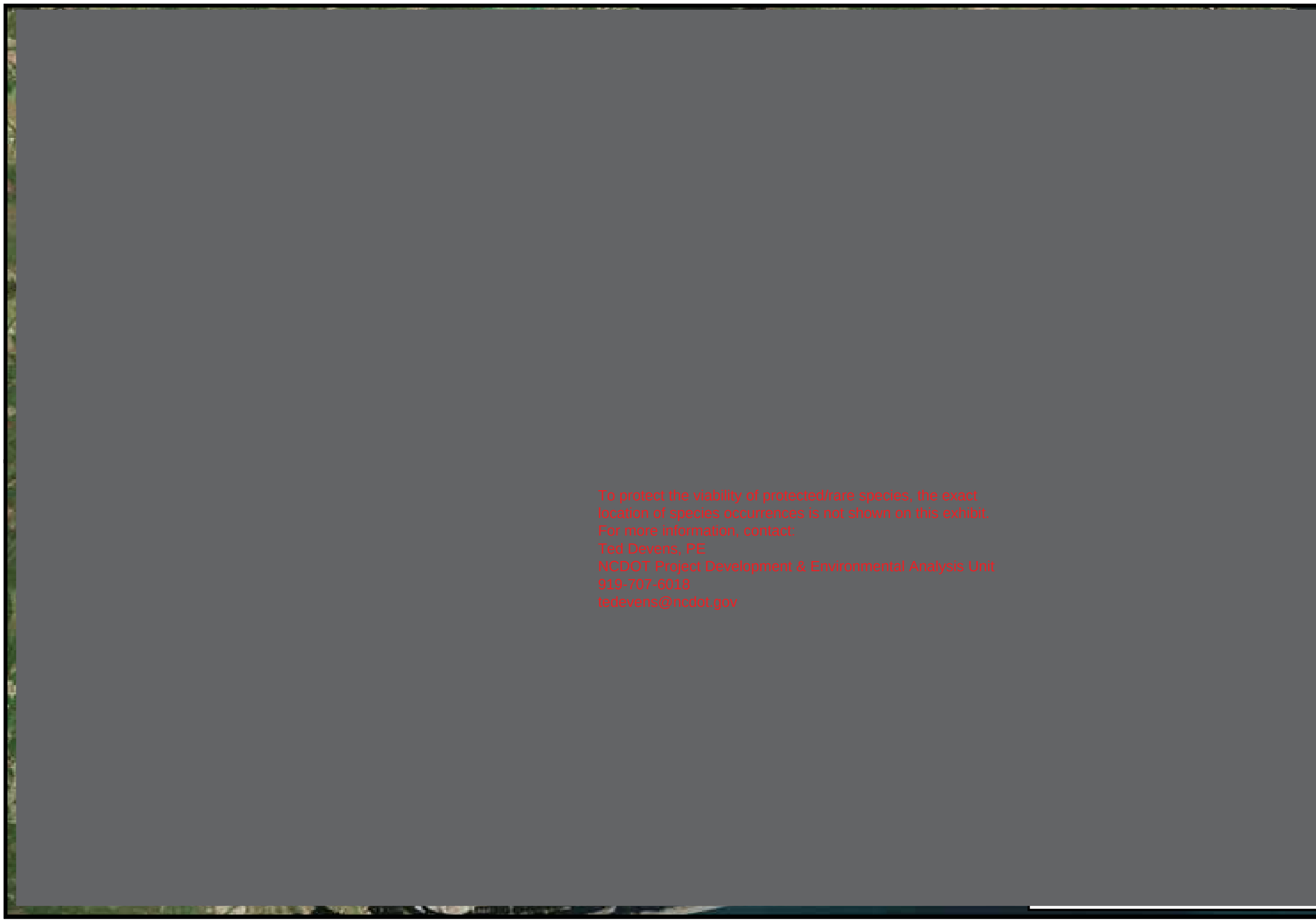
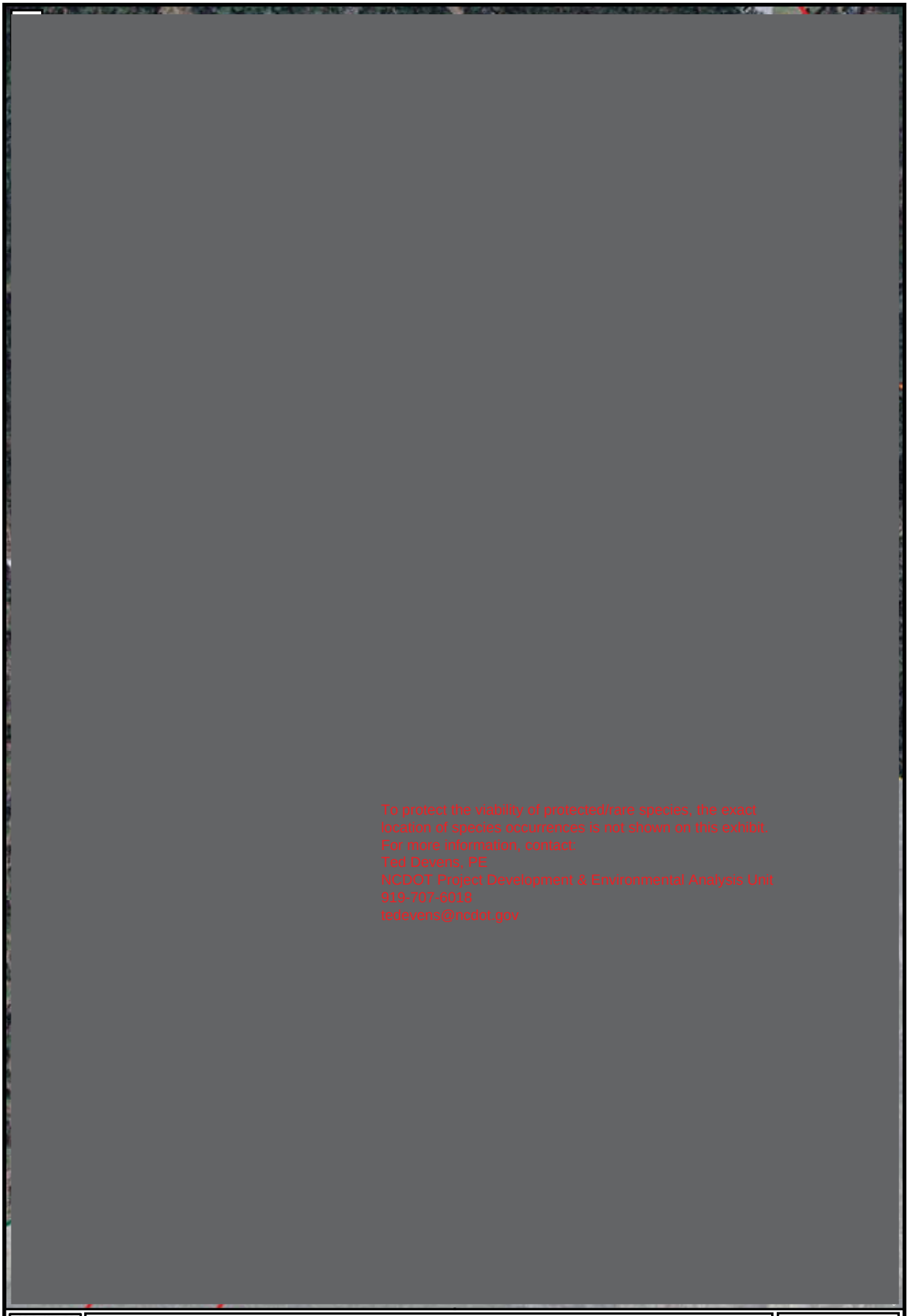


Awned Mountain-mint Occurrences Across the Croatan National Forest

US 70 Havelock Bypass

Craven and Carteret Counties, North Carolina

Project:	ER12050.13
Date:	June 2014
Drwn/Chkd:	KT/MKS
Figure:	**2a**



Awned Mountain-mint Assessment - NCNHP EO# 5

US 70 Havelock Bypass

Croatan National Forest, North Carolina

T.I.P. R-1015

Project:	ER12050.13
Date:	June 2014
Drwn/Chkd:	KT/MKS
Figure:	**2b**

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R-1015 – Havelock Bypass
Management Indicator Species on the Croatan National Forest

Introduction

The Croatan National Forest (CNF) was created in 1936 from 77,000 acres that the federal government owned in Carteret, Craven, and Jones Counties. Currently, the CNF covers approximately 162,000 acres and is bordered on three sides by water. Additions to the CNF acreage occur through purchases, exchanges, donations, or dispositions of mitigation banks. Losses to the CNF may occur from roadway projects, easements, and other public projects.

Management Indicator Species

Management Indicator Species (MIS) on the CNF were chosen to provide insight into the forest trends, species diversity, and habitat changes resulting from proposed alternatives. A list of the MIS selected for the CNF and their habitats are shown in Table 1.

Table 1. MIS and Their Preferred Habitats for the CNF.

Management Indicator Species	Habitats Utilized
Eastern black bear (*Ursus americanus*)	**Pocosin** Oak Gum Cypress Oak-Beech Hickory Pond-Pine Woodlands
Longleaf pine (*Pinus palustris*)	Dry Sandhills Pine Savanna Mesic and Wet Pine Flatwoods
Red-cockaded woodpecker (*Picoides borealis*)	**Pine Savanna** Pine Flatwoods
Wild Turkey (*Meleagris gallapavo*)	Maritime Forest Mature Pine/Hardwood Forests Oak Gum Cypress **Oak-Beech Hickory**
Wiregrass (*Aristida stricta*)	Dry Sandhills Pine Savanna Mesic and Wet Pine Flatwoods

Bold = Preferred Habitat

Havelock Bypass and MIS

The proposed Havelock Bypass contains three action alternatives and a no-action alternative. This section discusses all of the proposed alternatives and their impacts to the MIS on the CNF. The location of the action alternatives are shown and discussed in the Draft Environmental Impact Statement (NCDOT, 2011).

Roadway Alternatives and MIS

1)Eastern black bear (*Ursus americanus*)

The estimated population trend for the Eastern black bear in the Coastal Plain of North Carolina is projected to increase slightly (NCWRC, 2012). Over the last 40 years the population of black bears in the Coastal Plain and its range has steadily increased through management activities, the establishment of black bear sanctuaries, consistent food sources, and contiguous habitat and travel corridors. Black bears prefer large, contiguous pocosin ecosystems, where there is little human disturbance and a good source of

food from hardwood mast species or adjacent agricultural crops. The black bear trend on the CNF likely mimics the trends of the Coastal Plain of North Carolina since it is actively managed by the US Forest Service (USFS) and contains one of the largest core habitats for the Eastern black bear in the state (USFS, 2002). Big game hunting for black bear is the largest recreational activity on the CNF and aids in the management of the species (USFS, 2002). Long-term trends are dependent upon the fragmentation of existing habitats and travel corridors and the ability of the CNF to effectively utilize tools such as prescribed burning. Increased road densities may cause the black bear to shift their home range to avoid the disturbance. With an ever-growing human population in North Carolina, it will be important to maintain the existing black bear habitats and sanctuaries in the state. The black bear population on the CNF should have an upward trend over the next decade. This is due in part to the large quantity of preferred habitat (pocosin) on the CNF and the continued management of its resources by the USFS and NCWRC.

Neither the no-action alternative nor the three proposed action alternatives will change the suitable habitat for the black bear on the CNF. None of the proposed action alternatives directly impact the core black bear habitat on the CNF, so no suitable habitat loss is expected. The proposed action alternatives may cause the black bear to alter its movements and range due to their proximity to the core black bear habitat. However, this should not cause significant issues since the core black bear habitat lies south and west of US 70 and the proposed action alternatives. The proposed transfer of over 2,000 acres of suitable bear habitat (Cypress-Gum Swamp and Pocosin) from the Croatan Wetland Mitigation Bank (CWMB) to the CNF will provide a significant increase in the black bear habitat. The suitable habitat additions from the CWMB will allow greater connectivity throughout the CNF for the black bear and facilitate the overall management of the species. Since the suitable habitat for the black bear will not be impacted and additional acreage of suitable habitat for black bear will be added to the CNF in the future, the proposed action alternatives will not change the upward trend for the black bear populations on the CNF.

2)**Longleaf pine *(Pinus palustris)***

The current trend for longleaf pine is stable to slightly increasing across its original range in North Carolina. This is due to a renewed public interest in the species over the last two decades. With the management of longleaf pine being directly linked to other species such as red-cockaded woodpecker (RCW) and wiregrass, its role in the ecosystem has returned to the forefront. Longleaf pine stands exist on dry sandhills to mesic pine flatwoods. This slow growing species is adapted to a range of habitats and its existence is linked to fire. The CNF management objectives are focused on restoring the longleaf pine through species conversions such as loblolly pine, on sites that have suitable moisture and soil conditions. Once the longleaf pine has been established on the converted site, the stands are then maintained through the use of prescribed burning and long rotation periods. The long-term trend for longleaf pine on the CNF will continue upward with the current management objectives and so many other species' objectives being linked to its sustained management.

The no-action alternative will not affect the suitable habitat for longleaf pine on the CNF. All of the proposed action alternatives will impact some portion of longleaf pine habitat. According to data from the Draft Environmental Impact Statement (DEIS), Alternative 3 will have the greatest impact (107.8 ac) and Alternative 1 the least impact (61.2 ac) on the longleaf pine habitats (NCDOT, 2011). There will be a loss of older age-class long-leaf pine trees with implementation of the preferred alternative because the impacted area includes stands with trees over 80 years of age. However, due to the on-going conversion of stands from loblolly to longleaf pine on the CNF, the impacts from any of the proposed action alternatives should not significantly affect the amount of longleaf pine habitat forest-wide, including the older longleaf pine habitat. Therefore, the upward population trend for longleaf pine on the CNF will not change as a result of the implementation of the proposed action alternatives.

Red-cockaded woodpecker *(Picoides borealis)*

The statewide population trend for the RCW stabilized during the 1990s following the implementation of better management strategies for the species (NCWRC, 2014a). The species prefers mature to over mature, fire-maintained pine forests in the southeastern US such as pine flatwoods and pine dominated savannas (NCDOT, 2011). In 1992, the Croatan National Forest RCW Management Plan was developed

to link the fragmented RCW populations (NCDOT, 2011). The RCW and many other species has ultimately benefited from the management and restoration of longleaf pine/wiregrass communities on the CNF. The on-going conversion of stands from loblolly to longleaf pine coupled with the use of prescribed burning for controlling the understory has continually improved the RCW foraging habitat. Longer rotation periods for longleaf and other pine stands being implemented on the CNF will further increase the suitable habitat for the species (USFS, 2002). Currently, active clusters are increasing on the CNF as a result of forest management activities (Kauffman, 2014). Due to the CNF management activities for RCW and longleaf pine and the time required to restore or to create optimal RCW habitat, the projected population trend is likely to remain stable or slightly increase.

The no-action alternative will not impact the suitable habitat for the RCW on the CNF. All of the proposed action alternatives will have some impacts on the RCW habitats and the CNF as a whole. According the 2011 DEIS, Alternative 2 will have the greatest impact to the most suitable RCW habitat and Alternative 1 causes the most fragmentation of the CNF. Alternative 3 removes the most pine forest habitat and causes a moderate amount of fragmentation. Since the 2013 RCW Biological Assessment only discusses the Least Environmentally Damaging Preferred Alternative (LEDPA), which was determined to be Alternative 3, the following section only covers the analysis of this LEDPA.

The RCW Biological Assessment found that direct habitat removal resulting from the proposed Alternative 3 (preferred action alternative) should not have an adverse impact on the current RCW clusters recruitment potential for future Habitat Management Areas (HMA) in the action area (NCDOT, 2013). These future HMA will have enough forested habitat to support RCW recruitment clusters after the preferred action alternative has been constructed (NCDOT, 2013). Additionally, 90% of the habitat reserved for the future HMA lies to the west of the preferred action alternative and remains contiguous to the rest of the CNF (NCDOT, 2013). According to the 2013 RCW Biological Assessment, the USFS should be able to provide the necessary recruitment clusters to promote RCW growth and linkage between RCW subpopulations on the CNF following the construction of the preferred action alternative (NCDOT, 2013). The USFS Croatan National Forest Red-cockaded Woodpecker Territory Analysis for the US Highway 70 Bypass report (NCDOT 2014) also states the loss of habitat, within the RCW CNF territories, resulting from the Havelock Bypass' direct impact zone will not prohibit the CNF from managing within the individual territories for active clusters or recruitment clusters in the future. Therefore, the implementation of the preferred action alternative should not have an adverse impact on the stable to slightly increasing population trend for the RCW across the CNF.

3)**Wild turkey (*Meleagris gallapavo*)**

The statewide population of the wild turkey has steadily increased over the last four decades from just 2,000 birds in 1970 to over 150,000 in 2009 (NCWRC, 2014b). This tremendous increase is due primarily to better hunting regulations, increased habitat management, and a successful release program (NCWRC, 2014b). Wild turkeys need a mixture of open land and forested habitats to meet their cover, foraging, and roosting requirements (NCWRC, 2014b). A wild turkey requires good site visibility when selecting a habitat to utilize (NCWRC, 2010). Mature pine and hardwood forests with mast-producing species and an open midstory are one of the preferred habitats for the wild turkey (NCWRC, 2010; Peoples, 2014). Wild turkeys also prefer areas adjacent to streams and rivers such as bottomland hardwood stands for their mast producing hardwood species and use as travel corridors (USFS, 2002). Wild turkeys also utilize areas such as agricultural fields, grasslands, and open woods while roosting and foraging (NCWRC, 2010). The CNF has also seen an increase in the number of wild turkeys across its acreage since 1970 (USFS, 2002). This increase on the CNF is likely due to the sheer size of the CNF and its current management objectives. The CNF utilizes prescribed fire, long rotation periods, and thinning throughout the forest, which helps to improve the wild turkey habitat by providing mature, open

forest stands. The long-term population trend for the wild turkey will likely remain stable to slightly increasing on the CNF with the current management objectives.

The no-action alternative will not affect the suitable habitat for wild turkey on the CNF. All proposed action alternatives will affect some suitable habitat (Pine/Hardwood Forest) for the wild turkey. Approximately 50 to 70 acres of suitable habitat for wild turkeys will be impacted by each of the proposed action alternatives. The impacts to the Pine/Hardwood Forest compared with the entire CNF are less than 0.1 % of the total acreage, which makes it unlikely that these impacts will significantly affect the population trend for the wild turkey. Additionally, the CWMB contains a wide range of pine and hardwood stands that will likely provide additional areas of suitable wild turkey habitat. Therefore, implementation of the proposed action alternatives will not affect the stable to slightly increasing population trend for wild turkey across the CNF.

4)**Wiregrass (*Aristida stricta*)**

The current trend for wiregrass is stable to slightly decreasing across its range in North Carolina. Increases in development throughout its range and its sensitivity to physical disturbance (i.e. compaction, plowing, grading, clearing, scraping, etc.) have led to a reduction in its total acreage. The species can be found in moist flatwoods to dry sandhills. The species is shallow rooted, slow to spread, shade intolerant, and its seeds have difficulty germinating without optimal conditions. Established wiregrass communities are maintained through early summer prescribed burns and management prescriptions focused on reducing the hardwood shrub layer. Due to the difficulties in growing wiregrass, the CNF has management objectives that are focused on creating optimal conditions for its establishment. Since it is being actively managed together with longleaf pine and the RCW, its chances for increase are much greater on the CNF than other areas such as private lands. During the 2000's, the species was slightly increasing in the CNF due to vegetation management activities. For the past five years, the reduction in management burns due to weather suggests that wiregrass is currently stable to slightly decreasing across the CNF. However, the long-term prospect for wiregrass on the CNF is stable to slightly increasing due to active management activities.

The no-action alternative will not affect the suitable habitat for wiregrass on the CNF. The suitable habitat for wiregrass will be affected by each of the proposed action alternatives through the loss of longleaf pine stands and existing open habitat. The implementation of the proposed action alternatives will also fragment portions of the CNF, making certain management prescriptions (i.e. prescribed burning) more difficult to implement. However, due to the on-going conversion of stands from loblolly to longleaf pine on the CNF the impacts from any of the proposed action alternatives may be offset and not significantly affect the population trend for wiregrass forest-wide. Therefore, the long term prospect for wiregrass on the CNF will not change as a result of the implementation of the proposed action alternatives.

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ENVIRONMENTAL SERVICES, INC.
524 South New Hope Road
Raleigh, North Carolina 27610
919-212-1760 / Facsimile 919-212-1707
www.environmentalservicesinc.com

MEMORANDUM

TO: **Mary Frazer**

FROM: **Matt Smith**

DATE: **16 June 2014**

RE: **USFS Migratory Birds Evaluation**
US 70 Havelock Bypass (R-1015)
US Forest Service Protected Species Evaluations and FEIS Assistance
Consulting P. O. 6300036312
ESI Project No. ER12050.12

Environmental Services, Inc., (ESI), has been asked by the North Carolina Department of Transportation (NCDOT) to assist in providing additional information and analysis for migratory birds requested by the U.S. Forest Service (USFS) for National Forest System (NFS) lands within the direct and indirect impact areas under evaluation for the US 70 Havelock Bypass project as well as on the Croatan Mitigation Bank (CMB) property (formerly known as the Croatan Wetland Mitigation Bank [CWMB]); these areas are collectively referred to as the evaluation area for the migratory bird evaluation (see Figure 1). Specifically, the USFS identified the migratory bird assessment conducted for the *Uwharrie National Forest Land and Resource Management Plan Final Environmental Impact Statement* (FEIS) (2012) as a suitable example of the additional information and analysis requested for the Havelock Bypass FEIS. Following the example assessment identified by the USFS, the present evaluation provides an assessment on NFS lands for migratory birds identified as being of conservation concern by the U.S. Fish and Wildlife Service (USFWS) on the appropriate regional list from USFWS's *Birds of Conservation Concern 2008* (referred to hereafter as *BCC 2008*) document.

Affected Environment – Migratory Birds

The USFS considers migratory birds to be a focus of conservation concern based on range-wide declining population trends for many species and on a mandate to maintain viable populations of existing native and desired non-native vertebrate species on NFS lands. Because migratory birds may nest in one area with specific habitat requirements and migrate hundreds or thousands of miles annually to wintering areas with other specific habitat requirements, their conservation is dependent on the distribution of suitable habitats across large regions. Currently, NFS lands provide some of the largest blocks of forested habitat when

viewed at a physiographic area scale. As habitat quality and quantity continues to change on many privately-owned lands due to conversion to other land uses, NFS lands will become even more important to migratory birds in the future. Efforts by the USFS to coordinate closely with partners in bird conservation and to incorporate proactive conservation measures into forest plan revisions are designed to ensure national forests continue to support at-risk migratory birds.

The USFWS Migratory Bird Office created the list of Birds of Conservation Concern (BCC) to fulfill a 1988 mandate to "identify species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the Endangered Species Act [ESA] of 1973." The *BCC 2008* is the most recent effort by the USFWS to carry out this mandate.

The CNF is located within Bird Conservation Region (BCR) 27, which comprises the Southeastern Coastal Plain. The *BCC 2008* lists 53 species within BCR 27 for consideration in planning and evaluating conservation efforts. The BCR 27 list was reviewed and initial screening determined that 34 of these species would not be expected to occur, would not have suitable nesting or wintering habitat, nor regularly occur as migrants in the Havelock Bypass evaluation area on NFS lands in the CNF (see attached Table A-1). Four species (Bald Eagle, Black-throated Green Warbler, Bachman's Sparrow, and Henslow's Sparrow) for which potentially suitable habitat is present in the evaluation area are also listed as BCC, but are also considered Sensitive or Locally Rare on the CNF by the USFS and are treated in the evaluation for USFS-listed rare species. Occurrence data for the CNF for the remaining 15 species (Table 1) were provided by the USFS from annual breeding bird data that have been conducted on the CNF for the period 1997-2013. This data is supplemented with data from NCDOT studies associated with the Natural Resources Technical Report fieldwork and studies conducted for USFS rare species in the evaluation area between 1997 and 2013.

Table 1. USFWS BCC Occurrences on the Croatan NF.

Birds of Conservation Concern	**Status: Global/NC** [a]	**Occurrences Documented in Annual Breeding Bird Survey on the Croatan NF** [b]
Solitary Sandpiper (*Tringa solitaria*)	G5/SNA	0 (nb) [c]
Semipalmated Sandpiper (Eastern) (*Calidris pusilla*)	G5/SNA	1 (nb)
Chuck-will's-widow (*Antrostomus carolinensis*)	G5/S5B	1
Eastern Whip-poor-will (*Antrostomus vociferus*)	G5/S4B	0
Red-headed Woodpecker (*Melanerpes erythrocephalus*)	G5/S4B, S4N	78
Brown-headed Nuthatch (*Sitta pusilla*)	G5/S5	195

Birds of Conservation Concern	Status: Global/NC [a]	Occurrences Documented in Annual Breeding Bird Survey on the Croatan NF [b]
Sedge Wren *Cistothorus platensis*	G5/SUB, S4N	0 (nb)
Wood Thrush (*Hylocichla* mustelina)	G5/S4B	56
Blue-winged Warbler (*Vermivora cyanoptera*)	G5/S2B	0 (nb)
Prairie Warbler (*Setophaga discolor*)	G5/S5B, S1N	812
Prothonotary Warbler (*Protonotaria citrea*)	G5/S5B	362
Swainson's Warbler (*Limnothlypis swainsonii*)	G4/S3S4B	70
Kentucky Warbler (*Geothlypis formosa*)	G5/S4B	10
LeConte's Sparrow (*Ammodramus leconteii*)	G4/SNA	0 (nb)
Rusty Blackbird (*Euphagus carolinus*)	G4/S3N	0 (nb)

[a] Status rankings obtained from:

NatureServe Explorer. 2013. Data Search (last updated July 2013). http://explorer.natureserve.org/aboutd.htm. Accessed 4/15/2014.

Status Definitions:

≠ Conservation Status Scale:
- G – Global Level. The overall status of a species across its entire range.
- S – State Level. The status of a species determined for a particular state, here North Carolina.

≠ Status Rank:
- 1 – Critically Imperiled. At very high risk of extinction or elimination due to very restricted range, very few populations or occurrences, very steep declines, very severe threats, or other factors.
- 2 – Imperiled. At high risk of extinction or elimination due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.
- 3 – Vulnerable. At moderate risk of extinction or elimination due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.
- 4 - Apparently Secure. At fairly low risk of extinction or elimination due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.
- 5 – Secure. At very low risk of extinction or elimination due to a very extensive range, abundant population or occurrences, and little to no concern from declines or threats.
- NA –Not Applicable. A conservation status rank is not applicable because the species is not a suitable target for conservation activities. Applied here to long-distance migrants passing through the state or irregularly wintering species.
- U – Unrankable. Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.

≠ Breeding Status Qualifiers:
- B – Breeding. Conservation status refers to the breeding population in the state.
- N – Nonbreeding. Conservation status refers to the non-breeding population in the state.

[b] Breeding bird data from period 1997-2013

[c] (nb) - not breeding on the CNF

Environmental Consequences – Migratory Birds

Indicators of effects to migratory birds used in this analysis include:

- ≠ Habitat loss
- ≠ Habitat fragmentation
- ≠ Changes in ability to use prescribed burning for habitat management
- ≠ Cumulative effects from other projects on NFS lands
- ≠ Habitat availability on the CMB property

Direct habitat loss would result from clearing for the right-of-way (ROW) for and construction of the proposed US 70 Havelock Bypass. Direct impacts evaluated for the proposed US 70 Havelock Bypass are based on the tree clearing limits (slope stake limits plus 15 feet) plus an additional 25 feet. The area of NFS lands included for direct impact consideration varies by alternative (Figure 1):

- ≠ Alternative 1 covers approximately 238.5 acres of NFS lands;
- ≠ Alternative 2 covers approximately 271.3 acres of NFS lands;
- ≠ Alternative 3 covers approximately 295.4 acres of NFS lands.

Table 2 presents estimates of habitat loss on NFS lands resulting from the proposed US 70 Havelock Bypass, as well as habitats present on the CMB property (based on conditions reported in the May 2008 *Preliminary Habitat and PETS Species Evaluation for the Croatan Wetland Mitigation Bank*).

Table 2. Habitats Present in Direct Impact Evaluation Areas on NFS Lands and at CMB

Vegetative Community Feature	Alternative 1 (acres)	Alternative 2 (acres)	Alternative 3 (acres)	CMB (acres)
Pine Flatwoods (hydric)	48.3	44.9	48.7	76.7
Pine Flatwoods (mesic)	53.8	80.1	98.3	53.7
Pine Flatwoods (transitional)	NA	NA	NA	40.7
Pine Savanna (hydric)	NA	NA	NA	111.5
Pine/Hardwood Forest	22.7	27.3	21.1	234.4
Upland Hardwood Forest	NA [a]	NA	NA	1.4
Streamhead Pocosin (tree dominated)	9.0	10.4	9.0	NA
Streamhead Pocosin (shrub dominated)	1.3	1.2	1.3	NA
Swamp Forest (along large streams)	6.6	4.1	9.4	NA
Swamp Forest (along small streams)	12.1	10.1	12.9	122.0
Swamp Forest (in ponds)	16.4	20.7	20.0	NA
Non-riverine Wet Hardwood Forest	NA	NA	NA	99.5
Non-riverine Swamp/Bay Forest	NA	NA	NA	1,912.0
Lake Ridge Pine Forest	NA	NA	NA	5.0
Small Pond	0.3	0.2	0.2	6.9
Powerline Corridor (hydric)	0.8	1.8	1.9	47.0
Powerline Corridor (mesic)	4.1	6.1	6.0	NA
Pine Plantation (hydric)	5.5	5.5	5.5	46.1

Vegetative Community Feature	Alternative 1 (acres)	Alternative 2 (acres)	Alternative 3 (acres)	CMB (acres)
Pine Plantation (mesic)	7.4	1.1	9.5	NA
Successional/Ruderal Habitat	1.3	5.5	1.2	1,261.0 [b]
Rural/Urban Modifications	48.9	52.3	50.5	17.7
Total:	**238.5**	**271.3**	**295.4**	**4,035.6**

[a] NA – not applicable, habitat not mapped as present

[b] Includes areas mapped as grass-sedge dominated (593.3 acres), shrub-scrub dominated (667.7 acres)

Habitat fragmentation would result from ROW clearing and road construction that would create a canopy gap in existing contiguous forest cover on NFS lands. The gap will separate NFS lands between the proposed US 70 Havelock Bypass and the existing US 70 ROW and isolate these fragments from contiguous forested NFS to the south and west of the proposed Bypass ROW. The new roadway could also present a danger from vehicle strikes for low-flying birds attempting to cross the roadway between habitats on NFS lands located on opposite sides of the roadway. The area of NFS lands separated from other contiguous NFS lands by the proposed Bypass ROW varies by alternative (Figure 1):

- ≠ Alternative 1: totals approximately 1,877 acres;
- ≠ Alternative 2: totals approximately 712 acres;
- ≠ Alternative 3: totals approximately 1,239 acres.

Fragmentation may also affect the use of prescribed burning as a management tool on NFS lands. The USFS has previously stated that the US 70 Havelock Bypass will need to be closed periodically in order to minimize the effects of fragmentation on using prescribed burning as a management tool to maintain NFS lands between the US 70 Havelock Bypass and existing US 70. NCDOT has agreed to periodically close the US 70 Havelock Bypass under general conditions outlined with USFS to accommodate prescribed burning in order to minimize the effects of fragmentation on the use of prescribed burning as a management tool.

Cumulative impacts are considered for identified actions on NFS lands that could affect BCC impacted by the US 70 Havelock Bypass. Because the USFS concern for these species is for maintaining continued viability on NFS lands in the CNF, actions off NFS lands were not considered for determining whether an action could affect the viability of these species on NFS lands. Actions proposed on NFS lands are subject to independent review by USFS to assess potential effects to the continued viability of these species on NFS lands in the CNF. The following projects on NFS lands were identified as having potential impacts to BCC for which potential habitat may be present within the US 70 Havelock Bypass evaluation area and therefore having the potential to contribute to cumulative impacts:

- ≠ NCDOT US 17 Improvements (R02541B, C, and D); NFS lands in Jones County. This project would result in habitat loss on NFS lands adjacent to the existing US 17. Because this project involves relatively limited clearing adjacent to the existing roadway, this project would not be expected to contribute significant impacts towards cumulative effects for BCC.

- ≠ Duke Energy Progress (DEP) Havelock-Morehead Wildwood 115kV North Line Overhead Ground Wire Replacement (OHGW) project; NFS lands in Carteret and Craven Counties. This project is a maintenance project for replacing the existing OHGW and selected poles with new OHGW and poles of similar size and location in an existing maintained powerline corridor. Because no additional clearing of trees is required or changes in habitat would occur, this project would not contribute to cumulative effects for BCC.
- ≠ North Carolina Wildlife Resources (NCWRC) Wildlife Habitat Improvement Project; Little Road savanna location, NFS lands in Craven County. This project was completed in 2003 and habitat restoration was undertaken. Because there are no long-term effects to BCC on NFS lands, this project would not contribute to cumulative effects for BCC.
- ≠ Atlantic and East Carolina Railroad, potential future widening from single track to multiple tracks, NFS lands in Craven and Carteret Counties. No information is available for this potential future action, but widening to multiple tracks may be anticipated to require clearing and loss of habitat on NFS lands adjacent to the existing tracks. Because this project would likely involve relatively limited clearing adjacent to the existing infrastructure, this project would not be expected to contribute significant impacts towards cumulative effect considerations for BCC.
- ≠ USFS Forest Management Projects, various actions including habitat improvements and timber thinning, NFS lands across CNF. USFS considers effects to wildlife, including BCC in forest management actions. Forest management improving habitat on NFS lands would be considered beneficial effects for BCC.
- ≠ Closure of Craven County Waste Transfer Facility at Hickman Hill Road, NFS lands in Craven County. This facility is not expected to be relocated on NFS lands elsewhere in CNF. Because no impacts would occur to NFS lands from siting of a new facility, this project would not contribute to cumulative effects for BCC.
- ≠ US 70 Slocum Road Cherry Point Gate Improvements (R-5516), Craven County. This project will not affect NFS lands based on most current project description. Because no effects would occur to NFS lands, this project would not contribute to cumulative effects for BCC.

In 2007 NCDOT conducted a preliminary habitat and rare species evaluation of the CMB property, an in-holding located within the boundaries of the CNF to assess the potential for current use by, and as potential mitigation for USFS rare species. NCDOT purchased the 4,035-acre tract of land for the purpose of developing a mitigation bank for wetland impacts and mitigating NFS lands affected by the project. Contingent upon USFS release of ROW for the US 70 Havelock Bypass, the CMB property would be transferred to the USFS to become part of the CNF and managed by USFS.

Habitats present on the CMB property include Swamp Forest (along small streams), Pine Flatwoods (hydric, mesic, and transitional phases), Successional/Ruderal Habitat (grass-sedge, shrub-scrub), Powerline Corridor (hydric phase), Non-riverine Wet Hardwood Forest, Non-riverine Swamp/Bay Forest, Lake Ridge Pine Forest, Pond, Pine Plantation (hydric phase), Pine Savanna (hydric phase), Upland Hardwood Forest, Pine/Hardwood Forest, and Rural/Urban Modifications (dirt/gravel access road and shoulders). Table 2 presents a summary of the vegetation communities mapped for the CMB.

Effects to Migratory Birds

Potential effects are presented for the 15 migratory bird species from the BCR 27 list that were expected to occur, have suitable nesting or wintering habitat, or regularly occur as migrants in the Havelock Bypass evaluation area on NFS lands in the CNF and that are not otherwise addressed in the USFS rare species evaluation (see attached Table A-1). Nine of the BCC species evaluated as migratory birds have been documented on the CMB property, as well as have three other BCC species evaluated as USFS rare species (Sensitive or Locally Rare). Species documented on the CMB property are noted in the descriptions below, and also on attached Table A-1.

Three alternatives were evaluated for this assessment (Figure 1). Alternatives include the proposed action (Alternative 3) and two additional alternatives (Alternative 1 and Alternative 2) that differ from the proposed action in size and location of the NFS lands affected. The amount of specific habitats affected in the direct impact areas varies for each alternative (see Table 2), but each identified habitat type is present within the direct impact area for each of the three alternatives and each alternative would result in loss of the same habitat types identified as utilized or potentially utilized for each of the 15 migratory birds. Similarly, each of the three alternatives would result in separation of NFS land located between the alternative and existing US 70 ROW from currently contiguous NFS lands located south and west of each alternative. Fragmentation, forest edge effects and mortality due to vehicle collisions may be somewhat less pronounced for Alternative 2 than for Alternative 1 or 3, due to the closer proximity of Alternative 2 to the Town of Havelock and the edge of NFS lands. Aside from this, effects to migratory birds are expected to be relatively similar for each of the three alternatives, so separate detailed analyses are not provided for each alternative.

Solitary Sandpiper

The Solitary Sandpiper is a migrant through the Coastal Plain region of North Carolina and does not breed or overwinter on the CNF. There are no records of this species from USFS Breeding Bird Surveys for the CNF. Although not documented in the evaluation area during other NCDOT assessments, migrants of this species may utilize shorelines of freshwater pools, ponds, swamps, lakes, and streams in the evaluation area. The US 70 Havelock Bypass project would result in loss of potentially suitable habitat that could be used by migrants of this species. Potentially suitable habitat for this species is present on the CMB property.

Semipalmated Sandpiper

The Semipalmated Sandpiper is a migrant and non-breeding summer resident through the Coastal Plain region of North Carolina and does not breed or overwinter on the CNF. There is a single record of one individual of this species documented from USFS Breeding Bird Surveys for the CNF. This individual, documented in 1999 from a site along Forest System Road 121-3 (near western edge of CMB property), likely represented a migrant foraging or resting at a pool or ponded area in the vicinity. Although not documented in the evaluation area during other NCDOT assessments, migrants of this species may utilize shorelines of freshwater pools and ponds in the evaluation area. The US 70 Havelock Bypass project would result in loss of potentially suitable habitat that could be used by migrants of this species. Potentially suitable habitat for this species is present on the CMB property.

Chuck-will's-widow

The Chuck-will's-widow is a summer resident and occasional overwintering species in the Coastal Plain region of North Carolina. There is a single record of one individual of this species from USFS Breeding Bird Surveys for the CNF, but this species is nocturnal and not likely to be documented during typical breeding bird surveys. No population trends are available for the CNF. This species has been documented in the evaluation area during other NCDOT assessments. This species typically nests in drier pine and mixed pine/hardwood forest, usually near edges with fields or other openings. The US 70 Havelock Bypass project would result in loss of potentially suitable habitat that could be used by this species. Potentially suitable habitat for this species is present on the CMB property and this species has been documented on the CMB property.

Eastern Whip-poor-will

The Eastern Whip-poor-will is a summer resident and occasional overwintering species in the Coastal Plain region of North Carolina that is expected to occur on the CNF. There are no records of this species from USFS Breeding Bird Surveys for the CNF, but this species is nocturnal and not likely to be documented during typical breeding bird surveys. No population trends are available for the CNF. This species has been documented in the evaluation area during other NCDOT assessments. This species typically utilizes dry to mesic forest for nesting, especially near edges with fields or other openings. The US 70 Havelock Bypass project would result in loss of potentially suitable habitat that could be used by this species. Potentially suitable habitat for this species is present on the CMB property.

Red-headed Woodpecker

The Red-headed Woodpecker is a year-round resident in the Coastal Plain region of North Carolina that occurs in appropriate habitat on the CNF. There are 78 records of this species from USFS Breeding Bird Surveys for the CNF. This species appears to be stable and increasing on the CNF based on USFS Breeding Bird Surveys, with mean number of birds observed per point increasing from 0.09 (range 0.02 to 0.15) during the period 1997-2004 to 0.17 (range 0.10 to 0.31) during the period 2005-2013. This species has been documented in the evaluation area during other NCDOT assessments. This species typically nests in open stands of trees, including mature hardwoods and mature pines, and areas with numerous dead trees. The US 70 Havelock Bypass project would result in loss of potentially suitable habitat that could be used by this species. Potentially suitable habitat for this species is present on the CMB property and this species has been documented on the CMB property.

Brown-headed Nuthatch

The Brown-headed Nuthatch is a year-round resident in the Coastal Plain region of North Carolina that occurs in appropriate habitat on the CNF. There are 195 records of this species from USFS Breeding Bird Surveys for the CNF. This species appears to be stable on the CNF based on USFS Breeding Bird Surveys, but with fluctuating numbers or detectability from year-to-year; mean number of birds observed per point was 0.29 (range 0.11 to 0.53) during the period 1997-2004 and 0.33 (range 0 to 0.65) during the period 2005-2013. This species has been documented in the evaluation area during other NCDOT assessments. This species nests and winters in open pine forest habitats. The US 70 Havelock Bypass project would result in loss of potentially suitable habitat that could be used by this species. Potentially

suitable habitat for this species is present on the CMB property and this species has been documented on the CMB property.

Sedge Wren

The Sedge Wren is a migrant through the Coastal Plain region of North Carolina that typically winters along coastal marshes with a shrub fringe or a scattered shrubs; this species does not breed on the CNF. There are no records of this species from USFS Breeding Bird Surveys for the CNF. Although not documented in the evaluation area during other NCDOT assessments, migrants of this species may utilize wet, shrubby areas, particularly during migration. The US 70 Havelock Bypass project would result in loss of potentially suitable habitat that could be used by migrants of this species. Potentially suitable habitat for this species is present on the CMB property.

Wood Thrush

The Wood Thrush is summer resident in the Coastal Plain region of North Carolina that occurs in appropriate habitat on the CNF. There are 56 records of this species from USFS Breeding Bird Surveys for the CNF. This species appears to be stable on the CNF based on USFS Breeding Bird Surveys, but with fluctuating numbers or detectability from year-to-year; mean number of birds observed per point was 0.11 (range 0.05 to 0.25) during the period 1997-2004 and 0.08 (range 0 to 0.23) during the period 2005-2013. This species has been documented in the evaluation area during other NCDOT assessments. This species typically nests in moist to dry hardwood forest or mixed pine/hardwood forest with moderate density of saplings or small trees, shrubs, and rich herb layer. The US 70 Havelock Bypass project would result in loss of potentially suitable habitat that could be used by this species. Potentially suitable habitat for this species is present on the CMB property and this species has been documented on the CMB property.

Blue-winged Warbler

The Blue-winged Warbler is a migrant through the Coastal Plain region of North Carolina and does not breed or overwinter on the CNF. There are no records of this species from USFS Breeding Bird Surveys for the CNF. Although not documented in the evaluation area during other NCDOT assessments, migrants of this species may utilize habitats in the evaluation area. Migrants may be found in hardwood forests, particularly in bottomland or other mesic forests or thickets. The US 70 Havelock Bypass project would result in loss of potentially suitable habitat that could be used by migrants of this species. Potentially suitable habitat for this species is present on the CMB property.

Prairie Warbler

The Prairie Warbler is a summer resident and occasional wintering resident in the Coastal Plain region of North Carolina that occurs in appropriate habitat on the CNF. There are 812 records of this species from USFS Breeding Bird Surveys for the CNF. This species appears to be stable on the CNF based on USFS Breeding Bird Surveys, but with fluctuating numbers or detectability from year-to-year; mean number of birds observed per point was 1.27 (range 0.23 to 1.93) during the period 1997-2004 and 1.33 (range 0.59 to 2.08) during the period 2005-2013. This species has been documented in the evaluation area during other NCDOT assessments. This species nests in shrubby and successional habitats, including young or

recently burned pocosins, overgrown fields with saplings, and recently timbered areas, where woody vegetation is mostly less than 20 feet in height. The US 70 Havelock Bypass project would result in loss of potentially suitable habitat that could be used by this species. Potentially suitable habitat for this species is present on the CMB property and this species has been documented on the CMB property.

Prothonotary Warbler

The Prothonotary Warbler is a summer resident in the Coastal Plain region of North Carolina that occurs in appropriate habitat on the CNF. There are 362 records of this species from USFS Breeding Bird Surveys for the CNF. This species appears to be stable and increasing on the CNF based on USFS Breeding Bird Surveys, with mean number of birds observed per point increasing from 0.38 (range 0 to 0.93) during the period 1997-2004 to 0.79 (range 0.46 to 1.23) during the period 2005-2013. This species has been documented in the evaluation area during other NCDOT assessments. This species typically nests in swamps, bottomlands, nonriverine forests, wooded beaver ponds, and other wet habitats with dead trees and snags for cavity nesting. The US 70 Havelock Bypass project would result in loss of potentially suitable habitat that could be used by this species. Potentially suitable habitat for this species is present on the CMB property and this species has been documented on the CMB property.

Swainson's Warbler

The Swainson's Warbler is a summer resident in the Coastal Plain region of North Carolina that occurs in appropriate habitat on the CNF. There are 70 records of this species from USFS Breeding Bird Surveys for the CNF. This species appears to be stable on the CNF based on USFS Breeding Bird Surveys, but with fluctuating numbers or detectability from year-to-year; mean number of birds observed per point was 0.10 (range 0 to 0.18) during the period 1997-2004 and 0.12 (range 0 to 0.30) during the period 2005-2013. This species has been documented in the evaluation area during other NCDOT assessments. This species typically nests in wetland forests containing dense stands of cane. The US 70 Havelock Bypass project would result in loss of potentially suitable habitat that could be used by this species. Potentially suitable habitat for this species is present on the CMB property and this species has been documented on the CMB property.

Kentucky Warbler

The Kentucky Warbler is a summer resident in the Coastal Plain region of North Carolina that occurs in appropriate habitat on the CNF. There are 10 records of this species from USFS Breeding Bird Surveys for the CNF. This species appears to be stable on the CNF based on USFS Breeding Bird Surveys, but with fluctuating numbers or detectability from year-to-year; mean number of birds observed per point was 0.02 (range 0 to 0.10) during the period 1997-2004 and 0.02 (range 0 to 0.12) during the period 2005-2013. This species has been documented in the evaluation area during other NCDOT assessments. This species typically nests in moist, rich hardwood forests with an abundance of ferns and other herbaceous species. The US 70 Havelock Bypass project would result in loss of potentially suitable habitat that could be used by this species. Potentially suitable habitat for this species is present on the CMB property and this species has been documented on the CMB property.

LeConte's Sparrow

The LeConte's Sparrow is a migrant through the Coastal Plain region of North Carolina that typically winters south of North Carolina, but some may overwinter; this species does not breed on the CNF. There are no records of this species from USFS Breeding Bird Surveys for the CNF. Although not documented in the evaluation area during other NCDOT assessments, migrants of this species may utilize wet or mesic herbaceous areas, particularly during migration. The US 70 Havelock Bypass project would result in loss of potentially suitable habitat that could be used by migrants of this species. Potentially suitable habitat for this species is present on the CMB property.

Rusty Blackbird

The Rusty Blackbird is a migrant through the Coastal Plain region of North Carolina that also overwinters in areas with appropriate habitat; this species does not breed on the CNF. There are no records of this species from USFS Breeding Bird Surveys for the CNF. Although not documented in the evaluation area during other NCDOT assessments, migrants and overwintering individuals of this species may utilize swamps and other wetland forests and thickets. The US 70 Havelock Bypass project would result in loss of potentially suitable habitat that could be used by migrants of this species. Potentially suitable habitat for this species is present on the CMB property and this species has been documented on the CMB property.

Species Viability Evaluation

The 1982 planning regulations implementing the National Forest Management Act (NFMA) (36 CFR 219.19) require national forests to provide habitat in order "to maintain viable populations of existing native and desired non-native vertebrate species in the planning area." These regulations focus on the role of habitat management in providing for species viability. Supporting viable populations for BCC on NFS lands on the CNF involves providing habitat in amounts and distributions that can support interacting populations at levels that result in continued existence of the species well-distributed over time.

The proposed US 70 Havelock Bypass project would result in loss of approximately 295.4 acres of habitats on NFS lands through implementation of Alternative 3, the proposed action alternative, much of which currently may be or could be utilized by BCC on NFS lands in the CNF. The proposed US 70 Havelock Bypass would result in habitat fragmentation resulting from separation of approximately 1,239 acres of NFS lands located between the proposed Bypass and existing US 70 from contiguous NFS lands. To minimize fragmentation-induced habitat changes in USFS management of these areas, NCDOT has agreed to periodically close the US 70 Havelock Bypass under general conditions outlined with USFS to accommodate prescribed burning. No projects on NFS lands have been identified that would contribute significant adverse cumulative effects affecting BCC viability on the CNF. The 4,035-acre CMB property acquired by NCDOT contains potentially suitable habitat for several of the BCC species affected by loss of habitat by the proposed project. Nine of the BCC species evaluated as migratory birds have been documented on the CMB, as well as have three other BCC species evaluated as USFS rare species (Sensitive or Locally Rare). Contingent upon USFS release of ROW for the US 70 Havelock Bypass, the CMB property would be transferred to the USFS to become part of the CNF and managed by USFS. The

addition of the CMB to the CNF could have a positive effect on those BCC species for which suitable habitat is present on the CMB.

Based on consideration of direct habitat loss, allowance for continued use of prescribed burning for management of fragmented NFS lands, identification of no projects that would contribute to significant cumulative effects affecting BCC viability on the CNF, and mitigation measures proposed by NCDOT, the US 70 Havelock Bypass project would not result in loss of viability for BCC on NFS lands in the CNF. Habitat required for BCC would continue to be of sufficient quality, abundance, and distribution across the CNF to allow species to stabilize in a pattern similar to reference distribution.

HERBICIDE EVALUATION REPORT

FOR THE

US 70 HAVELOCK BYPASS (R-1015)

CROATAN RANGER DISTRICT
CROATAN NATIONAL FOREST

CRAVEN AND CARTERET COUNTIES

NORTH CAROLINA

May 16, 2014

Contact Person:
Mary Frazer
North Carolina Department of Transportation
Natural Environment Section
Biological Surveys Group

1598 Mail Service Center
Raleigh, NC 27699
919.707.6119
mefrazer@ncdot.gov

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1.0 Introduction

The U.S. Forest Service (USFS) has requested that additional information and analysis be provided for herbicide use to control Non-native Invasive Plant Species (NNIS) on National Forest System (NFS) lands in the direct and indirect impact areas for the US 70 Havelock Bypass and the Croatan Mitigation Bank (CMB). The USFS identified the evaluation completed for Non-Native Invasive Plant Control on the Nantahala and Pisgah National Forests as a suitable example of the additional information and analysis requested for the Havelock Bypass Final Environmental Impact Statement (FEIS).

The USFS has provided NCDOT with a list of 26 NNIS for the Croatan National Forest (CNF), 19 of which have been characterized as high priority for treatment, and the remaining seven as medium priority for treatment. The North Carolina Department of Transportation (NCDOT) has developed a list of nine herbicides that are proposed to be used for NNIS control. Following the example evaluation identified by the USFS, the present evaluation will provide an assessment of the potential effects from proposed methods for controlling NNIS, especially herbicide use. The evaluation will identify specific herbicides that can be utilized; target NNIS proposed for control; treatment methods; existing NNIS infestations; direct, indirect and cumulative effects to USFS rare species, management indicator species, and aquatic habitats; and proposed mitigation measures to minimize effects on USFS rare species and aquatic habitats. NNIS control may be conducted by both the USFS and NCDOT.

1.1 Purpose and Need

NCDOT and the USFS are proposing a multi-year project to control infestations of NNIS in association with portions of the proposed US 70 Havelock Bypass (R-1015) project in Craven and Carteret Counties, North Carolina. The evaluation area for this project includes NFS lands that are within the proposed right-of-way (ROW) for Alt. 3 of the proposed US 70 Bypass project, indirect impact areas located on NFS lands between existing US 70 and the proposed right-of-way, and the CMB (Figure 1, Appendix A). This action is needed because invasive species have been identified by the USFS as a significant threat to the nation's forests and grasslands. Without intervention, weed infestations will continue to expand and impacts to environmental and social resources will intensify annually.

The purpose of this project is to protect native populations of plants and animals through the timely treatment of NNIS infestations and to prevent or reduce the spread of NNIS infestations to high quality natural habitats associated with the proposed US 70 Havelock Bypass project.

A list of priority invasive plant species across the CNF has been developed from both botanical surveys and NNIS inventories that were conducted in the CNF (Table 1). Most of the 26 species identified in Table 1 are prevalent across the region and are continuing to spread, actively impacting biodiversity. These species were assigned a relative priority for treatment based on their known impacts on rare species and communities, their ability to rapidly spread, and their ability to persist in the forest. These species have been identified by USFS as the highest priority species on the CNF at the present time but the list may be updated as needed, based on new information regarding species' spread and infestation characteristics.

Table 1. Priority non-native invasive plant species on the Croatan National Forest.

Scientific Name	Common Name	Priority Treatment
Lespedeza cuneata	Sericea Lespedeza	High
Lespedeza bicolor	Bicolor Lespedeza	High
Albizia julibrissin	Mimosa	High
Ligustrum sinense	Chinese Privet	High
Rosa multiflora	Multiflora Rose	High
Ailanthus altissima	Tree-of-heaven	High
Miscanthus sinensis	Chinese Silver Grass	High
Lonicera maacki or *morrowii*	Amur or Morrow's Honeysuckle	High
Lonicera japonica	Japanese Honeysuckle	High
Sorghum halepense	Johnson Grass	High
Arthraxon hispidus	Basket Grass	High
Elaeagnus umbellata	Autumn Olive	High
Pueraria montana var. *lobata*	Kudzu	High
Hedera helix var. *helix*	English Ivy	High
Vinca minor	Periwinkle	High
Kummerowia striata	Japanese-clover	High
Youngia japonica	Asiatic Hawk's-beard	High
Wisteria sinensis	Chinese Wisteria	High
Verbena brasiliensis	Brazilian Vervain	High
Imperata cylindrica	Cogon Grass	Medium
Persicaria perfoliata	Mile-a-minute	Medium
Cayratia japonica	Bushkiller	Medium
Pyrus calleryana	Bradford Pear	Medium
Solanum viarum	Tropical Soda Apple	Medium
Centaurea stoebe ssp. *micranthos*	Spotted Knapweed	Medium
Commelina communis	Common Dayflower	Medium

1.2 Proposed Action

The proposed action is to treat NNIS infestations within the evaluation area, using an integrated combination of manual, mechanical, cultural, and chemical control treatment methods. The initial treatment, conducted by NCDOT, will begin prior to construction, and will consist of clearing and grubbing of NNIS along the US 70 Havelock Bypass easement. NCDOT will use herbicides to treat roadside NNIS in the CMB prior to turning over the site to USFS; an initial treatment, followed by a second spot application, will address invasive species growing along or adjacent to the existing roads. Post-construction, NCDOT will undertake treatments along the US 70 Havelock Bypass easement as needed in coordination with USFS staff, and USFS may undertake treatments in other portions of the evaluation area.

Any combination of the following mechanical, cultural, and chemical methods could be annually accomplished across the evaluation area.

- **Proposed Manual and Mechanical Methods:** Manual or mechanical methods would be the principle method for controlling small spot infestations. Examples of hand tools that might be used include shovels, saws, axes, loppers, hoes, or weed-wrenches. Mechanical methods could include cutting with a string trimmer, chainsaw, brush blade, or mower.

Initial treatment of the bypass easement by NCDOT will consist of clearing and grubbing larger infestations of NNIS, with disposal of material outside the limits of CNF.

- **Proposed Spot Treatments Using Propane Weed Torch:** A propane weed torch would be used to spot-burn targeted invasive plants. The weed torch works not by starting a ground fire but by using the torch's flame to burn the target plant. The weed torch would only be used during times of low fire danger. Propane weed torch use would primarily be within plant communities that have a low potential to carry fire, such as Swamp Forest communities. The weed torch is known to be effective with some invasive shrubs but would be tested on other high-priority invasive plants as an alternative to herbicide use.
- **Proposed Chemical (Herbicide) Methods:** The objectives of herbicide use would be to control NNIS infestations where manual or mechanical means would be cost-prohibitive or result in excessive soil disturbance or other resource damage. All herbicides would be used according to manufacturer's label direction for rates, concentrations, exposure times, and application methods. Herbicides would be directly applied to the target plants (*i.e.*, the NNIS) using spot treatment. Spot treatments would consist of various techniques for applying herbicides to target plants with minimal impact to desirable vegetation and other non-target organisms, including humans. Herbicide drift would be greatly reduced with spot treatments (relative to broad-scale or aerial application). Techniques that could be used include spraying foliage using a hand-held wand or backpack sprayer, basal bark and stem treatments using spraying or painting (wiping) methods, cut surface treatments (spraying or wiping), and woody stem injections. No herbicides would be applied aerially. Only formulations approved for aquatic-use would be applied in or adjacent to wetlands, lakes, and streams, in accordance with label direction.

Herbicides that potentially could be utilized include the following:

- **Triclopyr** - A selective herbicide that controls invasive, broadleaf herbaceous and woody plants, but has little to no effect on grasses. This chemical acts as a growth regulator and can be applied as a direct foliar application, stem injection, or cut-surface treatment. Specific ammine formulations of triclopyr have been labeled for aquatic application. Amine triclopyr formulations labeled for aquatic sites can be effective on both emergent aquatics and shoreline vegetation. Both amine and ester formulations of this herbicide have been proven effective on a wide variety of NNIS. Commercial brand names include but are not limited to, Garlon 3A™, Garlon 4™, Element 3A™, Element 4™, and Pathfinder II™. This herbicide is the one most likely to be used to control broadleaf herbaceous and woody NNIS.
- **Glyphosate** - A non-selective, broad spectrum, systemic herbicide that is used to control many grasses, forbs, vines, shrubs, and trees. Specific formulations of glyphosate have been labeled for aquatic application. Formulations labeled for aquatic sites can be effective on both emergent aquatics and shoreline vegetation. This chemical is a growth inhibitor that can be applied through direct foliar application, stem injection, and cut-surface application. It has been proven effective on a wide variety of NNIS species. Commercial brand names include but are not limited to, Roundup™, Accord™, and Rodeo™.
- **Clopyralid** - A selective herbicide affecting broadleaf herbs, primarily legumes, composites, and smartweeds. This chemical acts as a growth regulator and is typically

applied as a direct foliar application. With selectivity to legumes, this chemical is particularly useful in the control of kudzu, mimosa, and lespedeza. Commercial brand names include but are not limited to, Transline™.

- **Imazapic -** A selective herbicide primarily used to control cool season grasses. Warm season grasses, many wildflower species, and legumes are resistant, while many cool season grasses and broadleaf weeds are susceptible. Commercial brand names include but are not limited to, Plateau™.
- **Metsulfuron methyl** - A systemic herbicide that is selective to woody species, broadleaf species, and many annual grasses. This herbicide has been proven to be effective in the control of lespedeza, Japanese honeysuckle, kudzu, multiflora rose, and Johnson grass (when combined with glyphosate). Commercial brand names include but are not limited to, Escort™ and Oust™.
- **Dicamba -** A somewhat selective herbicide that controls most annual and perennial broadleaf herbs and some woody species. Care must be taken as it can damage or kill hardwood and pine seedlings, but has little to no effect on grasses. This chemical is known to be effective in the control of autumn olive. Commercial brand names include but are not limited to Vanquish™ and Overdrive™.
- **2, 4-Dichlorophenoxyacetic Acid - (commonly shortened to 2, 4-D)** A selective herbicide used to control invasive broadleaf herbaceous plants and woody seedlings, but does not harm most monocot species (*i.e.* grasses, orchids, lilies). Commercial brand names include Frontline, Weed-no-More, and Aqua-Kleen.
- **Imazapyr -** A non-selective herbicide used for the control of a broad range of invasive species ranging from annual and perennial grasses, broadleaved herbs, aquatic species, and woody species. This chemical does not readily break down in plants and thus is particularly good in controlling large woody species, such as tree-of-heaven, and has been frequently utilized for creating wildlife openings. Commercial brand names include Chopper, Arsenal, and Stalker.
- **Sethoxydim -** A selective herbicide that controls annual and perennial grasses. This chemical is known to be effective in control of Johnson grass, Chinese silver grass, and Japanese stilt grass. Commercial brand names include Poast, Torpedo, and Vantage.

The proposed treatments will be concentrated along areas with the greatest potential for infestations: 1) road corridors, 2) powerline corridors, 3) stream corridors, 4) wildlife openings, 5) registered NC Natural Heritage Program natural areas, 6) other natural areas with rare species or rare plant communities, and 7) areas subject to prescribed burns. Control projects will be prioritized for known infestations affecting USFS rare species or suitable habitat for USFS rare species.

2.0 Alternatives

There are two alternatives being considered for this project. Alternatives include the proposed action (Alternative 1) and a no action alternative (Alternative 2).

Alternative 1 - Proposed Action

The proposed action is to treat NNIS infestations on NFS lands within the CNF that are within the proposed easement for the highway project, areas located on NFS lands between existing US

70 and the proposed right-of-way, and the CMB, using an integrated combination of manual, mechanical, cultural, and chemical control treatment methods. Treatment will begin prior to the initiation of project construction and continue as needed to maintain the right-of-way and other portions of the evaluation area.

Alternative 2 - No Action

Under the no action alternative, there would be no treatment of NNIS infestations. Existing NNIS populations would continue to spread, and new infestations would continue to become established.

2.1 Mitigation Measures

All action alternatives would adhere to Forest Plan management direction, established mitigation measures, herbicide labels, and assigned monitoring. The following is a summary of additional mitigation measures that would be implemented under the proposed action alternative.

1) All guidelines and mitigation measures presented in Forest Manual 2150, *Pesticide-Use Management and Coordination*, and Forest Service Handbook 2109.14, *Pesticide Use Management and Coordination Handbook*, would be followed.
2) Equipment, boots, and clothing would be cleaned thoroughly before moving from treatment sites to ensure that seeds or other propagules are not transported to other sites.
3) Fueling or oiling of mechanical equipment would occur away from aquatic habitats.
4) Applicators would use barriers (loosely secured silt fence) along stream edges and banks prior to any application of herbicides. If a silt fence cannot be easily secured on steep rocky banks one member of an applicator team will maintain a mobile barrier (such as a large cardboard sheet about 3 by 3 feet in size) between the herbicide application and the stream during the application.
5) When conducting mechanical control by hand, NNIS parts capable of starting new plants (seeds, rhizomes, etc.) need proper disposal. Plants may be piled and burned on site or bagged and moved off site. Bagged plants would either be incinerated or would receive standard garbage disposal. For large woody bushes that would be difficult to move, treatments will be scheduled prior to seed set as practical.
6) When conducting mechanical control by hand, all NNIS within 10 feet of any known USFS rare species occurrences would be cut back to within 6 inches of the ground for woody stems and to expose the root crown for vining stems.
7) A barrier (such as an appropriately sized cardboard sheet) would be placed between the targeted NNIS and any known USFS rare species occurrences in the immediate vicinity.
8) When USFS rare plants species are present nearby, herbicide applications would be applied to cut stems with a small wick applicator if possible or with a small spray bottle to minimize herbicide drift onto non-target vegetation.
9) Use of mowing as a NNIS control method should be timed to avoid spreading seeds (e.g. before seed set).
10) When work is conducted in areas containing rare or sensitive plant species, those plants would be flagged or marked to avoid spraying. A physical barrier would be used to protect non-target species when they occur immediately adjacent to the treatment area.
11) Retain native vegetation and limit soil disturbance as much as possible.

12) Prior to any treatments, actions covered by this document would be reviewed by forest resource specialists in the areas of wildlife biology, botany, aquatics, soils, recreation, and heritage resources.
13) Exposed soils would be promptly revegetated to avoid re-colonization by NNIS or potential soil erosion. Only approved seed mixtures and weed seed-free mulch would be used.
14) The weed torch would only be used after consulting with the Forest Fire Management Officer to determine fire danger and needed protection measures.
15) Prior to construction, NCDOT will coordinate with the USFS to identify rare plant species on NFS lands occurring near the project's construction limits and put up protective orange fencing to be removed after completion of construction.
16) To prevent the spread of NNIS on NFS lands, NCDOT will require contractors to pressure wash all off-road equipment, including cranes, graders, pans, excavators, and loaders, prior to being brought into the CNF construction areas.
17) To control the spread of NNIS on NFS lands, NCDOT, in coordination with the USFS, will locate and flag areas of non-native invasive plant species. If any of these areas are within areas of proposed fill, those areas will be cleared and grubbed, and the material disposed of outside the limits of the CNF. If NNIS are located in areas of proposed cuts, then the material and actual thickness of root mat or other defined amount will be disposed of outside the limits of the CNF.
18) In consultation with the USFS, NCDOT will use seed mixes of native grasses and forbs or other non-aggressive, non-natives on NFS lands for erosion control and revegetation.
19) Broadcast sprays for herbicides will not be used on NFS lands. NCDOT will only use herbicides in specific areas on National Forest System lands in consultation with the USFS. In addition, NCDOT will coordinate with the USFS on any mechanical methods that would be allowed for NNIS.
20) NCDOT will work on adjacent NCDOT ROW to prevent the encroachment of NNIS on to CNF.

2.3 Comparison of Alternatives

The following table presents a comparison of the proposed alternatives by resource effects. The effects are discussed in detail in Section 3.0.

Table 2. Comparison of Alternatives.

Resource	Effects of Proposed Treatment	
	Alt. 1 (Proposed Action)	**Alt. 2 (No Action)**
Water and Soil Resources	Impacts to water and soil resources are beneficial as native riparian vegetation reestablishes and streambanks stabilize	Impacts to water and soil would continue to be adverse as native riparian vegetation communities continue to degrade
Vegetative Communities	Increased native diversity over time	Decreased native diversity
Management Indicator Species	Improved habitat conditions would benefit these species in the long term	Potential negative effects as habitat quality decreases
Terrestrial Wildlife and Terrestrial Rare Species	Improved native forage would benefit wildlife in long term	Decreased quality of native forage
Aquatic Habitats and Aquatic Rare Species	Native riparian habitats would improve over time	Impacts to riparian habitats would continue to be adverse as native riparian vegetation communities continue to degrade
Botanical Rare Species	Improved habitat conditions would benefit these species in the long term	Could impact local populations with extirpations as a worst case
Scenery and Recreation	Long term benefit to scenic values as natural viewsheds are restored	Potential decrease in scenic values where NNIS dominate the landscape
Cultural Resources	The natural environment would be improved over the long term by restoring native vegetation	Cultural resource sites could be impacted by encroaching NNIS infestations
Human Health and Safety	Impacts to public health and safety are negligible	None
Civil Rights	None	None

2.4 Alternatives Not Considered In Detail

A non-herbicide alternative was not considered because non-herbicide methods (hand or mechanical clearing, fire only, or use of grazing animals only, such as goats) are not likely to be effective and therefore would not accomplish the project purpose and need. Manual treatments are not as effective because of resprouting from persistent rootstocks and because some of these infestation areas cover fairly large acreages. In addition, costs would be higher for using only mechanical or manual methods compared to integrating the use of chemical methods for control.

3.0 Affected Environment and Environmental Consequences

This section summarizes the physical, biological, and social environments of the affected evaluation area and the potential changes to those environments due to implementation of the

alternatives. It also presents the scientific and analytical basis for the comparison of alternatives presented in Table 2.

3.1 Physical Environment

3.1.1 Soils and Hydrology

Affected Environment
The existing condition of soils and water varies depending on site-specific treatment areas. The potential affected soil and water environment ranges from well-drained upland sites to wetlands.

Direct and Indirect Effects of Alternative 1 on Soils and Hydrology
All treatments undertaken would conform to policy, laws, and regulations, including the NC Forest Practice Guidelines Related to Water Quality and the NC Best Management Practices for Forestry in the Wetlands of NC. Mitigation measures listed in Section 2.1 would additionally minimize soil and water contamination by herbicides.

Direct effects to soil and water resources may include some limited drift from fine mists during application. Once in the soils, herbicides can migrate via gravity, leaching, and surface runoff to other soils, groundwater, or surface water. However, many of the herbicide treatments would be applied directly to targeted species and relatively little herbicide would make contact with the soil. Due to the limited acreage and dispersed extent of the areas, and the short half-lives of the chemicals proposed for use, the effects would be temporary and minor.

Indirect effects for the chemical treatments are typically some loss in ground cover as the treated vegetation dies and decomposes. Because herbicides kill but do not physically remove plants and their root systems, herbicide use would not increase the potential for soil erosion. The dead plants would be expected to provide short-term soil stabilization until native plants revegetate the area.

On individual sites, local soil erosion may occur with the use of manual and mechanical treatments; however, water quality should not be affected because the material is not expected to reach stream channels.

Spot burning that is proposed for NNIS treatment using the propane weed torch would expose very little mineral soil. The type of burning proposed would change soil infiltration and porosity very little from preexisting conditions and therefore would have relatively little, if any, impact on soils in the treatment area.

Since the proposed action would restore native vegetation to riparian, streamside, and floodplain areas, the direct and indirect effects of Alternative 1 would be beneficial to the soil and water resources.

Direct and Indirect Effects of Alternative 2 on Soils and Hydrology
The no action alternative would change the existing soil and water conditions by exacerbating current degrading trends where invasive species dominate. Riparian areas occupied by invasive

plant populations would continue to have degraded native plant communities, resulting in less healthy stream ecosystems. Where deep rooted native vegetation is replaced by shallow rooted invasive plants, bank protection would continue to provide inadequate erosion protection.

Cumulative Effects of Alternative 1 on Soils and Hydrology
With expected mitigation measures and application rates and methods, no herbicide is expected to leave the evaluation area boundaries, and none is expected to enter the evaluation area from other projects. Any effects of past herbicide use on other lands will likely have dissipated.

The impacts from the proposed treatment activities are negligible and would contribute little or no incremental effect when combined with impacts of other past, present, or reasonably foreseeable future activities. Consequently, they are not expected to contribute to any measurable increase in cumulative degradation to soil or hydrological resources.

Cumulative Effects of Alternative 2 on Soils and Hydrology
No action would occur with the implementation of Alternative 2, so degrading trends to water quality would continue and would contribute to adverse cumulative effects in the associated watersheds.

Determination of Effect
Implementation of the action alternative may have a beneficial effect to the soil and water resources.

3.2 Biological Resources

3.2.1 Vegetation

Affected Environment
Habitats were visited within the evaluation area in order to document the various habitat characteristics in the field. Controlled burning is conducted by USFS throughout much of the evaluation area and, and as a result, influences the communities present. Habitats differ based on soil, hydrology, and topographic changes.

Nine major habitat types were identified in the evaluation area. These include Pine Flatwoods, Pine/Hardwood Forest, Streamhead Pocosin, Swamp Forest, Small Pond, Powerline Corridor, Pine Plantation, Successional/Ruderal Habitat, and Rural/Urban Modifications. Five habitat types are further divided by characteristics of hydrology or vegetation. Pine Flatwoods is the most abundant habitat type within the evaluation area and includes areas identified as either mesic or hydric. Streamhead Pocosin is divided into tree-dominated and shrub-dominated areas based on canopy coverage. Swamp Forest has been grouped into three distinct regimes with respect to hydrologic conditions and stream characteristics: large stream, small stream, and ponded/depressional. Powerline Corridor and Pine Plantation habitats are divided into mesic and hydric areas. One habitat type, Rural/Urban Modifications, is used to include all obvious human-maintained landscape modifications including roadsides, lawns, and other landscaped areas. Habitats sustaining regular disturbance are included under Successional/Ruderal Habitat.

Due to the unique landscape position of the CMB, five additional habitat types not present in the proposed Bypass ROW were identified that represent various levels of past disturbance, response to water level changes and a variety of human landscape manipulations. These additional habitats include Non-riverine Wet Hardwood Forest, Non-riverine Swamp/Bay Forest, Lake Ridge Pine Forest, Pine Savanna, and Upland Hardwood Forest.

NNIS Occurrences

Surveys for NNIS were undertaken in September 2013 for the species listed in Table 1. Ten species considered to be invasive by the USFS and characterized as high priority for treatment were found to occur, or are expected to occur on NFS lands on the CNF within the evaluation area (Figure 2, Appendix A). Table 3 lists NNIS infestations identified within the evaluation area.

Table 3. NNIS identified in the evaluation area.

Scientific Name	Common Name
Lespedeza cuneata [1]	Sericea Lespedeza
Lespedeza bicolor [1]	Bicolor Lespedeza
Albizia julibrissin [1]	Mimosa
Ligustrum sinense [1]	Chinese Privet
Rosa multiflora [1]	Multiflora Rose
Lonicera japonica [1]	Japanese Honeysuckle
Sorghum halepense [2]	Johnson Grass
Hedera helix var. *helix* [2]	English Ivy
Wisteria sinensis [1]	Chinese Wisteria
Verbena brasiliensis [1]	Brazilian Vervain

[1] Multiple Infestations; [2] Single Infestation

For the purposes of this analysis potential treatment areas (PTAs) are those areas that are known to have NNIS infestations or are likely to be affected by NNIS. These areas include wildlife openings, roads, riparian zones, trails, prescribed burn areas, and natural areas (including NC Natural Heritage sites). While dense NNIS infestations can occur anywhere in the evaluation area, the highest densities of infestations often occur in recently disturbed areas and travel corridors such as wildlife openings, roadsides, powerline corridors, and riparian communities.

Multiple infestations were documented for eight of the ten species of NNIS identified in the evaluation, with single infestations documented for the remaining two species, English Ivy and Johnson Grass. The NNIS with the most numerous infestations encountered were Sericea Lespedeza, Chinese Privet, Mimosa, and Brazilian Vervain.

Sericea Lespedeza infestations represent the greatest coverage by a single species followed by Bicolor Lespedeza and Chinese Wisteria. The remaining species were encountered as smaller infestations.

All ten of these NNIS were observed primarily in existing disturbed habitats on NFS lands along woodland borders adjacent to roads and bordering NFS lands boundaries adjacent to disturbed habitats. Since many of the NFS lands, including powerline rights-of-way in the evaluation area

are subjected to frequent prescribed burns, the number of infestations outside of roads and other boundary areas is greatly diminished. However, several species were found to have spread into adjacent habitats, most notably Chinese Privet, Multiflora Rose, and Chinese Wisteria, and to a lesser extent Sericea Lespedeza, Bicolor Lespedeza, Mimosa, and Japanese Honeysuckle.

Direct and Indirect Effect of Alternative 1 on Vegetation
The reduction in NNIS would benefit associated native plants. This alternative would help to restore native plant communities to their natural associated species assemblage. Where rare species populations are prioritized for NNIS treatment, the benefits would ensure continued viability of these rare species across the CNF.

Herbicide treatments may result in effects to non-target vegetation. However these effects would be minimal since all treatments will be applied with either hand-held or backpack spray equipment. Any adverse direct affects to non-targeted plants would be localized and temporary. Most of the herbicides that are proposed for use have short half-lives, are readily bound to soil particles, and are relatively target specific. For these reasons, effects to nearby native plant species would be minimal.

Direct and Indirect Effect of Alternative 2 on Vegetation
The no action alternative would not result in any direct effects to natural communities other than those with identified occurrences of NNIS infestations, however, if future NNIS infestations were identified, the no action alternative would not provide any opportunity for treatment in these areas.

There will be indirect effects to associated species in the plant communities with NNIS infestations. Most native species will be negatively affected by the increased competition from NNIS for light, moisture, and nutrients. Rare plant species, often with small population sizes, would be most at risk. See the additional discussion on USFS rare species within Section 3.2.5.

For most communities with uncontrolled NNIS infestations, shifts in species composition are likely, but complete removal of native vegetation is highly unlikely.

Cumulative Effects of Alternative 1 on Vegetation
Past and present timber harvest and prescribed burning activities in the evaluation area have affected the invasion and spread of NNIS. These activities will continue in portions of the evaluation area in the future and could result in the continued spread of uncontrolled NNIS infestations.

Without specific operational mitigation measures, current and future timber management activities could result in the spread of existing NNIS infestations. The communities most at risk are pine savannas, pine flatwoods, and swamp forests as they currently have the highest recorded number of priority NNIS within or in adjacent disturbed habitats and are typically the most frequently harvested areas.

Control of NNIS in the evaluation area will continue to be affected by NNIS infestations on adjacent private and public lands. The longer the time between implementation of control efforts

on the forests and implementation of similar measures on adjacent lands, the less likely is the success of Alternative 1. On private lands, control efforts tend to be isolated and across small tracts of land.

Cumulative Effects of Alternative 2 on Vegetation
The cumulative effects from not treating NNIS infestations across the evaluation area are expected to result in negative impacts to vegetation through increased competition and habitat alteration.

Determination of Effect
Implementation of the action alternative may have a beneficial effect on vegetation.

3.2.2 Management Indicator Species

Affected Environment
Management indicator species (MIS) are used to evaluate the effects of proposed actions on specific habitats across the national forests. The Forest Plan for the CNF designates three wildlife species, Red-cockaded Woodpecker (*Picoides borealis*), Eastern Black Bear (*Ursus americanus*), and Wild Turkey (*Meleagris gallopavo*), as MIS. In addition, Longleaf Pine (*Pinus palustris*) and Wiregrass (*Aristida stricta*) are designated as MIS, but treated together as the Longleaf/Wiregrass Community since this community type provides habitat for an assemblage of species on the CNF.

Direct and Indirect Effects of Alternative 1 on MIS
Because the proposed herbicide treatments would be performed manually by technicians and contractors targeting specific NNIS, direct effects to wildlife MIS are highly unlikely. With manual or mechanical treatments or use of a weed torch, direct effects to wildlife MIS are extremely unlikely because the MIS will likely leave the immediate vicinity of the treatment area upon initial observance of the field crews.

The reduction in NNIS would have a beneficial effect on the Longleaf/Wire Grass Community by reducing competition from NNIS species.

Direct and Indirect Effects of Alternative 2 on MIS
NNIS often rapidly invade disturbed areas and other forest openings, although several invasive species, such as English Ivy and Privet, tolerate shady conditions and can survive and spread without canopy disturbance. Once established, NNIS often have a competitive advantage over native vegetation, reducing native biodiversity through competitive exclusion.

In the absence of treatment, NNIS are expected to continue to spread thus negatively affecting the Longleaf/Wire Grass Community. Competition with native species would continue and become increasingly prevalent. Both soil-disturbing management activities, as well as natural events such as flooding, wind throw, and forest infestations would continue to promote the spread of invasive species by disturbing the seedbed and increasing the amount of light that reaches the forest floor.

NNIS have little direct effects on wildlife MIS because invasive plants do not compete for the same resources as most animal species. However, indirect effects to terrestrial wildlife MIS include an expected decline in populations over time with the loss of high quality, native habitats. The displacement of native plant species by NNIS would reduce native diversity, mast-producing species, native grass and forb forage, and nesting opportunities. NNIS also threaten investments in wildlife openings, ponds and restoration activities by lowering the efficacy of these resources.

Cumulative Effects of Alternative 1 on MIS
The cumulative effects from treatment of NNIS infestations across the evaluation area are not expected to result in negative impacts to MIS. For most MIS there is an expected benefit with an anticipated increase in the native flora diversity after successful treatment in an area.

Cumulative Effects of Alternative 2 on MIS
The cumulative effects from not treating NNIS infestations across the evaluation area are expected to result in negative impacts to the Longleaf/Wire Grass Community through increased competition and habitat alteration, and to wildlife MIS through habitat degradation reducing foraging habitat quality.

Determination of Effect
Implementation of the action alternative may have a beneficial impact on MIS.

3.2.3 USFS Rare Species – Terrestrial Animals

Affected Environment
There are 77 animal species on the most recent (August 2013) list of rare animal species provided by the USFS for the CNF. Surveys conducted in 2005 in combination with records available through October 2013 from NCNHP and the USFS resulted in documentation, confirmation, or presumed presence of 15 USFS rare animal species within the evaluation area (Table 4).

Table 4. USFS rare animal species documented/presumed present in the evaluation area.

Species No. [a]	Scientific Name	Common Name	USFS Status [b]	Habitat Type
MAMMALS				
110	*Corynorhinus rafinesquii macrotis*	Rafinesque's Big-eared Bat	LR	Abandoned structures, caves, hollow trees, loose bark trees near wooded areas
112	*Myotis austroriparius*	Southeastern Myotis	LR	Roosts in buildings and hollow trees, forages near water
BIRDS				
119	*Ammodramus henslowii susurrans*	Eastern Henslow's Sparrow	LR	Clearcut pocosins, damp weedy fields
124	*Dendroica virens waynei*	Black-throated Green Warbler (coastal plain population)	LR	Nonriverine wetland forests, especially where white cedar or cypress are mixed with hardwoods
133	*Peucaea aestivalis (=Ammodramus aestivalis)*	Bachman's Sparrow	LR	Open pine woods with grassy cover
135	*Picoides borealis*	Red-cockaded Woodpecker	E	Pine savannas
REPTILES AND AMPHIBIANS				
140	*Alligator mississippiensis*	American Alligator	T(S/A)	Fresh and brackish marshes, ponds, lakes, rivers, swamps
148	*Heterodon simus*	Southern Hognose Snake	LR	Sandy woods, particularly pine-oak sandhills
INSECTS				
162	*Amblyscirtes alternata*	Dusky Roadside Skipper	LR	Open grassy pine flatwoods, savannas, sandhill ridges
165	*Atrytone arogos arogos*	Arogos Skipper	S	Mesic to boggy reedgrass savannas
169	*Calephelis virginiensis*	Little Metalmark	LR	Grassy fields, savannas, marshes
173	*Euphyes berryi*	Berry's Skipper	LR	Wet prairies, marshes, savannas with pitcher plants
174	*Euphyes bimacula*	Two-Spotted Skipper	LR	Wet savannas, bogs, sedge areas near wet woods
175	*Euphyes dukesi dukesi*	Duke's Skipper	S	Ecotones of brackish or freshwater marshes with swamps
182	*Pyreferra ceromatica*	Anointed Sallow Moth	LR	Flatwoods and pocosins, ecotones between mesic woodland and bottomlands

[a] Species numbering continued from Biological Evaluation (BE).
[b] E – Endangered; LR – Locally Rare; S – Sensitive; T(S/A) – Threatened Due to Similarity of Appearance.

Because rare species specific information on exposure to herbicides is generally lacking and there do not appear to be significant differences among separate species evaluated within a group, the following analysis combines the terrestrial wildlife species by life type to analyze possible direct and indirect effects. Cumulative effects are summarized for all species at the end of this section.

Direct and Indirect Effects of Alternative 1 on USFS Rare Species – Terrestrial Animals

It is unlikely there will be any direct effects to animal species since they are highly mobile. These species would most likely leave or avoid the treatment area for the short-term while the applicators are applying herbicides, cutting or pulling vegetation, or spot burning NNIS infestations. When an animal returns to a treated site, the herbicide should have dried on the vegetation, reducing the likliehood of dermal exposure when brushing by vegetation or during grooming activities.

In some cases bats may move from one roost tree to another suitable roost tree. These rare bats are not known to ingest or roost on any NNIS, thus reducing the likliehood of any additional direct effects.

Birds will temporarily leave the immediate vicinity and leave their nests when treatments are occurring. However, the human disruption would be temporary in duration and only result in minimal effects. The treatment of various NNIS with abundant fruit (such as Multiflora Rose) may reduce the local quantities of soft mast available for birds. However, over time native vegetation should re-establish, providing increased quantities of soft mass as well as improving habitat for diverse prey, such as insects. It is possible that individual birds may ingest herbicide contaminated insects resulting in a negative indirect effect. The possibility of contaminating insects would be minimal and short term. All of the proposed herbicides have a low toxicity to birds.

Most insects have the opportunity to temporarily leave a treated area. Honey bees generally are used as the standard representative test organism for invertebrates on herbicide bioassays. The results for the selected herbicides to be used in treatments indicate a low toxicity to honey bees. The treatments would favor native species ultimately increasing native species richness and abundance which should increase the diversity of potential host plants for rare insects present within treatment areas.

Any direct adverse impacts caused by treatment activities in habitats would be relatively small and temporary. Follow up treatments may be necessary in certain areas, however, the time between treatments will be at least three months so there should not be any permanent avoidance by mammals in these areas.

By removing the NNIS, the associated native vegetation could become reestablished and the associated native plant community restored. A restored native plant community would provide a higher diversity habitat and food source for rare animals in the treated areas. These indirect effects of the treatments are expected to provide long-term benefits to native wildlife populations.

Direct and Indirect Effects of Alternative 2 on USFS Rare Species – Terrestrial Animals
The no action alternative will not result in any known direct effects to rare terrestrial animals on the CNF. Indirectly, this alternative will result in further decline of high quality native habitat. While it is commonly understood that NNIS outcompete and often displace native vegetation, few studies have empirically demonstrated how NNIS alter specific ecological processes within a plant community. It is understood that the presence of a NNIS infestation would result in declines in habitat components important for associated flora and fauna including rare terrestrial animals.

Cumulative Effects of Alternative 1 on USFS Rare Species – Terrestrial Animals
Past and present timber harvest and prescribed burning activities on the CNF, as well as on-going existing NNIS treatments on public and private lands have altered habitats suitable for some of the rare terrestrial animal species known to occur on the CNF.

These activities will continue in the future and the cumulative effects from treatment of NNIS infestations across the CNF is not expected to result in an increase of negative impacts to rare terrestrial wildlife species. For most terrestrial wildlife species there is an expected benefit with an anticipated increase in the native flora diversity after successful treatment in an area.

Cumulative Effects of Alternative 2 on USFS Rare Species – Terrestrial Animals

The cumulative effects from not treating NNIS infestations across the evaluation area are expected to result in negative impacts through increased competition and habitat alteration.

Determination of Effect
Alternative 1 will have no negative effect on any federally threatened or endangered wildlife species. The action alternative is not likely to result in a trend towards federal listing of sensitive species since there will be no impact to sensitive species or the species may benefit from the proposed action. Implementation of the action alternative may have a beneficial impact on select rare terrestrial wildlife species.

3.2.4 USFS Rare Species – Aquatics

Affected Environment
There are 15 aquatic animal species on the most recent (August 2013) list of rare animal species provided by the USFS for the CNF. Surveys conducted in 2005 in combination with records available through October 2013 from NCNHP and the USFS did not document the presence or presumed presence of any USFS rare aquatic animal species within the evaluation area. Since no USFS rare aquatic animal species were documented in the evaluation area, the following analysis will address effects of the proposed action based on the complete aquatic habitats. The aquatics analysis includes the following specific mitigation measures:

1) Only herbicides labeled for use in or near aquatic systems would be used within 30 feet of water, and
2) Applicators would use barriers (loosely secured silt fence) along stream edges and banks prior to any application of herbicides. If a silt fence cannot be easily secured on steep rocky banks one member of an applicator team would maintain a mobile barrier (such as a large cardboard sheet about 3 by 3 feet in size) between the herbicide application and the stream during the application.

Direct and Indirect Effects of Alternative 1 on Aquatic Habitats
Direct effects to aquatic habitats from herbicide drift will be minimized by following the above mitigation measures. The implementation of a streamside barrier to reduce any drift into the stream diminishes the risk. Risk assessments of the proposed herbicides on fish and invertebrates conducted on other National Forests in North Carolina indicate low sensitivity.

It is unlikely that flame throwers would be used near streams given the moist conditions. A weed wrench is a mechanical tool that is very succesful in extracting entire shrub root balls. It would be utilized for dispersed occurrences of certain NNIS such as Chinese Privet in riparian

systems. In riparian areas where large NNIS infestations would be treated, it may be necessary to replant native stream bank vegetation in order to stabilize the soil. Elimination of the NNIS may result in localized short-term sedimentation sources.

It is likely that removal of NNIS would allow native vegetation to become reestablished in the riparian areas. It is generally assumed that restoring native vegetation would result in a greater diversity of habitat components that may be important for rare aquatic species. These indirect effects of the treatments would provide long-term benefits to the aquatic community.

Direct and Indirect Effect of Alternative 2 on Aquatic Habitats
Taking no action to control NNIS riparian vegetation would not result in any direct effects to aquatic organisms. Indirectly it would result in further decline of high quality native riparian habitat and shifts in native plant diversity and abundance. It is assumed that the presence of NNIS infestations would also result in declines in habitat components important for associated aquatic fauna.

Cumulative Effects of Alternative 1 on Aquatic Habitats
The cumulative effects from treatment of NNIS infestations across the CNF are not expected to result in an increase in negative impacts to aquatic habitats and rare aquatic wildlife species. There would be a benefit with the anticipated increase in native vegetation after a successful NNIS treatment. Prior to any implementation on the ground, a checklist with analysis of the area will be completed by specialists to minimize any negative cumulative effects to rare species.

Cumulative Effects of Alternative 2 on Aquatic Habitats
The cumulative effects from not treating NNIS infestations across the evaluation area are expected to result in negative impacts through increased competition and habitat alteration.

Determination of Effect
Implementation of Alternative 1 will follow mitigation to protect aquatic habitats. Alternative 1 will have no effect on any federally threatened or endangered aquatic species. Implementation of the action alternative will have no effect on sensitive aquatic species or on locally rare aquatic species.

3.2.5 USFS Rare Species – Botanical

Affected Environment
There are 107 plant species on the most recent (October 2013) list of rare plant species maintained by the USFS for the CNF. Surveys conducted from 2003-2013 within the evaluation area in combination with records available from NCNHP and the USFS resulted in documentation or confirmation of the presence of 21 USFS rare plant species within the evaluation area (Table 5).

Table 5. USFS rare plant species documented in the evaluation area.

Species No. [a]	Scientific Name	Common Name	USFS Status [b]	Habitat Type
4	*Andropogon mohrii*	Bog Bluestem	LR	Wet savannas
16	*Cirsium lecontei*	LeConte's Thistle	LR	Savannas
18	*Cleistesiopsis oricamporum (=Cleistes bifaria)*	Small coastal Spreading Pogonia	S	Savannas, dry meadows
28	*Dichanthelium spretum*	Eaton's Witch Grass	LR	Wet sands and peaty bogs, savannas
42	*Lejeunea bermudiana*	A Liverwort	LR	On marl outcrops and on decaying logs in blackwater swamps
51	*Lysimachia loomisii*	Loomis's Loosestrife	S	Moist to wet savannas and pocosin ecotones
53	*Malaxis spicata*	Florida Adder's Mouth	LR	Maritime swamp forest, calcareous mucky outer coastal plain swamps
59	*Oxypolis ternata (=O. denticulata)*	Piedmont Cowbane	S	Pine savannas, sandhill seeps
62	*Paspalum dissectum*	Mudbank Crown Grass	LR	Mudbanks, open wet areas, wet ditches
66	*Plagiochila ludoviaciana*	A Liverwort	LR	On bark in swamps and maritime forests
69	*Platanthera integra*	Yellow Fringeless Orchid	S	Savannas
70	*Platanthera nivea*	Snowy Orchid	LR	Wet savannas
71	*Polygala hookeri*	Hooker's Milkwort	S	Savannas
72	*Ponthieva racemosa*	Shadow-witch	LR	Blackwater forests and swamps over calcareous rock (marl)
73	*Pycnanthemum setosum*	Awned Mountain-mint	LR	Dry pinelands and blackwater swamps
78	*Rhynchospora galeana*	Short-bristled Beaksedge	S	Wet savannas, may colonize disturbed areas/roadsides
90	*Solidago pulchra*	Carolina Goldenrod	S	Savannas
92	*Solidago verna*	Spring-flowering Goldenrod	S	Moist pine savannas, lower slopes in sandhills, roadsides in pinelands
94	*Sphagnum cribrosum*	Florida Peatmoss	S	Blackwater streams, ditches
95	*Sphagnum fitzgeraldii*	Fitzgerald's Peatmoss	S	Pocosins and savannas
97	*Spiranthes eatonii*	Eaton's Ladies'-tresses	LR	Wet savannas

[a] Species numbering continued from Biological Evaluation (BE).
[b] LR- Locally Rare; S – Sensitive.

The following analysis provides a synopsis of the effects analysis for the 21 USFS rare plant species that have been documented within the evaluation area.

Direct and Indirect Effects of Alternative 1 for USFS Rare Species - Botanical

Herbicide applications are planned for the majority of the treatment sites in close proximity to rare plant species. The intended purpose of herbicide application is to kill target vegetation. Some proposed herbicides are somewhat selective and can be more efficaceous at eradicating targeted woody plant species, broad leaf species, members of the legume family, or primarily cool season grasses. The potentially affected USFS rare plant species are herbaceous.

If possible, treatments in known herbaceous rare plant sites will utililize triclopyr. In general this herbicide is most effective against woody plants although specific impacts to rare herbaceous species are not known.

In order to reduce non-target herbicide impacts to rare plant populations, a qualified botanist would visit the site with applicators prior to any treatment. The goal is to train the applicators on identification of the rare plant species as well as provide any site-specific application techniques. Treatment areas would be surveyed by a qualified botanist prior to any implementation and as a part of the specialist checklist procedure.

The following mitigation measures would be followed at sites with USFS rare plant species present to reduce any non-target herbicide drift onto federally listed species:

1) All NNIS within 10 feet of any USFS rare species will be cut back to within 6 inches of the ground for woody stems and to expose the root crown for vining stems,
2) A barrier (such as an appropriately sized cardboard sheet) will be placed between the targeted NNIS and the USFS rare species, and
3) Herbicide applications will be applied to cut stems with a small wick applicator if possible or with a small spray bottle that minimizes non-target herbicide drift.

These control measures would greatly reduce the risk of impacts to any of the federally rare plant species.

Manual treatment methods would not result in any impacts to known rare plant populations.

Direct and Indirect Effects of Alternative 2 for USFS Rare Species - Botanical

The no action alternative would result in continued impacts to rare plant species as NNIS continue to spread. Sites with USFS rare plant populations in close proximity to NNIS could conceivably decline as NNIS infestations expand.

Cumulative Effects for Alternative 1 on USFS Rare Species - Botanical

Past and present timber harvest and prescribed burning activities in the evaluation area have affected the invasion and spread of NNIS. These activities will continue in the future and could result in the cumulative spread of uncontrolled NNIS infestations across the landscape.

Implementation of Alternative 1 would reduce impacts to rare plant species as those sites would receive high priority for treatment. It would also be possible to treat areas with rare plant populations if other vegetation management projects were being implemented nearby. While implementation of the action alternative is an effort to control NNIS infestations in the evaluation area, it may not be effective in permanently eliminating all known infestations or those located in remote locations.

The cumulative effects from treatment of NNIS infestations across the evaluation area are not expected to result in a detrimental impact to USFS rare plant species. Prior to any implementation on the ground, a checklist with analysis of the area will be completed by specialists in the field to minimize any negative cumulative effects to rare plant species.

Cumulative Effects for Alternative 2 on USFS Rare Species - Botanical

The cumulative effects from not treating NNIS infestations across the evaluation area are expected to result in negative impacts to through increased competition and habitat alteration. The cumulative effects of the no-action alternative is a reduction in diversity of plant species in

sites with NNIS infestations, especially moist open forests and dry fire-maintained forests where NNIS proliferate. Disturbance events and forest management activities would continue to spread NNIS infestations and may result in local extirpations of native species. The absence of NNIS treatments could ultimately affect the 21 USFS rare plant species identified in the evaluation area.

Determination of Effect
Implementation of Alternative 1 would have no effect on any federally listed species. The implementation of Alternative 1 would have a long-term beneficial impact on ten sensitive plant species Implementation of Alternative 1 would have a long-term beneficial impact on eleven locally rare plant species.

3.3 Social Resources

3.3.1 Recreation and Scenery

Affected Environment
Many of the NNIS targeted for treatment in this proposal were introduced as ornamental species for their aesthetic qualities. These trees, shrubs and vines that are known for their attractive flowers and/or ability to form hedges or ground covers include Silk Tree (Mimosa), Chinese Privet, Honeysuckle, and Multiflora Rose. Since their introduction to the United States, these species have become a noticeable component of the forest landscape. The spread of many of these species is accelerated at recreation areas and along trails and roads where people act as dispersers of seeds.

Direct and Indirect Effects of Alternative 1 on Recreation and Scenery
There would be a short term visual impact of seeing dead vegetation that has been treated with herbicides. These effects would be short term as the target vegetation would quickly deteriorate and the native vegetation would revegetate the treatment area.

Long term visual effects of herbicide application would be positive since areas targeted for treatment would become reestablished with native vegetation. Native plant diversity would increase once the NNIS vegetation is eliminated and native vegetation reoccupies the available growing space. In addition, the physical impediment posed by some of these invasive plants (especially in riparian areas) would be eliminated allowing easier access on and off of trails.

Forest standards require the public be informed of treatments in specific areas to reduce impacts and to avoid contact with recently treated areas (Forest Service Handbook 7109.11). These actions would minimize adverse effects to the recreating public from herbicide application and exposures.

Some manual and mechanical treatments may interfere with developed recreation for a short period of time. Ground-disturbing activities such as mowing, disking, or blading could temporarily alter the physical appearance of treated areas. However, any such activities would be limited to areas of prior physical disturbance such as roadsides and wildlife clearings.

Direct and Indirect Effects of Alternative 2 on Recreation and Scenery
Taking no action to treat NNIS would have no immediate adverse impacts on recreation; however, failure to effectively control NNIS could result in the establishment of dense thickets of exotic vegetation that could interfere with hiking, birding, and other recreation in forested areas.

Cumulative Effects of Alternative 1 on Recreation and Scenery
The proposed treatments are intended to slow the spread of NNIS and minimize the impacts to native plant populations. Due to proximity of private land adjacent to the forest and the ease at which the NNIS spread, there will continue to be new infestations across portions of the CNF in the evaluation area. The proposed treatments will positively move the scenic and recreation resources towards a desired landscape condition comprised of native plant communities.

Cumulative Effects of Alternative 2 on Recreation and Scenery
Over the long term, dense infestations of NNIS could hinder physical movement especially in riparian areas but this effect would be isolated to relatively small areas and is not considered substantial.

Determination of Effect
Implementation of Alternative 1 would have a beneficial effect on Recreation and Scenery. The no action alternative (Alternative 2) would have a negative effect on Recreation and Scenery.

3.3.2 Cultural Resources

Direct and Indirect Effects of Alternative 1 on Cultural Resources
Mechanical control methods that disturb the soil surface, such as hand-pulling or digging have the potential to permanently disturb surface and subsurface archaeological resources occurring in the upper six to twelve inches of the soil profile. However, mitigation measures outlined in Section 2.1 specify that all treatments would be reviewed by a cultural resource specialist before soil disturbance and any needed protective measures would be implemented.

Manual application of herbicides would have negligible potential to disturb cultural resources. Application personnel or equipment could cause slight soil compaction or disturbance but would not substantially alter the spatial distribution of subsurface resources.

Direct and Indirect Effects of Alternative 2 on Cultural Resources
The no action alternative will have no potential to directly disturb known cultural resource sites on the CNF within the evaluation area. Some invasive shrubs may cover heritage sites in non-forested areas, but this would be similar to other natural vegetation encroachment.

Cumulative Effects of Alternative 1 on Cultural Resources
Elimination of NNIS would result in a more realistic environmental condition associated with archaeological sites and potential traditional cultural areas.

Cumulative Effects of Alternative 2 on Cultural Resources
There would be no cumulative effects of the proposed action on cultural resources.

Determination of Effect
There would be no effects of any of the alternatives on cultural resources in the area.

3.3.3 Human Health and Safety

Affected Environment
Effects and associated risks of all herbicides listed in the proposed action for this project have been assessed by Syracuse Environmental Research Associates, Inc. The complete text of these documents can be found at: http://www.fs.fed.us/foresthealth/pesticide/risk.shtml.

Direct and Indirect Effects of Alternative 1 on Human Health and Safety
Manual and mechanical treatment methods would pose relatively little safety risk to workers or the public. The public would be excluded from all treatment areas while work is in progress. Many of the commonly used herbicides for control of invasive plants are applied at rates below the maximum label rate. Application of herbicides at these lower rates further reduces the potential human and environmental effects.

Direct and Indirect Effects of Alternative 2 on Human Health and Safety
The no action alternative would have no direct or indirect effects on the health and safety of humans.

Cumulative Effects on Human Health and Safety
There would be no cumulative effects from any of the proposed alternatives on human health and safety.

Determination of Effect
There would be no effects of any of the alternatives on human health and safety.

3.3.4 Socio-economics

Direct and Indirect Effects of Alternative 1 on Socio-economics
Because of the limited size of the proposed treatments, this alternative would result in little or no effect on local or regional social conditions or infrastructure requirements.

Direct and Indirect Effects of Alternative 2 on Socio-economics
There would be no substantial direct or indirect effects on social conditions, local or regional employment, or revenue generated as a result of taking no action. However, failure to effectively control the spread of NNIS might result in a long-term detrimental economic impact as a result of a reduction in local recreational activities and associated revenue. Additionally, failure to take appropriate action at this time could result in an accelerated invasion of NNIS, which could result in the need for more expensive control measures in the future.

Cumulative Effects on Socio-economics
There would be no cumulative effects of any of the alternatives on the socio-economics in the area.

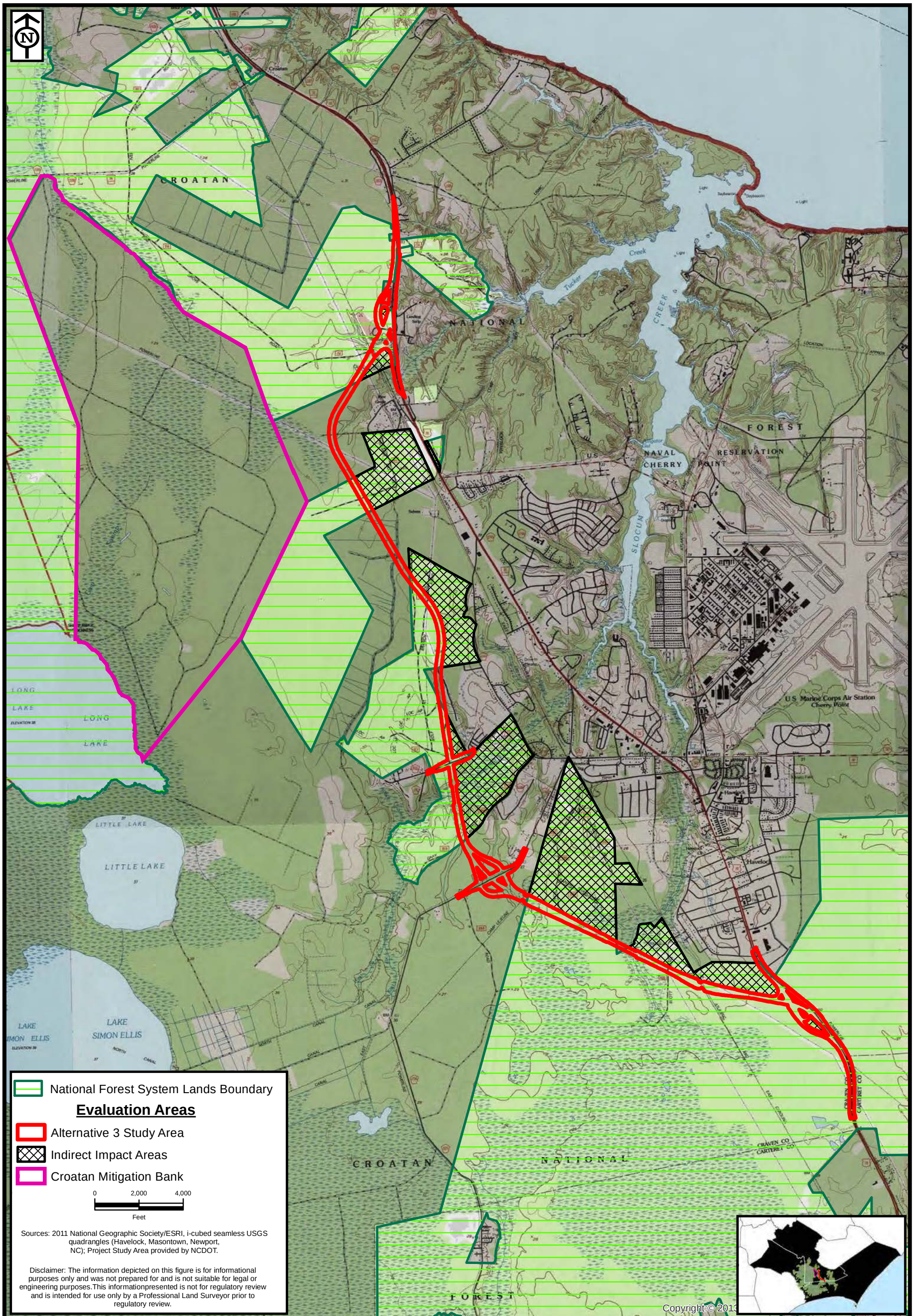
Determination of Effect
There would be no effects of any of the alternatives on socio-economics in the area.

3.3.5 Environmental Justice

Executive Order 12898, titled Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, mandates that federal agencies take the appropriate steps to identify, address, and mitigate all disproportionately high and adverse impacts of federally funded projects on the health and socioeconomic condition of minority and low-income populations. Ethnic minorities are defined as African Americans, American Indian and Alaska Natives, Asian, Hispanic or Latino, and Native Hawaiian and other Pacific Islanders. Low income persons are defined as people with incomes below the federal poverty level.

The action alternatives described in the document are limited to Forest Service managed lands. Adverse impacts resulting from these activities would either not affect or would have limited short-term effects on residents bordering the Forest Service lands. The mitigation measures outlined in Section 2.1, including short-term closures during herbicide applications, should ensure that the proposed activities would have no impact on the health of minorities or low income individuals.

Appendix A



Project Location

US 70 Havelock Bypass Herbicide Evaluation

Croatan National Forest, North Carolina

T.I.P. R-1015

Project:	ER12050.12
Date:	Apr 2014
Drwn/Chkd:	KT/MKS
Figure:	1

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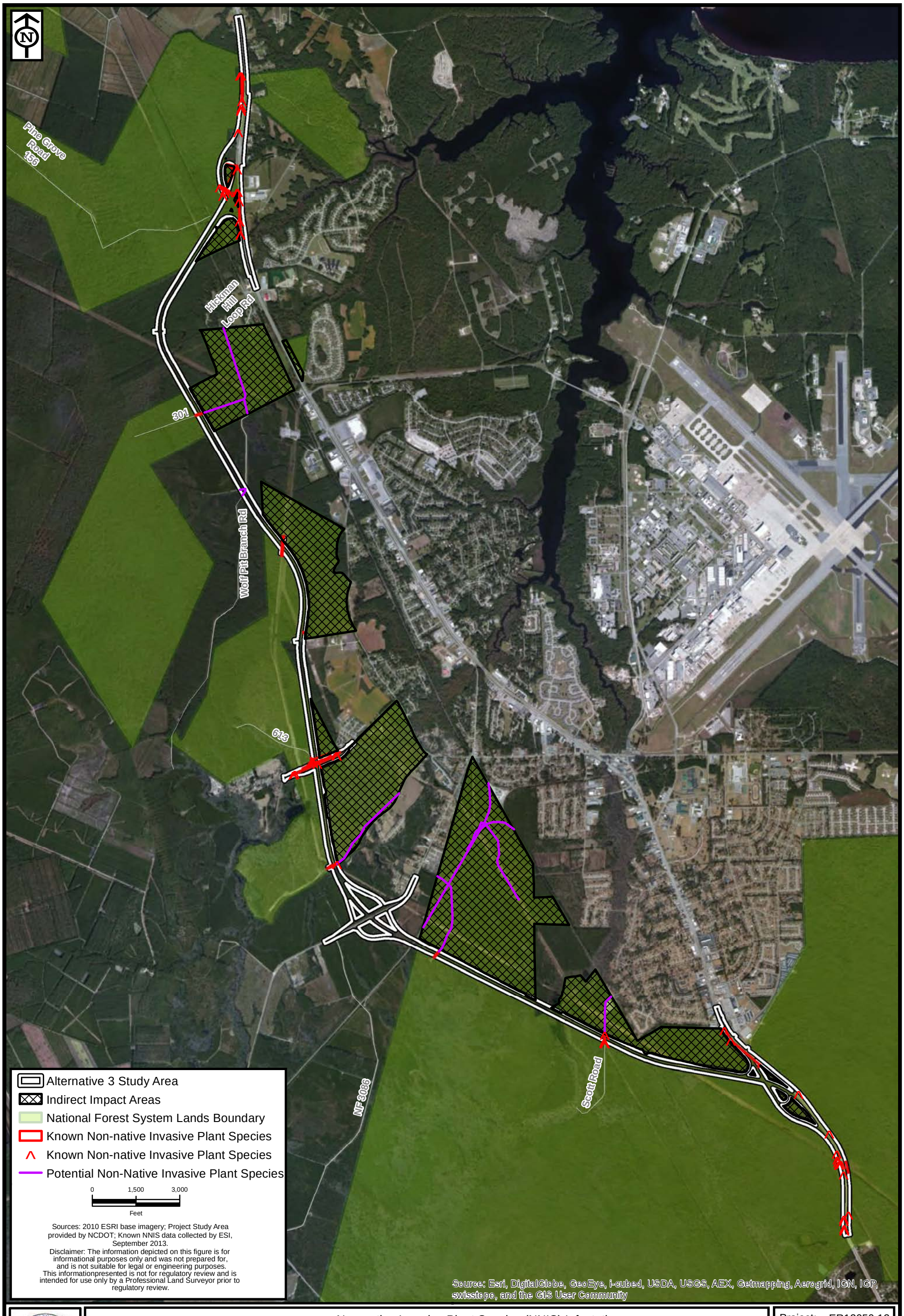

Non-native Invasive Plant Species (NNIS) Infestations

US 70 Havelock Bypass Herbicide Evaluation

Carteret and Craven Counties, North Carolina

T.I.P. R-1015

Project:	ER12050.12
Date:	Apr 2014
Drwn/Chkd:	KT/MKS
Figure:	**2a**

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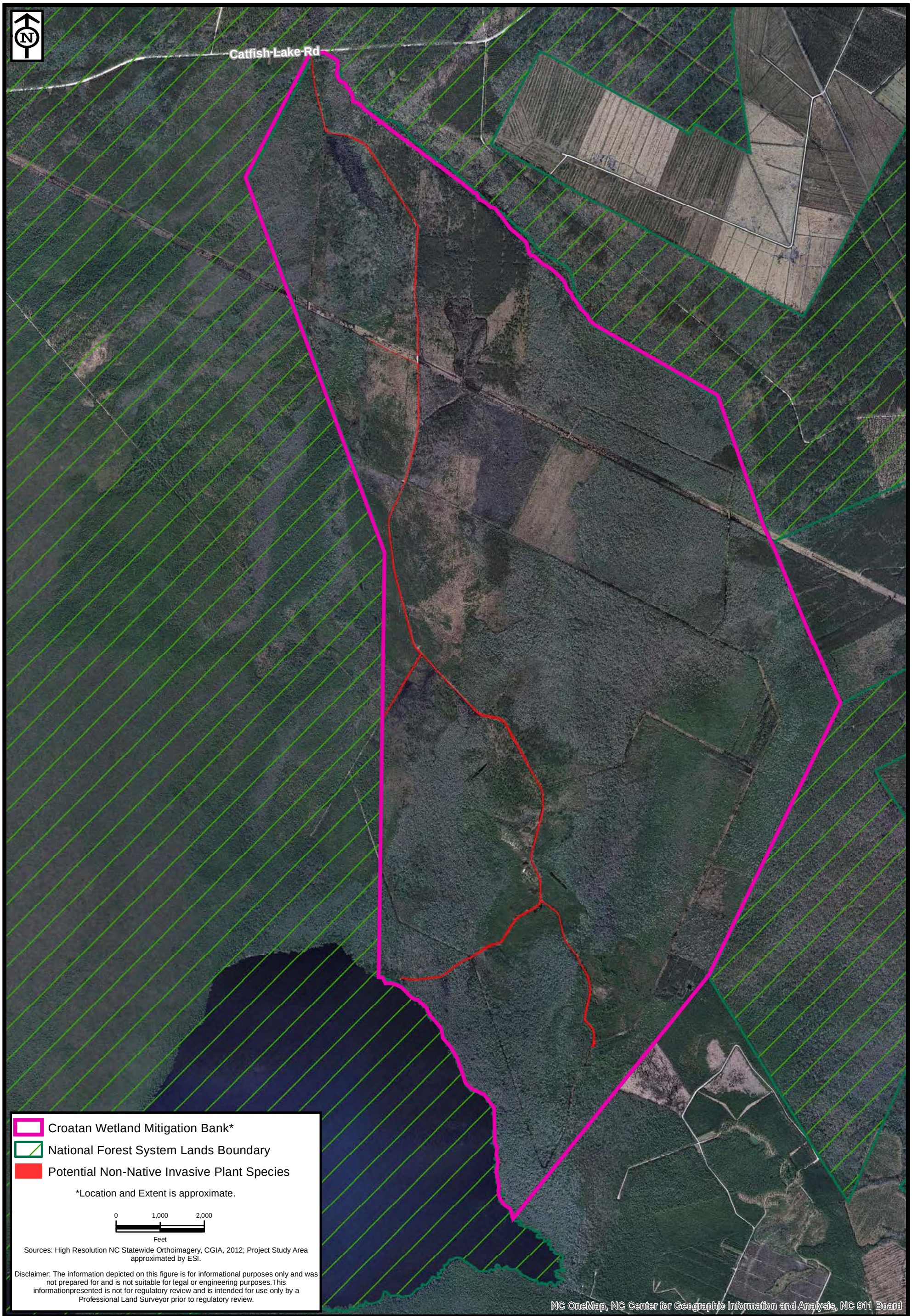


Non-native Invasive Plant Species (NNIS) Infestations

US 70 Havelock Bypass Herbicide Evaluation

Croatan National Forest, North Carolina

T.I.P. R-1015

Project:	ER12050.12
Date:	Apr 2014
Drwn/Chkd:	KT/MKS
Figure:	**2b**

Path: P:\GeoGra\Projects\2012\050\12\GIS_NNIP\Fig_NNIP_CWMB.mxd Date: 4/22/2014 10:35:25 AM

Appendix B

ENVIRONMENTAL SERVICES, INC.
524 South New Hope Road
Raleigh, North Carolina 27610
919-212-1760 / Facsimile 919-212-1707
www.environmentalservicesinc.com

MEMORANDUM

TO: **Mary Frazer**

FROM: **Matt Smith**

DATE: **14 October 2013**

RE: **US 70 Havelock Bypass (Rare Plant Species Mitigative Measures Support)**
Non-native Invasive species Analysis
T.I.P. No. R-1015
Consulting P. O. 63000033859
ESI Project No. ER12-050.06

Environmental Services, Inc., (ESI), has been asked by the North Carolina Department of Transportation (NCDOT) to assist in completing an analysis for Alternative 3 of the US 70 Havelock Bypass (R-1015) of Non-Native Invasive Plant Species (NNIS) listed by the U.S. Forest Service (USFS) as occurring or potentially occurring within the Croatan National Forest (CNF). The analysis for potential NNIS plant effects was confined to a study area defined as the proposed tree clearing limits (slope stake limits plus 15 feet) plus an additional 25 feet. This area covers those areas proposed for disturbance that may be susceptible to new infestiations of NNIS plants and those areas adjacent to the study area that may act as a source of infestation. This analysis will assist in addressing concerns for indirect effects that could result from growth of these species along the proposed bypass project. Mitigation measures proposed by NCDOT to minimize potential indirect effects are also included.

Methods

The NNIS plant evaluation was conducted in accordance with protocols provided by the USFS. ESI visited the study area for Alternative. 3 in September 2013 to identify infestations of NNIS species. Infestations identified for species listed in Tables 1 and 2 were recorded using a GPS device. Infestation of less than or equal to 10x10 meters in area are represented by a point. Larger infestations (those exceeding 10x10 m) are represented by a polygon. The percent cover, or aerial extent, of each invasive exotic plant has been estimated within each mapped infestation.

Not all non-native naturalized plant species, such as dandelion (*Taraxacum officinale*) or ox-eye daisy (*Leucanthemum vulgare*), are tracked by the USFS. Most USFS previous surveys have concentrated on those non-native plants known to be invasive in the Piedmont or coastal plain and those species that can be successfully controlled on the CNF. As such *Microstegium vimineum*, the most abundant NNIS previously recorded in other portions of the CNF is not currently being tracked. Table 1 includes species considered by the USFS to be present in the Piedmont or Coastal Plain and invasive across the Croatan National Forest that are currently being recorded. Table 2 includes NNIS plant species known to occur adjacent to the CNF which have the potential to spread to the CNF from nearby infestations. The list of NNIS plant species is subject to change as new plant threats are identified by the USFS.

T**able 1.** Croatan National Forest – NNIS plant species.

Scientific Name	**Common Name**
Lespedeza cuneata	Sericea Lespedeza
Lespedeza bicolor	Bicolor Lespedeza
Albizia julibrissin	Mimosa
Ligustrum sinense	Chinese Privet
Rosa multiflora	Multiflora Rose
Ailanthus altissima	Tree-of-Heaven
Miscanthus sinensis	Chinese Silver Grass
Lonicera maacki or *morrowii*	Amur or Morrow's Honeysuckle
Lonicera japonica	Japanese Honeysuckle
Sorghum halepense	Johnson Grass
Arthraxon hispidus	Basket Grass
Elaeagnus umbellata	Autumn Olive
Pueraria montana var. *lobata*	Kudzu
Hedera helix var. *helix*	English Ivy
Vinca minor	Periwinkle
Kummerowia striata	Japanese-clover
Youngia japonica	Asiatic Hawk's-beard
Wisteria sinensis	Chinese Wisteria
Verbena brasiliensis	Brazilian Vervain

Table 2. NNIS plant species infestations near the Croatan National Forest.

Scientific Name	**Common Name**
Imperata cylindrica	Cogon Grass
Persicaria perfoliata	Mile-a-minute
Cayratia japonica	Bushkiller
Pyrus calleryana	Bradford Pear
Solanum viarum	Tropical Soda Apple
Centaurea stoebe ssp. *micranthos*	Spotted Knapweed
Commelina communis	Common Dayflower

Existing Conditions

Surveys for NNIS plant species were undertaken in September 2013 for the species listed in Tables 1 and 2. Figures 2a-2l depict the locations of NNIS plants observed in the study area. Ten species considered to be invasive by the USFS were found to occur on NFS lands on the CNF within the study area. Table 3 lists NNIS infestations identified for the study area for Alt. 3.

Table 3. NNIS plant species infestations identified in the study area for Alternative 3.

Scientific Name	Common Name	Site No.	Figure Number	Community Type [a]	Percent Cover	Area (acres)	Total Area (acres)
Lespedeza cuneata	Sericea Lespedeza	1	2i	M, PCm	75	0.77	4.66
		2	2h	PFm	75	0.02	
		3	2g	M	75	0.08	
		4	2g	M	75	0.35	
		5	2g	M	25	<0.02	
		6	2g	M	75	0.09	
		7	2g	M	75	0.33	
		8	2f	M, PCm	75	0.36	
		9	2e	M	75	0.15	
		10	2d	M	75	0.21	
		11	2j	M	75	0.20	
		12	2l	M	50	0.80	
		13	2k	M	50	<0.02	
		14	2k	M	25	<0.02	
		15	2k	PFm, M, PCm	75	0.43	
		16	2k	M	50	0.68	
		17	2a	M	50	<0.02	
		18	2a	M, PCm	50	<0.02	
		19	2a	M	75	0.09	
Lespedeza bicolor	Bicolor Lespedeza	1	2g	PFm, M	75	1.86	2.81
		2	2g	PFm, M	75	0.47	
		3	2g	M, PCm	75	0.44	
		4	2f	M, PCm	50	0.02	
		5	2k	M	50	<0.02	
Albizia julibrissin	Mimosa	1	2g	M	75	<0.02	0.24
		2	2d	PFm	75	<0.02	
		3	2d	M	50	<0.02	
		4	2d	M	50	<0.02	
		5	2l	M	50	0.02	
		6	2l	M	50	<0.02	
		7	2l	M	50	<0.02	
		8	2l	M	50	<0.02	
		9	2l	M	50	<0.02	
		10	2k	M	50	<0.02	
		11	2a	M, PFm	75	<0.02	
		12	2a	M	75	<0.02	
Ligustrum sinense	Chinese Privet	1	2g	PFm	75	0.06	0.66
		2	2g	M	50	<0.02	
		3	2g	M	75	<0.02	
		4	2g	PFm, M	75	0.09	
		5	2g	M	50	<0.02	

Scientific Name	Common Name	Site No.	Figure Number	Community Type [a]	Percent Cover	Area (acres)	Total Area (acres)
		6	2d	M	25	<0.02	
		7	2d	M	25	<0.02	
		8	2l	M	50	<0.02	
		9	2k	M	75	<0.02	
		10	2k	M	75	0.02	
		11	2k	M	75	<0.02	
		12	2k	M	50	0.02	
		13	2c	PFh	75	0.12	
		14	2c	PFh	50	0.09	
		15	2c	M	50	0.02	
		16	2a	M	50	<0.02	
		17	2a	M	50	<0.02	
		18	2a	M	50	<0.02	
		19	2f	M	75	<0.02	
Rosa multiflora	Multiflora Rose	1	2g	M	50	<0.02	0.12
		2	2g	PFm	50	<0.02	
		3	2g	PFm	50	<0.02	
		4	2g	PFm	50	<0.02	
		5	2l	PFh	25	<0.02	
		6	2k	M	50	<0.02	
Lonicera japonica	Japanese Honeysuckle	1	2k	M	50	<0.02	0.16
		2	2k	M	50	<0.02	
		3	2k	M	50	<0.02	
		4	2k	M	50	0.02	
		5	2k	M	50	<0.02	
		6	2c	PFh	50	<0.02	
		7	2c	M	50	<0.02	
		8	2a	M	50	<0.02	
Sorghum halepense	Johnson Grass	1	2g	M	75	<0.02	<0.02
Hedera helix var. *helix*	English Ivy	1	2l	M	50	<0.02	<0.02
Wisteria sinensis	Chinese Wisteria	1	2l	PFh	50	<0.02	1.21
		2	2l	M	75	0.04	
		3	2k	PFh	75	0.84	
		4	2k	PFh	75	0.29	
		5	2k	M	75	<0.02	
Verbena brasiliensis	Brazilian Vervain	1	2b	M	75	<0.02	0.57
		2	2a	M	75	<0.02	
		3	2a	M	75	<0.02	
		4	2a	M	75	<0.02	
		5	2a	M	75	<0.02	
		6	2b	M	75	<0.02	
		7	2b	M	50	<0.02	
		8	2e	M	75	0.14	
		9	2g	M	50	0.27	
		10	2a	M	50	<0.02	

[a] Community Types: M = Rural/Urban Modifications; PFh = Pine Flatwoods, hydric; PFm = Pine Flatwoods, mesic; SR = Successional/Ruderal Habitat; PCm = Powerline Corridor, mesic

Multiple infestations were documented for eight of the ten species of USFS listed NNIS plant species identified in the study area, with single infestations documented for the remaining two species. The NNIS plant species with the most numerous infestations encountered were sericea lespedeza (*Lespedeza cuneata*) and Chinese privet (*Ligustrum sinense*) with 19 infestations documented for each species, mimosa (*Albizia julibrissin*) with 12, and Brazilian vervain (*Verbena brasiliensis*) with 10. The remaining six species each had between one and eight infestations documented within the study area.

Sericea lespedeza infestations represent the greatest coverage by a single species (4.66 acres) followed by bicolor lespedeza (*Lespedeza bicolor*) (2.81 acres) and Chinese wisteria (*Wisteria sinensis*) (1.21 acres). The remaining species were encountered as smaller infestations, with cumulative infestations of the other seven species totaling less than 1.0 acre each.

All ten of these NNIS plant species were observed primarily in existing disturbed habitats on NFS lands along woodland borders adjacent to roads and bordering NFS lands boundaries adjacent to disturbed habitats. Since many of the NFS lands, including powerline rights-of-way, in the study area are subjected to frequent prescribed burns the number of infestations outside of roads and other boundary areas is greatly diminished. However, several species were found to have spread into adjacent habitats, most notably Chinese privet, multiflora rose (*Rosa multiflora*), and Chinese wisteria, and to a lesser extent sericea lespedeza, bicolor lespedeza, mimosa, and Japanese honeysuckle (*Lonicera japonica*).

The sites within the study area with the largest incidence of NNIS plants were along Sunset Rd (Figure 2g) and in the vicinity of the solid waste transfer facility (Figure 2k). Smaller infestations were noted on forest service roads (Figures 2d, 2e, 2f, 2i, and 2j), along US 70 south of Havelock (Figures 2a-2c), and adjacent to residential properties bordering NFS lands (Figures 2h and 2l).

One large infestation of bicolor lespedeza adjacent to Sunset Rd (Site 1, Figure 2g) represents the largest coverage area of a single NNIS plant species in the study area (1.86 acres) and appears to be spreading. The Chinese wisteria infestation (Site 3, Figure 2k) in the vicinity of the solid waste transfer facility (0.84 acre) is large in size and in close proximity to additional infestations (Sites 4 and 5, Figure 2k) of this species with a high potential for spreading.

Effects of Alternative 3 on Invasive Plant Species

Without intervention, these NNIS plant species are expected to increase in the study area. It is expected that with no control efforts along the existing road shoulders and other existing disturbed habitats the infestations will continue to spread within these areas and potentially into adjacent natural areas. While some of these areas may eventually be controlled with prioritized forest-wide NNIS plant species control work, there is nothing proposed within the vicinity of the study area in the foreseeable future.

The proposed action will construct US 70 Havelock Bypass Alternative 3 on new location across NFS lands. Ground disturbance and the increased light conditions resulting from road construction may increase the amount of area suitable for NNIS plant species in the study area (Trombulak and Frissell 2000). The areas disturbed by road construction as well as the future road shoulders and maintained

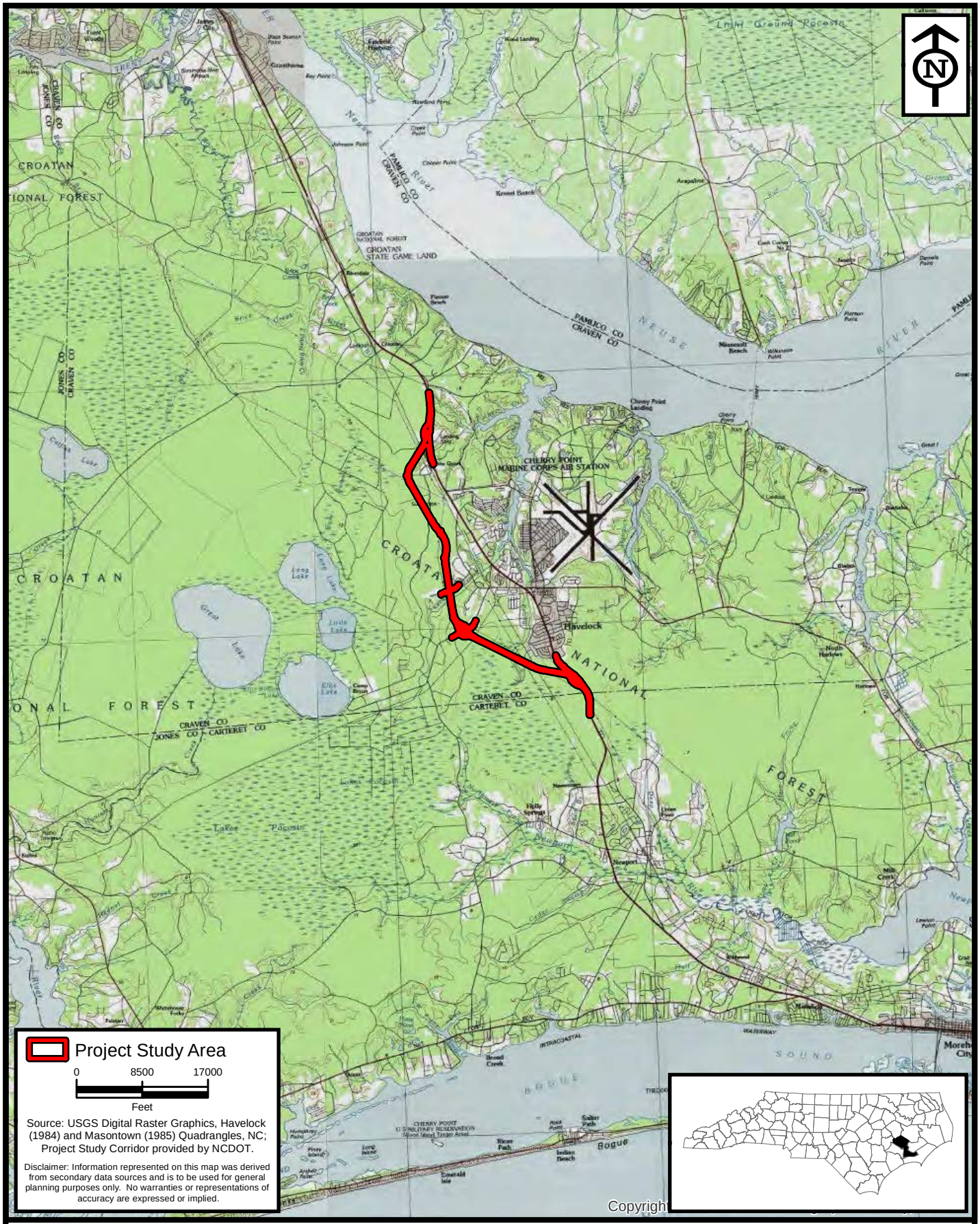
ROW of the completed project cound serve as potential areas for spread of NNIS plant species on NFS lands.

In coordination with the USFS, NCDOT has developed mitigation measures to minimize the spread of NNIS plant species on NFS lands within the CNF associated with the construction and maintenance of the US 70 Havelock Bypass.

- To prevent the spread of non-native invasive plant species on NFS lands, NCDOT will require contractors to pressure wash all off-road equipment, including cranes, graders, pans, excavators, and loaders, prior to being brought in the CNF construction areas.
- To control the spread of non-native invasive plant species on NFS lands, NCDOT, in coordination with the USFS, will locate and flag areas of non-native invasive plant species within the study area for Alt, 3 of the US 70 Havelock Bypass. If any of these areas are within areas of proposed fill, those areas will be cleared and grubbed, and the material disposed of outside the limits of the CNF. If non-native invasive plant species are located in areas of proposed cuts then the material and actual thickness of root mat or other defined amount will be disposed of outside the limits of the CNF.
- In consultation with the USFS, seed mixes of native grasses and forbs or non-aggressive, non-natives will be used on NFS lands for erosion control and revegetation.
- NCDOT will utilize rolled matting for erosion control and revegetation on NFS lands.
- NCDOT will coordinate with the USFS on a landscaping plan for NFS lands. The plan will detail appropriate native seeding mixes for erosion control and site specific control methods for invasive species, including a suite of acceptable herbicides for the corridor and adjacent natural habitats. The plan will also outline a plan for ongoing coordination between NCDOT and USFS personnel to maintain vegetation diversity and ensure no long-term impacts to rare species along the bypass corridor.

With the implementation of the mitigation measures developed by NCDOT, in coordination with the USFS, the threat of spread of NNIS plants on NFS lands associated with the construction and maintenance of the US 70 Havelock Bypass is expected to be minimimal.

Trombulak, S.C. and C.A. Frissell, 2000. Review of the Ecological Effects of Roads on Terrestrial and Aquatic Communities. Conservation Biology, Vol. 14(1), 18-30.



Project Location

US 70 Havelock Bypass

Craven and Carteret Counties, North Carolina

T.I.P. R-1015

Project:	ER12050.06
Date:	Oct 2013
Drwn/Chkd:	KT/MS
Figure:	1

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Non-native Invasive Plant Species Occurrences

US 70 Havelock Bypass

Carteret and Craven Counties, North Carolina

T.I.P. R-1015

Project:	ER12050.06
Date:	Oct 2013
Drwn/Chkd:	KT/MKS
Figure:	2

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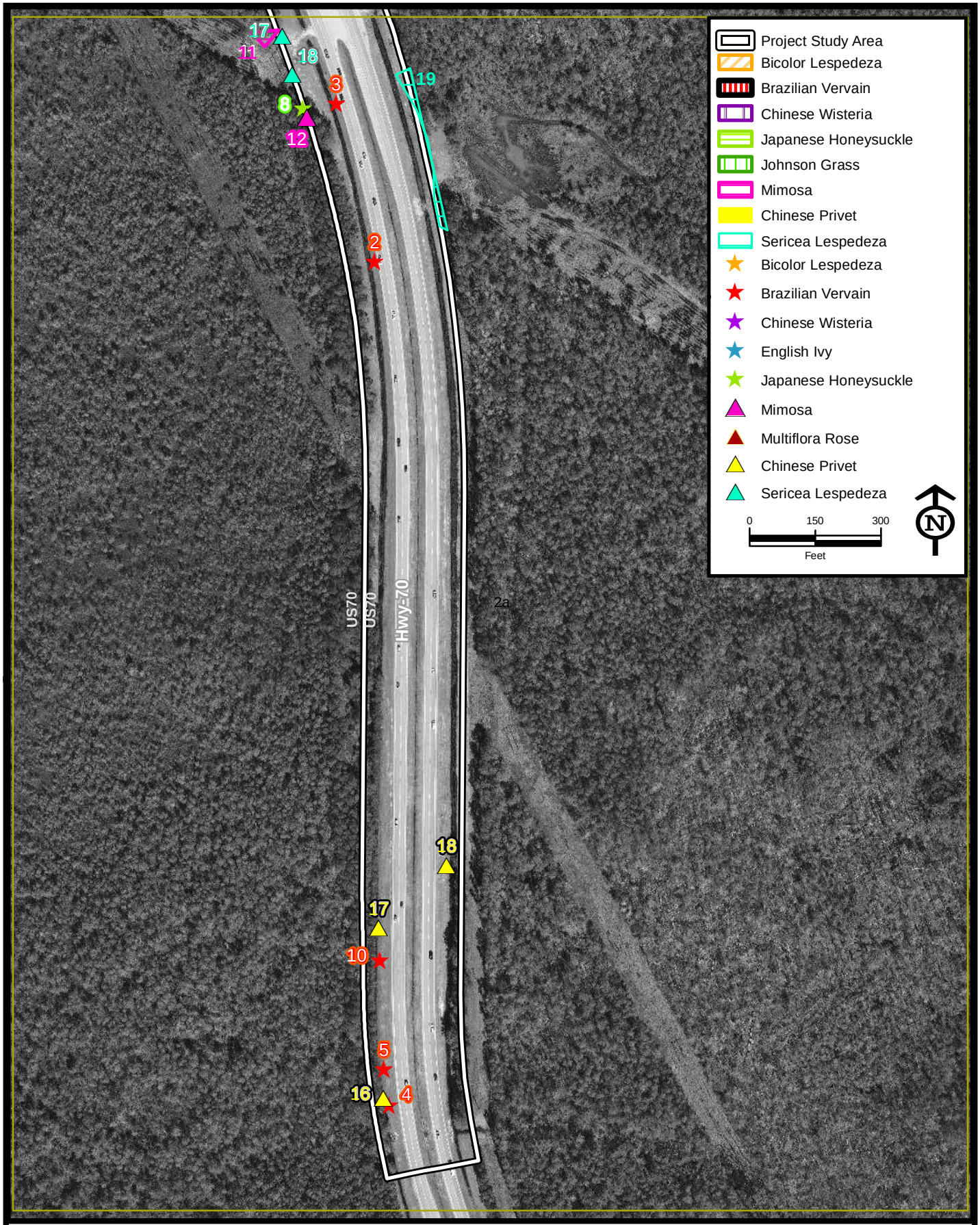

Non-native Invasive Plant Species Occurrences - Details

US 70 Havelock Bypass

Carteret and Craven Counties, North Carolina

T.I.P. R-1015

Project:	ER12050.06
Date:	Oct 2013
Drwn/Chkd:	KT/MS
Figure:	**2a**

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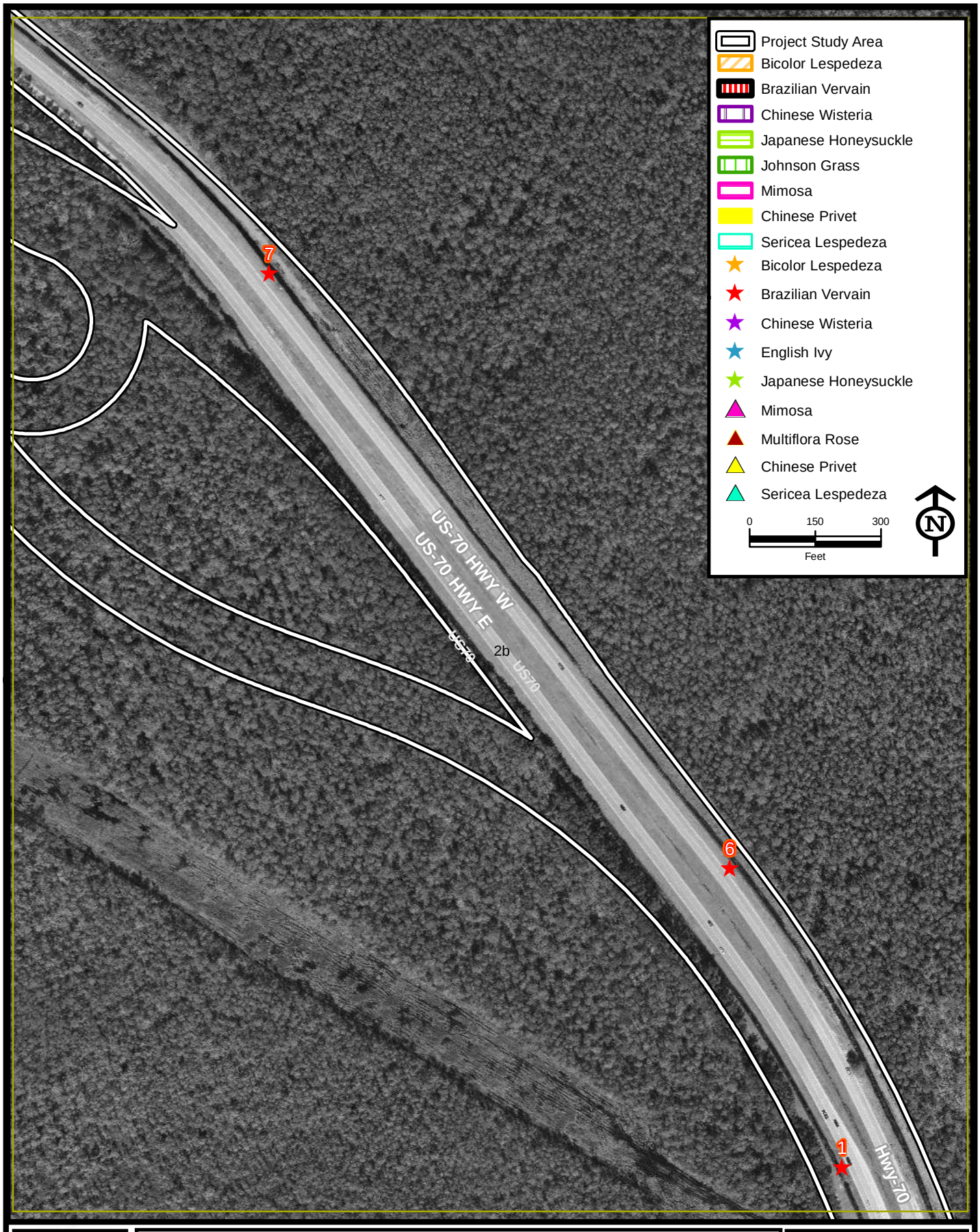

Non-native Invasive Plant Species Occurrences - Details

US 70 Havelock Bypass

Carteret and Craven Counties, North Carolina

T.I.P. R-1015

Project:	ER12050.06
Date:	Oct 2013
Drwn/Chkd:	KT/MS
Figure:	**2b**

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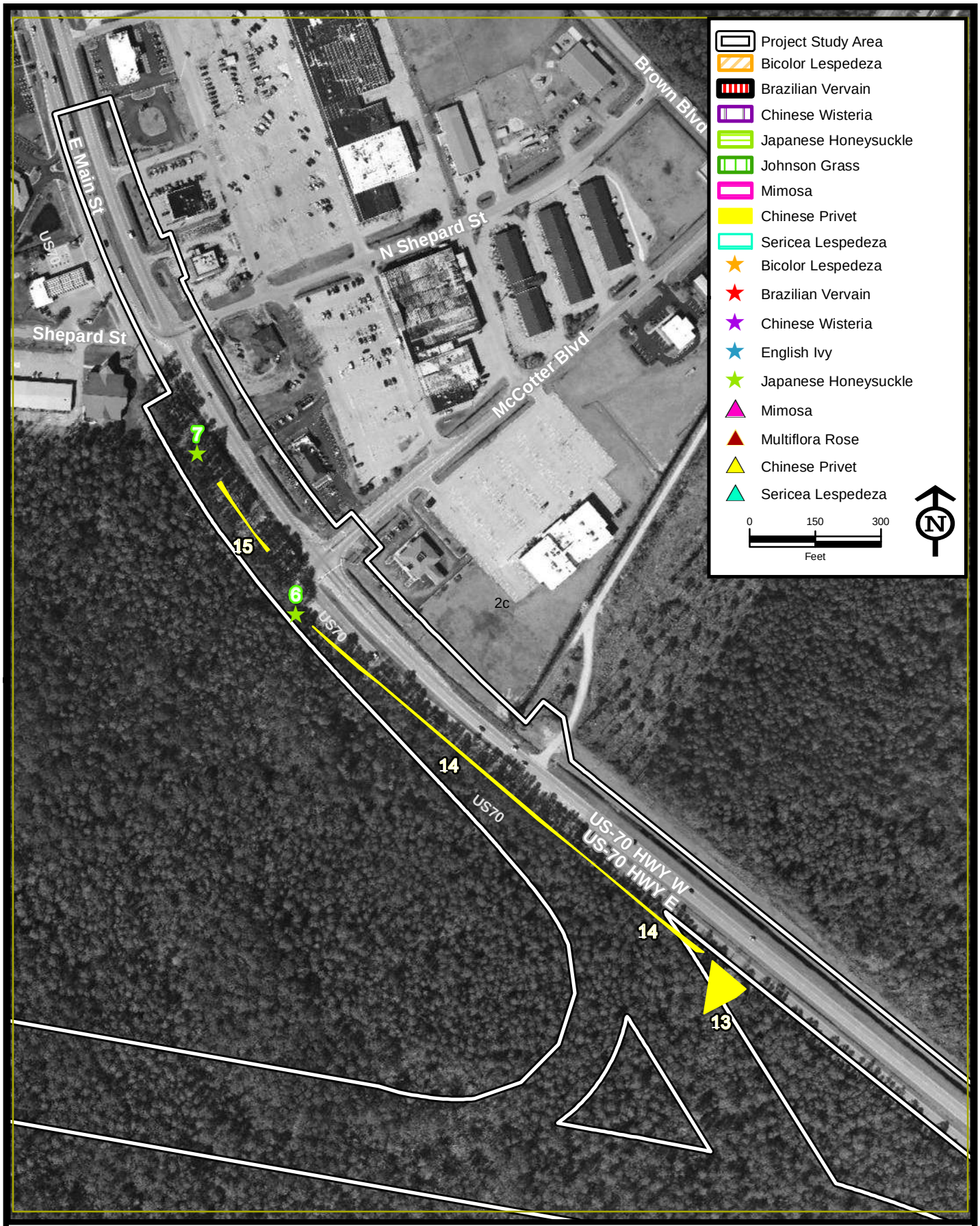

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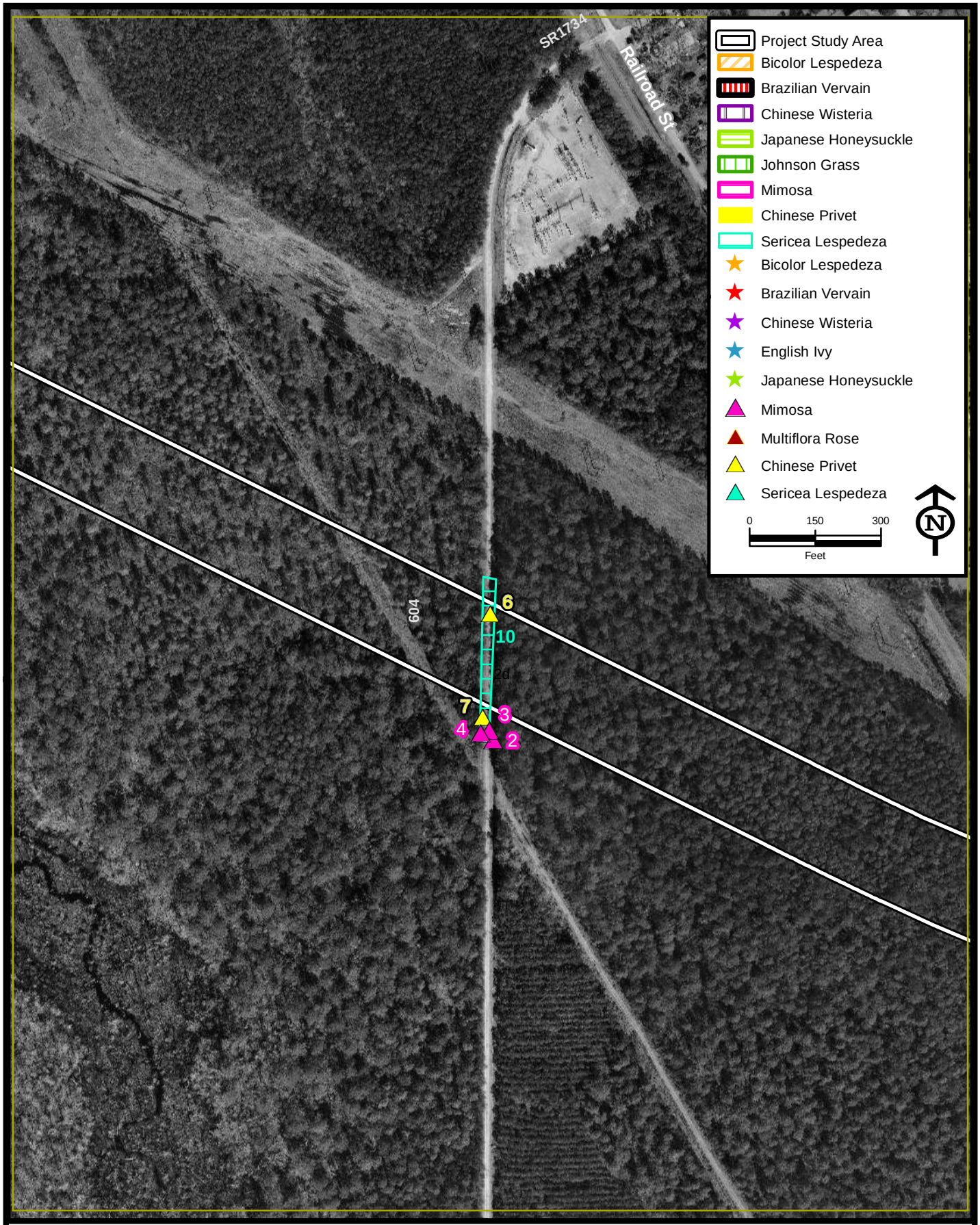

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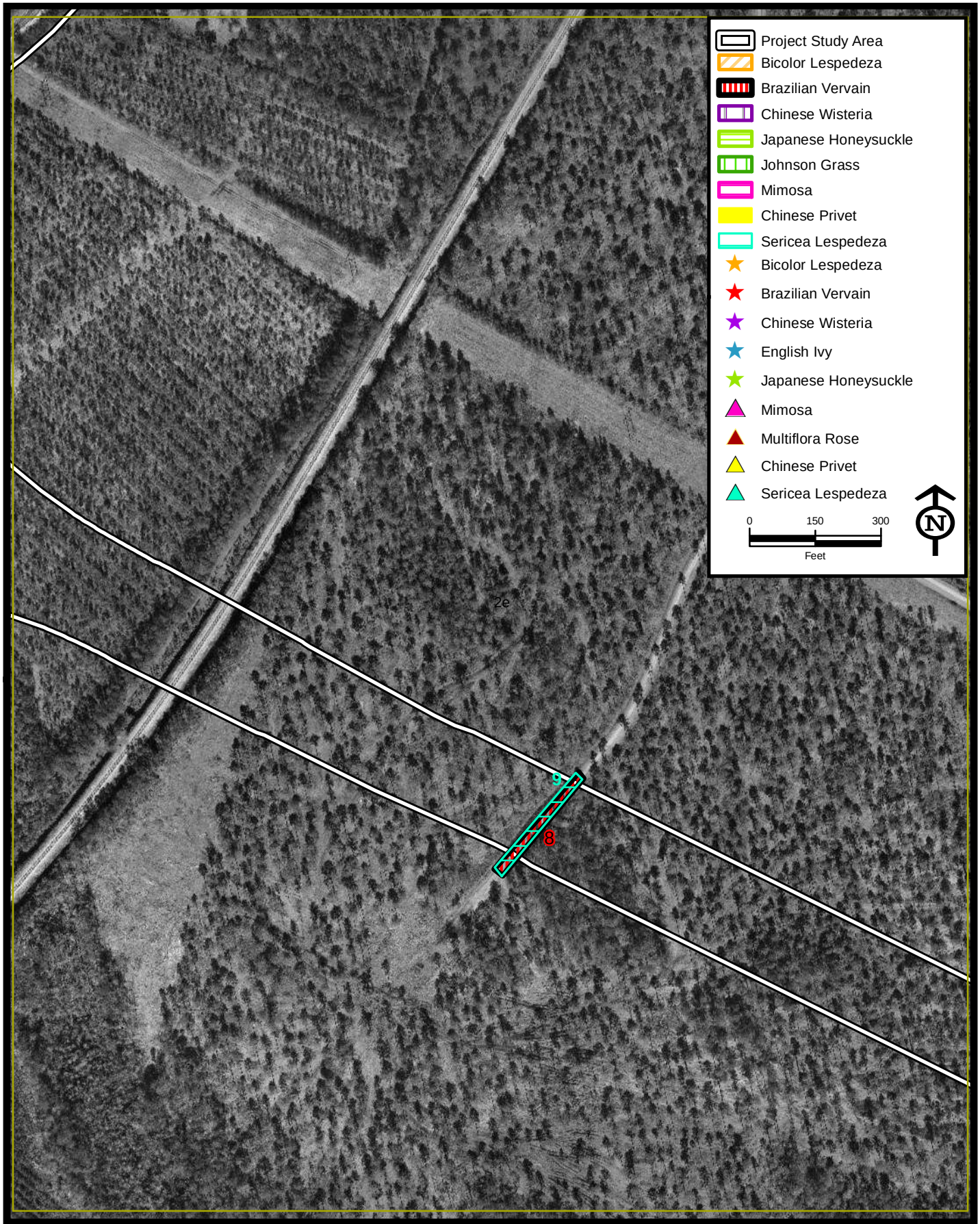

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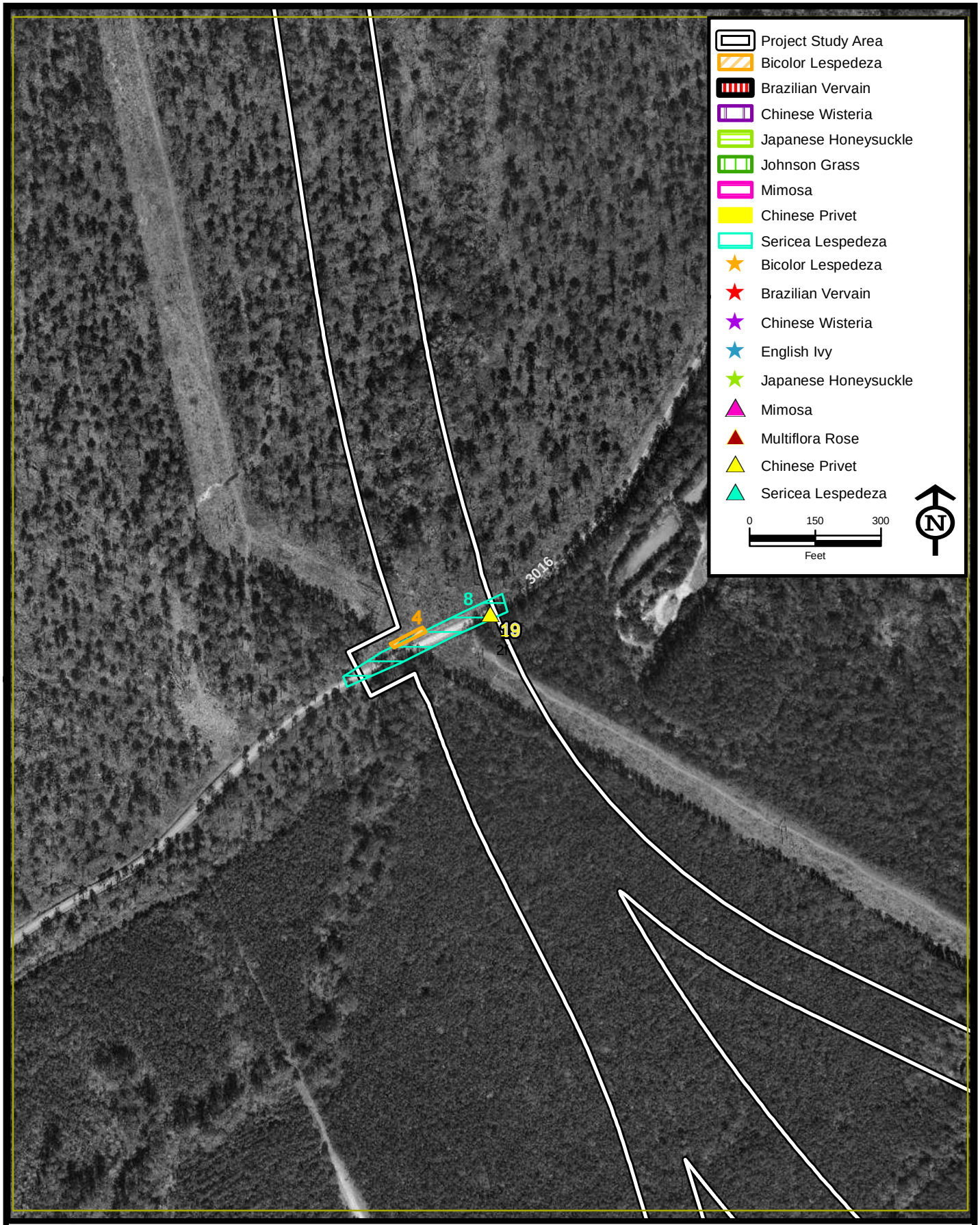

Non-native Invasive Plant Species Occurrences - Details

US 70 Havelock Bypass

Carteret and Craven Counties, North Carolina

T.I.P. R-1015

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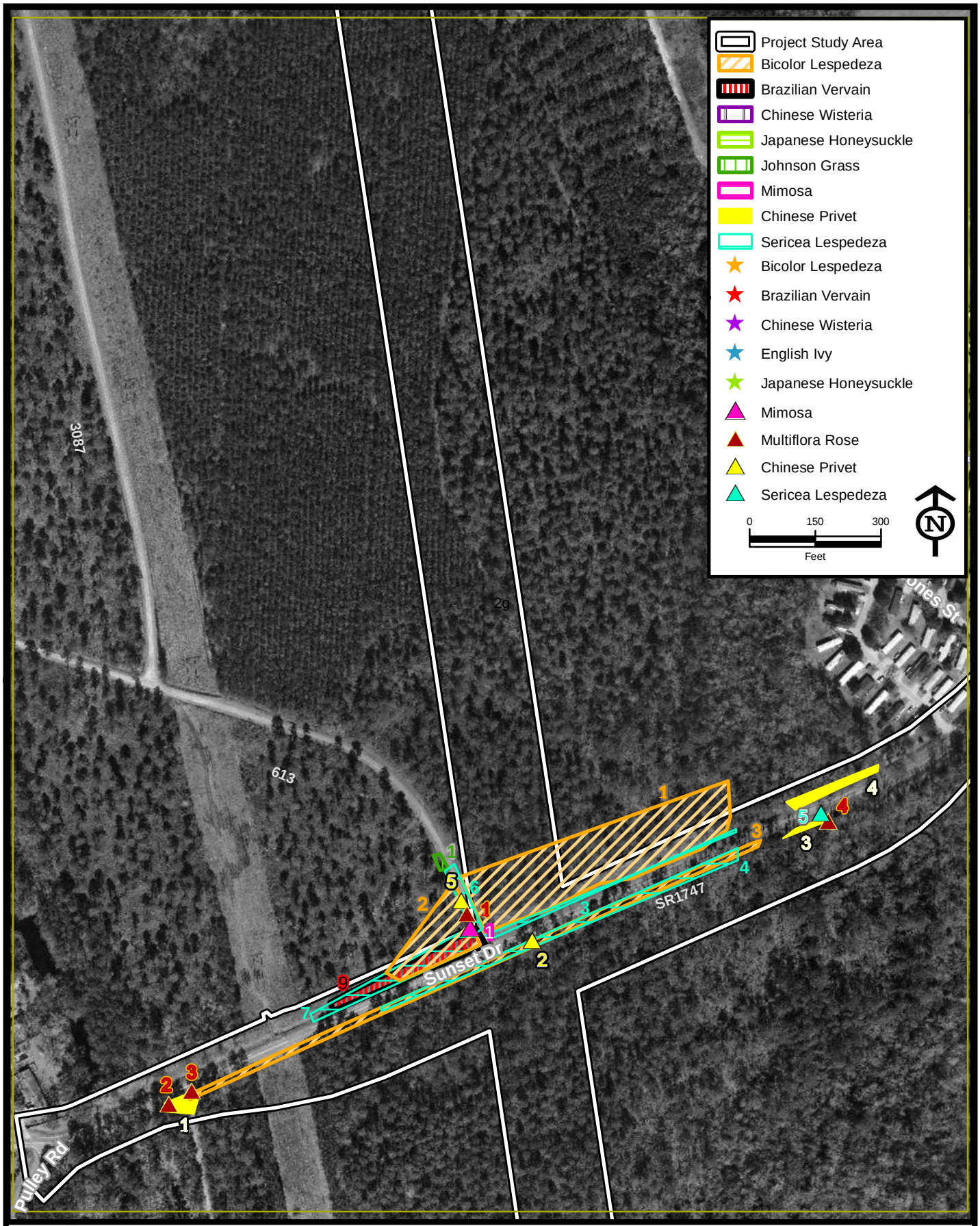

Non-native Invasive Plant Species Occurrences - Details

US 70 Havelock Bypass

Carteret and Craven Counties, North Carolina

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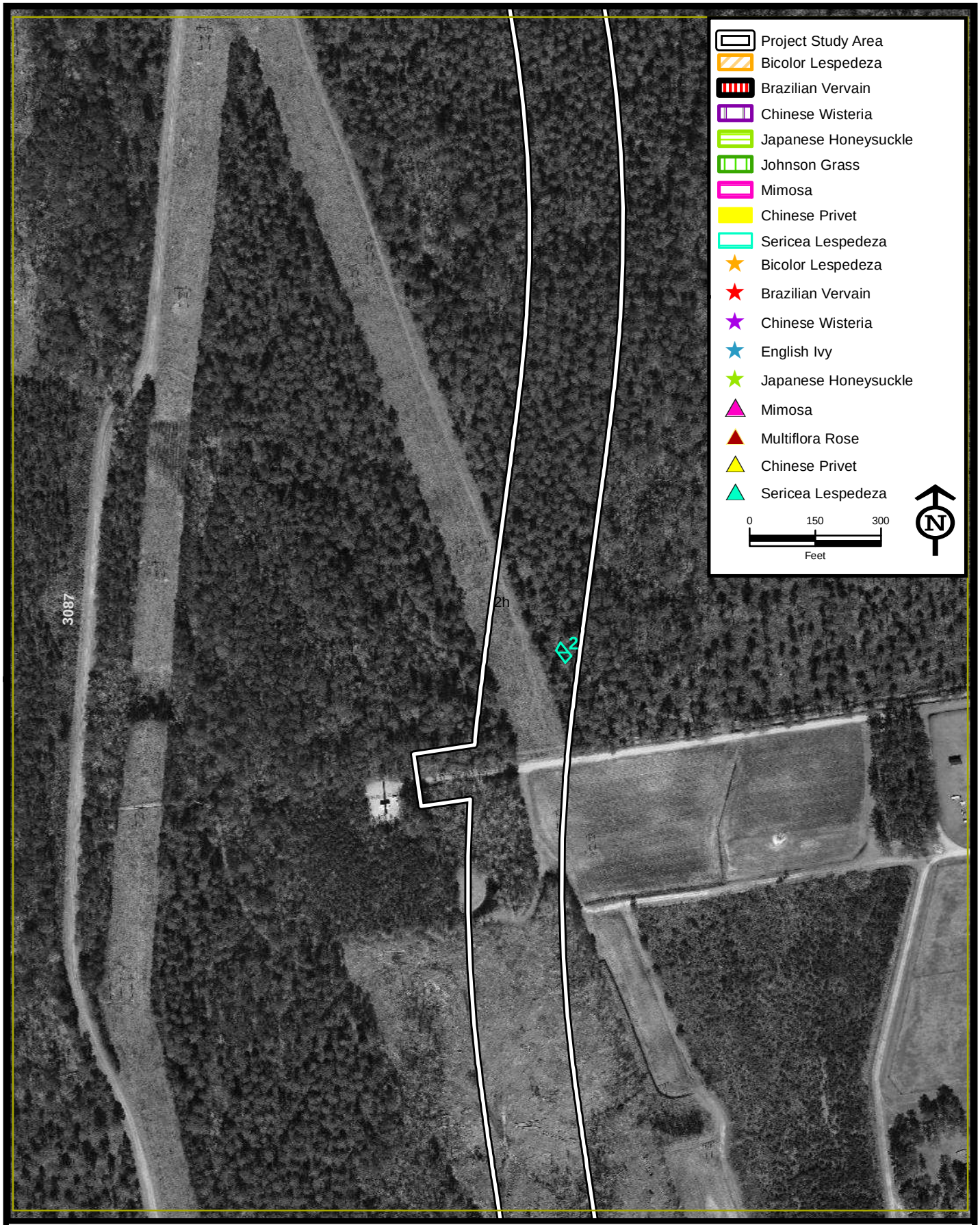

Non-native Invasive Plant Species Occurrences - Details

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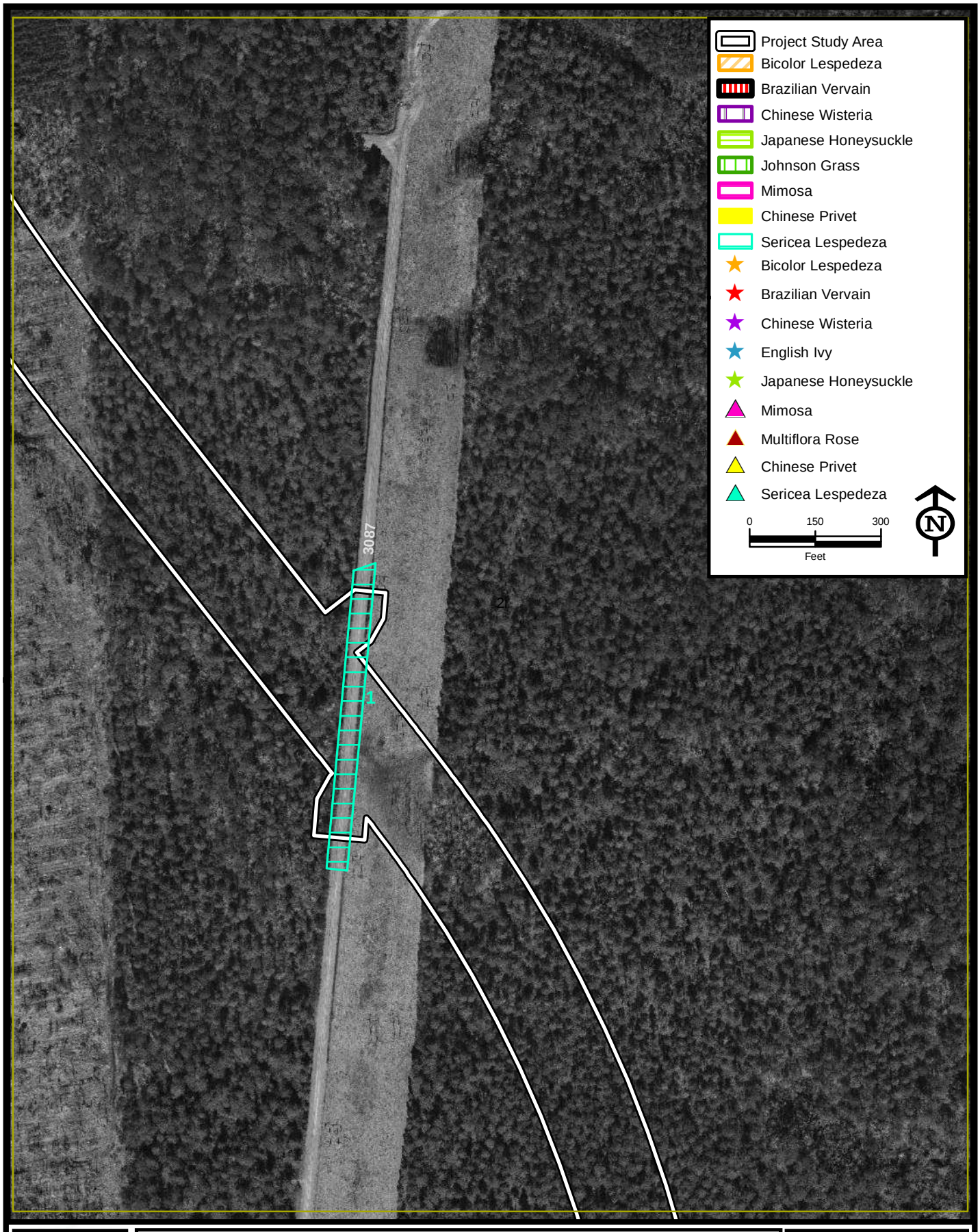

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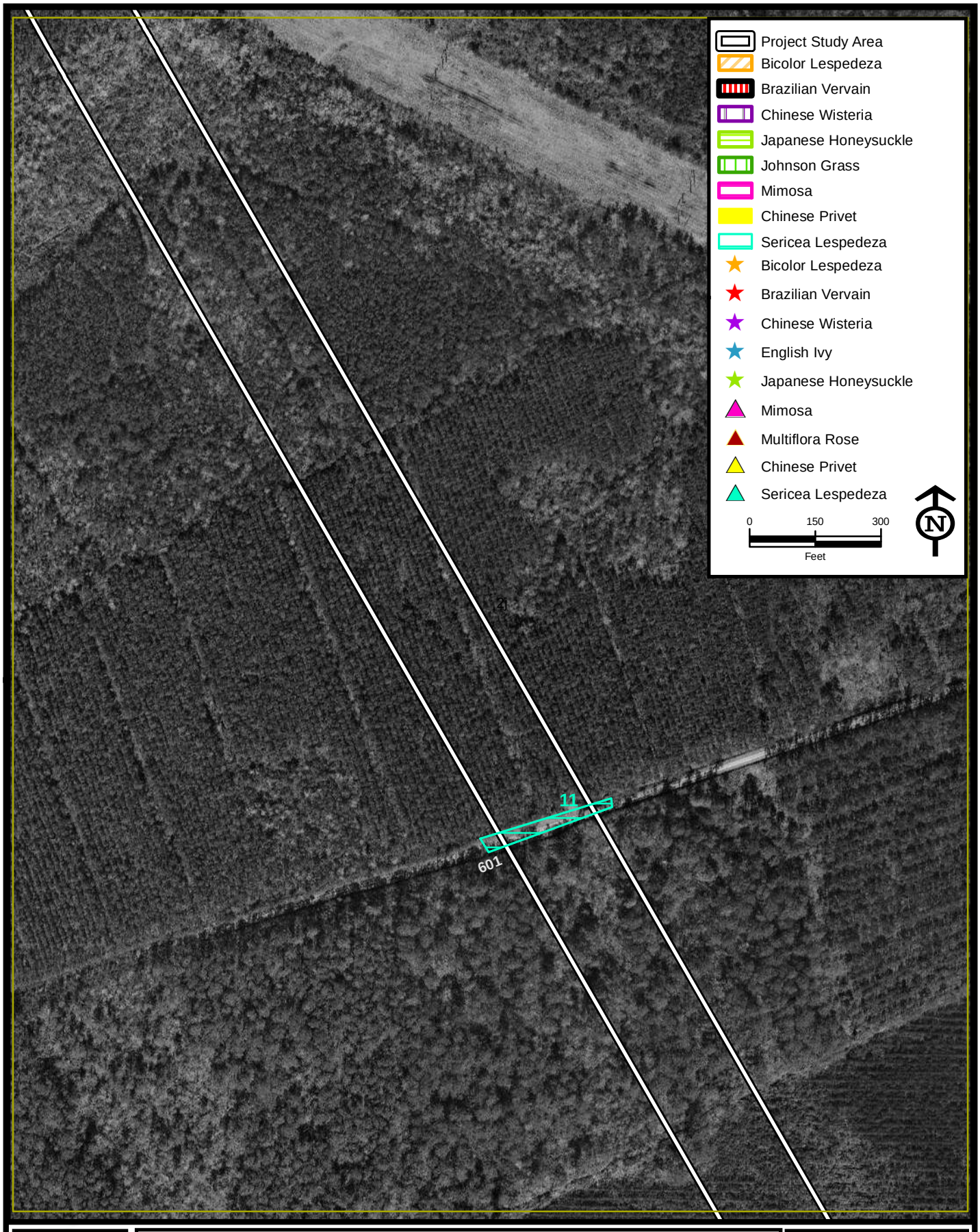

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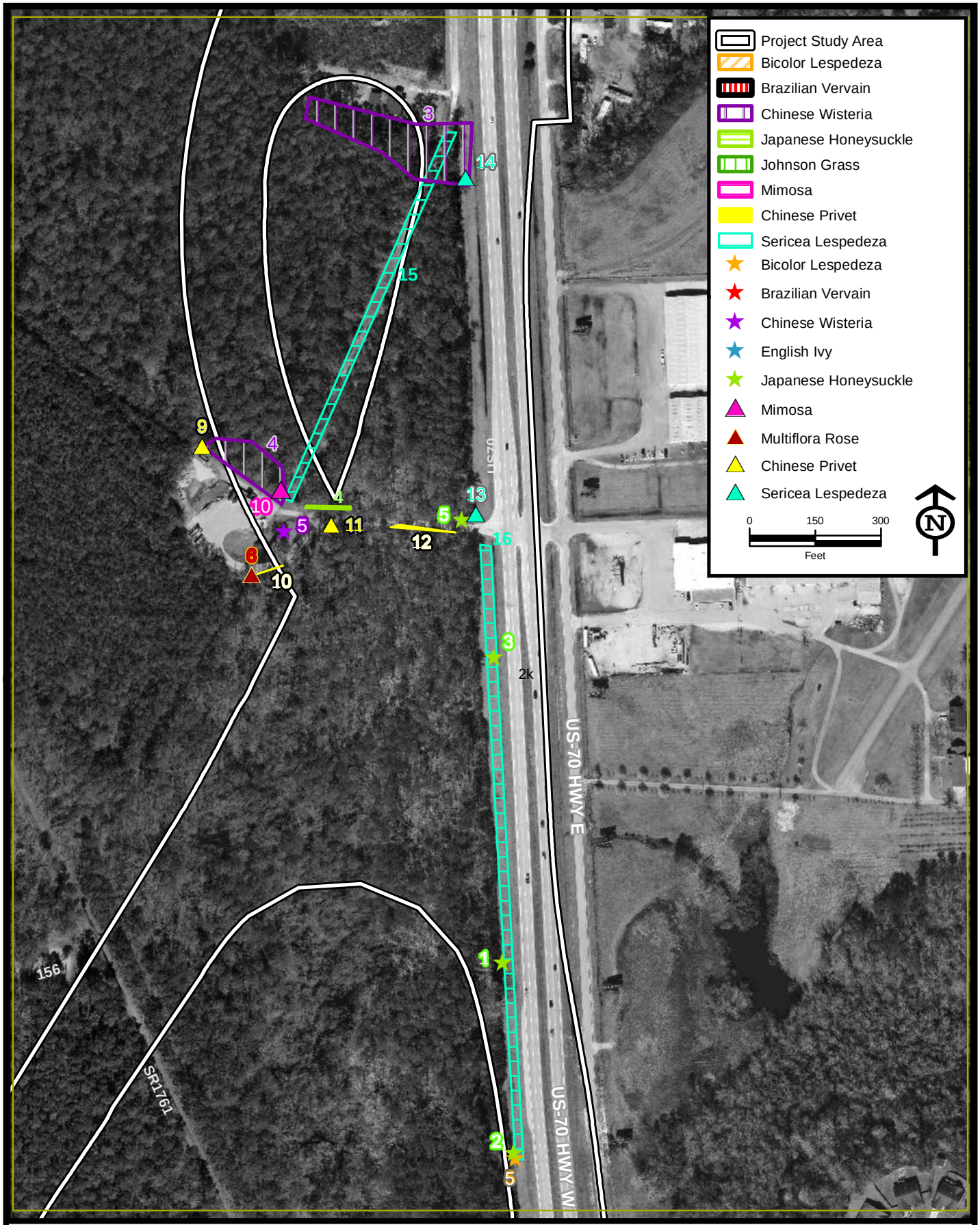

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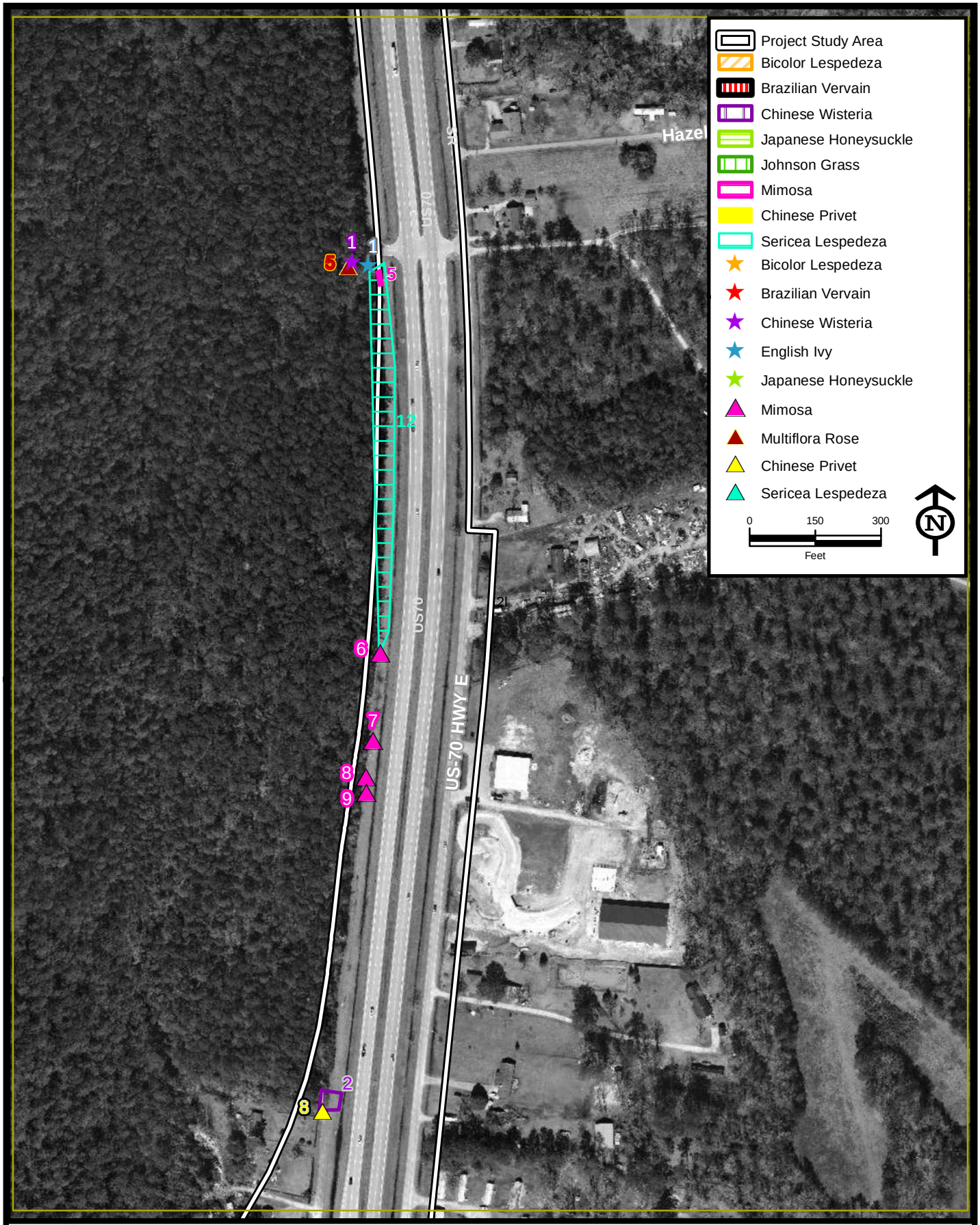

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Appendix D

Responses to Comments on the Draft Environmental Impact Statement

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US Army Corps of Engineers
December 2, 2011

1) Jurisdictional wetlands within the three alternatives under review for this project were verified by the US Army Corps of Engineers (Corps). The most recent jurisdictional determination (JD) was verified May 10, 2006 and has since expired on May 10, 2011. The Corps acknowledges NCDOTs' request of March 29, 2011for re-verification of the jurisdictional wetlands within the three alternatives. Following the May 10, 2006 date, regulatory guidance has changed and the level of required documentation for determining jurisdictional areas has increased significantly.

   To assist NCDOT in avoiding unnecessary expenditures associated with providing the documentation to re-verify all three alternatives, the Corps will provide a preliminary JD based on the May 10, 2006 verification. After the selection of the Least Environmentally Damaging Alternative (LEDPA), the Corps will request a complete JD package for the alternative selected and provide a final JD verification.

Response to USACE Comment 1:
Comment noted and appreciated.

2) Section 4.4.1 of the DEIS addresses NCDOT using the Croatan Wetland Mitigation Bank (CWMB) as mitigation for unavoidable impacts to wetlands. As of September 30, 2009, the CWMB has been successfully added to the NCDOT Statewide Umbrella Wetland and Stream Mitigation Bank. The description of available credits for riverine and non-riverine wetland impacts outlined on pages 4-99 to 4-100 refer to the April 2002 CWMB Mitigation Plan. The Final Environmental Impact Statement (FEIS) should reflect updated mitigation credit availability from this site if NCDOT proposes to use it.

Response to USACE Comment 2:
FEIS Chapter 4.14 includes an updated discussion of available credits at the CWMB. Actual debits against the CWMB would be determined during the permit phase after designs and impacts are finalized.

3) The DEIS provides no proposal for mitigation of potential stream impacts associated with the project. A complete wetland and stream mitigation proposal should be included in the FEIS.

Response to USACE Comment 3:
Jurisdictional issues and proposed wetland and stream mitigation is presented in FEIS Chapter 4.14. On-site mitigation strategies will be evaluated by NCDOT and documented in the Record of Decision (ROD). For any streams and wetlands and riparian buffers that cannot be mitigated on site, NCDOT would debit approved credits from the Croatan Wetland Mitigation Bank.

4) Section 4.1.8.2.3.1 "Streams" narrative and Table 4.6 discuss the proposed structures to be used in drainage crossings. Proposed bridge lengths noted in Table 4.6 Alternative 3 over the Southwest Prong and East Prongs of Slocum Creek are in direct conflict with the lengths agreed upon in the Concurrence Point 4B meeting held June 20, 2002 (Appendix B). The DEIS states that the bridge lengths are "preliminary" and are significantly different (25' longer and 150' shorter respectively) from the CP 4B meeting.

5) The DEIS suggests that new information is available that affects bridge lengths and hydraulic decisions and may require a field visit prior to the CP 3 meeting. Should Alternative 3 be re- affirmed as the LEDPA, then a return to CP 4A and 4B would be necessary. This conflict needs to be resolved and the Corps recommends that NCDOT clarify its expectations to the Merger Team prior to and following the re-affirmation, of the LEDPA.

Response to USACE Comments 4 and 5:

The NCDOT Hydraulics Unit reviewed their files, including the original Bridge Survey Reports and meeting minutes, and concluded that the bridge length for the Southwest Prong of Slocum Creek was incorrectly stated at the CP4B Meeting as 899 feet rather than 925 feet. After review of the East Prong of Slocum Creek crossing, it was noted that the approximate length of 1,476 feet was for a skewed crossing and that the adjusted perpendicular length is 1,618 feet. To clarify the proposed bridge lengths and reaffirm NEPA/404 Merger Team concurrence, NCDOT provided these revised recommendations (summarized below) to the NEPA/404 Merger Team in an e-mail dated July 17, 2012. More recently, hydraulic structure dimensions were discussed and confirmed at a combined CP4A and CP4B NEPA/404 Merger Team meeting that was held on August 20, 2014. Agreed-upon bridge lengths are listed below. FEIS Chapter 4.13 contains the updated bridge lengths.

Crossing Location	CP2A Revisited (7/17/2012)	CP4A/B Concurrence (8/20/2014)
East Prong of Slocum Creek	1618-ft Bridge	Approx. 1,618-ft Bridge
Southwest Prong of Slocum Creek	925-ft Bridge	Approx. 925-ft Bridge
Tributary of Tucker Creek	2@9'x7'x384' RCBC	2@10'x8'x400' RCBC

6) The DEIS states that all three alternatives would impact large portions of the Croatan National Forest and potentially the foraging and habitat areas of the red-cockaded woodpecker (RCW). Section 3.5.4.3 and Section 4.1.9.3 "Protected Species" discusses Federally Protected and Listed Species associated with the Endangered Species Act and in Table 4.8 lists fourteen protected species that occur in Craven and Carteret Counties. Biological Conclusions for potential effects on the listed species are provided, with 13 of 14 being either Not Required, No Effect, or Not likely to Adversely Affect. Unresolved issues remain in determining the level of impact the project alternatives will have on the foraging and habitat areas of the RCW and the necessary actions to mitigate for those impacts. The Corps defers to the expertise of the USFWS, USFS and NCWRC on these matters and recommends that NCDOT and FHWA address the unresolved issues prior to publication of the FEIS.

Response to USACE Comment 6:

Comment noted. FEIS Chapter 4.14.4 presents final biological conclusions for protected species as well as a discussion of use of prescribed burns to maintain the unique habitats of the Croatan National Forest. USFWS has concurred with a biological conclusion of "May Affect, Not Likely to Adversely Affect" for the red-cockaded woodpecker, and that the project would have "No Effect" on any other federally-listed Endangered, Threatened, or Proposed plant species.

US Environmental Protection Agency
November 14, 2011

1) The U.S. Environmental Protection Agency (EPA) Region 4 has reviewed the subject document and is commenting in accordance with Section 309 of the Clean Air Act (CAA) and Section 102(2)(C) of the National Environmental Policy Act (NEPA). The Federal Highway Administration (FHWA) and the North Carolina Department of Transportation (NCDOT) are proposing to construct a 10-mile new location, multi-lane, median divided, bypass facility of US 70 Highway around the City of Havelock, Craven County, North Carolina.

   EPA has been involved in the proposed project under the NEPA/Section 404 Merger process since 2001. EPA's last written correspondence on this project was on November 4, 1998, on the NCDOT's Environmental Assessment (Appendix Al). On January 18, 2001, EPA concurred on avoidance and minimization measures under a Concurrence Point 4. On August 21, 2008, EPA requested additional information to be addressed in the DEIS at a Merger Process Team Informational Meeting. EPA's technical review comments on the DEIS are attached to this letter (See Attachment A).

   EPA has rated the DEIS as 'Environmental Concerns' (EC-2) indicating that the review has identified potential environmental impacts from all three detailed study alternatives that should be avoided. The review has disclosed the opportunity for possible avoidance and minimization measures and mitigation measures that might require potential changes to the proposed action. The rating of '2' indicates that DEIS information and environmental analysis is not sufficient and that additional information is required. EPA has substantial environmental concerns with respect to wetland and stream impacts and appropriate avoidance and minimization measures and compensatory mitigation. In addition, EPA also has environmental concerns for prime farmland impacts, impacts to threatened and endangered species, wildlife habitat fragmentation, impacts to Croatan National Forest and solid waste issues. EPA recommends that all of the technical comments in the attachment be addressed in a Final EIS (FEIS). Furthermore, all relevant environment impacts that have not been disclosed in this document or covered in the FEIS should be addressed in additional NEPA documentation prior to the issuance of a Record of Decision (ROD).

Response to EPA Comment 1:
Comments noted. See responses to specific comments below.

2) EPA recommends that the transportation agencies consider the most stringent Best Management Practices (BMPs) and other enhanced environmental stewardship measures to mitigate for the proposed project's substantial natural resources impacts. The transportation agencies should also consider other reasonable measures to reduce long-term socio-economic impacts from the proposed bypass facility.

Response to EPA Comment 2:
Selection of the LEDPA involved the review of a full array of alternative impacts, including natural resources and the human environment. NCDOT will continue to coordinate with state and federal agencies through the NEPA/404 Merger Process to determine appropriate avoidance, minimization, and mitigation measures for the proposed project. Because the preferred alternative is consistent with local plans, no mitigation is currently proposed to address long-term socio-economic impacts. NCDOT will also implement a standard suite of BMP's of which the EPA and other agencies are familiar.

Specific Comments:

3) Purpose and Need for the Proposed Project: The proposed southwest bypass project of US 70 was identified in 1979 on a City-approved Thoroughfare Plan. Other notable milestones shown in Table 1.1 include a September 28, 1992, Notice of Intent to prepare· an EIS, a January 27, 1998, issuance of an Environmental Assessment, and a FHWA determination that a DEIS is the appropriate NEPA document on December 8, 2003.

   EPA was not a member of the early Project Steering Committee that began in 1993. The DEIS identifies two potential problems involved with the existing facility, including a poor level of service (LOS) currently (2008) and an unacceptable projected LOS in the design year (2035), an increase in traffic demand that diminishes the ability of US 70 to function as a Strategic Highway Corridor (SHC). EPA notes that on September 2, 2004, the NCDOT Board of Transportation adopted the SHC Plan that depicts the new location US 70 Havelock Bypass.

   The 2008 traffic and LOS is shown in Table 1.3. The four primary intersections operate at C/C, E/D, F/E and C/B during am/pm peak hours. The poor LOS is attributed to heavy left turn demand during the morning and afternoon peak hours. Table 1.4 predicts E/F, F/F, F/F, and F/F for the 2035 No-build traffic scenario. Table 2.4 shows a slightly different LOS in the 2035 Traffic with Bypass for one intersection (Titled: "Existing US 70 Intersection LOS, 2035 Traffic with Bypass"). This information is confusing and seems to indicate that traffic on existing US 70 with the Havelock Bypass completed is approximately the same in the 2035 design year than without the proposed project. It seems to contradict Table 2.5 which is titled "Proposed Havelock Bypass Freeway LOS, 2035 Build Traffic". This information should be clarified at the next Merger concurrence meeting and in the Final Environmental Impact Statement (FEIS).

Response to EPA Comment 3:

FEIS Chapter 2.8.3 includes a travel time analysis that was developed to demonstrate the results of the traffic capacity analysis shown in the DEIS. It is noted that the comparison of No-Build versus Build shows a travel time reduction for every growth scenario presented.

   Detailed Study Alternatives: The FHWA and NCDOT studied three (3) alternatives for the proposed bypass: Alternatives 1, 2 and 3. Alternative 1 is the longest and mostly southerly alternative. Alternative 2 is the shortest and most direct parallel route to existing US 70. Alternative 3 (i.e., Preferred alternative) is a combination of Alternatives 1 and 2. There are three interchanges proposed one at each terminus and at the intersection of Lake Road. Alternative 1 has the least number of residential relocations, the least impact to Croatan National Forest, the least impact to Prime Farmlands, the second lowest wetland impacts, the second lowest stream impacts, and similar impacts in other categories with Alternative 3.

4) Human Environment Impacts – Relocations: The Preferred Alternative (Alternative 3) is expected to impact 16 residences, 1 business and 1 non-profit organization. Alternative 1 is expected to impact 13 residences, 1 business, and 1 non-profit organization. Alternative 2 is expected to impact 133 residences or more than a magnitude more than either Alternatives 1 or 3.

5) Minority and Low-Income Populations: Environmental Justice: Census data from 2000 was utilized for the evaluation and analysis of environmental justice (EJ) demographic characterization and potential impacts in Sections 3.15 and 4.1.2 of the DEIS. The FEIS

should include more current Census data. EPA acknowledges that relocation reports were based upon 2009 information. However, Alternative 3 (NCDOT's Preferred Alternative) should be compared to more recent demographic information that is identified in Section 3.1.5 from pre-2000. None of the residential relocations are identified in the DEIS as being to minority or low-income properties (Table S.1).

Response to EPA Comments 4 and 5:
The NEPA/404 Merger Team concurred on the reaffirmation of Alternative 3 as the Least Environmentally Damaging Practicable Alternative (LEDPA) at the April 10, 2012 meeting to revisit Concurrence Point 3. The EPA noted that the impact table indicates that Corridor 1 has the least impacts and suggested that the table should attempt to capture some of the decision-making features, such as habitat fragmentation, so that the LEDPA decision is more clearly presented in the FEIS. Per EPA suggestion, FEIS Tables S.2, 2.10.5, and 4.21.1 include the category "CNF Habitat Fragmentation" and FEIS Chapter 2.10.2.2 includes a discussion of habitat fragmentation effects for each of the build alternatives.

FEIS Chapters 3.2 and 4.2 utilize the most current demographic data available from the US Census Bureau, including the 2010 Census.

6) Community Resources: The DEIS identifies the Craven County Waste Transfer Station being relocated as the result of the bypass. A general description of this facility is provided on Page 3-43 of the DEIS. The Craven County Waste Transfer Station accepts used appliances, furniture and household waste from County residents and businesses. There are apparently no permanent disposal facilities located in the County. There are apparently no other waste transfer stations located in the County. All three proposed bypass alternatives impact the Craven County Waste Transfer Station. On Page 4-29, the FHWA and NCDOT indicate that the County must relocate this facility if they are to continue to provide a waste transfer station in the Havelock area. EPA has numerous environmental concerns regarding this issue. The DEIS does not adequately address the potential impact to the City of Havelock or the County and the potential for increases in illegal dumping and disposal of trash and other hazardous materials if the County encounters a problem with the relocation of this facility.

***Response to EPA Comment 6*:**
The displacement of the Craven County Waste Transfer Facility will be necessary. NCDOT will compensate Craven County for relocation expenses; however it is the county's decision whether to build a new facility. Thus, Craven County will accept responsibility to locate and obtain a new site, conduct any appropriate environmental studies, and obtain permits for a new facility. If the county provides a replacement facility in the project vicinity, no change to solid waste activities is envisioned (other than route to the site). It is possible that a county decision to not build a replacement facility could affect illegal dumping activity in this area; however this speculation is a county issue to manage. As of November 2014, the Craven County Solid Waste & Recycling Department informed NCDOT that it is currently coordinating with the County Planning Department to search for a new replacement facility location for the center. DENR Solid Waste Management is also aware of the planning effort.

In coordination with its USFS agreement, the County must develop recommendations for a "site restoration plan" to return the current site to preexisting conditions. NCDOT conducted a geoenvironmental assessment of the Craven County Waste Transfer Station, which is included in FEIS Chapters 3.9 and 4.9. NCDOT notes EPA's concerns regarding hazardous materials at

the existing site: Results of a preliminary site assessment completed in 2013 at the Craven County Waste Transfer Facility indicated no hazardous materials concerns associated with the site. Coordination on future effort associated with relocating the site will be updated in the ROD.

7) Socio-economic Issues: The DEIS presents unemployment data that is not current. Table 3.10 includes unemployment rates from 1990 and 2006. The narrative on Page 3-10 of the DEIS includes information from 2008. More recent unemployment figures (e.g., March of 2011) show unemployment for Craven County at 9. 7% or more than double the 2006 levels identified in the DEIS. Similarly, other information contained in Section 3.1.2.2 on Income and Poverty is not current or potentially relevant. Median Household Income and Poverty levels in Tables 3.11 and 3.12 are from 1989 to 1999. Table 3.13 showing the summary of Socio-economic Data compares the City of Havelock, Craven County and North Carolina from 1990 to 2000. This information should be updated to more current socio-economic data in the FEIS.

   Page 4-11 of the DEIS describes economic effects of the proposed bypass. The information is not quantified. The negative impacts to local businesses from the diversion of traffic along existing US 70 are considered by FHWA and NCDOT to be minimal. The benefits of reduced travel times and vehicle operating costs by bypassing existing traffic signals and congestion are not quantified. There are numerous examples in North Carolina where bypasses have severely damaged downtown business areas once there are alternatives routes provided for through traffic. There is no origin/destination study cited that would identify how much traffic is seasonal 'beach traffic' versus local or regional traffic. EPA believes the negative business impacts from a bypass to a relatively rural county with a large percentage of the land that is in Federal or State ownership (e.g., Cherry Point Marine Corps Air Station, Croatan National Forest, etc.) can be potentially severe. Regional traffic from western North Carolina and New Bern heading to Morehead City, Beaufort, Atlantic Beach, and Bogue Banks destinations will be diverted around Havelock. There are no other major U.S. routes connecting New Bern to other coastal and beach communities in this area of the state. The information concerning the potential decreases and increases in property values along the proposed bypass route is also subjective and not quantified. Any short-term gains to the local economy from the construction of the bypass will be off-set from long-term negative impacts to local businesses after traffic is diverted from the downtown commercial and retail area of Havelock.

Response to EPA Comment 7:
FEIS Chapters 3.2 and 4.2 utilize the most current employment and economic data available.

Simply stated: a new bypass will benefit both regional and local traffic conditions, which benefits the local economy.

Chapter 1 of both the Draft EIS and Final EIS clearly discuss the Purpose and Need for Havelock Bypass. The DEIS is inclusive of the Strategic Highway Corridor (SHC) and the FEIS presents an updated policy: Strategic Transportation Corridor (STC) goals with respect to future economic prosperity. The goals of the SHC and STC are most certainly not congruent with undue economic hardship on the State of North Carolina or the City of Havelock. Chapter 4.1.2 of the FEIS indicates the proposed Havelock Bypass is consistent not only with SHC and STC, but also with the City of Havelock's 2030 Comprehensive Plan.

The STC (formerly SHC) is a long-range planning effort that identifies a critical network of 25 multimodal transportation corridors considered the backbone of the state's transportation system. These 25 corridors move most of North Carolina's freight and people, link critical centers of economic activity to international air and sea ports, and support interstate commerce. They must operate well to help North Carolina attract new businesses, grow jobs and catalyze economic development. This topic is discussed in Chapter 1.8.

Chapter 4.2.4 of the FEIS includes an expanded discussion of anticipated economic effects from construction of the bypass as well as the economic implications associated with the no-build and improve existing alternatives. The new bypass will benefit regional commerce through mobility, while improved local traffic conditions on existing US 70 will benefit the local economy.

There are many studies that refute the overarching suggestion that all bypass projects are likely to inflict economic hardship. Research has found that there are factors that give an indication of whether a community is likely to experience negative economic impacts when bypassed, among these is the community's population and distance from the bypass. This discussion is included and expanded upon in Section 4.2.4 of the FEIS.

8) Farmland Impacts: Section 4.1.6.3 of the DEIS addresses Farmlands. The Farmland Conversion Impact Rating Form was completed and Alternative 3 scored 116.8 points (less than 160). Based upon the information contained in this section there will be 71 acres of prime farmland converted. The DEIS discussion on pages 4-26 and 4-27 does not identify the additional acreage determined to be of State-wide and Local Important Farmland shown on the AD-1006 form contained in Appendix A1. The copy of the form is difficult to read. It appears that another 29 acres are considered to be State-wide and Local Important Farmland for Alternative 3. Excluding the 83 acres within Croatan National Forest from line B, Part III, the total acres of farmland potentially impacted appears to be 355 acres with 71 acres considered to be Prime and Unique Farmland and 29 acres as State-wide and Local Important Farmland. The FEIS should clarify this information and identify any issues involved with dissecting active fields within the corridor alignment, access for farm equipment and any special N.C. or local designations (e.g., Voluntary Agricultural Districts VADs). According to the 2008 Annual Report of the North Carolina Agricultural Development and Farmland Preservation Trust Fund, Craven County received a grant to establish a VAD Ordinance.

Response to EPA Comment 8:
Alternative 3 would impact 71 acres of prime farmland, which is six acres more than Alternative 1, but 41 acres less than Alternative 2. In accordance with the Farmland Protection Policy Act (FPPA), a farmland conversion impact rating form, contained in DEIS Appendix A.1, was prepared in coordination with the Natural Resources Conservation Service (NRCS). As stated in DEIS Section 4.1.6.3, Alternative 3 received the lowest rating (116.8) for farmland conversion impacts. The ratings for Alternative 1 and 2 were 138.0 and 118.4, respectively. All three build alternative scores are below the threshold warranting a higher level of consideration for protection and are in compliance with the FPPA. Craven County developed a Voluntary Agricultural District (VAD) program in 2009; however, there are no VADs within the project study area. This information is contained in FEIS Chapters 3.11 and 4.11.

9) Natural Resources Impacts: Jurisdictional Streams and Wetlands: The Preferred Alternative (Alternative 3) is expected to impact 115 acres of jurisdictional wetlands and

2,505 linear feet of streams. Alternative 1 is estimated to impact 109 acres of jurisdictional wetlands and 2,581linear feet of streams. Alternative 2 potentially impacts 78 acres of wetlands and 3,094 linear feet of streams. The DEIS also contains information on the potential impacts to Neuse River Riparian Buffers (NRRB). The units presented in Table S.1 are in square feet. Because this is an aerial impact calculation, EPA recommends that the units be consistent with other impacts in the tables (e.g., Using acreages as well). For Alternatives 1, 2, and 3, NRRB are 1.6, 3.3, and 2.4 acres, respectively.

The primary jurisdictional streams in the project study area include East Prong Slocum Creek, Southwest Prong Slocum Creek, Black Swamp, and Tucker Creek. Current water quality classifications include Class SC for Tucker Creek and tributaries and Class C for Slocum Creek and its tributaries. All of the impacted streams include supplemental classifications of Nutrient Sensitive Waters (NSW) and Swamp Waters (SW). Similar to issue of appropriate units of measure identified above for NRRB, Tables 4.7a and 4.7b list stream impacts in acres as well as linear feet. Identifying impacts of jurisdictional streams in acres is not consistent with other NEPA/Section 404 Merger project documents. There is no discussion in the DEIS on how to translate a linear impact to an area impact for streams.

For Alternative 3, NCDOT is proposing dual bridges at Southwest Prong Slocum Creek (925 feet in length) and East Prong Slocum Creek (1,470 feet in length). However, these previously reviewed stream and wetland crossing sites were made prior to June of 2002. These two bridge crossings are not listed as environmental commitments in the DEIS (i.e., "Green Sheets"). After the proposed LEDPA 're-affirmation' meeting, EPA anticipates that NCDOT will seek to change these previously agreed to bridge lengths. According to Page 4-46 of the DEIS the *"Merger Process Team has approved Concurrence Point 4B (Hydraulic Review)"*. From Appendix B, regarding the hydraulic review meeting on June 20, 2002, EPA was not listed as a team member or a participant. The Merger Team members from the USACE, NCDWQ, NCWRC, and USFWS 2002 project team have all changed. As with other Merger 'pipeline' projects, EPA recommends that a field visit of the major hydraulic crossings be scheduled prior to the LEDPA meeting to determine appropriate bridge lengths based upon current practice for each of the detailed study alternatives. EPA has not been afforded an opportunity to review the proposed hydraulic plans. EPA also expects that unresolved issues from the meeting minutes have not been resolved (e.g., NCDWQ representative's concern for stormwater treatment from additional paved surfaces from the new roadway).

The DEIS does not address required avoidance and minimization measures under the current NEPA/Section 404 Merger process (i.e., Concurrence Point 4A). Such typical measures include bridging, steepening side slopes, reduced and tapered median widths, and utilizing single bridges at major hydraulic crossings. EPA requests that FHWA and NCDOT consider these typical avoidance and minimization measures at the meeting following the 'reaffirmation' meeting on the LEDPA.

The DEIS discusses the Croatan Wetland Mitigation Bank (CWMB) for unavoidable jurisdictional impacts on Pages 4-99 to 4-101. The discussion includes available credits for both riverine and non-riverine wetland systems. The information in Section 4.4.1 does not identify mitigation for jurisdictional stream impacts and if there are available credits for these potential impacts. This section of the DEIS also discusses credits for RCW habitat losses under Section 7 of the Endangered Species Act. The FEIS needs to identify the compensatory mitigation plans for unavoidable impacts to jurisdictional streams.

Response to EPA Comment 9:

The NEPA/404 Merger Process incorporates the 404 avoidance, minimization, and mitigation process into the NCDOT project development process. Even prior to the Merger Team and on this project, NCDOT followed an interagency coordination protocol that included avoidance and minimization activities. Thus, the entire alternative development process includes avoidance and minimization. CP4A is the established "Avoidance and Minimization" concurrence point, which typically occurs after the DEIS. These measures were pursued prior to the April 2012 LEDPA re-visitation meeting. DEIS Appendix B contains the completed CP4A form, dated January 18, 2001. The FEIS contains information on the second CP4A meeting that was held in August 2014. Avoidance and minimization measures are described in FEIS Chapter 4.14.

FEIS Chapter 4.14 includes riparian buffer impact quantities.

Updated stream impacts are shown in linear feet in FEIS Chapter 4.14.

The NCDOT Hydraulics Unit reviewed their files, including the original Bridge Survey Reports and meeting minutes, and concluded that the bridge length for the Southwest Prong of Slocum Creek was incorrectly stated at the CP4B Meeting as 899 feet rather than 925 feet. After review of the East Prong of Slocum Creek crossing, it was noted that the approximate length of 1,476 feet was for a skewed crossing and that the adjusted perpendicular length is 1,618 feet. To clarify the proposed bridge lengths and reaffirm NEPA/404 Merger Team concurrence, NCDOT provided these revised recommendations (summarized below) to the NEPA/404 Merger Team in an e-mail dated July 17, 2012. More recently, hydraulic structure dimensions were discussed and confirmed at a combined CP4A and CP4B NEPA/404 Merger Team meeting that was held on August 20, 2014. At that time EPA concurred with the continued recommendation of Alternative 3 and its CP4A/B minimization measures. Agreed-upon bridge lengths are listed below. FEIS Chapter 4.13 contains the updated bridge lengths.

Crossing Location	CP2A Revisited (7/17/2012)	Preliminary Plans (10/9/2012)
East Prong of Slocum Creek	1618-ft Bridge	Approx. 1,620-ft Bridge
Southwest Prong of Slocum Creek	925-ft Bridge	Approx. 925-ft Bridge
Tributary of Tucker Creek	2@9'x7'x384' RCBC	2@10'x8'x400' RCBC

Proposed wetland and stream mitigation is presented in FEIS Chapter 4.14. On-site mitigation strategies will be evaluated by NCDOT and documented in the Record of Decision (ROD). For any streams and wetlands and riparian buffers that cannot be mitigated on site, NCDOT's would debit approved credits from the Croatan Wetland Mitigation Bank.

10) Croatan National Forest and Terrestrial Forests: Alternative 3 is expected to impact 240 acres within the Croatan National Forest. In addition, the proposed bypass impacts the Southwest Prong Flatwoods Priority Area and the Havelock Station Flatwoods and Powerline Corridor Natural Area. According to Table 4.5b, terrestrial forest community impacts from the Alternative 3 alignment are estimated to be 277.9 acres. Considering the rural project setting, EPA recommends that the FHWA and NCDOT consider the most proactive efforts to minimize clearing in order to reduce impacts to terrestrial forest communities and wildlife habitat. FHWA and NCDOT should also consider wildlife passage

issues between dissected terrestrial forest communities and other wildlife habitat areas. The proposed freeway will greatly increase travel speeds and increase the likelihood for more collisions with large mammals. The accident analysis provided on Pages 1-20 to 1-23 indicates that there were no fatalities reported between the study period years of 2005-2008 involving 530 accidents along US 70. Collisions with large mammals along existing US 70 within the project study area were not identified in the DEIS.

Response to EPA Comment 10:
NCDOT has incorporated wildlife crossings into the project design. The proposed 1,618-foot bridge over the East Prong of Slocum Creek, as well as the proposed 925-foot bridge over the Southwest Prong of Slocum Creek will accommodate wildlife passage under the proposed bypass.

NCDOT designs reflect measures that minimize the highway footprint on the landscape. For example: highway width was reduced to 200-feet for a 5,500-foot section, to reduce impact to RCW habitat.

NCDOT notes that any clearing that is needed for the proposed bypass within the Croatan National Forest will be conducted according to US Forest Service protocols. FEIS Chapter 1.10 includes an updated accident analysis that details data on collisions with large animals.

11) Threatened and Endangered Species: Sections 3.5.4.3 and 4.1.9.3 of the DEIS address Protected Species issues associated with the Endangered Species Act. Federally-protected species are identified in Table 4.8 including the Biological Conclusion for each of the 14 species listed. There are still unresolved issues associated with the red-cockaded woodpecker *(Picoides borealis).* According to the DEIS, all three alternatives would impact portions of Croatan National Forest, as well as habitat within the foraging partitions of up to six red- cockaded woodpecker (RCW) clusters (Currently 3 active, 1 inactive and 2 recruitment). The DEIS information (e.g., Page S-20) appears to be different from the information provided by the U.S. Fish and Wildlife Service (USFWS). According to Table S.1, there will also be impacts to 3 RCW habitat management areas. The USFWS provided formal comments on the DEIS in a letter dated October 26, 2011, identifying their concerns for the environmental commitments included in the DEIS. EPA defers to the USFWS and State wildlife agencies on these issues but recommends that these unresolved issues be addressed by FHWA and NCDOT prior to the issuance of the FEIS.

The DEIS also identifies the U.S. Forest Service's Proposed, Endangered, Threatened and Sensitive (PETS) species associated with Croatan National Forest. Pages 3-112 to 3-120 identify the PETS species, the status, the habitat type and if the habitat is present in the project study area. There appears to be 103 protected, endangered, threatened and sensitive plant and animal species on the PETS list that have habitat present within the project study area. Fragmentation of wildlife habitat is a significant environmental concern and the transportation agencies should look to additional input and recommendations from the U.S. Forest Service, USFWS and the North Carolina Wildlife Resources Commission.

Response to EPA Comment 11:
Comment noted. FEIS Chapter 4.14.4 presents final biological conclusions for protected species as well as a discussion of use of prescribed burns to maintain the unique habitats of the Croatan National Forest. USFWS has concurred with a biological conclusion of "May Affect, Not Likely to Adversely Affect" for the red-cockaded woodpecker, and that the project would

have "No Effect" on any other federally-listed Endangered, Threatened, or Proposed plant species.

The NCDOT has conducted intensive coordination under NEPA with the USFS as a cooperating agency and an affected federal landowner. FEIS Appendices contain a November 2014 letter from NCDOT to USFS which catalogs the numerous studies performed, commitments made, and mitigation that is proposed - as a result of years of USFS coordination. The results of PETS studies (recently re-termed by USFS as "USFS Rare Species") are detailed in the FEIS, as are supplemental studies of USFS Management Indicator Species and additional RCW analysis that is specific to USFS needs for compliance with its forest management plan. NCDOT has also coordinated with other state and federal agencies through the NEPA/404 Merger Process to identify measures to avoidance, minimize, and mitigate project impacts.

NCDOT notes EPA's request for continued coordination with US Forest Service, US Fish and Wildlife Service, and NC Wildlife Resources Commission regarding fragmentation. Ongoing coordination efforts are updated for this FEIS and will be updated again in a final NEPA document.

US Department of Agriculture, Forest Service
November 21, 2011

1) The DEIS discussion on the red-cockaded woodpecker (RCW) is conflicting and contradictory in places. The document also seems unclear on the commitments that NCDOT has made to close the proposed Havelock Bypass to allow for prescribed burning on the Croatan National Forest (CNF). The Forest Service (FS) would like clarification from NCDOT in writing that states whether State Highway Administrator Terry Gibson approves and supports the commitments made at the March 17, 2011 meeting and documented in the April 25, 2011 memorandum. If Mr. Gibson does not approve of the commitments, we request a meeting to discuss the implications and impacts of the project on RCW and the CNF.

The Forest Service will need additional time to review reports documenting the impacts to Proposed, Endangered, Threatened, and Sensitive (PETS) species prior to the Final Environmental Impact Statement (FEIS). It is our understanding that some of these documents are still being prepared. Please send copies of these documents and technical reports to the FS as soon as they are available for our review. The Forest Service would like to continue to work very closely with NCDOT on appropriate mitigation for PETS species.

Response to USFS Comment 1:
Progressive RCW studies and coordination between NCDOT, USFS, NCWRC, and USFWS have occurred since the DEIS. NCDOT coordinated with USFS to determine study scope of work, and then provided additional PETS studies (now identified as USFS Rare Species) to USFS in the summer of 2014. Environmental commitments in the FEIS were developed based on the study results and subsequent coordination with USFS. NCDOT also provided a written commitment to closing the proposed bypass to allow for prescribed burns. The current status of RCW coordination is best summarized and cataloged in the November 2014 letter from NCDOT to USFS (see FEIS appendices). An excerpt from that letter appears below:

"RCW studies for the Havelock Bypass were initiated in 1998 and a Biological Assessment was completed in 2013. The USFWS concurred with the "May Affect – Not Likely to Adversely Affect" conclusion rendered in this Biological Assessment, thereby resolving Endangered Species Act coordination for RCW. The USFS requested additional studies to comply with the Service's own standards and commitments of the RCW Recovery Plan. The results of these recent studies reaffirmed the conclusion of the Biological Assessment. The Havelock Bypass project will not result in the loss of any existing or proposed RCW territories on Croatan National Forest lands. Because no RCW territories will be lost, there is no need for NCDOT to provide RCW territory replacement. The RCW population goals established in the Recovery Plan will not be affected. With the completion of these studies and given NCDOT's commitments listed below, NCDOT now considers all RCW impact assessment associated with the Havelock Bypass to be resolved."

The USFS responded to this letter on January 28, 2015 indicating that regional staff and other RCW experts were being consulted to determine if the project meets the RCW Recovery Guidelines as they apply to NFS lands. In an email dated February 11, 2015, the USFS stated, "the project meets the FS requirements under the RCW Recovery Plan and that mitigation for loss of foraging habitat acres is not needed as a result of the impacts from the project."

RCW studies and conclusions, as well as discussions of the NCDOT commitment regarding road closure to allow for prescribed burns, are included in Chapter 4.14.4 of the FEIS. Project commitments (green sheets) also reflect said coordination. FEIS Appendices contain the prescribed burn commitment letter, additional studies, and NCDOT-USFS correspondence.

2) We appreciate the changes made to this document since our initial review in July of 2010; however, there are still a number of analyses that have not been included in the DEIS. The DEIS fails to adequately disclose the effects on the red -cockaded woodpecker; PETS species; Essential Fish Habitat; the Craven County Waste Transfer Facility; and the old landfill site. The Forest Service will be unable to concur with any Least Environmentally Damaging Practicable Alternative (LEDPA) selection until effects to all resources have been adequately disclosed.

Response to USFS Comment 2:
Regarding Essential Fish Habitat (EFH), the Draft EIS acknowledges that the project area is under the jurisdiction of the NC Coastal Area Management Act, and as such contains water bodies that may be considered EFH unless otherwise documented by NOAA-Fisheries. However, no streams or wetlands within the project study area are tidal in nature or identified as a water body containing EFH by NOAA-Fisheries, and NOAA Fisheries has not requested further consultation regarding EFH. Therefore no EFH studies are warranted.

Significant studies occurred after the DEIS on RCW and PETS (USFS Rare Species). These are summarized and cataloged in the November 2014 letter from NCDOT to USFS as well as Chapter 4.14 of this FEIS and Appendix C.

NCDOT has also conducted geoenvironmental studies and coordinated for the closure/relocation of the Craven County Waste Transfer Facility. FEIS Chapter 4.9 was updated to detail recent project decisions (in particular NCDOT's commitment regarding prescribed burns) as well as all anticipated impacts and proposed measures to avoid, minimize, and mitigate impacts.

NCDOT notes that based on discussions of the technical studies ongoing at the time of LEDPA reaffirmation in April 2012, the US Forest Service did not have objections to the selection of Alternative 3 as the LEDPA.

General Comments

3) Cumulative effects to all biological resources must be disclosed in the Draft Environmental Impact Statement (DEIS).

Response to USFS Comment 3:
FEIS Chapter 4.12 contains a full analysis of cumulative effects (impacts) to biological resources.

4) Green Sheet: The DEIS states (also found on pp. S-17, 4-70, and 4-75) that *'The BA will be submitted to the USFWS to initiate formal consultation for Section 7 of the Endangered Species Act".* If the commitments for prescribed burning made at the March 17, 2011 meeting with United States Forest Service (USFS) and USFWS ("NCDOT has agreed to close the proposed Havelock Bypass to facilitate prescribed burning in accordance with the

measures discussed in this meeting"; from meeting minutes dated April 25, 2011) are honored the USFWS has stated that their conclusion for the RCW will be "may affect, not likely to adversely affect". Therefore, there should be no need for formal consultation on RCW with USFWS unless new information is presented.

Response to USFS Comment 4:
Comment noted. Please also see Response to USFS Comment 1.

5) Summary of Impacts (Land Use) p. S-8: This document has not presented any data to show how impacts to wildlife habitat and recreational opportunities will be mitigated with the transfer of the adjacent Croatan Wetlands Mitigation Bank (CWMB) property to the USFS. The purpose of the CWMB is to provide "in-kind compensatory mitigation for unavoidable wetland impacts occurring on NCDOT projects for which no on-site, in-kind mitigation is available" (p. 50, CWMB Draft Mitigation Plan September 2000). The CWMB may allow for a similar amount of recreation access but these properties are not equal in terms of existing and potential ecosystems. Mitigation for loss of resource acres and opportunities needs to comparably replace the acres and opportunities being lost.

Response to USFS Comment 5:
FEIS Chapters 4.5 and 4.13.3 include a discussion of likely impacts to recreational opportunities within the Croatan National Forest and measures that mitigate these effects. Additional information on how impacts to wildlife habitat are mitigated by the CWMB is also included in FEIS Chapter 4.12.4. The above aspects are also discussed in the November 2014 letter from NCDOT to USFS (see FEIS appendices). NCDOT and USFS and the Corps of Engineers are presently developing an updated MOU that clarifies management responsibilities and rights (prior to transferring the CWMB to USFS as mitigation) and which details various types of uses. It is anticipated the updated MOU will be signed near to the time of ROD completion.

6) Summary of Impacts (Potentially-Contaminated Properties) p. S-14: There are potential contamination issues at the Craven County Transfer Facility located on NFS lands. In 2010, the operator of the facility, at the direction of the USFS, cleaned up surface oil spills in the oil recycling area and installed secondary containment systems for all containers intended for liquid or hazardous waste. However, the paved surface contains oil and other potentially hazardous chemicals that have penetrated into it over the years of using the facility. Impacts to the environment from both disturbance of the old landfill and relocation of the Transfer Facility must be disclosed prior to the Final Environmental Impact Statement (FEIS).

Response to USFS Comment 6:
Please refer to Response to EPA Comment 6.

Coordination on this effort is ongoing and the results will be documented in the ROD.

7) Correction needed at the bottom of p.S-14, *" ...coordinated with the NFS"* should read *" ...coordinated with the USFS"*

Response to USFS Comment 7:
This correction is included in the FEIS Executive Summary and FEIS Chapters 3.9 and 4.9.

8) Summary of Impacts (Biotic Communities) p. S-16: The DEIS states "NCDOT conceptually agrees to close the US 70 Havelock Bypass to accommodate prescribed burning." Based on the March 17, 2011 meeting with NCDOT, USFS, and U.S. Fish and Wildlife Service (USFWS), details on how to accomplish this have been agreed upon. This meeting and the agreements were documented in an April 25, 2011 Memorandum to the meeting attendees. One of the action items in that memorandum was for Mr. Terry Gibson, the State Highway Administrator, to review and approve the commitments for prescribed burning and closure of the proposed Havelock Bypass. The Forest Service has not received notification of approval of those commitments by Mr. Gibson. We request notification of his review and approval or non- approval of those commitments in writing.

   All of the comments on this DEIS are based on the approval of the prescribed burning commitments discussed in the April 25, 2011 memorandum. If Mr. Gibson does not approve of the commitments, we request a meeting to discuss the implications and impacts of the project to RCW and the Croatan National Forest.

Response to USFS Comment 8:
FEIS Chapter 4.14 includes a discussion of NCDOT commitments regarding prescribed burns. In 2012, the NCDOT Highway Administrator (now identified as the NCDOT Chief Engineer) wrote a commitment letter to USFS that provided written concurrence with a burning plan. This letter and accompanying meeting minutes are located in an FEIS Appendix A.

9) Summary of Impacts (Protected Species) p. S-17: While the bald eagle is covered under the Bald and Golden Eagle Protection Act, a biological conclusion and consultation with the USFWS is not required.

Response to USFS Comment 9:
Comment noted.

10) Summary of Impacts (Table S.I) p. S-20: References to the 3 red-cockaded woodpecker (RCW) clusters in the project area varies throughout the document. Based on the most current information as of the 2011 breeding season, the USFS considers all 3 clusters in the project area to be active. USFS personnel have observed RCW activity in all 3 clusters. It will be assumed that these clusters are active until next breeding season when intensive nest monitoring begins again.

Response to USFS Comment 10:
RCW studies and discussions are updated in FEIS Chapters 3.15.3 and 4.14.4, with a Biological Assessment located in Appendix C.

The most recent RCW cluster activity status update is dated August 12, 2014: There are 7 RCW territories impacted by the Havelock Bypass project (CNF 58, 144, 901, 902, 168, 169 and 170). Only CNF territory 901 is active. CNF 58, 144 and 902 are inactive and CNF 168,169 and 170 are future recruitment sites for RCW clusters (USFS unpublished data). USFS decided that there was no need to analyze CNF territory 186.

11) Actions Required by Other Federal and State Agencies (Permits) p. S-22: The DEIS states *"Lands owned by the National Forest System required for right-of-way for the Havelock Bypass will be transferred to the North Carolina Department of Transportation under the provisions of..."* This language is incorrect and is unacceptable to the Forest Service as the Forest Service will not be transferring land to the State. A highway easement deed will be

issued after we have agreed to the construction stipulations necessary for the protection and utilization of NFS lands. This should be corrected to read: "Interest in lands owned by the United States of America administered by the USDA-Forest Service approved for use as part of the project, will be authorized through a highway easement deed issued to the North Carolina Department of Transportation under the provisions of 23 U.S. C. Section 107 (d) and Section 317."

Response to USFS Comment 11:
The FEIS Executive Summary includes the correct text, as provided by the USFS, regarding the issuance of an easement deed for the proposed project.

12) The Forest Service questions the ability of the Croatan Wetlands Mitigation Bank (CWMB) to provide the required mitigation for all impacts to NFS resulting from this project. We are especially concerned about mitigating the impacts to RCW habitat and the loss of uplands. This DEIS has not demonstrated how the CWMB is providing mitigation for any resources other than wetland and stream impacts.

Response to USFS Comment 12:
At the time of the DEIS approval, NCDOT was not fully aware of the entirety of studies needed by the US Forest Service to render decisions regarding the potential allowance of easement for the proposed Havelock Bypass. However, the NCDOT believed that the information provided in that document was suitable to determine if previous project decisions that USFS participated in, were still valid.

Substantial avoidance coordination, as well as development of commitments and mitigation (with USFS and other agencies) has also occurred since completion of the Draft EIS. Additional information regarding the Croatan Wetland Mitigation Bank habitats and ecological functions is included in FEIS Chapter 4.12.

FEIS Appendix B contains a November 2014 letter from NCDOT to USFS that comprehensively discusses impacts to Croatan National Forest, and how mitigation is amply provided. After considering the numerous biotic studies and their conclusions, when considering an array of project commitments agreed-to by NCDOT, and when considering the transfer of the 4,035 acre CWMB and the prescribed burn commitment, the NCDOT believes that: the Croatan National Forest RCW Recovery Plan will not be negatively affected by the proposed highway project. The Croatan Wetland Mitigation Bank property, which is being offered as compensation to the USFS, provides a potential long-term opportunity to expand the RCW population beyond that detailed in the Recovery Plan. The Croatan Wetland Mitigation Bank also provides potential habitat for all of the Croatan National Forest Management Indicator Species, as well as additional species, some in substantial excess to probable project impacts. Future USFS management of the CWMB to achieve these habitat goals is allowable under existing agreements with other resource and permitting agencies. As compensation for highway impacts, the CWMB provides a net benefit to the CNF, which will enhance the overall management mission and objectives identified in the Land and Resource Management Plan (2002).

13) Chapter 2.5.2.1.2 Railroad Crossing Criteria p. 2-11: Second Paragraph: The DEIS indicates an interest by the North Carolina Railroad, and the Camp Lejeune Railroad, in "obtaining additional grade separation clearances for the project design". If this is planned

as a part of the Havelock Bypass project it needs to be included in this DEIS and the impact disclosed in this document. The Forest Service should be included in the coordination and review of the preliminary designs for the railroad overpass as the railroad is located on our property. Any proposed changes to the location or improvement of the railroad on NFS lands must have the prior approval of the Forest Service. If necessary, the special use permit issued to the Department of the Navy (No. CR000404) for operation of the railroad will be amended.

Response to USFS Comment 13:
After substantive coordination with representatives of the involved railroads, NCDOT has determined no additional clearance beyond the standard 23 feet vertical clearance is required for rail grade separations. The NCDOT does not anticipate any changes to the vertical clearance based on coordination to date; however, the USFS will be notified if any changes to the overpass clearance are discussed in the future.

14) Chapter 3.3.4 Utilities p. 3-41: There is no mention of phone lines in the utilities sections of this document. Please confirm that there are no phone lines that will need to be relocated as a result of this project. If there are phone lines that need to be relocated on the CNF, they need to be identified at this time and included in the DEIS.

Response to USFS Comment 14:
Comment noted. If any telephone lines (or other utilities) need to be relocated on Croatan National Forest Lands, then USFS will be contacted for input and to advise on needed approvals. Known impacts to utilities on USFS land is included in FEIS Chapter 4.6.

15) Chapter 3.3.6 Hazardous Materials p. 3-46: The DEIS states "...U.S. Forest Service and Craven County records indicate the exact boundaries of the landfill are not available". After conducting additional research the USFS was able to locate a plat dated March 9, 1970 showing the boundaries of the landfill area that was previously under permit. In addition, we were able to overlay that plat on an aerial photograph of the landfill area and accurately identify the landfill boundaries. Scanned files of these maps were provided to NCDOT in September of 2010.

Response to USFS Comment 15:
The maps specified by the commenter of the landfill boundary have been provided to the NCDOT Geoenvironmental Unit for use in preparing the geoenvironmental assessment for the project. The landfill is located adjacent to the Craven County Waste Transfer Station. The geoenvironmental investigation conducted by GEL Engineering of NC for NCDOT indicates there are no hazardous material concerns associated with the landfill or waste transfer facility. Results of this assessment are included in Sections 3.9 and 4.9 of this FEIS.

16) Chapter 3.4.2 Archeological Resources pp. 3-53 thru 3-55: There is no indication in the DEIS that the Tuscarora, a Federally Recognized Tribe, has been consulted on this project. It is the responsibility of the lead agency to consult with Federally Recognized Tribes. The USFS consulted with the Tuscarora on the Croatan Forest Plan, Section 106 Programmatic Agreement and the New Planning Rules. Chief Stuart Patterson did express interest in the CNF, especially in the case of human remains (NAGPRA). The Tuscarora must be contacted and offered the opportunity to comment on this project. We suggest the Tuscarora be notified immediately and sent copies of both the DEIS and the Archaeological Studies Report. The USFS can provide contact information for both Chiefs Henry and Patterson if requested.

Response to USFS Comment 16:
NCDOT has determined that the project will not impact an archaeological site (31CV302) that is associated with the Tuscarora tribe. Moreover, NCDPT has developed a project commitment (see commitments at beginning of FEIS) requiring the archaeological site to be fenced-off and protected during construction. In December 2013, NCDOT provided the Tuscarora Tribal Historic Preservation Officer (THPO) with copies of the DEIS and Archaeological Survey in accordance with 36 CFR 800.3 (c)(3)and invited the tribe to participate in the project's planning as a consulting party in accordance with 36 CFR 800.3(f)(2). In 2014, NCDOT also provided the Tribe with text of a project commitment to protect the subject archaeological site. NCDOT has since followed-up with the Tuscarora Nation (via email and a telephone conversation) to solicit comment, but no comment has been received; therefore the Department intends to protect the tribal resources via fencing.

17) Chapter 3.5.4.3.3 U.S. Forest Service PETS Species pp. 3-112 and p. 3-113: The USFS acknowledges the reevaluation of PETS species as the species list changes from year to year. We look forward to the additional technical reports and "...complete reevaluation of PETS species determined to have suitable habitat in the project study area prior to the completion of the Final Environmental Impact Statement". Please forward these reports to the USFS for our review when they become available.

Response to USFS Comment 17:
PETS and other updated technical reports were finalized and provided to the USFS in 2014.

Chapter 4.1.6.4 Utilities p. 4-29: The proposed decommissioning and/or relocation of the Craven County Waste Transfer facility will have to be negotiated with Craven County and any associated costs will be the responsibility of the State and included within the Forest Service Construction Stipulations. Relocation of the facility to another site on NFS lands is not guaranteed and would have to be evaluated in accordance with our current screening regulations which require exhausting the ability to acquire suitable private lands for this facility prior to applying for use of NFS lands.

Response to USFS Comment 18:
Please see Response to EPA Comment 6.

18) Chapter 4.1.6.5 Visual pp. 4-29 and 4-30: Scenery from Alternative 3 would be more attractive than either the existing road or Alternative 2 because both of these alternatives are in an urban setting compared to a forested setting. Alternative 1 is currently a rural setting but has the potential for more development than Alternative 3 because it crosses more private land than Alternative 3. Visual impacts to all alternatives can be mitigated with a landscaping plan once a LEDPA is selected.

Response to USFS Comment 19:
During the spring and summer of 2014, NCDOT staff coordinated with Karen Compton (USFS) and the Croatan Forest Ranger and his staff - holding a day-long meeting with them to discuss and agree,on components of a proposed landscaping plan. Discussions covered issues such as seed collection, herbicide treatments (and constraints), and proposed type of vegetation for the bypass. Minutes from an August 24, 2014 meeting (included in FEIS appendices) and current project commitments reflect the mutual agreements made between USFS and NCDOT.

19) Chapter 4.1.6.6 Hazardous Materials p. 4-31: Adequate analysis of the potential impacts to the old landfill must be conducted in the DEIS in order to properly evaluate the impacts. It is

not acceptable to the Forest Service to withhold this analysis until after the FEIS has been signed and the final right-of-way limits are established. Due to the potential of serious impacts resulting from disturbance of an old landfill, impacts must be disclosed prior to the FEIS. These potential impacts must be discussed with the USFS as the property owner and Craven County who maintains liability for any environmental problems resulting from the landfill under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

Response to USFS Comment 20:
Please refer to Response to EPA Comment 6.

20) Chapter 4.1.6.8.3 Gamelands and Preservation Areas p. 4-34: The DEIS does not disclose the potential negative impacts to hunting as a result of this project. The portion of the CNF being bisected by the proposed alternatives is traditionally heavily hunted with dogs. The project will cut off accessibility for the hunting public and it will most likely raise a safety issue as dog hunters will likely be walking, riding, and parking on the edge of the new highway to catch their dogs. There is also a potential safety issue with the possibility of dogs running deer and bear across the new four-lane highway.

Response to USFS Comment 21:
A more detailed description of impacts to hunting activities, as well as additional hunting benefits derived from transfer of the CWMB, is included in FEIS Chapters 4.3.4 and 4.12.4.

FEIS Chapter 4.12.4.3 discusses the impact of a proposed bypass on hunting access. Hunters will not be allowed to pull-off or park on the sides of the freeway to access hunting areas. Resultantly, the proposed bypass does in some areas lengthen the on-foot travel distance from nearby roads to a hunting area. However, since the bypass is a freeway facility, 48-inch high right-of-way fence (with barbed wire) will be installed on both sides of the highway. This fence also serves as a preventive barrier to inhibit hunting dogs (and hunters) from straying onto the highway. At the two proposed bridge locations over the East Prong and Southwest Prong of Slocum Creek, dogs can travel underneath the bypass. Hunters will have to plan accordingly.

As mentioned in "Response to USFS comment 19," in August 2014, NCDOT staff met with Croatan Forest District Ranger and staff and Karen Compton(USFS) to discuss accessibility issues - both for CNF management and for recreational use. To maintain accessibility to CNF lands, NCDOT agreed (subject to FHWA approval) to provide 13 specific access points (with gates in the right-of-way fence) with driveways that extend directly from shoulders of the proposed freeway facility. It was specifically discussed that these access points will serve USFS only, that the driveways/gates will not serve hunters, and would be signed as "No Hunting Access" or similar. Considerable time was spent identifying driveway locations and establishing design parameters (driveway lengths, slope, pavement design, gate types, etc.). Minutes from the August 24, 2014 meeting (included in FEIS appendices) and current project commitments reflect the mutual agreements made between USFS and NCDOT.

21) Chapter 4.1.8.1.1 Terrestrial Community and Wildlife pp. 4-37 thru 4-43: Although a mention was given regarding neotropical migrants in section 3.5.2.1 (p. 3-75), there is no discussion of impacts of this project to neotropical migratory birds in the DEIS.

Response to USFS Comment 22:
A discussion of impacts to neotropical migratory birds is included in FEIS Chapter 4.13.3.

22) Chapter 4.1.9.3 Federally-Protected and Federally-Listed Species

Red-cockaded woodpecker (RCW) pp. 4-61 thru 4-75
The USFS needs a copy of the document referenced on p. 4-63 "Addendum to the Biological Alternatives Analysis for Red-cockaded Woodpecker and Bald Eagle Impacts, US Highway 70 Bypass (R-1015), Craven County, North Carolina (JCA, 2011)".

The discussion of the impacts to RCW contains conflicting and inaccurate information. There is also information in the DEIS that does not reflect the prescribed burning commitments that NCDOT agreed to at the March 17, 2011 meeting.

First Paragraph p. 4-64: states that "... *cross-section of the project is also greater than 200 feet wide through portions of HMA 170, but this will not create any non-contiguous habitat".* This statement conflicts with Table 4.9 (p. 4-66) which shows that there will be non-contiguous habitat within HMA 170 for all Alternates.

Third Paragraph p. 4-64 and First Paragraph p. 4-68: the statement "...*impacts could individually or collectively adversely affect RCW dispersal to or from the area and inhibit unification of the CNF RCW population."* is in conflict with the statement on p. 4-70 that *"Based on available data, RCW dispersal is not likely to be adversely impacted as a result of the project".*

p. 4-68: The paragraph on cumulative effects just defines what cumulative effects are and does not list any specific projects that may have cumulative effects with the Havelock Bypass Project. This is not a cumulative effects analysis. Later in the document on p. 4-70 the DEIS does list the widening of US 17 on the northwest side of the CNF as potentially having cumulative effects on RCW; however it is the only project ever listed for possible cumulative effects on RCW.

The HMA analysis in this document is done at the neighborhood level which includes all potential RCW habitat including private land. The text and tables present data (pp. 4-64 thru 4-75) that is not meaningful to the discussion. Much of the habitat within the existing HMA's on the CNF is naturally occurring poorer quality longleaf pine and mixed pine woodlands and in all likelihood will never meet the Recovery Standard Guidelines (RSG). The RSG were written for ideal conditions which exist in greater quantity in other parts of the RCW's range, but not in the North Carolina coastal plains. The fact that these areas do not meet the RSG is not a product of mismanagement by the USFS, but rather a weakness in that the Recovery Plan fails to fully recognize varying habitat conditions across the range of the RCW.

The DEIS states on p. 4-74 "A plan is being developed in a joint effort between the CNF [and NCDOT] to close the proposed Bypass to allow for prescribed burning along the highway...". As previously discussed, finalization of a plan to allow prescribed burning along the highway is a requirement to avoid a Jeopardy opinion on the RCW by the USFWS. All USFS comments on this DEIS are based on the commitments in the April 25, 2011 memorandum to allow for the periodic closing of the proposed highway for the purpose of prescribed burning.

Rough-leaved loosestrife p. 4-77
The surveys conducted by ESI biologists from June 24-30, 2010 were adequate to assess the presence of this federally listed plant. Since no individuals were located during an appropriate seasonal field survey and the species has not been found by other biologists doing field work near the area, we think the biological conclusion should be a no effect. With this conclusion there should be no reason to consult with the USFWS for this species.

Response to USFS Comment 23:
Comments noted. Please see Responses to EPA Comment 11 and to USFS Comment 1. USFWS comments on the DEIS state that the agency concurs with the biological conclusion of "No Effect" for rough-leaved loosestrife and recommended that prior to construction, NCDOT resurvey the project corridor for any unrelated clearing activities since the time of the last survey as any suppressed populations would respond favorably to more sunlight.

23) Chapter 4.1.9.3.3 U.S. Forest Service Proposed, Endangered, Threatened, and Sensitive (PETS) Species p. 4-79: We are aware that ESI and NCDOT are conducting additional analysis on PETS species. To date we have received a copy of a memorandum dated November 8, 2011 and an attachment that will be incorporated into the DEIS as this section in Chapter 4. It is our understanding that there are additional technical reports being written. Please provide the USFS copies of these technical reports as soon as they are available for our review. I am including a review of the November 8 technical report as Appendix 1. Since documentation of the effects to PETS species is not complete, the USFS wants to provide additional comments on PETS once all the reports have been completed.

Response to USFS Comment 24:
PETS and other updated biological reports were finalized and provided to the USFS in 2014.

24) Chapter 4.1.9.4 Essential Fish Habitat p. 4-79: When is the determination of effect going to be made on Essential Fish Habitat (EFH)? This information needs to be disclosed for all alternatives in order to have the information necessary to select a LEDPA.

Response to USFS Comment 25:
See Response to USFS Comment 2. NOAA Fisheries did not identify a water body containing EFH habitat; therefore no EFH studies were necessary. Thus, all alternatives were equally benign with regard to EFH. Reaffirmation of Alternative 3 as the LEDPA was reached by the NEPA/Section 404 Interagency Merger Team on April 10, 2012.

25) Chapter 4.1.9.5 N.C. Coastal Area Management Act Areas of Environmental Concern p. 4-80: When is the Consistency Certification going to be issued? This information needs to be disclosed in order to have the information necessary to select a LEDPA.

Response to USFS Comment 26:
All build alternatives are consistent with the NC Coastal Management Program. A detailed consistency analysis is included in FEIS Chapter 4.1.2 and NCDOT will coordinate with the NC Division of Coastal Management to obtain a consistency determination, as an appropriate component of the CAMA Major Development Permit. Currently, a CAMA permit is not anticipated. Reaffirmation of Alternative 3 as the LEDPA was reached by the NEPA/Section 404 Interagency Merger Team on April 10, 2012.

26) Chapter 4.4.1 Croatan Wetland Mitigation Bank pp. 4-99 and 4-100: The DEIS states "the CWMB will provide project mitigation for jurisdictional wetland impacts and mitigation for the use and fragmentation of CNF lands". That statement is true for wetland impacts; however, evidence has not been presented to show that the CWMB can adequately mitigate for fragmentation of CNF lands.

p. 4-100: This section needs to be updated using the Croatan Mitigation Bank Addendum to the NCDOT UMBI issued in May of 2009 to reflect the revised credits available for both

riverine and non-riverine credit by credit type (Restoration, Enhancement, and Preservation). The DEIS needs to state the number of credits, based on the number of acres to be impacted, and the compensation for wetlands that will be provided by the CWMB. According to the 2009 Addendum, Riparian Headwater Stream Credits available have been identified for the CWMB. If any of these credits are proposed for use on this project, this information also needs to be disclosed in this section. In addition, the available credits should be adjusted to deduct credits that have already been used for other projects.

The DEIS makes claims that the CWMB will be used to mitigate fragmentation (p.4-99), loss of wildlife habitat (p. S-8), PETS (p. 4-99), and recreation (p. S-8). More information is needed on the community types available within the CWMB to determine if the CWMB can be used for mitigation for any of these losses. For example, loss of RCW habitat in the project area is more than likely greater than the Mesic Pine Flatwoods available in the CWMB. It is also likely that it is fragmented from other contiguous habitat and would not function as viable RCW Habitat in the near future.

The DEIS on p. 4-100 references a document prepared in June of 2008 titled "Final Red-cockaded Woodpecker Mitigation Plan for the Croatan Wetland Mitigation Bank, Craven County, North Carolina". This report says on p. 17 that the stands in the CWMB could reach the minimum age for foraging in 2032 and for nesting in 2092. The report also lists many challenges and uncertainties that these stands will be able to meet the specific habitat characteristics required for these stands during those timeframes if at all. Due to the long-term nature and uncertainties involved in development of these stands for RCW habitat, the USFS does not consider the CWMB as providing adequate mitigation for loses to RCW habitat resulting from the Havelock Bypass Project.

Response to USFS Comment 27:

Please see Response to USFS Comment 12. FEIS Appendix B contains a November 2014 letter from NCDOT to USFS that comprehensively discusses impacts to Croatan National Forest, and how mitigation is amply provided by the proposed project (with planned mitigation).

Since the DEIS, substantial coordination has ensued between NCDOT and USFS. Additional USFS "PETS" species (rare species) studies are completed, as is a Management Indicator Species (MIS) study, additional RCW analysis, and numerous other studies. FEIS Chapters 3.15.1, 3.15.3, 14.4 include updated information on the CWMB and impacts to RCW habitat, as well as mitigation discussions in Section 4.14. Considering all of the project commitments and proposed mitigation, NCDOT has concluded that:

> *"The Croatan National Forest RCW Recovery Plan will not be negatively affected by the proposed highway project. The Croatan Wetland Mitigation Bank property, which is being offered as compensation to the USFS, provides the potential long-term opportunity to expand the RCW population beyond that detailed in the Recovery Plan. The Croatan Wetland Mitigation Bank also provides potential habitat for all of the Croatan National Forest Management Indicator Species, as well as additional species, some in substantial excess to probable project impacts. Future USFS management of the CWMB to achieve these habitat goals is allowable under existing agreements with other resource and permitting agencies. As compensation for highway impacts, the CWMB provides a net benefit to the CNF, which will enhance the overall management mission and objectives identified in the Land and Resource Management Plan (2002)."*

27) Chapter 7 Agency Coordination and Public Involvement 7.1.3 U.S. Forest Service Coordination p. 7.5: The Asheville Forest Service office is the Forest Supervisor's office not the regional office.

Response to USFS Comment 28:
FEIS Chapter 6.0 contains revised text regarding coordination with the USFS Forest Supervisor's Office in Asheville.

28) Additional Concerns: There is no discussion or acknowledgement of impacts to access on woods roads located on NFS lands that will be impacted by the construction of the bypass. The lack of access to these areas needs to be assessed in the EIS for the Havelock Bypass. Attached as Appendix 2 is a chart which lists the roads on NFS, the expected impacts, and influencing alternatives. These access issues need to be addressed so the USFS can maintain access to these areas of the CNF.

Forest Service Road # and Name	Impact and Influencing Alternative
156 Pine Grove Road	Loss of access depending on road placement. This is near the north end of the bypass and dead ends at the railroad track. All alternatives may affect this access area.
601 Hickman Hill Road	Loss of access from all alternatives. This road begins just off of Hickman Hill loop road on the north end of Havelock. The first section may have an existing ROW between Weyerhaeuser and the USFS for access. All alternatives will impact this road.
604 Scott Road	Loss of access from all alternatives. This road begins just off of Hollywood Blvd. in Havelock, crosses a railroad crossing and goes by an electric substation eventually terminating in a dead end. All alternatives will affect this access.
613 Greenfield Heights	This road begins off of Sunset Dr. road in Havelock. Alternatives 2 and 3 will impact parts of this access road with alternative 3 cutting off the most access.
3016 Gray Road	This road begins off of the state owned Gray Road in Havelock. Alternatives 1and 3 will both cut off all the access to the timber in the area. Alternative 2 will impact some but should not restrict most of the access.
3084 Randal Br., 3085 J.C. Road, and 3086 French Road	All alternatives impact the access to this portion of the forest. These three roads begin on the Lake Road where the USFS has an existing ROW across private land to get to these roads. The road begins next to a junkyard.

Response to USFS Comment 29:
Since the DEIS, NCDOT has coordinated with USFS to assess reasonable access needs and solutions. Plan sheets include these mutually agreeable solutions, as does the November 2014 letter from NCDOT to USFS, which is contained in FEIS appendices. An assessment of impacts

to access roads on NFS lands is contained in FEIS Chapter 4.1.3.

29) Botanical General Comments: As a preferred alternative to non-native plantings along the road corridor, we appreciate your willingness to utilize Aristida stricta. Other species to consider would be Muhlenbergia expansa, Saccharum brevibarbe, and Schizachyrium scoparium. We have recently collected germplasm for those species across the Croatan NF and would like to coordinate with local NCDOT personnel for their use in appropriate locations. At the present time we are working with the NC Division of Forest Resources in the production of some of these native grasses and forbs.

We appreciate your discussion of guidelines for herbicide use across USFS, both for control of native and non-native invasive plant species (NNIS). It would be appropriate to determine which NNIS are currently or potentially could threaten USFS lands adjacent to the constructed corridor. This information could be used to develop appropriate species and site specific control methods including a suite of acceptable herbicides both across the constructed corridor and within adjacent natural habitats. It would be useful to have an annual meeting between pertinent USFS and NCDOT personnel to ensure good communication and discuss management to ensure no long-term impacts to rare species as well as vegetation diversity.

Response to USFS Comment 30:
During 2013 and 2014, NCDOT staff coordinated with USFS officials to develop a conceptual landscape plan and herbicide regime. This coordination culminated with an all-day meeting to discuss and agree on these parameters - as well as access points. Discussions ranged from seed collection to herbicide treatments (and constraints), to type of vegetation for the proposed bypass. Minutes from the August 24, 2014 meeting (included in FEIS appendices) and current project commitments reflect the mutual agreements made.

30) **PETS plant analysis:** We believe it is inappropriate to use potential habitat (Table 4.10 in supplemental PETS plant analysis), defined by soil types, historical fire compartments and local hydrology, as an analysis tool to determine the extent of habitat across the entire Croatan NF. This analysis disregards individual rare plant species biology and or their present distribution across the Croatan NF.

The amount of potential habitat both across the Croatan NF and within separate corridors cannot be substantiated. And the amount of occupied habitat for the species is questionable also, particularly when derived from coarse spatial delineations. Thus it is misleading to determine, for instance, that *Platanthera integra* has over 10 times more occupied habitat across the Croatan NF in comparison to *Solidago verna.* The former has not recorded more than 100 individuals in any of the recent surveys completed during the last 10 years and perhaps 3 of its occurrences are no longer present. In comparison, *Solidago verna* has widely dispersed occurrences across the northern *12* of the Croatan NF with tens of thousands of individuals in total.

In reference to specific mitigation measures needed for individual PETS or locally rare plant species we would request a meeting to develop specific criteria. The species we are concerned about from direct impacts include *Cirsium lecontii, Lejeunea bermudiana, Paspalum dissectum, Plagiochila ludoviciana, Rhynchospora breviseta, Solidago verna,* and *Sphagnum cribosum.* We request specific mitigation measures be incorporated in the green sheets "Project Commitments".

In regards to indirect effects, the flexibility to annually close the highway to continue to prescribe burn the open upland habitats east of the constructed highway corridor will be critical to maintain optimal habitat for some other rare species. Perhaps the one species most in need to maintain a fire-restored landscape is *Platanthera nivea.*

The following comments are specific for individual rare plant species:

Cirsium lecontei **(LeConte's Thistle)**
For a species with as few numbers of individuals recorded across the Croatan NF it is inappropriate to assess affects by the amount of occupied habitat, delineated spatially as separate occurrences, since the occupied habitat is coarsely defined and difficult to adequately determine for a species with dispersed clumped individuals. Our records (NCNHP EO numbers 8, 12, 17, 20, 24, 26, 27, 29, and 32) indicate nine populations for this species on the Croatan NF. Four of these occurrences have multiple spatial delineations, either as polygons or points. Three populations on the Croatan NF are historical or were not relocated in recent attempts by us to relocate them. For the remaining six populations a total of only 113 plants have been recorded, albeit one field survey indicated there were probably more individuals. Four of the populations are within the Havelock area, with three potentially affected, directly or indirectly, by the proposed highway construction. These three occurrences are the only ones on the Croatan NF with an EO Rank of A or B. Of these occurrences, two are directly affected by two or more of the corridors. Both Corridors 2 and 3 could directly affect up to 54 individuals or about 50% of all the recorded number of plants across the Croatan. It is uncertain if the all the counted individuals, 21 in total, will be affected since the data record does not adequately distinguish their distribution. Is this distribution evenly dispersed or do a disproportionate number occur either in or out of the direct path of the corridor. Even with the uncertainty in the number of individuals directly affected, it should be stated both of these alternatives could indirectly affect the largest population on the Croatan if prescribe burning becomes more difficult or implement or the road construction results in an increase in non-native invasive plant species.

Platanthera integra **(Yellow Fringeless Orchid)**
In reference to total number of populations across the Croatan NF, it should be noted one roadside population is apparently extirpated and another may be extirpated from a disturbed borrow area in a savanna. And there are 21 individuals potentially directly affected by Alternative 2 (John Fussell, biological contractor, personal communication) or indirectly affected by Corridor 3. Direct impacts to this species probably would not result in a viability concern across the Croatan NF, however the species is only represented by small population sizes across 5 other populations.

Cleistes bi(aria **(Small spreading Pogonia)**
There are five additional occurrences recorded for this species across the southern portion of the Croatan NF. While the population's counts were not recorded at these sites, all the occurrences were dispersed across high quality fire-maintained wet longleaf pine savanna habitat. This species does not appear to have viability concerns across the CNF.

Rhynchospora breviseta **(Short-bristled Beaksedge)**
It should be stated the largest recorded population for this species is within the proposed corridor. And there is population data from 2005 for this and the other occurrence within the corridor. For the population (EO# 27) that will be partially affected by all three corridors and completely affected by Corridor 2, 850 individuals were recorded. Since this is by far the highest quality population recorded across the Croatan NF, it would be helpful to determine if

the individuals are evenly dispersed across the powerline corridor or a disproportionate number occur either in or out of the direct path of the preferred corridor.

Sphagnum fitzgeraldii **(Fitzgerald's Peatmoss)**
The species has been more recently relocated in some historical sites as well as new sites across the Croatan NF and probably is more common than previously delineated. Ten populations are now documented on the Croatan NF in additional to the one occurrence in the proposed construction zone for all three alternatives. On page 23 of the supplement PETS report, the conclusion states there is a viability concern across the Croatan NF for this *Sphagnum* species. Based on more recent records across the Croatan NF, we do not think this will be the case if significant impacts result to the occurrence with implementation of Alternative 1.

Sphagnum cribosum **(Florida Peatmoss)**
Is the entire delineated area for the affected occurrence either potentially directly or indirectly affected by all the alternatives? There are viability concerns for this species across the Croatan NF with implementation of any alternative.

Paspalum dissectum **(Mudbank Crown Grass)**
Paspalum dissectum is only known within the Croatan NF near Havelock, across 7 ponds. Apparently this species is very localized and can occur within a very small area, such as a 10 by 25 meter extent recorded for one of the ponds. This species certainly does not have over 25,000 acres potential habitat across the Croatan NF as indicated in Table 4.1. Our records only have two populations, dispersed across three delineated ponds, for this species on the Croatan NF while your report indicates four occurrences. Are you recording EO# 13 on the Croatan NF? Of the two sites for EO# 7, only one would be potentially directly affected by Alternatives 2 and 3, although the other pond to the north would be potentially indirectly affected. This species is very rare across the Croatan NF and could have more than 80% of all the recorded culms directly or indirectly affected by the proposed project. There appears to be viability concerns with implementation of either Alternatives 2 or 3 with this project.

Lejeunea bermudiana **(A Liverwort)**
All the recent occurrences for this species are documented across one of the preferred alternatives. There appear to be viability concerns with implementation of any alternative. Is there any information on unsuccessful surveys across the Croatan NF for this liverwort?

Plagiochila ludoviciana **(A Liverwort)**
It should be noted the recent documentation of this species within the Havelock area is the only extant occurrence for this liverwort in the North Carolina coastal plain. The last recent documentation for this species within the coastal plain was 19 years ago. There would be viability concerns across the Croatan NF with implementation of Alternative 1. Is there any information on unsuccessful surveys across the Croatan NF for this liverwort?

Platanthera nivea **(Snowy orchid)**
There is only one occurrence, east of the corridor for either Alternatives 2 and 3, for this species on the Croatan NF. It is uncertain from the affects analysis what amount of field review was completed to relocate this 20 year old occurrence or document its extirpation. Given its very limited extent across the Croatan NF, it is critical to have the flexibility for annual road closure to provide prescribed burns within this habitat.

Solidago verna **(Spring-flowering Goldenrod)**

While this rare plant species is more common across the Croatan NF than any other Havelock bypass potentially impacted rare plant species, the number of impacted individuals and separate occurrences is quite large. The continued viability of this species across the Croatan NF is also dependent on the analysis from another NCDOT project, US 17 in the Maysville area, that is also in the planning process. Several thousand individuals will be impacted with construction across USFS lands from this project. There has been coordination with USFS and NCDOT personnel on the ongoing collection of spring-flowering goldenrod seed for the last few years and we do believe that propagation and relocation of the material to an appropriate site can be an acceptable tool for this species. However there has been no coordination with USFS personnel for a final appropriate site. A meeting to discuss an appropriate location, such as suggested at the Havelock Station Flatwoods between pertinent USFS and NCDOT individuals is necessary. It is critical mitigation measures be coordinated and approved by the Forest Supervisor prior to finalizing the EIS.

Response to USFS Comment 31:

The above comments were considered and incorporated into the final PETS analysis that was provided to the USFS in 2014. Results from the analysis are summarized in FEIS Chapters 3.15.3 and 4.4.

US Department of Agriculture, National Resource Conservation Service
October 3, 2011

The Natural Resources Conservation Service does not have any comments at this time.

Response:
Comment noted.

US Department of the Interior, Fish & Wildlife Service [1]
October 26, 2011

The following comments only address issues related to federally threatened and endangered species and Section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531-1543).

1) According to the DEIS, there are currently three Bypass alternatives still under consideration, with Alternative 3 being the preferred alternative of the North Carolina Department of Transportation (NCDOT). All three alternatives would impact portions of the Croatan National Forest (CNF), as well as habitat within the foraging partitions of up to six red-cockaded woodpecker (RCW, *Picoides borealis)* clusters (currently 3 active, 1 inactive, 2 recruitment). Based on current information, coordination, and agreements with NCDOT and the U.S. Forest Service (USFS), the Service does not oppose Alternative 3 as the preferred alternative.

Response to USFWS Comment 1:
Comment noted.

2) With regard to RCWs, the DEIS appears to use equivocal language and contradictory streams of thought. In several places it is stated or implied that there is no "take" of the species at any level (foraging partition, group, neighborhood, or population) and that the project will not prevent the USFS from achieving its RCW management goals. However, interspersed throughout the text are multiple statements implying that adverse effects could occur. An adverse effect equates to a "take" of the species. The document needs to take a more clear and definitive position on whether the project will have adverse effects or not on RCWs.

Response to USFWS Comment 2:
FEIS Chapters 3.15.3 and 4.14 contain a detailed analysis of any anticipated impacts to RCWs, their habitat, and the project's consistency with the USFS's RCW management goals.

3) The Service has met with NCDOT several times over the last few years to discuss RCWs and the upcoming Section 7 consultation. Although information and positions have changed as the project has developed, the last significant coordination occurred at a March 17, 2011 meeting in Greenville, North Carolina. Service staff met with NCDOT and USFS staff. Similar to other coordination meetings, the issues centered on whether the Bypass would preclude the USFS from conducting prescribed burns for RCW management. Assuming that the preferred Alternative 3 is selected as the Least Environmentally Damaging Practicable Alternative, the Service has repeatedly stated that we believe that the project would have no adverse effects on RCWs provided that the USFS could use prescribed fire to properly manage for RCWs. However, in lieu of prescribed fire management, the Service has repeatedly stated that we believe adverse indirect effects would occur, resulting in incidental take of the species and interminably delaying species recovery. At the March 17, 2011 meeting, NCDOT agreed to allow the Bypass to be closed a few days a year to allow the USFS to conduct prescribed burns. An April 25, 2011 memo from NCDOT provides the minutes from the March 17, 2011 meeting and unequivocally states "NCDOT has agreed to close the proposed Havelock Bypass to facilitate prescribed burning in accordance with the

[1] The responses contained in this section also apply to identical comments provided by the USDOI Office of Environmental Policy and Compliance, dated November 14, 2011.

measures discussed during this meeting." Based on this agreement, the Service stated that we would concur with a "may affect, not likely to adversely affect" biological conclusion for the RCW. The April 25, 2011 memo documents our position. As such, no formal Section 7 consultation would be needed unless new information arises.

However, page 1 of the Project Commitments "Green Sheets" and pages S-17, 4-70 and 4-75 all state that formal Section 7 consultation will be initiated and a biological opinion produced by the Service. This is in contradiction to our previous mutual understanding as detailed in the April 25, 2011 memo. The Service had viewed the March 17, 2011 coordination as having produced a way forward for Section 7 consultation, but there now appears to be a disconnect between the DEIS and our previous coordination. If the NCDOT has changed its position regarding the need for formal Section 7 consultation, we request that additional coordination take place as soon as possible. Regardless, this issue needs to be resolved prior to the next Merger Process concurrence meeting.

Response to USFWS Comment 3:
NCDOT is appreciative of USFWS's help to clarify process so that the Department proceeds efficiently. After the DEIS was released in January 2012, NCDOT formally committed to allow periodic closure of the proposed Havelock Bypass, in order to accommodate prescribed burns. FEIS Chapter 4.14 includes a discussion of the NCDOT commitments regarding prescribed burns, and FEIS Appendix A contains a 2012 prescribed burn commitment letter from the NCDOT Highway Administrator. After committing to prescribed burns, in 2014 the NCDOT produced a Biological Assessment for review by the US Fish and Wildlife Service; however, this was completed as part of informal consultation with the Service.

Endangered Species Consultation was concluded with USFWS in November 2013.

4) Specific RCW Comments

Page S-16 states "NCDOT conceptually agrees to close the US 70 Havelock Bypass to accommodate prescribed burning." Based on the aforementioned April 25, 2011 memo, NCDOT's agreement goes beyond the conceptual level. The memo acknowledged NCDOT's agreement to several details related to road closing (e.g. timing, frequency, etc.). We acknowledge that Action Item 5 of the referenced memo states "Mr. Terry Gibson, the State Highway Administrator, will need to review and approve these commitments for prescribed burning and closure of the proposed Havelock Bypass." Since the issuance of the April 25, 2011 memo, the Service is not aware of any changes or challenges to the agreements addressed in the memo. However, if Mr. Gibson did not approve of the commitments in the memo, we request to be notified immediately since our comments on this DEIS are based, in part, on an understanding that the commitments are still valid.

Table S.1 on page S-20 uses outdated data for the status of RCW clusters. As of the 2011 breeding season, three clusters were active (CNF 58, 901, and 902).

Page 4-63 references the following document: Addendum to the Biological Alternatives Analysis for Red-cockaded Woodpecker and Bald Eagle Impacts, US 70 Highway Bypass (R-1015), Craven County, North Carolina (JCA 2011). This document has not been provided to the Service for review; therefore, we request a copy.

Page 4-64 states "There will be no "take" at the RCW cluster-level, group-level, population-

level or neighborhood-level due to foraging habitat removals..." We agree with this statement and believe that there will be no adverse direct effects to RCWs. All clusters will still meet the Standard for Managed Stability (SMS) standards post-project, and the Bypass will not block dispersal since most of the clearing for the right-of-way will be less than 200 feet wide.

Page 4-64 and 4-75 state "Indirect impacts may result from traffic noise, development of some private properties along the highway corridor (such as interchanges) and/or restriction of necessary management activities (e.g. burning). Such impacts could individually or collectively adversely affect RCW dispersal to or from the area and inhibit unification of the CNF RCW population." The NCDOT's commitment to allow road closing and the USFS' agreement to conduct prescribed burning (as per April 25, 2011 memo) along the Bypass make the potential for adverse indirect effects from restricted burning a moot point. The potential for increased private development (which would be mostly limited to the vicinity of the interchange with Lake Road) to result in adverse indirect effects is also a moot point because CNF 902 and CNF 901 are already demographically isolated from each other by a wide swath of non-habitat, private land and development. Overall, assuming that the USFS properly manages RCW habitat with prescribed fire, the Service believes that potential indirect effects are insignificant (i.e. unable to meaningfully measure, detect, or evaluate and therefore should never reach the scale where take occurs).

The text and tables on pages 4-63 through 4-75 refer to several Habitat Management Areas (HMAs). The future management of the referenced HMAs and their contribution to recovery is, at best, ambiguous and uncertain. Much of the habitat within these HMAs is currently poor quality and may never meet the Recovery Standard Guidelines (RSG). With regard to Section 7, the HMAs should not, at this time, be an important consideration for the purposes of determining a biological conclusion for the effect of this project on RCWs.

Page 4-64 states "Such impacts could individually or collectively adversely affect RCW dispersal to or from the area and inhibit unification of the CNF RCW population." This statement conflicts with the following statement on page 4-70, "Based on the available data, RCW dispersal is not likely to be adversely impacted as a result of this project..."

Table 4.9 on page 4-66 poses the question of whether Habitat Management Area (HMA) 168, 169, 170, and 186 will meet the RSG standards. This question is not relevant or applicable. No RCW clusters exist within the HMAs, and the USFS has no current actionable plans to create clusters within the HMAs. This portion of the table is also misleading since much of the landscape within these HMAs will likely never meet the RSG standards regardless of the construction of the Bypass.

In table 4.9 on page 4-66, each column for HMA 170 depicts 134.59 to 177.37 acres of habitat as being non-contiguous. This conflicts with the following statement on page 4-64, "The cross- section of the project is also greater than 200 feet wide through portions of HMA 170, but this will not create any non-contiguous habitat."

In Table 4.9 on page 4-66, the first point 3 in the Group Level Analysis states "Alternatives 1 and 3 separate 3 active clusters from the remainder of the CNF." This statement is misleading and conflicts with the accurate second point 3 statement directly below it, "The Bypass will not impact dispersal based solely on its presence adjacent to clusters since most of its cleared width of 175 feet is less than the 200-foot wide non-contiguous habitat threshold designated by the Recovery Plan…" On a map, Alternatives 1 and 3 may

pictorially separate up to three active clusters from the remainder of the CNF, but no active clusters will be biologically or demographically separated from the remainder of the CNF as a result of the Bypass.

The Foraging Partition Level Analysis section of Table 4.9 on page 4-66 contains some irrelevant information regarding commercial and residential relocations, prime farmlands and wetlands.

In point 1 in the Neighborhood Analysis section of Table 4.9 on page 4-67, it is unclear what the numbers in the parentheses represent.

Point 6 in the Neighborhood Analysis section of Table 4.9 on page 4-67 states "Alternatives 1 and 3 will take Clusters CNF 901 and 11-15R further below the RSG minimum guidelines which they were already unable to meet prior to the Bypass project." This is a moot point since CNF 901 and 11-15R can never reach the RSG with or without the Bypass. The project will not further increase the level of impact at the neighborhood level.

Point 9 in the Neighborhood Analysis section of Table 4.9 on page 4-67 states "Alternative 3...separates an active RCW cluster from the CNF..." This statement is misleading. CNF 902 is already demographically separated from other clusters due to the presence of a> 0.5 mile swath of non-habitat, private land and development between it and CNF 901. The Bypass will not further increase this separation.

Point 10 in the Neighborhood Analysis section of Table 4.9 on page 4-67 refers to "3 affected CNF HMAs". There are actually four affected HMAs.

Page 4-68 defines cumulative impacts (effects) but does not provide any relevant information regarding projects that may result in cumulative effects. Page 4-70 states "Another project that could potentially have a cumulative affect *(sic)* on Subpopulation 3 is the widening of US 17..." This statement implies that one or more other projects were addressed; however, US 17 is the only project considered for cumulative effects.

Page 4-71 states "The CNF is not currently meeting its burning goals in the project area." Similarly, page 4-73 states "Based on data received from the USFS and current habitat trends, the LRMP goals are not being met. The reasons for failure to attain these goals are independent of the Bypass. The construction and operation of the Bypass should not prevent the USFS from meeting its goals if current management limitations are overcome." The Service agrees with these very important statements. Although the Bypass project introduces additional complexities for management, the Service, USFS and NCDOT all agree that the project should not preclude the USFS from meeting its management requirements. With regard to Section 7, the Service's decisions will be based, in part, on the USFS' commitment to fulfill its ESA obligations. Any deficiencies in RCW management would be attributable to limitations within the USFS.

Section 4.1.10.10 on pages 4-86 and 4-87 address borrow and disposal sites. Based on past experience, the Service notes that borrow and/or disposal sites can have an adverse effect on RCWs. Any borrow or disposal sites in the vicinity of the project area which involve the removal of pine trees should be evaluated for RCW habitat, regardless of land ownership (i.e. public or private). A survey should be conducted to determine whether any RCW cavity trees occur within a 0.5 mile radius of any borrow or disposal site. Should RCW cavity trees be present, the Service should be contacted immediately. A foraging habitat

assessment may be required.

Page 4-100 references the following document, Final Red-cockaded Woodpecker Mitigation Plan for the Croatan Wetland Mitigation Bank, Craven County, North Carolina. We believe that "Red-cockaded Woodpecker Mitigation Plan" is a misnomer and should not be construed as satisfying any current Section 7 requirements.

Response to USFWS Comment 4:
NCDOT provided USFWS with the requested Addendum to the Biological Alternatives Analysis for Red-cockaded Woodpecker and Bald Eagle Impacts, US 70 Highway Bypass (R-1015), Craven County, North Carolina (JCA 2011).

NCDOT is appreciative of USFWS' helpful edits on the DEIS - many of which were reflected in the RCW Biological Assessment (dated November 8, 2013) which preceded the USFWS concurrence letter (informal consultation) (dated November 19, 2013) with a biological conclusion of "May Affect, Not Likely to Adversely Affect" for the red-cockaded woodpecker. FEIS Sections 3.15.3 and 4.14 include updated information on RCW impacts and habitat management.

5) Comments on Other Federally Listed Species

Pages S-17 and 4-78 refer to a biological conclusion and potential concurrence from the Service for the bald eagle *(Haliaeetus leucocephalus)*. The bald eagle is protected by the Bald and Golden Eagle Protection Act, but no biological conclusion or concurrence is required.

Table 4.8 on page 4-59 provides biological conclusions for all federally listed species within Craven and Carteret Counties. With the exception of the RCW and rough-leaved loosestrife *(Lysimachia asperulaefolia),* NCDOT has rendered a "No Effect" biological conclusion for all other species. The Service concurs with these "No Effect" conclusions. Table 4.8 and page 4-77 render a biological conclusion of "May Affect, Not Likely to Adversely Affect" for rough-leaved loosestrife. The Service concurs with this conclusion; however, we recommend that NCDOT re-survey the project corridor if any unrelated clearing activities occur prior to the Bypass construction. Rough-leaved loosestrife may occur in a hidden and suppressed form underneath tree canopy or taller vegetation and may respond favorably if opened up to sunlight.

Response to USFWS Comment 5:
FEIS Chapter 4.14 is updated to delete a reference to a biological conclusion for the bald eagle; however, evaluation of this species is included in the Biological Evaluation that was provided for USFWS review.

Given the multi-year duration between a ROD and construction, NCDOT realistically expects that the corridor will need to be re-surveyed prior to construction, in order to comply with the Endangered Species Act.

Federal Railroad Administration, Office of Railroad and Policy Development
October 11, 2011

1) The "Railroads" and "Rail Alternatives" section of each alternative should acknowledge that the railroads through Havelock are on the US Department of Defense Strategic Rail Corridor Network (STRACNET) serving the Marine Corps Air Station at Cherry Point, Camp Lejeune and the Port of Morehead City.

Response to FRA Comment 1:
FEIS Chapter 1.6.2 includes a discussion of regional military and port rail operations.

2) Upon review of the three alternatives, each alternative involves three crossings of the rail routes, one at the east and west ends of each alternative, and one along the mid-section near Lake Road. The current route of US-70 only has one crossing of the railroad between Miller Blvd. and Roosevelt Blvd.

Response to FRA Comment 2:
FEIS Chapters 1.6.2, 2.5, and 2.6 were revised to describe existing and proposed rail crossings.

3) The traffic impacts of the three alternatives should include delays due to rail activity at each of the crossings, unless grade separated crossings are to be constructed.

Response to FRA Comment 3:
FEIS Chapter 2.7 describes grade-separated rail crossings at all three highway-railroad intersections on the project length; therefore traffic operations are not affected by railroad activity, and vice-versa.

4) Any alternative should not impose on the STRACNET routes by impacting the clearance envelopes required for "oversize" freight, providing 16 foot 11 inches vertical from top of rail and horizontal width for a 12 foot wide rail car. Any structures supporting rail must be designed to support a load of 65,000 lbs per axle or the typical 263,000 lb gross weight for a 4 axle rail car, with the exception of special permits. If applicable any factors for the design requirements for rail structures, clearances for roadway structures, and safety equipment at grade crossings should be included in the cost estimates for the alternatives considered.

Response to FRA Comment 4:
Comment noted. Section 2.7 describes clearance criteria that are consistent with FRA design criteria, providing a 23-foot vertical clearance from the top of rail to the bottom bridge girder.

NC Department of Agriculture and Consumer Services, Agricultural Services
November 7, 2011

1) Thank you for the opportunity to comment on the proposed construction of a new, 10-mile four lane divided, controlled access freeway for US 70 Bypass around the southwest side of the City of Havelock (TIP# R-1015). The Environmental Assessment indicates that the proposed project will contribute to the ongoing loss of prime farm and forest land in our State. Farm and forest lands are important for both economic and environmental reasons. Appropriately managed agricultural lands can provide groundwater recharge, wastewater filtration, flood prevention, and wildlife habitat protection. Agricultural land enhances the quality of life for citizens within a community by offering scenic landscapes, open space, and a variety of outdoor recreational activities. In addition, loss of productive farmland has the potential for irreversible damage to the agricultural sector of our economy. Agricultural production incomes from locally grown products have a considerable multiplier effect. It is estimated that for every 40 acres converted from agricultural production, one agribusiness job and its associated economic activity is lost indefinitely.

Response to NCAGR Comment 1:
On April 12, 2012, the NEPA/404 Merger Team affirmed Alternative 3 as the Least Environmentally Damaging Practicable Alternative (LEDPA) in consideration of total impacts for each build alternative, including impacts to prime farmland soils outside the Croatan National Forest. Alternative 3 would impact 71 acres of prime farmland, which is six acres more than Alternative 1, but 41 acres less than Alternative 2. In accordance with the Farmland Protection Policy Act (FPPA), a farmland conversion impact rating form, contained in DEIS Appendix A.1, was prepared in coordination with the Natural Resources Conservation Service (NRCS). As stated in DEIS Section 4.1.6.3, Alternative 3 received the lowest rating (116.8) for farmland conversion impacts. The ratings for Alternative 1 and 2 were 138.0 and 118.4. All three build alternative scores are below the threshold warranting a higher level of consideration for protection and are in compliance with the FPPA.

2) In addition to direct impacts associated with this project, it is anticipated that additional acreage loss will occur due to development that would likely take place once the proposed modifications are installed. Overall, farmland consumes fewer services relative to the taxes generated, compared to other types of development. Careful review of activities that result in loss of farm and forest land is warranted when consideration is given for the loss of environmental amenities, the loss of local tax revenue, the value of agricultural products no longer produced, and the decrease of agribusiness jobs associated with the loss of the land.

Response to NCAGR Comment 2:
As stated in Response to NCAGR Comment 1, the proposed project is in compliance with the FPPA. Farmland resources are identified and evaluated in FEIS Chapters 3.11 and 4.10.

3) **Based on the secondary, cumulative, and direct impacts, this project will adversely impact the agricultural, environmental and economic resources in the proposed area.** The total negative impact on the environment and agribusiness economy will be proportionately related to the total acres of farm and forest land taken out of production. Increased division of land units and its reduced accessibility for agricultural production will also increase the negative impact on agriculture. Due to these adverse impacts, additional consideration should be given to alternative routes and/or designs that would reduce the

loss of farm and forest lands.

Response to NCAGR Comment 3:
As stated in Response to NCAGR Comment 1, the proposed project is in compliance with the FPPA. With the exception of silviculture operations associated with the Croatan National Forest, there are no farming operations currently active within the build alternative corridors This information, as well as a discussion of the Craven County VAD program is included in FEIS Chapters 3.11 and 4.11.

NCDENR, Division of Coastal Management
October 28, 2011

1) S.7, Page S-21, Actions Required by Other Federal and State Agencies

It is stated that, "The NC Coastal Area Management Act (CAMA) provides for jurisdictional review of impacts affecting Areas of Environmental Concern (AEC)... "

This sentence is not entirely accurate and perhaps confusing. As a point of clarification, CAMA provides for jurisdictional review of development activities with the goal of balancing economic development with preserving and managing the natural, cultural, and recreational resources of the coastal zone. Development projects within an AEC typically require a CAMA permit. Federal actions located within the coastal zone (but not within an AEC) require review for consistency with the enforceable policies of the State's coastal management program.

DCM has concluded that the proposed project will not impact a CAMA AEC as defined by the rules of the NC Coastal Resources Commission. Therefore, the proposed project will not require a CAMA Permit. It is correctly stated that the project will require a Federal Consistency Determination.

As another point of clarification, the applicant (NCDOT) is required to evaluate the proposed project and certify to DCM and USACE that the project is consistent with the NC Coastal Management Program. This Consistency Certification includes a review of the State's coastal program (including the applicable CAMA Land Use Plans) and contains an analysis describing how the proposed project would be consistent with the State's enforceable coastal policies as mandated by the requirements of Federal Consistency (15 CFR 930). No federal license or permit shall be issued by a federal agency until the requirements of Federal Consistency have been satisfied.

DCM will issue a public notice and circulate the Consistency Certification with its accompanying supporting documentation to state agencies with potential interest in the project. Upon an internal review of NCDOT's written analysis of how the project is consistent with the NC Coastal Management Program and the comments received, DCM will either concur with NCDOT's Consistency Determination or find that the project is not consistent. The Final EIS should include an analysis of the project under Federal Consistency (15 CFR 930).

Response to NCDCM Comment 1:
NCDOT appreciates the clarification and helpful process guidance. The FEIS Executive Summary and Section 3.15.6 and 4.14.6 clarify CAMA regulations as they relate to the proposed project and include a discussion of the project's consistency with the NC Coastal Management Program. A CAMA permit is not currently anticipated.

2) 3.5.4.5. page 3-121, N.C. Coastal Area Management Act Areas of Environmental Concern

It is stated that, *"There are no AEC within the project study area; however, since this project* is *expected to result in fill in wetlands, NCDOT will be required to submit a Consistency Certification...* "

The provisions of Federal Consistency under 15 CFR 930 apply to any federal action that may reasonably affect any coastal resource or coastal use within the State's coastal zone. In this case, the activity requires a federal permit, i.e., the USACE Individual Permit, due to the amount of wetlands impacted. Projects with wetland impacts that are small enough to be authorized by one of the USACE Nationwide Permits have been deemed to be consistent with the NC Coastal Management Program. However, an activity that has wetland impacts that are greater than an amount that are applicable to USACE Nationwide Wide Permits and requires an Individual Permit must be reviewed for consistency with the NC Coastal Management Program. Therefore, the trigger of Federal Consistency is the federal permit (USACE Individual Permit) rather than simply, *"the project is expected to result in fill in wetlands..."*

Response to NCDCM Comment 2:

Please refer to Response to NCDCM Comment 1. FEIS Chapters 3.15.6 and 4.14.6 clarify CAMA regulations as they relate to the proposed project and appropriately include a discussion of the project's consistency with the NC Coastal Management Program.

NC Division of Water Quality
October 14, 2011

Project Specific Comments:

1) This project is being planned as part of the 404/NEPA Merger Process. As a participating team member, NCDWQ will continue to work with the team.

Response to NCDWQ Comment 1:
Comment noted.

2) Black Swamp, Southwest Prong of Slocum Creek, and the East Prong of Slocum Creek are class C;Sw, NSW waters of the State; Goodwin Creek and Tucker Creek are SC;Sw,NSW waters of the State. The NCDWQ is very concerned with sediment and erosion impacts that could result from this project. The NCDWQ recommends that highly protective sediment and erosion control BMPs be implemented to reduce the risk of nutrient runoff to these surface waters. The NCDWQ requests that road design plans provide treatment of the storm water runoff through best management practices as detailed in the *most* recent version of NCDWQ's *Stormwater Best Management Practices.*

Response to NCDWQ Comment 2:
NCDOT will continue to coordinate with NCDWR through the NEPA/404 Merger Process to determine appropriate stormwater BMPs.

3) The document states that a reach of the Neuse River is listed on the 303(d) list. However, it is not indicated what the reach is listed for.

Response to NCDWQ Comment 3:
This information is clarified in FEIS Chapter 3.14.

4) The Neuse River Buffer jurisdictional determination was performed in October 2004. Jurisdictional determinations applicable to riparian buffers, streams, and isolated wetlands are only valid for a period of five (5) years. Therefore, the jurisdictional determinations for this project have expired and will need to be reverified prior to submitting a 401 Water Quality Certification application.

Response to NCDWQ Comment 4:
A jurisdictional determination was performed in November 2013; an additional determination may be required prior to permitting.

5) It is not indicated which year the 303(d) list used to determine listings is from: although from the citation it appears that it may have been from 2006. The discussion should be updated to reflect the most recent approved 303(d) list, which is currently from 2010.

Response to NCDWQ Comment 5:
This information is clarified in FEIS Chapter 3.14.

6) This project is within the Neuse River Basin. Riparian buffer impacts should be avoided and minimized to the greatest extent possible pursuant to 15A NCAC 2B .0233. New

development activities located in the protected 50-foot wide riparian areas within the basin should be limited to "uses" identified within and constructed in accordance with 15A NCAC 2B .0233. Buffer mitigation may be required for buffer impacts resulting from activities classified as "allowable with mitigation within the "Table of Uses" section of the Buffer Rules or require a variance under the Buffer Rules. A buffer mitigation plan, including use of the NC Ecosystem Enhancement Program, must be provided to NCDWQ prior to approval of the Water Quality Certification.

Response to NCDWQ Comment 6:
FEIS Chapters 3.15.2 and 4.14.3 include an expanded discussion of riparian buffer impacts and mitigation.

7) As referenced in the document, the NCDWQ has a copy of the "Quantitative Indirect and Cumulative Effects" for the project dated July 15, 2008 on file. The NCDWQ has reviewed the document and generally agrees that growth in the area will be low to moderate due to constraints, and does not feel that further analysis is required at this time. However, should the information or assumptions change or the assessment be updated, please inform the NCDWQ.

Response to NCDWQ Comment 7:
NCDOT prepared an Indirect and Cumulative Impacts Assessment for the proposed project in September 2013. NCDWQ comments on the report (dated December 31, 2013) state that "the analysis performed is sufficient and no further analysis is warranted at this time". NCDOT will maintain ongoing coordination with DWQ to ensure new information or revisions are conveyed to DWQ.

8) While the Croatan Wetland Mitigation Bank may be available to offset all anticipated wetland impacts associated with this project, the NCDWQ encourages the NCDOT to full explore all possible onsite mitigation opportunities. When feasible, the NCDWQ prefers onsite mitigation to mitigation banks.

Response to NCDWQ Comment 8:
On-site mitigation strategies will be evaluated by NCDOT and documented in the Record of Decision (ROD). For any streams and wetlands and riparian buffers that cannot be mitigated on site, NCDOT would debit approved credits from the Croatan Wetland Mitigation Bank.
General Comments:

9) Future documentation, including the 401 Water Quality Certification Application, should continue to include an itemized listing of the proposed wetland and stream impacts with corresponding mapping.

Response to NCDWQ Comment 9:
Comment noted.

10) Alternatives should consider design criteria that reduce the impacts to streams and wetlands from storm water runoff. These alternatives should include road designs that allow for treatment of the storm water runoff through best management practices as detailed in the most recent version of NCDWQ's *Stormwater Best Management Practices Manual,* July 2007, such as grassed swales, buffer areas, preformed scour holes, retention basins, etc.

Response to NCDWQ Comment 10:
Comment noted.

11) After the selection of the preferred alternative and prior to an issuance of the 401 Water Quality Certification, the NCDOT is respectfully reminded that they will need to demonstrate the avoidance and minimization of impacts to wetlands (and streams) to the maximum extent practical. In accordance with the Environmental Management Commission's Rules (I5A NCAC 2H .0506[h]), mitigation will be required for impacts greater than 1 acre to wetlands and impacts greater than 150 feet to any single stream. In the event that mitigation is required, the mitigation plan should be designed to replace appropriate lost functions and values. The NC Ecosystem Enhancement Program may be available for use as wetland mitigation.

Response to NCDWQ Comment 11:
FEIS Section 7.1.2 describes the combined CP4A Avoidance and Minimization and CP4B Hydraulic Review meeting that was held on August 20, 2014. All appropriate agencies agreed with NCDOT efforts, as evidenced by their signatures on the CP4A concurrence form. Minutes of the meetings are included in FEIS Appendix E. Mitigation for aquatic resources is discussed in FEIS Chapter 4.14.2

12) NCDWQ is very concerned with sediment and erosion impacts that could result from this project. NCDOT should address these concerns by describing the potential impacts that may occur to the aquatic environments and any mitigating factors that would reduce the impacts.

Response to NCDWQ Comment 12:
Comment noted. FEIS project commitments include designing the proposed stream crossings in adherence to guidelines for anadromous fish passage and for a specific-location in-water work moratorium from February 15 to June 15.

13) NCDOT is respectfully reminded that all impacts, including but not limited to, bridging, fill, excavation and clearing, and rip rap to jurisdictional wetlands, streams, and riparian buffers need to be included in the final impact calculations. These impacts, in addition to any construction impacts, temporary or otherwise, also need to be included as part of the 401 Water Quality Certification Application.

Response to NCDWQ Comment 13:
Comment noted.

14) The 401 Water Quality Certification application will need to specifically address the proposed methods for stormwater management. More specifically, stormwater should not be permitted to discharge directly into streams or surface waters.

Response to NCDWQ Comment 14:
Comment noted.

15) Based on the information presented in the document, the magnitude of impacts to wetlands and streams may require an Individual Permit (IP) application to the Corps of Engineers and corresponding 401 Water Quality Certification. Please be advised that a 401 Water Quality Certification requires satisfactory protection of water quality to ensure that water quality

standards are met and no wetland or stream uses are lost. Final permit authorization will require the submittal of a formal application by the NCDOT and written concurrence from NCDWQ. Please be aware that any approval will be contingent on appropriate avoidance and minimization of wetland and stream impacts to the maximum extent practical, the development of an acceptable storm water management plan, and the inclusion of appropriate mitigation plans where appropriate.

Response to NCDWQ Comment 15:

NCDOT will coordinate with NCDWR through the NEPA/404 Merger Process. Post-merger and prior to letting: the Department will complete final Section 404/401 permit authorizations in compliance with the Clean Water Act.

NC Natural Heritage Program
November 10, 2011

1) The NC Natural Heritage Program (NHP) has reviewed the Draft Environmental Impact Statement (DEIS) for the US 70 Havelock Bypass in Craven County. According to the DEIS, there are currently three alternatives for the Bypass under consideration, with Alternative 3 being the preferred route by NCDOT. Each of the three alternatives poses significant direct or indirect threats to rare species and natural communities within the Croatan US National Forest. NHP's first preference is to improve the existing US 70 corridor over the three alternatives for the US 70 Bypass in order to avoid impacts to rare species and Significant Natural Heritage Areas. Failing that option, we strongly oppose Alternative 3, preferred by NCDOT, and would like the least damaging alternative to be selected.

Response to NCNHP Comment 1:
Alternative 3 was selected as the least environmentally damaging practicable alternative (LEDPA) by a team of state and federal agencies, in addition to NCDOT and FHWA. Improve Existing alternatives were evaluated and eliminated in earlier phases of the study due to the anticipated impacts along existing US 70 through Havelock. In addition, the Expressway alternative failed to adequately handle future traffic volumes. Of the remaining new location bypass alternatives, Alternative 3 was later developed and then selected as the LEDPA - after considering impacts to a large array of resources. Chapters 2 and 7 of the FEIS present relevant and chronological discussion of the LEDPA's development and selection. See Response to USACE Comment 2 for information regarding the project commitments for Alternative 3.

2) Alternative 3 passes through the most significant natural area within the project study area, the Southwest Prong Flatwoods Significant Natural Heritage Area (SNHA). This site has one of the best examples of Mesic Pine Flatwoods (Coastal Plain Subtype) in the state. The Longleaf Pine communities at this site occur on various soil types, including ones that today only rarely support longleaf, mainly because they have elsewhere been converted to agriculture or silviculture. Southwest Prong Flatwoods SNHA also has state significant populations of Spring-flowering Goldenrod *(Solidago verna),* a federal species of concern, and NC endangered Mudbank Crown Grass *(Paspalum dissectum).* Other rare species that would be impacted by Alternative 3 include:

Red-cockaded Woodpecker *(Picoides borealis)* - US: Endangered, NC: Endangered
Bachman's Sparrow *(Peucaea aestivalis)* - US: Federal Species of Concern, NC: Special Concern
Little Metalmark *(Co/ephelis virginiensis)* - NC: Significantly Rare
Leconte's Thistle *(Cirsium lecontei)* - NC: *Special* Concern-Vulnerable
Short-bristled Beaksedge *(Rhynchospora breviseta)* - NC Significantly Rare
Showy Orchid *(Pfatanthera niveo)* - NC Threatened

Alternative 3 would not *only* destroy significant natural communities, and many rare species populations and their habitat, but would also cause fragmentation on the landscape. The Bypass would bisect the National Forest lands, making management and prescribed fire very difficult, given the strict DOT smoke regulations.

Response to NCNHP Comment 2:
Please refer to FEIS Chapter 2 for a full description of alternative development and selection. An appropriate range of alternatives was studied and considered by a state and federal interagency team, and Alternative 3 was determined to be the LEDPA based on all impacts.

An Environmental Impact Statement is prepared when a project is determined to have significant impacts; and the stated impacts are significant to NCNHP. The interagency team was aware of these impacts when the LEDPA was being considered and later reaffirmed.

The DEIS was approved by FHWA in September 2011. After receiving agency comments and conducting public hearings in December 2011, the Merger Team revisited the earlier LEDPA decision and its parameters (including impacts). Alternative 3 was re-affirmed as the LEDPA in April 2012. The team noted that Alternative 3 was selected for the following reasons:

- *2nd lowest number of residential and business relocations*
- *Lowest length of stream impacts*
- *2nd lowest prime farmland impacts*
- *2nd shortest project length*
- *Lowest cost*
- *Minimizes fragmentation of red-cockaded woodpecker habitat.*

3) Alternative 2, the easternmost route, would cause heavy direct impacts to the Havelock Station Flatwoods and Powerline Corridor SNHA and part of the Southwest Prong Flatwoods SNHA. The Havelock Station Flatwoods is significant *for* the large number of rare plant species that occur there. Although this route would cause significant direct impacts to many rare plant and animal species and a colonial wading bird colony, it causes the least amount of fragmentation of the natural communities and species habitat as a whole. Records of rare species that occur within the project boundaries for this alternative include:

Dusky Roadside-Skipper (*Amblyscirtes alternata*) - NC: Significantly Rare
Little Metalmark *(Calephelis virginiensis)* - NC: Significantly Rare
Bog Bluestem (*Andropogon mohrii*) - NC: Threatened
Leconte's Thistle *(Cirsium /econtei)* - NC: Special Concern-Vulnerable
Yellow Fringeless Orchid *(Piatanthera integra)* - NC: Special Concern-Vulnerable
Hooker's Milkwort *(Polygola hookeri)* - NC: Special Concern-Vulnerable
Spring-flowering Goldenrod (*Solidago vema*) - US: Federal Species of Concern, NC: Significantly Rare
Eaton's Witch Grass (*Dichonthelium spretum*) - NC: Significantly Rare
Short-bristled Beaksedge (*Rhynchospora breviseta*) - NC: Significantly Rare

Response to NCNHP Comment 3:
Please refer to FEIS section 2.10.2, and to Response to NCNHP Comment 2 - which summarize why Alternative 3 was selected as the LEDPA.

Alternative 3 was selected as the LEDPA based on consideration of impacts, including habitat fragmentation and the feasibility of conducting prescribed burns. Alternative 2 is not recommended by the Merger Team as the LEDPA primarily due to high relocation impacts. During alternative decision-making, USFS provided the opinion that conducting prescribed burns on USFS lands adjacent to Alternative 3 would minimize indirect effects to RCW habitat and other special habitats within the Croatan National Forest, and is the most feasible alternative for that purpose.

4) Alternative 1, the westernmost route, imposes the least amount of direct impacts to rare species and natural communities. There would *still* be significant impacts to rare species to the south where the Bypass is proposed to diverge from the existing US 70 and impact the Havelock Station Flatwoods and Powerline Corridor. To the north, this route extends

through private land between the Croatan National Forest avoiding rare species. However, if Alternative 1 is chosen, there may be serious indirect impacts by fragmentation of the Longleaf Pine communities and species habitat to the east. This option could create significant challenges for managing and burning National Forest land to the east. NHP is concerned that if management becomes extremely difficult, rare species and natural communities east of the Bypass could be lost over time due to secondary impacts.

Response to NCNHP Comment 4:
FEIS Chapter 2.10.2 provides detailed discussion about the basis for alternative selection. Alternative 1 is not recommended by the Merger Team as the LEDPA, mainly because it will cause the largest amount of fragmentation to the Croatan National Forest. See Response to NCNHP Comment 3 for additional information.

5) NHP most strongly opposes Alternative 3, the NCDOT preferred central route, as the most environmentally damaging alternative and we are already on the record for doing so in a letter dated April 6, 1998. Among the three alternatives, NHP's first preference is Alternative 1, the westernmost route, because it avoids and minimizes impacts to rare species and SNHAs. However, we are concerned of the long-term impacts of fragmentation and difficulty in managing the isolated land to the east. If this route is chosen, it is imperative that the savannas and flatwoods to the east be burned on a several year rotation. NHP would approve this alternative only if there is a written agreement stating that the fragmented stands would be burned regularly, even if that means US 70 would be closed for several days in the winter or early spring to conduct prescribed burns.

Response to NCNHP Comment 5:
Please see Responses to NCNHP Comments 2 and 3.

6) Additionally, NHP concurs with the NC Wildlife Resources Commission's recommendations to construct a wildlife underpass that would maintain the link between the Southwest Prong Flatwoods SNHA and the other Croatan National Forest land as an essential component of mitigation intended to maintain the ecological integrity of the SNHA. However, NHP is not just concerned about the passage for black bears but we are also concerned about several rare species that are particularly associated with longleaf flatwoods and savanna habitats. Species falling in this category include the Southern Hognose Snake, Pygmy Rattlesnake, Gopher frog, Mimic glass lizard, and Oak Toad, all of which NHP has records for in the immediate area of the project. We would also like the chance to be involved in the selection of crossings that meet the needs of these species as *well* as those of bear, deer, and other wildlife.

   If no wildlife crossing is included in the mitigation for this project and there is no written agreement to ensure that appropriate management will occur in perpetuity in the natural areas surrounding the Bypass, then NHP's second preference is Alternative 2, the easternmost route, which would keep the blocks of US National Forest land more intact. This route would also cause the least amount of difficulty for management of habitat to the west. However, there would be a significant loss of rare species located at the northern end of the Southwest Prong Flatwoods SNHA and within the Havelock Station Flatwoods and Powerline Corridor SNHA.

Response to NCNHP Comment 6:
Please see Response to USFS Comment 1, regarding NCDOT's commitment to allow prescribed burns for habitat management.

The proposed 1,618-foot bridge over the East Prong of Slocum Creek is considerably longer than the channel and floodplain width of Southwest Prong. The bridge extends more than 650-feet over adjacent wetlands and offers a vertical clearance ranging from 4 to 10 feet. As such, the bridge offers considerable wildlife passage opportunities. FEIS Chapter 4.14 includes a discussion of the proposed bridge designs and how these structures will facilitate animal passage to reduce animal mortality and habitat fragmentation effects.

The proposed 925-foot bridge over the Southwest Prong of Slocum Creek is also longer than the minimum hydraulic length necessary for water conveyance, and will accommodate wildlife passage through adjacent floodplain and wetlands.

These two bridges are incorporated into the proposed project's design, and comprise the wildlife crossings offered. No other crossings are envisioned.

NC Wildlife Resources Commission
November 7, 2011

1) The locations identified as areas WRC requested an in-water work moratorium and the applicable dates are accurate, furthermore NCDOT should follow the "Stream Crossing Guidelines for Anadromous Fish Passage" in the design of these crossing structures.

Response to NCWRC Comment 1:
The FEIS project commitments include designing the proposed stream crossings in adherence to guidelines for anadromous fish passage and for a specific-location in-water work moratorium from February 15 to June 15.

2) Sec 4.1.8.1.1 Terrestrial Community and Wildlife: The document identifies impacts associated with the bypass to include habitat fragmentation, and identifies bridge structures associated with two stream crossing as providing permeability in the form of 10-30 foot rip rap free areas under the bridge. The parcels of the Croatan National Forest (CNF) impacted are designated black bear sanctuaries. These sanctuaries are designated to protect core areas of habitat for black bears to reproduce and disperse from. To accommodate larger mammals such as black bear in association with stream crossing structures WRC recommends a minimum of 10 feet vertical clearance and 30 feet of horizontal dry rip rap free passage in order to promote a vegetated travel corridor. In order to minimize habitat fragmentation NCDOT should incorporate these dimensions into their bridge designs.

Response to NCWRC Comment 2:
FEIS Chapter 4.14 includes a discussion of the proposed bridge designs and how these structures will facilitate animal passage to reduce animal mortality and habitat fragmentation effects.

3) Multiple references in the document identify the need to manage the fragmented parcels of CNF for red-cockaded woodpeckers (RCW). In contrast the bypass is also identified as hindering the management of these parcels particularly through the use of prescribed burning. This has been a topic of discussion over the past several years, and in order to fully evaluate the impacts associated with this project a commitment from NCDOT resolving the issue of future management is necessary.

Response to NCWRC Comment 3:
Please see Response to USFS Comments 1, 10, 12, and 27, as well as Response to EPA Comment 10. NCDOT reduced the width of a 5,500-foot length of highway to minimize impacts to RCW habitat, and plans to transfer ownership of the 4,035-acre Croatan Wetland Mitigation Bank to USFS. NCDOT has committed to closure of the proposed bypass for prescribed burns, based on the comparison of RCW impacts versus the other study alternatives and on the Merger Process Team's concurrence on Alternative 3 in 1996 as a compromise between Alternatives 1 and 2.

Southern Environmental Law Center
Comments on the Corps Section 404 Public Notice
March 30, 2012

Please accept these comments on the application by the North Carolina Department of Transportation ("NCDOT") "regarding a potential future requirement" for a permit pursuant to section 404 of the Clean Water Act for the construction of the Havelock Bypass. The Southern Environmental Law Center submits these comments on behalf of the North Carolina Coastal Federation and the Cypress Group of the North Carolina Sierra Club. As detailed below, and in the attached comments on the draft environmental impact statement ("DEIS") which are incorporated by reference, the NCDOT has not provided adequate information for conducting the analysis required, and the U.S. Army Corps of Engineers ("Corps") should not issue the requested permit without additional evaluation of alternatives as well as environmental impacts.

Under Section 404 of the Clean Water Act, permits for dredged or fill material must be evaluated through the application of the 404(b) Guidelines.[1] Those Guidelines provide that a permit application must be denied if there is a practicable alternative to the proposed project that has a less adverse effect on the aquatic ecosystem, if the proposed project would result in significant degradation, or if there is not sufficient information to make a reasonable judgment that the project will comply with the guidelines. A permit application must be rejected if it meets any of these conditions. The DEIS fails to provide the necessary information.

Comment 1: **The DEIS fails to consider upgrade alternatives.**

According to the 404(b)(1) Guidelines, "the analysis of alternatives required for NEPA environmental documents, including supplemental Corps NEPA documents, will in most cases provide the information for the evaluation of alternatives under these Guidelines." 40 C.F.R. §230.10(a)(4). However, the alternatives that must be analyzed under the Clean Water Act create a more demanding task than that undertaken in the NEPA process. While NEPA only requires an agency to consider a reasonable range of alternatives, the CWA mandates that "No discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have a less adverse impact on the aquatic ecosystem." 40 C.F.R. §230.12(a)(3). An alternative "is practicable if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purpose." 40 C.F.R. § 230.10(a)(2). Thus, in certain cases, the Guidelines recognize that the NEPA documents "may not have considered the alternatives in sufficient detail to respond to the requirements of these Guidelines[,]" in which case "it may be necessary to supplement these NEPA documents with this additional information." Id. In light of these requirements, it is not sufficient under the CWA "for the Corps to consider a range of alternatives to the project: the Corps must rebut the presumption that there are practicable alternatives with less adverse environmental impact." Greater Yellowstone Coal. v. Flowers, 321 F.3d 1250, 1262 n. 12 (10th Cir. 2003).

The analysis of alternatives set out in the DEIS fails to comply with the NEPA and the 404(b)(l) Guidelines. Rather than conducting detailed study on only new location bypass alternatives, the Agencies should have given greater consideration to upgrading the existing corridor, including, but not limited to, a combination of NCDOT's own US 70 Access Management Study and a superstreet alternative. The failure to conduct this detailed analysis is particularly relevant to the

Corps' review of the project given that aquatic impacts associated with upgrade alternatives would be in urban areas and would likely have fewer effects and those effects would be limited to lower quality waters. Therefore, determining a reasonable least environmentally damaging practicable alternative ("LEDPA") requires consideration of the least environmentally damaging alternative - an upgrade to the existing roadway.

Response No. 1

As reported in the DEIS and in the FEIS, NCDOT evaluated two distinct "upgrade existing" alternatives and presented them to the agencies that would eventually comprise the NEPA/404 Merger Team. One alternative was an Expressway, and one was a Freeway. Both the Upgrade Existing Expressway and Freeway options would affect the historic Needham B. White House (NR-eligible) and a small city park, both of which are resources protected under Section 4(f) of the US Department of Transportation Act of 1966. The US Army Corps of Engineers concurred with eliminating these options from more detailed study via their [February 7, 1997] letter to NCDOT (See DEIS Appendix A for a copy of the letter).

As described in FEIS Chapter 2.6, the "Upgrade Existing: Expressway Alternative" was eliminated due to a number of reasons. The Expressway alternative requires an approximate 360-foot right-of-way with additional right-of-way needs at intersections. The proposed right-of-way would relocate approximately 59 businesses and would alter access for a considerable number of remaining businesses, which creates an overall negative effect on the local business community. In addition to creating Section 4(f) and Section 106 impacts by affecting a historic home, the Expressway alternative does not conform with goals detailed in the City of Havelock's Comprehensive Plan to "set a new vision for the US 70 Corridor that will transform Main Street back into a community asset."

As discussed in Chapter 1.8, the subject section of US 70 is envisioned as a freeway in the NCDOT Strategic Highway Corridors (now identified as Strategic Transportation Corridors (STC) initiative). One of the primary purposes of the project is to enhance the ability of US 70 to serve its regional transportation function in accordance with the Strategic Highway Corridors Plan. A freeway facility offers full access control and sufficient median widths, shoulders, obstruction setbacks, and drainage features that collectively improve operational efficiency and safety. Superstreet designs fall under the SHC Expressway category where side-street traffic is redirected from going straight through or left at a divided highway intersection. All side-street traffic must turn right, but can then access a U-turn to proceed in the desired direction. The superstreet concept can provide an effective design along heavily traveled arterials; however, the lower levels of access control associated with superstreet (and other expressway) designs are not compatible with the Freeway vision for US 70.

In summer 2014, NCDOT verified its traffic forecasts and analysis by re-evaluating both capacity and travel time. The updated traffic analysis (which is included in the DEIS Reevaluation) demonstrates that additional through capacity is needed or the highway will fail in the design year. Analysis furthermore shows that an expressway design on the existing US 70 alignment would not operate at an acceptable LOS due to high projected traffic volumes at intersections. The analysis demonstrates that a freeway facility along the existing US 70 alignment, that adds an existing through lane in each travel direction with fully controlled access, would dramatically reduce travel time and provide superior LOS and capacity as compared to an expressway type option with limited or partial access control.

Comment 2: **The statement of purpose and need is impermissibly narrow.**

The statement of project purpose required by the 404(b)(l) Guidelines is of critical importance because it serves as the touchstone for the analysis of alternatives. "It is only when the 'basic project purpose' is reasonably defined that the alternatives analysis required by the [404(b)(l)] Guidelines can be usefully undertaken by the applicant and evaluated by the Corps." U.S. Army Corps of Engineers, Permit Elevation, Old Cutler Bay Associates, at 6 (Sept. 30, 1990). Although courts have held that the Corps must consider the applicant's view of the project purpose, see, e.g., Louisiana Wildlife Fed'n v. York, 761 F.2d 1044, 1048 (5th Cir. 1985), the Corps is not bound by the applicant's stated purpose. Corps regulations provide that "the Corps will, in all cases, exercise independent judgment in defining the purpose and need for the project from both the applicant's and the public's perspective." 33 C.F.R. § 325, App. B(9)(b)(4).

The Assistant Secretary of the Army (Civil Works) has cautioned against "so narrowly defining the project purpose that it unreasonably limits the consideration of alternatives and, thereby, subverting a key provision of the [Section 404(b)(l)] guidelines." Old Cutler Bay at 4. Corps headquarters has rejected overly restrictive statements of project purpose, emphasizing that "[t]he project purpose must be defined so that an applicant is not in the position to direct, or attempt to direct, or appear to direct, the outcome of the Corps evaluation required under the 404(b)(l) Guidelines." Old Cutler Bay at 7.

The stated project purpose in the DEIS-to build a freeway-essentially restates the specific project design desired from the outset by NCDOT, rather than identifying the primary underlying purpose of the project. As such, it is too narrow to support the identification and permitting of the least damaging practicable alternative that meets the underlying purpose of the project, as required under Section 404 of the Clean Water Act.

Response No. 2

The purposes of the project as stated in the FEIS for the project are:

- *To improve the traffic operations for regional and statewide traffic along the US 70 corridor*
- *To enhance the ability of US 70 to serve the regional transportation function in accordance with the Strategic Highway Corridor Plan.*

NCDOT disagrees with the commenter's assertion that the stated project purpose is to simply build a freeway. The ultimate vision for US 70 in the Strategic Highway Corridor plan is for a controlled access, median-divided freeway. As discussed in FEIS Chapter 1.3, US 70 has regional importance for commerce, military facilities, tourism, and hurricane evacuation.

The purpose and need for this project is supported by empirical data and information. The purpose and need is thoroughly discussed in FEIS Chapter 1.0. NCDOT acknowledges the commenter's re-statement of Section 404 regulation that the USACE will "exercise independent judgment in defining purpose and need for the project," but reminds the commenter that the USACE has been a cooperating agency in the preparation of the Draft Environmental Impact Statement. The USACE expressed no concerns to NCDOT regarding the statement of project purpose in their comments on the Draft Environmental Impact Statement provided 12/2/2011. (See appended USACE comments.)

Comment 3: **The DEIS's description of impacts to aquatic resources is inadequate.**

The DEIS omits the information that is necessary to conduct the analysis required by the 404(b)(1) Guidelines. Those Guidelines require NCDOT to evaluate the effect of the proposed project on substrate, water circulation, turbidity, contamination, and aquatic ecosystems and organisms.[3] The DEIS's discussion of the potential impacts of the proposed highway is cursory, superficial, and fails to make an effort to compare and contrast these potential impacts between alternatives. Without support, it summarily states that "[n]o substantial adverse long-term impacts on water quality are anticipated as a result of any of the alternatives for the proposed project."[4] The project cannot be authorized based on the DEIS because "[t]here does not exist sufficient information to make a reasonable judgment as to whether the proposed discharge will comply with the Guidelines."[5]

In addition, the DEIS fails to document any efforts that have been made to avoid and minimize impacts to streams and wetlands within the alternative corridors. Protection of aquatic ecosystems under the Clean Water Act and the state program is based on a sequential analysis of avoiding impacts that can be avoided, minimizing impacts that cannot, and mitigating for harm from unavoidable impacts.[6] Yet the DEIS assumes that the proposed impacts for each alternative are justified without providing any analysis demonstrating that appropriate avoidance and minimization of impacts has been implemented. The LEDPA cannot be selected based on the DEIS because the alternatives analysis "does not include all appropriate and practicable measures to minimize potential harm to the aquatic ecosystem."[7] Moreover, the public can only comment on proposed avoidance and minimization efforts if those plans are made public during the NEPA process.

Finally, based on the information contained in the DEIS, Alternative 3 cannot be selected as the LEDPA. Notably, the DEIS does not eliminate either Alternative 1 or 2 as impracticable. According to the DEIS, the proposed alignment for Alternative 2 affects significantly fewer wetlands than Alternative 3 overall and within the Croatan.[8] The proposed alignment for Alternative 1 appears to have less overall impact to streams and wetlands than Alternative 3.[9]

Although significantly more analysis under the 404(b)(1) Guidelines is necessary to evaluate the difference in these impacts, it does not appear that Alternative 3 can be selected as the LEDPA because "[t]here is a practicable alternative to the proposed discharge that would have less adverse effect on the aquatic ecosystem."[10]

Response No. 3

The results of the 2013 indirect and cumulative impact (ICI) assessment and water quality modeling analyses are included in FEIS Chapter 4.16. Predictions from the modeling analyses indicate that the increase in pollutant loads and stormflow over the entire watershed is low in both the No-Build and Build Scenarios. This is due to a number of factors including the use of stormwater controls to mitigate the effects of new development and low population growth/anticipated housing needs in the study area. Chapter 4.14.1 provides updated descriptions of the impacts to aquatic systems including streams and wetlands. Chapter 4.14.2 describes the avoidance and minimization steps that have been taken in the development of the project, leading to the selection of the LEDPA.

Section 230.10(a) of the 404(b)(1) Guidelines require that there must be no "practicable alternative to the proposed discharge that would have less adverse impact to the aquatic ecosystem, ***so long as the alternative does not have other significant adverse environmental consequences.*** *" The Federal Highway Administration, US Army Corps of Engineers, NC Department of Transportation, NC Department of Environment and Natural Resources – Division of Water Quality, and other members of the NEPA/404 Merger Team re-affirmed concurrence on Alternative 3 as the Least Environmentally Damaging Practicable Alternative (LEDPA) on April 10, 2012.*

During the April 10, 2012 meeting, the team collectively concurred that Alternative 3 had:

- *2nd Lowest number of relocations*
- *Lowest stream impacts*
- *2nd lowest prime farmland impacts*
- *2nd shortest project length*
- *Lowest cost*
- *Minimizes fragmentation of Red-cockaded woodpecker habitat*

The potential to avoid, minimize, and mitigate stream and wetland impacts is considered during the Section 404/NEPA Interagency Merger Process. As noted on the CP 4 Concurrence form (January 18, 2001), avoidance and minimization measures include: 1) no ditching in wetlands; a 46-foot median (as opposed to a 70-foot median); and long bridges at the Southwest Prong of Slocum Creek and the East Prong of Slocum Creek. NCDOT also committed to minimizing fill slope widths and, where feasible, designing perpendicular stream and wetland crossings to minimize impacts.

The NEPA/404 Merger Team reviewed updated project designs on August 20, 2014 and updated the measures demonstrating appropriate avoidance and minimization measures to date including:

- *No new ditching in wetlands with inverts below existing wetland elevations. Relocated ditches shall match ditch elevations.*
- *46-foot median (from original CP4A 1/18/01)*
- *Bridge structures (reaffirmed CP3 4/10/12)*
    - *Tributary of Tucker Creek – Double Box Culvert at 10' X 8' X 400'*
    - *Southwest Prong of Slocum Creek – 925' bridge*
    - *East Prong of Slocum Creek – 1,618' bridge*
    - *Tucker Creek – retain and extend existing triple 9' X 7' box culvert approximately 25 feet upstream and 78 feet downstream*
- *Minimization efforts reflect that right-of-way limits (and clearing limits) do not exceed 200 feet in width for the 5,500-foot section from Station 338+00 to Station 393+00 (with the exception of very specific spot locations such as driveway entrances or drainage conveyance), to minimize impact to Red-cockaded woodpecker habitat.*

In addition to these avoidance and minimization measures, NCDOT has established the Croatan Wetland Mitigation Bank (CWMB) where 3,900 wetland acres and 61,000 linear feet of streams are created and/or preserved in perpetuity and utilized to mitigate wetland impacts of this project as well as other NCDOT projects and private development projects. By helping to reestablish the site's original hydraulic regime, the CWMB also contributes to water quality improvement and groundwater recharge, both of which minimize harm to the aquatic ecosystem. Minimization efforts will continue through the final design of the Preferred Alternative. FEIS Chapter 4.14.2 includes a detailed discussion of the avoidance, minimization, and mitigation measures agreed to by the Merger Process Team.

Comment 4: **The DEIS does not provide sufficient information regarding effects of the Havelock Bypass on red-cockaded woodpeckers to allow the Corps to issue a permit.**

One critical issue that is poorly addressed in the DEIS and of fundamental importance in this analysis is the effect of the proposed bypasses on the red-cockaded woodpecker ("RCW"). The continued, and expanded, use of prescribed burning to maintain and improve RCW habitat is essential to the continuation of the Croatan population and the recovery of the species. The DEIS's evaluation of the Forest Service's ability to use this essential management technique is cursory, vague, and fails to fully evaluate the various potential impacts of the project, including the effect of restricted management on habitat for the endangered red-cockaded woodpecker and rare plant communities.

The Corps' analysis must take RCW impacts into account. First, like all federal agencies, the Corps must comply with the Endangered Species Act. 16 U.S.C. § 1536(a). As outlined in the attached comments, building the proposed bypass would eliminate significant RCW habitat through direct impacts and indirect habitat modification, thereby adversely affecting Subpopulation 2, fragmenting the Croatan population, and contributing to the decline of the species.[11] As noted, an ephemeral promise by NCDOT to consider closing the road is not a sufficient basis to support the assumption that RCW habitat in the vicinity of the proposed highway will be protected.

Second, when selecting a LEDPA, the 404(b)(1) guidelines state that the Corps must consider not only the aquatic ecosystem, but "other significant adverse environmental consequences."[12] Accordingly, federal guidance makes clear that when applying the Guidelines, "it is not appropriate to select an alternative where minor impacts on the aquatic environment are avoided at the cost of substantial impacts to other natural environmental values."[13] Additionally, under Corps' public interest review regulations, the agency must evaluate the "cumulative effects" to "fish and wildlife values."[14]

Therefore, even if- with additional analysis- NCDOT were to demonstrate that its preferred alternative had the least effect on the aquatic environment, the Corps must account for impacts to RCW habitat. That analysis cannot be completed based on the partial analysis included in the DEIS, as described in more detail in the attached comments.[15]

Response No. 4

A detailed Biological Alternatives Assessment (BAA) was developed and reported in the Draft Environmental Impact Statement to assess the potential impacts of each detailed study alternative on the Red-cockaded woodpecker and its habitat. This impact information informed all merger team agencies of the comparative impacts to RCW and its habitat in their consideration of selecting a LEDPA. Based in part on the information provided in the BAA, the Merger Team was able to re-affirm its concurrence on Alternative 3 as the LEDPA on April 10, 2012. After the LEDPA was reaffirmed, NCDOT provided a Biological Assessment for the LEDPA (November 2013) and the USFWS concurred with a Biological Conclusion for the RCW of "May Affect – Not Likely to Adversely Affect"- thereby resolving Endangered Species Act coordination for RCW. Chapter 4.14.4 provides a detailed summary of the Biological Assessment (BA) and its conclusion related to the RCW. It is expected that the USACE will consider this, and an abundance of updated studies conducted for this Final Environmental Impact Statement, at such time that the North Carolina Department of Transportation applies for a permit following a Record of Decision.

With regard to the concern that the project will restrict management of habitat for the endangered red-cockaded woodpecker and rare plant communities, NCDOT coordinated with the USFS to prepare updated analyses since publication of the DEIS. These analyses specifically address this subject area and are summarized in the FEIS. Additional studies include the following:

- *Prescribed Burn Plan Agreement (January 2012)*
- *Spring species (Solidago verna) report (Sept. 2012)*
- *RCW Management Plan for CWMB (Nov. 2012)*
- *Updated rare species/PETS report (Jan. 2013)*
- *Summer species report (Aug. 2013)*
- *Fall species (Paspalum) report (Aug. 2013)*
- *Rare Plant Mitigation/Non-native Invasive Analysis (Oct. 2013)*
- *Bryophyte report (Nov. 2013)*
- *RCW Biological Assessment (Nov. 2013)*
- *US 70 Havelock Bypass Biological Evaluation (Jan. 2014)*
- *Biological Evaluation Report (Jan. 2014)*
- *Migratory Bird Evaluation (Jun. 2014)*
- *CNF Management Indicators Species Report (Jul. 2014)*
- *CNF RCW Territory Analysis (Aug 2014)*

Upon request of the US Forest Service in August 2014, NCDOT completed the "CNF RCW Territory Analysis," an additional study specific to management needs of the Croatan National Forest. The results of the BA and RCW territory analysis, also reported in FEIS Chapters 4.14.4 and 4.14.5 and FEIS Appendix C, conclude that no RCW cavity trees will be "taken" by the Havelock Bypass project, that the design will not come within 200 feet of any known RCW cavity trees, and that construction of the Havelock Bypass will not prohibit the US Forest Service from managing within the individual territories for active clusters or recruitment clusters in the future. Based upon this study, the USFS determined in March 2015 that the CNF will meet its obligations under the RCW Recovery Plan and no RCW habitat mitigation is necessary.

As discussed in FEIS Chapter 4.12.4.5, the Final Mitigation Plan for the CWMB (NCDOT, 2002) permits prescribed burning of "pine dominated stands". Implied in this allowance are the practices required to achieve such prescribed burning, such as the establishment of burn units and fire breaks. In addition, the mitigation plan states that "For pine-dominated natural communities, management may be used according to accepted methods for improving or restoring selected areas for RCW use." The Umbrella Mitigation Banking Instrument (UMBI) between NCDOT and the water resources agencies (2009) allows activities identified in the mitigation plan and in the 2002 Memorandum of Understanding (MOU) between NCDOT, USFS, and the U.S. Army Corps of Engineers (USACE). NCDOT is currently coordinating with the USACE and USFS to develop an updated MOU that will address the feasibility of managing the CWMB for RCW habitat.

It is noted that the CWMB includes land that could potentially be managed to support RCW foraging and nesting habitat. The USFS notes that it would be impracticable to manage RCW habitat on the CWMB due to logistics (e.g., limited access to potential management areas, the need for more frequent burning on hydric soils to control denser understories, personnel time, and funding) and that it could take 30 to 60 years before any of the potential clusters could provide suitable nesting trees.

The practicality and logistics of management notwithstanding, NCDOT has identified areas within the CWMB that could potentially be managed as future RCW recruitment partitions, as identified in the RCW Management Plan for the CWMB (NCDOT, 2012).

NCDOT has committed to several important design and management agreements as part of the Havelock Bypass RCW minimization measures to address both USFWS and USFS concerns related to the management of RCW and rare plant species habitat. NCDOT has agreed to a median width no greater than 46 feet, as well as steepened 2:1 sideslopes that result in a cleared corridor width of less than 200 feet for a distance of 1.1 miles, through a section of the project containing RCW habitat. Impact minimization and mitigation were also considered in the selection of the LEDPA. The USFS stated its opinion that Alternative 3 is the most practicable alternative for minimizing and mitigating habitat fragmentation effects because it best facilitates conducting prescribed burns on NFS lands. NCDOT has agreed to periodically close US 70 Havelock Bypass and reroute traffic to accommodate USFS prescribed burning on adjacent land parcels (See FEIS Appendix A). The prescribed burn plan for the proposed project is discussed in FEIS Chapter 4.14.4. To facilitate management of CNF lands isolated by the bypass, NCDOT has also committed to provide the USFS with 13 separate access points for their management vehicles, along the controlled access freeway.

To compensate USFS for the loss of a currently-estimated 240 acres of federal lands, NCDOT has also offered to transfer ownership of the Croatan Wetland Mitigation Bank (CWMB) property in Craven County, N.C. to USFS. Although the CWMB was established principally as a wetland and stream mitigation site, sizable areas of dry and marginally wet soils exist across the northern and central portions of the property which could support mesic and wet pine flatwoods communities. NCDOT has identified areas on the property which could be managed as future RCW habitat, and determined that the potential exists to establish up to four future RCW territories on the property. Because the proposed Havelock Bypass does not eliminate any existing RCW territories, any clusters established at the CWMB would be additive to those previously identified in the Recovery Plan. Thus, long term RCW management of CWMB offers the likely potential to provide a net increase to the Croatan National Forest RCW population in excess of Recovery Plan goals.

The document records associated with the CWMB clearly establish longleaf pine and RCW management as compatible and allowable activities on the property. The Final Mitigation Plan for the CWMB (2002) permits prescribed burning of "pine dominated stands". Implied in this allowance are the practices required to achieve such prescribed burning, such as the establishment of burn units and fire breaks. In addition, the mitigation plan states that "For pine-dominated natural communities, management may be used according to accepted methods for improving or restoring selected areas for RCW use." Studies performed by NCDOT have identified up to 1,041 acres of pine dominated stands on the CWMB where future prescribed burning and RCW management would be allowable. The Umbrella Mitigation Banking Instrument (UMBI) between NCDOT and the water resources agencies (2009) allows activities identified in the mitigation plan and in the Memorandum of Understanding (MOU) between NCDOT, USFS, and the USACE (2003). Thus, activities identified as allowable in the mitigation plan or the MOU are allowable under the UMBI by reference. Lastly, the MOU includes a provision to "allow for the active management of red cockaded woodpecker (RCW) territories in accordance with the RCW Recovery Plan (1992)". The intent of this document record clearly establishes that RCW and longleaf/wiregrass habitat management are compatible uses for portions of the CWMB where pines predominate.

In summary, since the publication of the DEIS, additional coordination with the USFS and the resultant analyses evaluate the various potential impacts to protected/rare species habitat and

provide additional details related to the management of these habitats. NCDOT's agreement to close the bypass to facilitate prescribed burns, commitment to a reduced corridor width through RCW habitat, and creation of 13 USFS access points along the bypass, combined with the transfer of the CWMB to the USFS, serves to mitigate impacts such that future management activities will not be hindered.

***Comment 5*: The DEIS segments one portion of the overall project for review.**

Critically, even if the "need" espoused by NCDOT is accepted at face value,[16] it cannot be met without the remaining two thirds of the Havelock-Morehead City highway that NCDOT has envisioned. Therefore, the projects-and their environment effects-must be considered in a single EIS process. NCDOT's recent Maritime Study clearly states that the three projects are interdependent, noting that "[t]he Gallants Channel Bridge project that is now underway will provide an alternative route to US 70," but that "[u]ntil the Northern Carteret Bypass and Havelock Bypass are completed, this link would not be a viable alternative route to and from MHC." NCDOT, NC Maritime Strategy: Draft Final Report at 18 (Feb. 15, 2012) ("Maritime Strategy"). Until the Northern Carteret Bypass and Havelock Bypass are complete, "all traffic would have to continue through Morehead City." Id.

The impacts of the entire project are likely to be significant. As proposed, the Northern Carteret Bypass would appear to affect a significant number of wetlands and additional parts of the Croatan National Forest. NCDOT views the Havelock Bypass, Northern Carteret Bypass, and Gallants Channel Bridge as part of one, larger project for the purpose of transportation planning; the agency must be required to evaluate the environmental impacts for that project before beginning any portion of it. To do otherwise would be to engage in segmentation of the project that precludes meaningful review by the Corps and side steps NEPA's requirements. See New River Valley Greens v. U.S. Dep't of Transp., No. 97-1978, 1998 U.S. App. LEXIS 22127, **8-9 (4th Cir. Sep. 10, 1998) (quoting 40 C.F.R. 1508.27(b)(7)). A hallmark of segmentation is an initial proposed action involving "such a large and irretrievable commitment of resources that it may virtually force a larger or related project to go forward notwithstanding the environmental consequences." Id.; see Western N.C. Alliance v. N.C. Dept. of Transp., 312 F. Supp. 2d 765, 773-75 (W.D.N.C. 2003) (finding division of a transportation project into parts that had no independent utility or logical termini, and that would force the undertaking of future actions, similar to the present project, resulted in segmentation and failure to assess cumulative impacts in violation of NEPA); North Carolina v. Virginia Beach, 951 F.2d 596 (4th Cir. 1991) (In determining whether illegal segmentation has occurred, we ask whether the completion of the first action has a "direct and substantial probability of influencing [the] decision" on the second); Florida Wildlife Fed'n v. U.S. Army Corps of Eng'rs, 401 F. Supp. 2d 1298, 1318, 1321 (S.D. Fla. 2005) (finding illegal segmentation where the "inescapable conclusion from th[e] record is that" the project "was conceptualized as an integrated whole, progressing in phases, and that" the first phase "was never intended to stand alone," and that the claim that the first phase had "independent utility" was "developed post-hoc as an avenue to limit and expedite permit review").

The DEIS must be expanded to include the Northern Carteret Bypass and Gallants Channel Bridge and their associated environmental impacts.

Response No. 5

Chapter 2 of the FEIS includes descriptions of the project's independent utility and logical termini. Therefore NCDOT does not agree that the project is unlawfully segmented and believes that all applicable law is satisfied.

For the proposed Havelock Bypass, NCDOT and FHWA selected appropriate logical termini that offer independent utility and do not restrict or predetermine other actions (DEIS p. 2-28) on other sections of the US 70 corridor. The Gallants Channel project is well-removed from the Havelock Bypass location, such that decisions on one project would not, and did not, affect the other. In fact, the Gallants Channel bridge is under construction and for purposes of this study would be considered as an existing condition.

Conversely, the Northern Carteret Bypass concept presents a bypass of Morehead City that is identified as a future need on the Carteret County Comprehensive Transportation Plan. This conceptual corridor has never proceeded beyond a feasibility study nor does it appear in the current NCDOT State Transportation Improvement Program (December 2014). It is not funded for planning, design, or construction in the foreseeable future and its starting location and termini are undetermined. It could not and did not have an effect on the location and planning for the proposed US 70 Havelock Bypass. NCDOT does not consider a single EIS for the Havelock Bypass, the Gallants Channel Bridge, and the conceptual Northern Carteret Bypass to be a reasonable suggestion.

Comment 6: **Summary**

In sum, the DEIS does not address the full scope of NCDOT's plan to build a 4-lane highway from Havelock to Morehead City, fails to address upgrade alternatives to US 70 in Havelock, and does not provide adequate information regarding environmental impacts, both aquatic impacts and impacts to the endangered RCW. Therefore, the DEIS must be substantially revised.

SELC endnotes to PN letter

[1] 33 U.S.C. § 1344(b).

[2] See 40 C.P.R. § 230.12(a).

[3] 40 C.F.R. § 230.11.

[4] DEIS at 4-49.

[5] 40 C.F.R. § 230.12(iv).

[6] See 15A N.C. Admin. Code 02H.0506.

[7] 40 C.F.R. § 230.12(iii).

[8] DEISat4-51.

[9] Id. SELC's Nov. 21,2011 comments on the DEIS incorrectly stated that Alternative 1 would impact fewer streams and wetlands overall and within the Croatan compared to Alternative 3. That is not the case when considering the study corridor, but is accurate for the proposed alignments for both wetlands overall and within the Croatan as well as streams within the Croatan. Overall, the proposed alignment for Alternative 1 would affect 76 linear feet more streams than Alternative 3.

[10] 40 C.F.R. § 230.12(i).

[11] Letter from D. Farren, SELC, to Mark Pierce, NCDOT at 5-14 (Nov. 21, 2011) ("DEIS Comments").

[12] 40 CFR 230.1O(a).

[13] Memorandum to the Field, Appropriate Level of Analysis Required for Evaluating Compliance with the Section 404(b)(l) Guidelines Alternative Requirements (1993), available at http://water.epa.gov/lawsregs/guidance/wetlands/flexible.cfrn.

[14] 33 C.F.R. § 320.4.

[15] DEIS Comments at 15-17.
[16] The attached DEIS comments explain how NCDOT has not justified that need and why the stated need should not be taken at face value.

Response No. 6
This is a summary statement. Please refer to specific responses for previous comments.

Southern Environmental Law Center
Comments on the DEIS
November 21, 2011

Comment 7:

On behalf of the North Carolina Wildlife Federation, the Cypress Group of the North Carolina Chapter of the Sierra Club, and North Carolina Coastal Federation, the Southern Environmental Law Center submits the attached comments on the above-referenced Draft Environmental Impact Statement ("DEIS"), prepared by the North Carolina Department of Transportation ("NCDOT"), and the Federal Highway Administration ("FHWA") (collectively the "Transportation Agencies"). The DEIS analyzes the impacts of the proposed alternatives for the Havelock Bypass ("Bypass" or "highway").

In our comments, we identify a number of issues related to the proposed Bypass that we believe require significantly greater disclosure and analysis to comply with the National Environmental Policy Act ("NEPA") and other federal and state laws prior to the issuance of the Record of Decision and potential permitting of this project. The key shortcomings of the DEIS include the following:

- **The DEIS fails to adequately consider the impact of the project on the management of the Croatan National Forest.** One of the key environmental impacts of the proposed highway is the effect on the U.S. Forest Service's ability to carry out prescribed burning in proximity of the proposed highway. The DEIS's evaluation of the Forest Service's ability to use this essential management technique is cursory, vague, and fails to fully evaluate the various potential impacts of the project, including the effect of restricted management on habitat for the endangered red-cockaded woodpecker and rare plant communities.

Response No. 7
See Response No. 4 regarding NCDOT's commitment to close the bypass to allow for prescribed burns and effects on RCWs, to provide lands that compensate USFS for federal lands used, and for proposed driveway locations that will provide access to any CNF parcels isolated by the new bypass. FEIS Appendix A contains a November 2014 letter to USFS that contextually explains the prescribed burns – an attachment of which has a letter of commitment from the NCDOT State Highway Administrator (now identified as the NCDOT Chief Engineer).

The NCDOT will continue to work with the US Forest Service regarding their specific management needs through the process. The NC Department of Transportation does not believe that the proposed bypass, with commitments identified in this Final EIS, will debilitate the US Forest Service's ability to appropriately manage habitats through prescribed burning.

Comment 8:

- **The DEIS omits a 4(f) analysis.** Section 4(f) of the Department of Transportation Act is intended to ensure that valuable public land functions-specifically, recreation and wildlife habitat-are not unnecessarily impaired by highway projects. Here, the proposed bypass threatens a portion of the Croatan National Forest that is used for recreation and designated as wildlife habitat, yet the DEIS does not include a 4(f) analysis.

Response No. 8

The Draft Environmental Statement discusses the relationship of Section 4(f) regulation to the Croatan National Forest in Chapter 4.5. A detailed analysis was not required, as coordination with the US Forest Service (the administrator of the resource) yielded written documentation that the portion of Croatan National Forest potentially affected by the Havelock Bypass is not a Section 4(f) resource. Correspondence from the USFS, dated May 1, 1998, states, "The proposed highway project does not require the use of federal lands from any presently used or planned park or recreational area within the Croatan National Forest. The project does not encroach on any special interest areas, preserves, sanctuaries, reservations, or other specially designated lands established by Congress. The project will not affect any historic site on or eligible for the National Register of Historic Places, nor will it require the use of lands from any historic site of state or local significance." The Federal Highway Administration agrees with the administrator of the property that a Section 4(f) evaluation is not necessary for the proposed project's effects on the Croatan National Forest.

Comment 9:

- **The DEIS excludes analysis regarding wetland and stream impacts that is necessary to evaluating the project under the Clean Water Act.** The DEIS must, but fails to, provide an analysis of the value of streams and wetlands that would be affected, the potential impacts of degradation of those streams and wetlands, and the efforts that have been made to avoid and minimize those adverse impacts. That information is required before the Least Environmentally Damaging Practicable Alternative can be selected. Based on the scant evidence in the DEIS, Alternative 3 cannot be selected as the LEDPA.

Response No. 9

While the DEIS is a large document, CEQ regulations advocate the minimization of document length by referring to technical reports when appropriate. Prior to LEDPA selection, the project team compiled a considerable amount of stream and wetland data into tables and maps that are included in a Natural Resources Technical Report that is referenced in the DEIS and the FEIS. These documents present both quantitative and qualitative evaluations of the stream and wetland data and impacts. Highway corridors and designs were then overlaid on these resource maps, in order to generate impact comparison matrices for various resources. This information was provided to the NEPA/404 Merger Team prior to the LEDPA decision being revisited on April 10, 2012. It should be noted, however, that the information included data about all resources potentially affected by project alternatives - not just streams and wetlands. The US Army Corps of Engineers, which administers permitting under the Clean Water Act, expressed no major concerns about the type of information provided in regards to wetland and stream impacts, and concurred with the selection of Alternative 3 as the LEDPA.

Refer to response to Comment 3 for additional information on the reasons for selecting Alternative 3 as the LEDPA and additional avoidance and minimization measures that have occurred to date. As

NCDOT continues to refine design, additional opportunities to minimize impacts to wetlands will be explored as a routine part of the interagency NEPA/Section 404 Merger process.

Comment 10:

- **The DEIS fails to substantiate the economic or transportation justification for travel unimpeded by stoplights between Raleigh and the port at Morehead City.** Rather than providing an economic or transportation justification to support the expense and environmental disruption of the preferred new location bypass, the DEIS generally states that US 70 needs to be upgraded to "improve traffic operations for regional and statewide traffic along 70" and "[t]o enhance the ability of US 70 to serve the regional transportation function in accordance with the Strategic Highway Corridors Plan". The bypass may move the congestion that is currently along the existing route to the termini and interchange of the bypass, frustrating the project goal of improved traffic operations. The bypass may also leave local communities stuck with congestion along the existing route. Quantifiable data on harm to local economies from loss of through-traffic, or unrelieved congestion and quantifiable data on local and through trip times with and without the bypass are necessary to evaluate whether the project will meet the project's stated purpose.

Response No. 10

NCDOT maintains that there are both transportation and economic needs that support construction of the proposed Havelock Bypass. A travel time analysis is included in in Chapter 2.8.3 of the FEIS. The FEIS includes an expanded discussion of anticipated economic effects from construction of the bypass as well as the economic implications associated with the no-build and improve existing alternatives.

In addition to specific sections in the Draft and Final Environmental Impact Statements for the project, public documents have been readily available identifying US 70 as one of NCDOT's Strategic Highway Corridors (SHC) (which are currently transitioning to the updated Strategic Transportation Corridors(STC)). The STC (formerly SHC) is a long-range planning effort that identifies a critical network of 25 multimodal transportation corridors considered the backbone of the state's transportation system. These 25 corridors move most of North Carolina's freight and people, link critical centers of economic activity to international air and sea ports, and support interstate commerce. They must operate well to help North Carolina attract new businesses, grow jobs and catalyze economic development.

NCDOT worked with a broad-based advisory group comprised of stakeholders, including local planning organizations, members of local and regional governments, and area business leaders to develop the STC. The department also conducted eight public meetings across the state to present the preliminary STC.

In identifying a network of Strategic Transportation Corridors, NCDOT is focusing on those transportation facilities deemed to be critical for achieving the State's economic development goals. This effort is a follow-up to the 2040 Statewide Transportation Plan (2040 Plan) adopted by NCDOT in 2012. The 2040 Plan recommended that the Strategic Highway Corridors (SHC) network adopted in 2004 be updated to reflect multiple transportation modes and changes in North Carolina's transportation demands. The STC is a planning tool intended to

help the state identify critical travel sheds (origins, destinations, travel patterns, travel times) within its system. It will serve local planners by letting them know what corridors the state sees as necessary to preserve for connectivity, mobility and economic prosperity purposes.

The STC process was designed to analyze the transportation system with a fresh set of eyes, based on goals, objectives, and criteria consistent with NCDOT's current overall goals and objectives. As such, this process did not start with the 55 previously identified Strategic Highway Corridors, nor were they specifically evaluated during this effort. The STC process involved identifying those corridors that best support the three transportation goals of system connectivity, mobility and economic prosperity. The result was the identification of 25 corridors considered critical for achieving those goals. US 70 is one of those 25 corridors identified in the STC plan. This topic is discussed in Chapter 1.8.

US 70 provides connectivity with the Port of Morehead City, Global TransPark, industries in New Bern and Craven County, Cherry Point US Marine Corps Air Station, and other military facilities, and it functions as a primary route for seasonal beach traffic. It also is identified as part of the US Department of Defense Strategic Highway Network for moving military personnel and equipment.

Comment 11:

- **The DEIS fails to adequately consider a reasonable, cumulative upgrade alternative.** NEPA requires, but the DEIS does not provide, detailed analysis of a reasonable range of alternatives. Rather than conducting detailed study on only new location bypass alternatives, the Agencies should have given greater consideration to upgrading the existing corridor, including but not limited to a combination US 70 economic impact assessment of NCDOT's own US 70 Access Management Study and a superstreet alternative.

Response No. 11

See Response No. 1 regarding the alternatives to improve existing US 70. Two separate "upgrade existing" alternatives were studied; however their shortcomings and degree of impacts (when compared to other alternatives) eliminated them from more detailed evaluation. The Steering Committee, which eventually transitioned to the NEPA/404 Merger Team, concurred with eliminating these options from detailed study in the Draft Environmental Impact Statement for the proposed project. NEPA advocates this type of progressive decision-making.

Comment 12:

- **The DEIS fails to consider the cumulative impacts of foreseeable transportation projects closely linked to the Havelock Bypass.** NEPA requires that the DEIS evaluate the impact of reasonably foreseeable projects in its cumulative impacts analysis for the proposed bypass. This bypass is one of several interrelated projects along Highway 70 in Eastern North Carolina. In particular, the cumulative impacts analysis of the Havelock Bypass should have also considered the impacts of two expensive and environmentally destructive projects, the Northern Carteret Bypass and the Gallants Channel Bridge. These two projects are close in proximity to the Havelock Bypass, and directly relate to access to Morehead City.

Response No. 12

For the proposed Havelock Bypass, NCDOT and FHWA selected appropriate logical termini that offer independent utility and do not restrict or predetermine other actions (DEIS p. 2-28) on other sections of the US 70 corridor. The Gallants Channel project is well-removed from the Havelock

Bypass location, such that decisions on one project would not, and did not, have effect on the other. In fact, the Gallants Channel bridge is under construction and for purposes of this study would be considered as an existing condition.

Conversely, the Northern Carteret Bypass concept presents a bypass of Morehead City that is identified as a future need on the Carteret County Comprehensive Transportation Plan. This conceptual corridor has never proceeded beyond a feasibility study nor does it appear in the current NCDOT State Transportation Improvement Program (December 2014). It is not funded for planning, design, or construction in the foreseeable future, and its termini are undetermined. It could not and did not have an effect on the location and planning for the proposed US 70 Havelock Bypass (FEIS Chapter 1.8.3).

Comment 13:

In addition to the myriad substantive flaws in the analysis of impacts and alternatives, the DEIS fails to provide updated analysis, relying instead on outdated prior study. As described in this summary and the detailed comments attached, the Transportation Agencies must revise their analysis of alternatives and impacts according to the recommendations set forth herein and issue a supplemental DEIS for public review and comment.

Response No. 13

Comments on the DEIS were considered during the preparation of the FEIS. As noted herein, in response to these comments, several studies and discussions were updated and/or expanded to include additional details in the FEIS. A supplemental DEIS is not required, because there are no substantial changes in the proposed action nor are there significant new circumstances or information relevant to environmental concerns. By virtue of decision to classify this project as an EIS, the project was already anticipated to have significant impacts. Alternatives for the proposed action have not undergone any substantial changes since all three build corridors were initially presented to the public in 1998, and the LEDPA was again shown to the public in 2011. While environmental studies have been updated throughout the course of the planning process, the project study area has not been expanded or otherwise altered to indicate that there is significant new information relevant to environmental concerns. From its inception, the proposed project has been developed in coordination with an interagency team and subsequently coordinated through the Section 404/NEPA Interagency Merger Process.

Comment 14:

INTRODUCTION

I. Project Description

The proposed U.S. 70, Havelock Bypass, S.T.I.P. ID No. R-1015 is a new location, almost 10-mile, four-lane divided, controlled access freeway around the southwest side of the City of Havelock and the Cherry Point United States Marine Corps Air Station (MCAS) in Craven County, North Carolina.[1] This is one of several projects that are part of the Super 70 effort, one that envisions freeway access with no stops from Raleigh, North Carolina to Morehead City.[2] Existing U.S. 70 through Havelock is a multilane arterial with a total of fourteen signalized intersections along the route.[3] The existing route serves a majority of the commercial business in Havelock.[4]

Project setting

Under the detailed study alternatives, the Havelock Bypass would directly impact 189 to 240 acres of forest land[5] and isolate a 746 to 1,909 acre[6] portion of the Croatan National Forest from the remainder of the forest, fundamentally altering the long-term management of the isolated section of the forest and potentially affecting the forest's ability to carry out two of its primary functions – providing wildlife habitat and recreational opportunities. Yet the DEIS fails to studiously evaluate the proposed impact of building the proposed highway on forest management-specifically with respect to prescribed burning. Prescribed burning is well recognized as being essential to maintaining the longleaf pine ecosystem that the highway would fragment. Apart from mentioning a "conceptual" agreement to burn, the DEIS is nearly silent on the procedural difficulties inherent in a burning program, how the highway would affect those difficulties, or what the potential consequences are for the RCW population and the broader longleaf community-including rare plant communities in designated significant natural heritage areas. Nor does the DEIS include a Section 4(f) analysis of the impact to wildlife and recreational areas on national forest land.

Response No. 14

The impacts of the proposed project have been adequately and comprehensively studied. Years of project studies and coordination have resulted in a substantial array of design minimizations, commitments and mitigation that cumulatively provides a net benefit to the Croatan National Forest (CNF). See Response No. 4 regarding NCDOT's commitment to periodically close the bypass for prescribed burns to manage RCW habitat, to provide land-management access driveways, and to transfer the 4,035 acre Croatan Wetland Mitigation Bank property to the CNF. See also the project commitments (greensheets) section at the front of FEIS, which contains a substantial number of items that resulted from coordination with USFS and natural resource agencies. See Response No. 8 regarding Section 4(f) applicability.

Comment 15:

Similarly, the DEIS lacks the detailed analysis necessary to adequately evaluate the potential impact to streams and wetlands. Although the DEIS identifies streams and wetlands that would be affected, it does not include the analysis under the Clean Water Act that is essential to comparing the various alternatives and selecting the Least Environmentally Damaging Practicable Alternative.

Response No. 15

See Response Nos. 3 and 9 for discussions of avoidance and minimization efforts. FEIS Chapters 4.13 and 4.14 also include a more detailed discussion of stream/wetland impacts.

Comment 16:

The DEIS is also flawed with respect to its transportation analyses. Bypassing small towns in order to create unfettered access to another location is not novel, and most of the problems with these bypasses are typical. Substantial cost to the state and reduction in sales to existing business are two common foibles. This particular bypass is beset with many more.

Response No. 16

As discussed in FEIS Chapter 4.2.4, a number of studies do not support the overarching suggestion that all bypass projects are likely to inflict economic hardship. Research has found

that there are factors that give an indication of whether a community is likely to experience negative economic impacts when bypass. Among these are the community's population and distance from the bypass. A discussion of likely economic effects associated with the proposed bypass is included in FEIS Chapter 4.2.4. Resolutions of local support for the proposed project are appended to this document. In addition, the 2010 Strategic Transportation Investments (STI) Law (House Bill 817) established the Strategic Mobility Formula, a new way of allocating available revenues based on data-driven scoring and local input. The Strategic Mobility Formula is a data-driven analysis that evaluates, among other factors, how a project fits in with local priorities. The FEIS reflects final results of the Strategic Mobility Formula analysis.

Comment 17:

First, this project serves little independent transportation utility. There is scant data in the DEIS on travel times for local traffic, and the description of project benefits does not state that it will improve those times. Rather, the DEIS touts reduction in travel time to "Carteret County beaches and the Port of Morehead City,"[7] clearly a benefit for those passing through rather than those living in town. Safety to long-distance motorists is listed as a benefit of the project [8] but safety to local motorists is given little to no attention in the DEIS.[9] While the project is said to improve access for area commuters to the military base, corridors that would have included an interchange at the area that currently serves the base, Slocum Road, were dismissed from consideration. [10] Slocum Road connects directly to MCAS, intersects U.S. 70 and has a poor level of service, including the 4th highest number of accidents in Havelock. [11] The Havelock Bypass will do nothing to improve this intersection.

Response No. 17

Contrary to the commenter's suggestion, the proposed project does have independent utility and addresses legitimate transportation needs. See Response Nos. 5 and 9 regarding the proposed project's independent utility.

FEIS Chapter 1.4 provides an analysis that shows the improved safety that a freeway facility provides to motorists.

Travel time reduction is presented as a component of Purpose and Need in FEIS Chapter 1.4

FEIS Chapter 2.8.3 includes a travel time analysis that was developed to demonstrate the results of the traffic capacity analysis shown in the DEIS. It is noted that the comparison of No-Build versus Build shows a travel time reduction for every growth scenario presented.

A new bypass is consistent with the City of Havelock's 2030 Comprehensive Plan which cites the city's desire to "establish land use controls for protecting investment in the proposed bypass and set a new vision for the US 70 Corridor that will transform Main Street [existing US 70] back into a community asset."

As discussed in Response No. 1, traffic analysis clearly shows that a bypass alternative yields excellent LOS and traffic operations, as opposed to an expressway design on existing US 70 which fails in the design year.

Planning and design studies are currently underway for an interchange at Slocum Road and US 70 which has its own independent utility and termini. It is anticipated that this project will be

completed in the next several years. FEIS Chapters 1.8 and 4.18.1 include a discussion of this and other nearby projects.

Comment 18:

In addition to providing few, if any, benefits to the locality, the overall objective of the project to achieve uninterrupted service between Raleigh and Morehead City will be eventually thwarted by the growth that will occur at each end of the bypass – creating slowdowns where people want to get on and off. Experience from other locations indicates that these connecting points may create local land use problems and require traffic management actions that will prevent the Bypass from achieving this overall goal. Yet the DEIS does not identify or evaluate these effects.

Response No. 18

It is not practical for a state highway program to remedy all transportation needs at once along the many miles of its existing highways. Thus, highway projects must be prioritized, and programmed for funding in appropriately-sized components that meet legal requirements and which can be studied, funded, and built in a reasonable and efficient manner. Such is the case for the US 70 corridor in North Carolina. Although long-range plans may designate a vision for the entire corridor, not all of those visions will actually be funded and constructed. Most certainly, they will not be funded at the same time.

The Strategic Transportation Corridor (STC) clearly establishes that US 70 must operate well to help North Carolina attract new businesses, grow jobs and catalyze economic development. NCDOT has authority to control driveway permits at either end of the proposed bypass to discourage the type of development that would inhibit the regional traffic function of US 70. The US 70 Access Management Study includes recommendations to maintain mobility along the proposed bypass. FEIS Chapter 4.1.2 includes a discussion of these recommended strategies as well as the project's consistency with local land use and transportation plans.

Comment 19:

The economic justification for the project is seriously flawed as well. The Super 70 project is based upon an unsupported background assertion that freeway access from the capital to the port at Morehead City will somehow create economic development for the eastern North Carolina that lies between. In fact, the port at Morehead City is small, and the amount of freight that enters and exits the facility has steadily declined since 1990. Nothing has been shown to support the idea that bypassing economically depressed communities in eastern North Carolina to quicken trips between Raleigh and already-thriving coastal communities will benefit the economy.

Response No. 19

The Purpose and Need for this project does not rely on the economic justification represented. See Response Nos. 1 and 2 for a more detailed explanation of Strategic Highway Corridors (now STC's) that do provide purpose and need justification.

Comment 20:

The road itself is costly and the economic justification for it is absent. The environmental impacts are significant, and the environmental analysis of those impacts is lacking. For these reasons and those detailed herein, the Agencies should issue a supplemental DEIS that fully addresses these impacts and includes careful evaluation of viable upgrade alternatives to the existing corridor before proceeding to the Final EIS phase.

Response No. 20

The impacts of the proposed Havelock Bypass have been reported in the Draft Environmental Impact Statement and supplemented for progressive NEPA/404 merger meetings, as requested by the lead federal agency, cooperating agencies, and other federal and state regulatory and resource agencies. After the DEIS was published, public hearings were held and comments were received from agencies, the public, and non-governmental organizations. The FEIS considered those comments and provides additional and responsive studies that are reported herein. NCDOT and the Federal Highway Administration disagree that a supplemental Draft Environmental Impact Statement is necessary before proceeding to a Final Environmental Impact Statement for the reasons cited in the response to Comment 13.

Comment 21:

II. As Proposed, the Havelock Bypass Would Threaten the Continued Existence and Recovery of the Red-Cockaded Woodpecker, Violating Sections 7(a)(l) and 7(a)(2) of the Endangered Species Act.

The Endangered Species Act ("ESA") imposes substantive requirements on each of the federal agencies involved in the consideration, of the proposed Havelock Bypass and the management of red-cockaded woodpecker ("RCW") populations on the Croatan National Forest. Section 7(a)(l) includes "a specific, rather than a generalized duty to conserve species."[12] Conserve means "to use and the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this chapter are no longer necessary." [13] Therefore, FHWA, U.S. Forest Service ("USFS"), U.S. Fish and Wildlife Service ("FWS"), and the U.S. Army Corps of Engineers ("Corps") each has a legal obligation to advance the recovery of the RCW.

Section 7(a)(2) requires each federal agency to "insure that any action authorized, funded, or carried out by such agency ... is not likely to jeopardize the continued existence of any endangered species or threatened species."[14] As a result, FHWA and the Corps must affirmatively demonstrate that the proposed bypass will not jeopardize the continued existence of the RCW.

As discussed below, the DEIS fails to address the potential impacts of the proposed highway in sufficient detail to allow the federal agencies involved to carry out their responsibilities under the ESA- particularly with respect to future prescribed burning. Therefore, any action taken based on the information and analysis provided in the DEIS would violate the ESA.

Response No. 21

See Response No. 4. In November 2013, the USFWS concurred with the "May Affect – Not Likely to Adversely Affect" conclusion rendered in the RCW Biological Assessment, thereby resolving Endangered Species Act coordination for RCW. In coordination with the US Forest Service, in August 2014 NCDOT also completed an additional RCW Territory Analysis for the Croatan National Forest. The results of these recent studies reaffirmed the conclusion of the Biological Assessment- that the Havelock Bypass project will not result in the loss of any existing or proposed RCW territories on Croatan National Forest lands.

Comment 22:

A. The RCW is endangered because of, and continues to be threatened by, loss of suitable habitat.

The reasons leading to the RCW's endangered status – habitat loss due to clearing, fragmentation, and fire suppression – make proper management of existing habitat on public lands essential to recovery of the species. At one time, the old-growth longleaf pine that RCW depend on dominated the southeastern coastal plain. Among the causes of that habitat decline, fire suppression has had particularly far-reaching effects. The RCW Recovery Plan describes its impacts as "severe and numerous" because of the resulting changes in forest composition and structure.[15] Specifically, fire suppression has stifled reproduction of longleaf pine, leading to shortages of old secondary growth forests.

The threats that caused the RCW to be endangered continue and all have the same root cause, shortage of suitable habitat. Threats caused by the lack of habitat include:

1. insufficient numbers of cavities and continuing net loss of cavity trees;
2. habitat fragmentation and its effects on genetic variation, dispersal, and demography;
3. lack of foraging habitat of adequate quality; and
4. fundamental risks of extinction inherent to critically small populations from random demographic, environmental, genetic, and catastrophic events.[16]

Fire suppression plays a key role in each of these threats. It is a "profound threat" to RCW populations and "has been a leading cause of loss of woodpecker groups on both public and private lands."[17] Importantly, the negative effects of fire suppression extend to foraging habitat as well as nesting and roosting habitat.[18] Even if nesting and roosting habitat is protected, "lack of fire in the foraging habitat can reduce group size and productivity."[19] To reverse these habitat impacts, "[w]idespread and frequent application of early-mid growing season fire throughout lands managed for red-cockaded woodpeckers is essential to the recovery of the species."[20] Indeed, the 2002 CNF Land and Resource Management Plan ("LRMP") recognized that "[p]ast fire suppression and widespread planting of loblolly pine has greatly reduced the amount of longleaf pine habitat on the forest over the last 100 years."[21]

Habitat fragmentation is also a substantial threat to RCW. Because they are group breeders, RCW are particularly sensitive to fragmentation.[22] "Fragmentation and isolation of groups **within a population** can substantially increase that population's risk of extinction."[23]

Degraded foraging habitat is also a threat to RCW's long-term viability and recovery. "Foraging habitat ... affects population densities; it may be a secondary factor currently limiting populations and will likely become a primary limiting factor once abundant nesting habitat is provided."[24] Even when cavity trees are protected, adequate foraging habitat is "an important concern for long-term viability."[25]

These threats to suitable habitat are not only the reason the RCW is endangered, they continue to threaten the existence and recovery of the species. As reflected in the LRMP, the most significant challenge facing the population on the CNF is managing habitat. "Maintaining a viable population of RCW on the Croatan is dependent not only on having sufficient suitable habitat for nesting and foraging through forest management, but having a suitable spatial mix and arrangements of habitat through time."[26]

B. Recovery of the RCW depends on the recovery of primary populations, including the CNF population.

The recovery of RCW is dependent on the recovery primary and secondary populations across the historic range.[27] The recovery of these populations is necessary to make RCW a viable species, one that "can reasonably be expected to avoid extinction over a long period of time."[28] The recovery populations are widely distributed throughout the historic range of the species. That dispersal serves "several critical ecological objectives," including "reduc[ing] threat of species extinction from catastrophic events such as hurricanes."[29] In addition, the "secondary and primary core populations together create a network which, when population goals are reached, may facilitate the natural dispersal among populations that is critical to long- term genetic viability."[30] Promoting natural dispersal is essential because "the vast majority of red-cockaded woodpecker populations are threatened by demographic stochasticity and will remain so for the foreseeable future."[31] Demographic stochasticity, the natural fluctuation of populations due to changes in reproduction and death rates, is a serious threat to small, isolated populations.

The CNF population is one of the 13 primary populations with recovery goals of "350 potential breeding groups at the time of and after delisting," and is therefore essential to the recovery of the species.[32] Its importance is, in part, because the national forest is its hub.[33] Critically, recovery of the "species depends primarily on the conservation of populations on federal lands."[34] The LRMP recognizes the pivotal role of the CNF populations, stating that RCW population on the CNF, Camp Lejeune, and Holly Shelter is one of the populations that is "needed to recover the species."[35]

But the CNF population is currently falling behind recovery goals. The Recovery Plan expects populations to increase "at a rate of 5 percent per year."[36] Based on that expectation, the Croatan should have had 101 potential breeding groups ("pbgs") in 2010. According to the DEIS, the population was well below that number, with only 58 pbgs.

This failure to establish a large, stable population that meets the Recovery Plan's expectations threatens the existence of the species. Until the CNF population attains its recovery goal, it will be vulnerable to "the set of risks inherent to critically small populations."[37] Those risks include demographic stochasticity, environmental stochasticity, catastrophes, and genetic drift and inbreeding.[38] Each of the risks varies depending on the size of the population. Demographic stochasticity depends on spatial structure of habitat, hut may threaten populations as large as 100 groups if spatial structure is poor.[39] Importantly, "small, low-density populations always seem to decline."[40] Populations must be even larger to avoid the threat of environmental stochasticity.[41] At least one study has "suggested that populations with an effective size of 50 individuals or less would be vulnerable to inbreeding effects."[42]

Hurricanes present an additional threat, particularly to the CNF population. As demonstrated by Hurricane Hugo's destruction in the Francis Marion National Forest, a single event has the capacity to eliminate small, spatially restricted populations.[43] The recovery population at CNF is small enough, and the breeding groups are sufficiently compact, that loss of a complete subpopulation, and perhaps the entire population, from a single storm remains a serious risk.

C. Establishing a fire regime that replicates natural burning patterns is necessary for the recovery of the CNF population.

Installing a fire regimen that mimics natural cycles is essential to establishing a viable population of RCW on the CNF and recovering the species. As described in the Recovery Plan, "a viable population is one that is self-sustaining over a long period."[44] Creating a self-sustaining population on the CNF requires connecting the population by providing suitable habitat in the area that would be affected by the proposed bypass and is essential to the recovery of the CNF population and the species. Implementing prescribed burning in a manner that mimics natural, growing-season fires is essential to providing that habitat.

The importance of fire to RCW habitat cannot be overstated. As discussed above, fire suppression has played a major role in the degradation of habitat and the resulting decline in populations. Fire is critical to each aspect of RCW habitat and resulting individual fitness.[45] Fire increases productivity of groundcover, improving flower production, synchronicity, and pollination as well as reducing hybridization.[46] That fire-maintained groundcover in turn supports more arthropods- e.g. ants, roaches, beetles- than areas with a hardwood midstory. [47] As widely recognized, regular growing season bums effectively control midstory hardwoods and shrub growth, and does so without damaging groundcover or soil structure as heavy machinery does.[48] Critically, regular fire reduces fuel levels, minimizing the risk of catastrophic fire that destroys cavity trees. [49]

In sum, "prescribed fire is a fundamental solution to the conservation of red-cockaded woodpeckers and their ecosystems."[50] It "is and will continue to be the primary means of restoring and maintaining fire in southern pine ecosystems."[51] That is true in RCW habitat throughout that Southeast and on the CNF specifically.[52]

"Prescribed burning . is an essential management tool for the conservation and recovery of red-cockaded woodpeckers."[53] Restoring the RCW's longleaf habitat "requires frequent and consistent application of fire to control competing pine species and other woody competitors."[54]

The necessity of prescribed burning has been demonstrated in North Carolina through comparison of population growth rates in the Sandhills, Lejeune, and Croatan. Data shows "rates have been higher in recent years in the Sandhills and Lejeune, following reintroduction of growing season fire, and lower in the last several years on Croatan, since burning during the growing season there has been reduced."[55] This increased performance with more-frequent burning programs comes as no surprise, the Recovery Plan recommends that managers "strive for a program of frequent early to mid-growing season burns to maintain and enhance quality of nesting and foraging habitat."[56] To be sure "restoration of good quality habitat is vital to the recovery of the species."[57]

D. Expansion of Subpopulation 3 is **essential to the recovery of CNF population.**

Just as restoring the habitat generally is essential to RCW's continued existence and eventual recovery, restoring habitat that would be affected by the proposed bypass is essential to restoring the CNF population- one of the critical recovery populations for the species. Beginning in 1992, the CNF has been working to unify its fragmented populations.[58] As depicted on the map showing Management Prescriptions and Locations under the 2002 Land and Resource Management Plan,5 RCW habitat is divided on the CNF. RCW habitat management is prescribed for segments of the forest closest to Camp Lejeune, the southern section of the forest, the portion of the forest east of Cherry Point, the northeastern segment of the forest, and within the proposed corridor for the Havelock Bypass. The proposed corridor cuts through what is known as Subpopulation 3, which is centrally located among the areas designated for RCW habitat management.

Because of its central location, Subpopulation 3 is essential to the long-term plans for unifying these subpopulations.[60] As the DEIS recognizes, dispersal between populations that is necessary for that unification depends on the development of "habitat bridges" linking populations.[61] Its central location is critical in connecting isolated populations because when "groups are isolated and dispersal behavior disrupted, risk of population extinction increases."[62] The area that would be affected by the proposed bypass is one of these habitat bridges, making "[c]ontinued and increased habitat management [] critical to the growth of Subpopulation 3," and the linking of the CNF's fragmented populations.[63]

The potential impacts to Subpopulation 3 are considerable. According to the DEIS, the proposed project would directly remove 81.6 acres of suitable or potentially suitable habitat under Alternate 1, 88.51 acres under Alternative 2, and 168.55 acres under Alternative 3.[64] As noted above, without prescribed burning, habitat not directly affected will also be substantially degraded and ultimately lost. Although the DEIS does not quantify the habitat that could be lost if prescribed burning were precluded, that habitat would certainly include the portion of the forest between the Bypass and Havelock. That area would encompass 1,909.42 acres of habitat under Alternative 1, 746.25 acres of habitat under Alternative 2, and 1,083.80 acres of habitat under Alternative 3. Therefore, the proposed project has the potential to destroy between 834.76 and 1991.02 acres of suitable or potentially suitable habitat within Subpopulation 3, without even considering the degradation of habitat west of the proposed Bypass if burning is precluded in that section of the forest.

Given the difficulty identified above, it must be presumed that the proposed Bypass will preclude burning this habitat and result in the extirpation of Subpopulation 3. The loss of Subpopulation 3, or even the degradation of its habitat, would prevent the CNF population from meeting its recovery goals and imperil the species. Under the Recovery Plan, the CNF must contribute 169 pbgs for the Coastal North Carolina population to meet its recovery goal of 350.[65] As noted in the DEIS, "the USFS quantified the amount of potentially suitable RCW habitat on the CNF with a range of 137 to 169 pbgs as its population goal."[66] Therefore, due to the limited available habitat and its role in connecting the CNF subpopulations, loss of the habitat necessary to support Subpopulation 3 would jeopardize the CNF population and the RCW.

E. Proposed bypass alternatives would fragment habitat, preclude prescribed fire, and degrade remaining habitat.

Prescribed burning will not occur if the Havelock Bypass is built, existing habitat will be degraded, Subpopulation 3 will collapse, and the CNF population will dwindle, threatening the long-term existence and recovery of the RCW. This conclusion is inescapable considering the history of burning in the CNF, the difficulty in carrying out prescribed burns near highways and developed areas, NCDOT's lack of definitive commitment to close the proposed bypass for burning, and the effect of not carrying out prescribed burns on RCW habitat.

As the DEIS notes, the USFS has not recently met its prescribed burning goals.[67] To be sure, the clusters and HMAs in the project area have not been adequately burned to promote good quality RCW habitat and to promote the growth of Subpopulation 3, unify the CNF population, or meet recovery goals.[68] By failing to do so, the USFS may not be meeting its requirements under the Endangered Species Act to conserve the species.[69] The DEIS fails to evaluate the potential impacts of the proposed project in light of this historic failure to properly manage the affected area for RCW

recovery. Given this history, it is clear that the substantial additional difficulty that the bypass will present for prescribed burning will ensure that the habitat within the project area will not be burned.

The added complexity brought to the prescribed burning program by the proposed bypass comes into clearer focus by considering the issues that must be evaluated before a prescribed burn can proceed. The minimum standards that the Forest Service must abide by are outlined in the Interagency Prescribed Fire: Planning and Implementation Procedures Guide ("Interagency Guide"). The Interagency Guide describes 21 elements of a Prescribed Burning Plan that must be evaluated before any prescribed burning can move forward. Even after the plan is prepared and approved, the Interagency Guide requires the burning agency to go through a "Go/No-Go Pre-Ignition Approval Checklist" that includes assessments of specific issues related to burning, ranging from smoke-management and weather to public notices. [70] The DEIS recognizes some of these difficulties, noting that "decisions to burn are determined at the last minute based on wind speed and direction, humidity."[71] The document fails, however, to discuss how the added complexity of coordinating with NCDOT and closing the highway would affect this already complicated process. It does admit that "it would be logistically difficult to close the highway on short notice," suggesting that, even without an appropriate analysis and "hard look," the NCDOT and FHWA recognize that constructing the bypass would preclude prescribed burning.[72]

Nor has NCDOT committed to closing the proposed bypass to allow for prescribed burning. The DEIS states that NCDOT has "conceptually" agreed to close the proposed bypass,[73] but does not include any commitment to transfer discretion to the USFS or present any plan for doing so. In fact, the DEIS later acknowledges that no formal plan has been developed and that "[a] plan is being developed in a joint effort between the CNF and NCDOT" and concedes that "it would be logistically difficult to close the highway on short notice."[74]

The vagueness with which the DEIS discusses closing the road is critical not just because prescribed burning is essential to maintaining habitat, but also because NCDOT has previously refused to commit to doing so.[75] In short, NCDOT's conceptual agreement to consider closing the highway cannot be relied upon in this analysis, particularly in light of the project's purpose- to create a non-stop connection between Raleigh and Morehead City. Without a binding, irrevocable commitment that puts road closure within the discretion of the USFS rather than the NCDOT, and enforcement mechanisms to ensure that the road is closed to allow for burning with frequency that mimics natural burn patterns, it would be arbitrary and capricious to base an analysis of environmental impacts on closing the road to allow for burning.

In addition, it is not clear that, even if NCDOT closes the highway, the Forest Service will be able to burn east of the road. The DEIS describes NCDOT and the USFS's effort as attempting to "minimize the likelihood that the Bypass will further complicate prescribed burning in the project area."[76] In the past, the Forest Service has stated that even if the highway were closed, it still could not burn between the Bypass and Havelock,[77] which would result in the loss of 834-1,991 acres of suitable or potentially suitable RCW habitat. Thus, even if NCDOT and USFS were to develop a plan to close the road, it would be insufficient to demonstrate that prescribed burning would be implemented on forest land between the Bypass and Havelock.

While the USFS's ability to carry out prescribed burning if the highway is built is, at best, speculative, the DEIS acknowledges that the adverse effects of a failure to do so are certain and significant. The DEIS frequently notes that failure to burn will further degrade and fragment RCW habitat. It states:

- "[I]f habitat management is restricted due to the project, fragmentation or degradation of suitable and/or potentially suitable habitat could impact the dispersal corridor created by Subpopulation 3."[78]

- "Habitat quality is directly related to habitat management. Management within and around the project area is already hampered by its proximity to Havelock and by fragmented ownership. Smoke generated by prescribed burning is an ongoing concern on the CNF."[79]

- "Thus the ability of the CNF to properly manage habitat is vital to the fitness of RCWs."[80]

- "Alternates 1 and 3 would cause the most difficulties for managers conducting prescribed burns because they would separate RCW habitat from the CNF to the west."[81]

- "If the USFS is unable to use a prescribed burn east of the Bypass, RCW existing habitat, whether suitable, potentially suitable or future potential, has the ability to degrade over time."[82]

- "Indirect and cumulative impacts may result from traffic noise, development of some private properties along the highway corridor and/or restriction of necessary management activities (e.g., burning). Such impacts could individually or collectively adversely affect RCW dispersal to/from the area and inhibit unification of the CNF RCW population."[83]

These sections of the DEIS emphasize what is broadly known about the importance of fire in maintaining RCW habitat and necessarily recognize that, without fire, the Havelock Bypass will have the same impacts that have put the RCW on the endangered species list- loss of habitat due to fragmentation, degradation, and fire suppression.

F. Authorizing the proposed bypass based on the information and assumptions included in the DEIS would violate sections 7(a)(l) and 7(a)(2) of the Endangered Species Act.

The ESA requires every federal agency to conserve listed species and prohibits any agency from jeopardizing the continued existence of any endangered species.[84] The DEIS fails to provide the information and analysis to satisfy those requirements. To be sure, it excludes perhaps the most critical piece of information, the conceptual agreement between NCDOT and USFS that would presumably allow prescribed burning to take place east of the proposed highway. Without that document and an analysis of its effects on each alternative, the DEIS's analysis of potential impacts is substantially incomplete. As the document recognizes, whether or not prescribed burning can be done on the fragmented sections of forest land will substantially affect the impacts of Alternatives 1, 2, and 3 on the RCW as well as the remainder of the CNF population due to the role of Subpopulation 3 in unifying the overall population. The omitted prescribed burning assessment is, therefore, an essential part of the analysis.

Courts have made clear that federal agencies cannot gamble the continued existence of endangered species on "conceptual" plans like the one this DEIS relies upon. The ESA is "the most comprehensive legislation for the preservation of endangered species ever enacted by any nation."[85] Thus, to meet its rigorous standards, "a far more subtle calculation than merely totaling the number of acres to be asphalted is required where the environmental impact of a project is at issue."[86] Where, as here, federal agencies fail to demonstrate that an endangered species "can survive the additional loss of habitat caused by the indirect effects of the highway," they violate the ESA.[87]

Particularly relevant here, "reliance on the proposed actions of other agencies does not satisfy the FHWA's burden of insuring that its actions will not jeopardize the continued existence" of the RCW.[88] Unlike the conceptual plan proposed here, "[m]itigation measures under the ESA must be reasonably specific, certain to occur and subject to deadlines or other forcible obligations."[89] By comparison, the proposed plan to close the highway and implement prescribed burning on fragmented segments of forest land is not specified, certain to occur, or subject to any enforceable obligations. Therefore, authorizing construction of the Havelock Bypass based on the information and analysis in the DEIS would violate the ESA.

Response No. 22

See Response No. 4. In November 2013, the USFWS concurred with the "May Affect – Not Likely to Adversely Affect" conclusion rendered in the RCW Biological Assessment, thereby resolving Endangered Species Act coordination for RCW. On behalf of the US Forest Service, on August 2014 NCDOT also completed an additional RCW Territory Analysis for the Croatan National Forest. The results of these recent studies reaffirmed the conclusion of the Biological Assessment- that the Havelock Bypass project will not result in the loss of any existing or proposed RCW territories on Croatan National Forest lands. A component of this finding is an NCDOT commitment to periodically close the bypass to allow for prescribed burns, which is located in FEIS Appendix A.

Comment 23:

III. The DEIS Violates NEPA By Failing to Thoroughly and Critically Analyze Impacts of the Proposed Bypass.

The National Environmental Policy Act of 1970 ("NEPA")[90] forms the foundation of "a national policy of protecting and promoting environmental quality.[91] NEPA has two fundamental aims. First, it serves "to sensitize all federal agencies to the environment in order to foster precious resource preservation."[92] Second, it "ensures that the public and government agencies will be able to analyze and comment on the action's environmental implications."[93]

NEPA is implemented by regulations developed by the Council of Environmental Quality ("CEQ") and by regulations developed in each individual federal agency. The regulations require that an Environmental Impact Statement ("EIS") be developed for all "major Federal actions significantly affecting the quality of the human environment."[94] An EIS requires agencies to take a "hard look" at environment impacts, and "an agency's hard look should include neither researching in a cursory manner nor sweeping negative evidence under the rug."[95]

In keeping with NEPA's twin aims to provide information both to decision-makers and to the public and other resources agencies, NEPA procedures insure that environmental information is "available to public officials before decisions are made and before actions are taken.''[96] Accordingly, an EIS must be prepared "early enough so that it can serve practically as an important contribution to the decision making process and will not be used to rationalize or justify decisions already made.''[97] While agencies will typically have a preferred alternative in mind as they begin the NEPA process, the statute "requires that the ultimate decision maker remain open to reconsidering any or all aspects of the proposed action based on the environmental impact identified in the FEIS."[98]

This DEIS fails to comply with NEPA because it does not adequately examine the direct, indirect and cumulative impacts of the proposed project, nor does it adequately analyze a reasonable range of alternatives.

Response No. 23

The proposed Havelock Bypass is a product of decades of study and coordination with the US Forest Service, the US Army Corps of Engineers, US Environmental Protection Agency, US Fish and Wildlife Service, Federal Highway Administration, local officials, and numerous other state and federal regulatory and resource agencies.

See Responses 1, 5, 12, and 13. The project's progression through the Steering Committee Process and Section 404/NEPA Interagency Merger Process has allowed for the thorough examination of direct, indirect, and cumulative impacts and a reasonable range of alternatives that comply with CEQ regulations.

Comment 24:

A. The DEIS fails to take a hard look at direct, indirect, and cumulative impacts to longleaf pine habitat, streams, and wetlands.

The DEIS fails to take the requisite "hard look" at various environmental issues, including:

- **Indirect effect of not carrying out prescribed burning.** The DEIS repeatedly states that habitat may be degraded if prescribed burning is precluded by the proposed bypass. It fails to analyze which areas are more likely to degrade, how that degradation would affect existing communities, or the long-term effects on the RCW population. Moreover, it does not evaluate the differences in these effects between the various alternatives.

- **The effect of roads on burning in other areas of the Croatan**. The DEIS omits any discussion of difficulties encountered due to roads and development in other parts of the Croatan. These experiences could provide valuable information regarding the impacts of the proposed Bypass on the prescribed burning program and must be evaluated.

- **Details of the proposed road closure agreement and the frequency of burning that would be allowed pursuant to it.** It is clear that the ability to burn is one key element in the evaluation of the environmental effect of the proposed Bypass. Yet the DEIS excludes the proposed agreement to close the road and fails to address how road closure needs would change with each alternative.

- **Potential for increased wind damage.** Wind damage is identified by the RCW recovery plan as one of the primary threats to cavities. The DEIS fails to address the potential for the proposed bypass to increase the threat of wind damage. In addition, it fails to address how the proposed highway would affect the population's vulnerability to hurricanes, as specifically recommended by the Recovery Plan.

- **Consideration of ecosystem interactions in longleaf pine savannas.** The DEIS does not adequately address the interconnectedness of soils, groundcover, midstory, and canopy organisms in evaluating potential impacts to the longleaf pine ecosystem. As discussed above with respect to the ESA, the various levels of the system are interdependent and their respective health depends on ecosystem-based management. The DEIS fails to provide this holistic analysis.

- **Evaluation of impacts to Proposed, Endangered, Threatened, and Sensitive (PETS) species.** The DEIS fails to analyze the highway's impacts on PETS species. In the Environmental Consequences section of the DEIS, the document defers to future consideration of impacts to these species through the special use permit process. NEPA does not allow that type of deferral, the EIS must take a hard look at these potential impacts.

- **Ages of trees directly impacted.** The DEIS fails to address the future impact of trees removed due to direct impacts. The RCW Recovery Plan emphasizes the importance of older secondary growth trees to the species' recovery. Yet the DEIS does not reveal the age of the trees involved, their value as potential future cavity trees, or compare the potential impacts of the alternatives.

- **Conformance with the Recovery Plan.** The RCW Recovery Plan includes a series of "Recovery Tasks" to facilitate recovery of the species and Management Guidelines to implement those tasks. The DEIS fails to consider these tasks and guidelines in total or evaluate the impact of the proposed highway on the USFS's ability to carry out their requirements. Significantly, the DEIS does not address how, with the potential loss of Subpopulation 3, the Croatan population will meet its recovery goals.

- **Reliance on conducting additional analyses after the selection of the LEDPA.** The DEIS frequently, and unlawfully, defers evaluating environmental impacts of the proposed project until the LEDPA is selected. This approach is directly contradictory to NEPA's purpose and mandate - to require consideration of environmental impacts before an agency's focus turns to a single alternative.

- **Effect of construction on powerline corridors.** The powerline corridors in the project area contain some of the last vestiges of groundcover plant communities that were once more widespread in the Croatan. The DEIS does not address the potential impact to these areas and their rare plant communities during the construction period of the proposed highway. Storing equipment and materials in these corridors threatens long-term disturbance of these systems.

- **Analysis of stream and wetland impacts.** The DEIS analysis of stream and wetland impacts is cursory and does not provide the information necessary to evaluate compliance with the Clean Water Act or the state's 401 certification rules. In addition to presenting the overall wetland and stream impacts, the DEIS should differentiate impacts between the projects and compare the quality of impacts. Although it provides some raw information regarding quality of wetlands, the DEIS must analyze that information comparing the different alternatives. The DEIS does not provide the information necessary to determine compliance with the Clean Water Act and the 404(b)(1) Guidelines.[99]

- **Compliance with the Land and Resource Management Plan.** The DEIS dismisses compliance with the CNF LRMP by summarily stating that the USFS is currently failing to meet its goals and that "[t]he reasons for failure to attain these goals are independent of the Bypass." Without support, the DEIS states that "[t]he construction and operation of the Bypass should not prevent the USFS from meeting its goals if current management limitations are overcome." DEIS at 4-73. The DEIS not only fails to provide background to support this conclusion, the document frequently contradicts it. The Croatan's habitat management failures in recent decades are, in large part, due to infrequent burning and

habitat fragmentation. The proposed highway threatens to fragment, degrade, and preclude burning on an essential portion of habitat in forest, making the achievement of established goals substantially more difficult. The DEIS must evaluate compliance with the LRMP and take the hard look required by NEPA.

Response No. 24

Through ongoing coordination with the USFS, NCDOT conducted additional detailed studies on the Preferred Alternative to evaluate the impacts of the project on the forest biological communities. Updated analyses conducted since publication of the DEIS, and that specifically address this subject area, are summarized in the FEIS as follows:

- *Prescribed Burn Plan Agreement (January 2012) (Appendix A)*
- *Spring species (Solidago verna) report (Sept. 2012) (referenced in Biological Evaluation, Appendix C)*
- *RCW Management Plan for CWMB (Nov. 2012) (Appendix C)*
- *Geoenvironmental Site Assessment for Hickman Hill Convenience Center (Dec. 2012) (Chapter 3.9)*
- *Updated rare species/PETS report (Jan. 2013) (referenced in Biological Evaluation, Appendix C)*
- *Stream and Wetland delineation update (2013) (Chapter 3.15)*
- *Summer species report (Aug. 2013) (referenced in Biological Evaluation, Appendix C)*
- *Fall species (Paspalum) report (Aug. 2013) (referenced in Biological Evaluation, Appendix C)*
- *Indirect and Cumulative Impacts Assessment (Sep. 2013) (Chapter 4.16)*
- *Rare Plant Mitigation/Non-native Invasive Analysis (Oct. 2013) (referenced in Biological Evaluation, Appendix C)*
- *Bryophyte report (Nov. 2013) (referenced in Biological Evaluation, Appendix C)*
- *RCW Biological Assessment (Nov. 2013) (Appendix C)*
- *US 70 Havelock Bypass Biological Evaluation (Jan. 2014) (Appendix C)*
- *Biological Evaluation Report (Jan. 2014) (Appendix C)*
- *Migratory Bird Evaluation (Jun. 2014) (Appendix C)*
- *CNF Management Indicators Species Report (Jul. 2014) (Appendix C)*
- *CNF RCW Territory Analysis (Aug 2014) (Appendix C)*

Comment 25:

B. The DEIS Fails to take a hard look at the indirect economic impacts of the proposed project.

CEQ regulations require the Agencies to consider the "indirect effects" of a proposed action. Indirect effects are defined as those effects that are "caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable." Effects includes ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. [100] The DEIS fails to include sufficient analysis of the indirect economic effects of the proposed project in two important ways. First, the DEIS fails to adequately examine the impacts the Bypass would cause to existing local businesses. Second, the DEIS fails to examine the induced development that may occur at the Bypass interchanges, which are located at both ends of the bypass and at Lake Road. [101]

1. The analysis of impacts to local business is unsupported and superficial.

First, the DEIS does not adequately examine the economic consequences to existing businesses that the Bypass will cause. The DEIS states that the Bypass will "likely create substantial economic benefits for the regional and local economy," but fails to substantiate the claim with any quantitative data.[102] Likewise, the DEIS states that "[n]egative economic impacts are expected to be minimal" for "local highway-oriented businesses" but fails to substantiate the claim with data.[103] In reality, bypasses may cause negative economic impacts for businesses located along the old route. [104] Further, smaller communities are more likely to suffer adverse economic consequences, and some may never recover.[105] The DEIS states that property values may decrease along the bypass but increase near the interchange, but provides no firm economic data to support the claims.[106] The analysis also states that businesses that "receive a large portion of their income from drive-by customers" will suffer minimal economic harms as a result of the project, without going into detail.[107] Such claimed analysis is clearly insufficient to satisfy the requirements of NEPA, particularly when the effects of bypasses on other communities are considered.

On average, retail sales decrease when a bypass is built around a community.[108] Already, from 1990 to 2006, retail sales have decreased in Craven County. In 1990, 4,481 people were employed in retail. By 2006, the number decreased to 4,187.[109] So, while the DEIS shows employment growth in Craven County from 1990 to 2006, in the breakdown by sector, retail suffered.[110] This decrease in retail trade will likely be exacerbated by the bypass. Research has shown that retail businesses that cater to pass-through-traffic, such as gas stations and fast food restaurants, are the most likely to be impacted by reduced traffic.[111] There are few opportunities to relocate in the project area, as much of the land is National Forest. While businesses that cater to visitors attracted to the community are less likely to be negatively impacted from bypasses, Havelock is disadvantaged by not having much tourism.[112]

The consequences of this type of bypass are also revealed in studies that interview business owners. A majority of business owners surveyed in towns where a bypass had been constructed believed the bypass had a major effect on their sales, with a majority believing sales had decreased.[113] More than three quarters believed sales would have been better if the bypass had not been built.[114] Two-thirds thought bypasses had a negative effect on the town as a whole.[115] Because the DEIS fails to adequately address the potential negative economic consequences induced by the bypass, the DEIS should be revised to address these deficiencies and fully study the issue.

2. The DEIS does not evaluate the effects of Induced Growth.

Of particular relevance to this project, are the indirect effects of induced growth.[116] Induced growth effects include patterns "of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems." [117] Consideration of induced growth and related issues "furthers the National Environmental Policy Act's information and public awareness goals."[118] The DEIS fails to adequately examine the indirect effect of induced growth that is likely to occur at the termini of the Preferred Alternative and existing US 70 and at the intersection with Lake Road.

Studies have found that bypasses tend to spur economic development where the new road intersects with the existing road. [119] The termini are northwest of Havelock at the intersection of existing 70 with Hickman Hill Loop Road, and southeast of Havelock at the intersection of existing 70 and McCotter Boulevard.[120] In this case, the two termini are located outside the City of Havelock

in Craven County, which does not regulate land use.[121] If development is allowed to occur around the termini unchecked by land use regulations, in addition to the economic impact, it may likely lead to additional congestion at the termini that the Bypass is seeking to avoid.[122] The development induced at the termini may cause Craven County to request traffic signals be installed to mitigate safety concerns, which will cause deterioration in traffic service.[123] This exact scenario was documented in Texas, forcing the Texas Department of Transportation to consider upgrades to the newly constructed bypass. [124]

The DEIS also notes that the Bypass will induce development near its interchange with Lake Road.[125] Development near interchanges is typical of bypass projects.[126] However, the induced economic development tends to cater to customers located outside of town, and not to town residents.[127] Retailers opening along a bypass tend to be new businesses instead of relocated businesses, because many existing businesses will choose to shut down instead of relocate.[128] The DEIS notes that there is a moderate potential that the bypass will cause extensive land use change, but fails to detail these changes.[129] While the City of Havelock has stated that a comprehensive plan is necessary to deal with development along the bypass, no such plan exists yet.[130]

The City of Clayton has been forced to deal with the issue of development along a bypass in the 18 months since the US 70 Clayton Bypass opened.[131] The City has found it necessary to develop a special plan to handle development at the interchanges and termini of the bypass, but developing the plan has caused strife within the community.[132] A development has already been proposed for one of the interchanges along the Clayton Bypass.[133] The developers have already requested NCDOT expand the local road to accommodate traffic between the development and the bypass.[134]

The DEIS acknowledges how development requires improvements to existing US 70 to accommodate anticipated increases in traffic.[135] It then fails to take a hard look at the impact of the same type of development that will happen as a result of the bypass, and the subsequent inability of the preferred alternative to meet the goals of the project. Studies have shown that bypasses like the proposed project will induce development of some sort at its termini and interchanges. However, the DEIS fails to adequately examine the extent of this development, its effects on the project's ability to meet the stated purpose and need or its environmental consequences. Such failings, including the economic justification for and the economic impacts of the Havelock Bypass should be studied in greater detail in a revised DEIS.

Response No. 25

Chapters 4.1 and 4.2 of the FEIS discuss the effects of the project on land use, transportation planning, and socio-economic conditions. Chapter 4.16 of the FEIS summarizes ICE analyses and the updated Indirect and Cumulative Impact (ICI) Water Quality Study Report prepared in September 2013. This updated study includes detailed assessment of the land use and growth effects anticipated with the proposed bypass.

The conclusions of these evaluations, and specifically the detailed assessment of growth scenarios in the ICI, determined that indirect impacts would be minimal and that any contribution of the project to cumulative impacts resulting from current and planned development patterns is expected to be minimal. Resolutions of local support for the proposed project are appended to this document. Also, as discussed in Response No. 18, NCDOT has jurisdiction to control driveway permits at either end of the proposed bypass to discourage the type of development that would inhibit the regional traffic function of US 70.

Comment 26:

C. The DEIS fails to take a hard look at the cumulative effects of other land use impacts in the vicinity of the project.

When preparing an EIS, an agency must consider the cumulative impacts of its proposed project. [136] "The purpose of the cumulative impact analysis is to provide readers with a complete understanding of the environmental effects a proposed action will cause."[137]

A cumulative impact is defined as: [t]he impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.[138]

Therefore, reasonably foreseeable actions must be included when considering cumulative impacts.

A "reasonably foreseeable" action is one that is "sufficiently likely to occur that a person of ordinary prudence would take it into account in reaching a decision."[139] An action that is "highly speculative or indefinite" is not reasonably foreseeable. [140] In addition, a future action is reasonably foreseeable if it is "'imminent,' 'inevitable,' or one that can be sufficiently concrete that consideration of its effects would be 'useful to a reasonable decision-maker."' 141

Projects that are not yet finalized can be "reasonably foreseeable." In Western N.C. Alliance, NCDOT prepared an EA for a highway project that expanded an existing highway and was in the vicinity of three future NCDOT projects. [142] The EA did not include the future projects in its cumulative impact analysis.[143] The court stated that even though the designs were not finalized, funding had not been allocated, and no environmental documents had been prepared, the planning that had taken place for those projects was sufficient to "meaningfully evaluate" their cumulative impacts. [144]

Like the EA challenged in the Western N.C. Alliance, the Havelock Bypass DEIS fails to consider cumulative impacts from other closely related NCDOT projects. As the DEIS explains, the Havelock bypass "is one of five US 70 projects east of Raleigh planned to improve the US 70 corridor and to enhance statewide travel."[145] Two of these projects will directly link with the Havelock Bypass if the full Super 70 vision is implemented. These are the Northern Carteret Bypass and the Gallants Channel Bridge.

The Transportation Agencies appear to confuse the requirements for the consideration of cumulative "impacts", with the consideration of [sic] cumulative "actions." NEPA regulations require an EIS to include all connected and cumulative actions to ensure that projects are not improperly segmented.[146] This makes certain that agencies considering a major action look at all related projects at once, rather than dividing a project into smaller segments to decrease the significance of the environmental impacts.[147] Cumulative actions are defined as those "which when viewed with other proposed actions have cumulatively significant impacts and should therefore be discussed in the same impact statement," and cover only proposed federal actions, rather than non-federal actions. [148]

The requirement that agencies not address major federal actions in a segmented manner is distinct from the requirement under NEPA to address cumulative impacts. As explained above, a cumulative impact is defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions."[149] Cumulative impacts are therefore not limited to federal actions; they must simply result from reasonably foreseeable actions. A "reasonably foreseeable" action or impact is one that is "sufficiently likely to occur that a person of ordinary prudence would take it into account in reaching a decision."[150] Because the Northern Carteret Bypass and the Gallants Channel Bridge project are reasonably foreseeable, their impacts should be accounted for in the Havelock Bypass DEIS.

The proposed Northern Carteret Bypass is a 33.1 mile four-lane divided freeway in Carteret County.[151] It will directly link the Havelock bypass to the Gallants Channel Bridge project in Beaufort.[152] The purposes of the project include improving traffic safety, operations, and access between Havelock and Morehead City, as well as improving access to the port at Morehead city.[153] Current cost estimates vary between $181 and $295 million, depending on whether a superstreet or freeway is chosen.[154] However, depending on the route chosen, costs could go as high as $390.1 million.[155] The project is currently unfunded.[156] NCDOT is awaiting a record of decision for the Havelock Bypass before planning a route for the Northern Carteret Bypass.[157]

The final major section of Super 70 is a 2.2 mile replacement for the Gallants Channel Bridge from Morehead City to Beaufort, TIP R-3307.[158] Planning is complete and design is underway for a 65' fixed span bridge based on preliminary approval from the US Coast Guard, and should be completed in 2012.[159] Construction was originally scheduled to begin in 2015, but was accelerated by 2.5 years and is now scheduled to start in July 2012.[160] The project is a high priority for several governmental organizations in the area.[161] The project is expected to cost between $73.4 and $105 million and is funded by the State Highway Trust Fund.[162] The Gallants Channel Bridge/Beaufort Bypass project includes the relocation of the current bridge between Morehead City and Beaufort and the construction of five miles of connecting highway to link up with existing US 70, and the Northern Carteret Bypass.[163]

The only mention of the North Carteret Project in the Havelock Bypass DEIS is that it is a bypass from "Havelock to Beaufort paralleling the NC 101 corridor" that "is programmed for a feasibility study only."[164] The Gallants Channel Bridge project is completely omitted from the DEIS.

In May 2007 internal NCDOT emails, the agency discussed whether the Northern Carteret Project (sometimes referred to as the Havelock Connector) be included in the Havelock Bypass cumulative impacts analysis. The emails contained arguments of a federal agency that the Northern Carteret project was reasonably foreseeable, despite it not being a part of the Transportation Improvement Program at the time.[165]

Because the Havelock Connector/Northern Carteret Bypass and Gallants Channel Bridge projects will both link to the Havelock Bypass, are also part of the US 70 Corridor Project and are omitted from detailed study in the DEIS, the DEIS should be revised to include them and to sufficiently evaluate the environmental impacts of the project.

Response No. 26

NCDOT prepared an Indirect and Cumulative Impacts Assessment for the proposed project in September 2013. The results of these studies are included in FEIS Chapters 4.16.3 through 4.16.8.

NCDWQ comments on the report (dated December 31, 2013) state that "the analysis performed is sufficient and no further analysis is warranted at this time".

FEIS Chapter 4.16.1 contains a summary of previous ICE studies; Chapter 4.16.2 summarizes all the FEIS discussions on natural resource ICEs. Table 4.16.1 contains a summary of cumulative effects associated with the proposed project.

See Response No. 12 regarding reasonably foreseeable transportation projects in the area.

Comment 27:

D. The DEIS fails to take a hard look at the effects of the project on air quality.

An EIS should rigorously examine air quality impacts of a proposed project. The DEIS for the Havelock Bypass fails to do so. Rather than conducting a thorough investigation into the impacts of the proposed project on air quality, the DEIS contains stock language on the effects of various air pollutants on health and the environment.[166] The use of stock language on air quality and air pollutants is not the "hard look" required by NEPA and does not enable informed decision making.

Further, the only air quality analysis tailored to the Havelock project is a study performed in 1995. This study has not been updated in the 16 years since it was produced. This is contrary to CEQ regulations requiring agencies to "insure the professional integrity, including scientific integrity, of the discussions and analyses in environmental impact statements.[167] The regulations also state that "[a]ccurate scientific analysis" is essential to implementing NEPA.[168]

Response No. 27

The FEIS clarifies that the proposed project is located in an air quality attainment area (Craven County), meaning that the County is currently compliant with National Ambient Air Quality Standards. Air quality micro-scale analysis (CO hot spot modeling) is based on traffic projections, location of potential receptors, and the alignment of the proposed project. NCDOT updated the air quality analysis in March 2013 based on state-of- the-practice procedures for transportation projects in an attainment area. The results of the updated analysis are described in Chapter 4.7 of the FEIS.

Comment 28:

IV. The DEIS Violates NEPA By Failing to Thoroughly Analyze a Reasonable Range of Alternatives to the Bypass.

The N.C. Department of Transportation first proposed the Havelock Bypass in the City of Havelock's 1979 thoroughfare plan.[169] A TIP number was assigned in 1983, and preparations for an Environmental Impact Statement began in 1992.[170] In December 1996, before the Environmental Assessment ("EA'') was completed, the Preferred Alternative was selected.[171] In 1997, the decision was made to prepare an Environmental Assessment instead of an Environmental Impact Statement.[172] The Environmental Assessment was approved in January 1998, and the Preferred Alternative selected in 1996 was selected as the Least Environmentally Damaging Preferred Alternative in August 1998.[173] While a Mitigated Finding of No Significant Impact ("FONSI") was developed, it was abandoned when the Federal Highway Administration determined that an Environmental Impact Statement ("EIS") was indeed necessary.[174]

When the decision was made to write a DEIS, the document "would also include updated traffic projections and analysis, more community impact studies, and indirect and cumulative impacts studies."[175] Largely, this has not happened.

The Improve Existing US 70 Alternatives were dismissed by NCDOT in 1996 based on traffic operation analyses.[176] While NCDOT claims to have "revisited" the alternatives in the DEIS, no new data was used in the consideration.[177] Likewise, many of the possible corridors for the bypass were eliminated from consideration in 1995, before the right-of-way impact evaluation took place in 1998.[178]

NEPA requires agencies to analyze all environmental impacts of their proposed action.[179] The analysis of environmental impacts is essential to the NEPA process because it "forms the scientific and analytic basis" for comparisons between different alternatives.[180] The DEIS for the Havelock Bypass fails to fulfill this fundamental requirement of NEPA. Many environmental impacts are dealt with summarily, and in some cases completely ignored. Those impacts which are documented are often based on outdated information, and therefore do not provide a sound basis for comparison among alternatives.

A. NEPA requires a meaningful alternatives analysis.

NEPA directs agencies to prepare a "detailed statement" of alternatives to the proposed federal action.[181] CEQ regulations require agencies to "[r]igorously explore and objectively evaluate all reasonable alternatives."[182] An "informed and meaningful consideration of alternatives- including the no action alternative- is an integral part of the statutory scheme."183 The agency must "[d]evote substantial treatment to each alternative considered in detail, including the proposed action, so that reviewers may evaluate their comparative merits."[184] Only those alternatives that are deemed to be unreasonable can be eliminated from the study.[185] Detailing all realistic possibilities forces the agency to consider the environmental effects of a project and to evaluate those against the effects of alternatives.[186]

Thus, a highway project DEIS "should consider all possible alternatives to the proposed freeway, including changes in design, changes in the route, different systems of transportation and even abandonment of the project entirely."[187] "Each alternative should be presented as thoroughly as the one proposed by the agency, each given the same weight so as to allow a reasonable reviewer a fair opportunity to choose between the alternatives."[188] By dismissing functional alternatives without thorough review, the Havelock Bypass DEIS falls short of meeting this required legal standard.

B. The DEIS improperly restricted the detailed analysis to three alternatives.

The DEIS describes only three alternatives in detail. Each of these involves a new location bypass being constructed through the Croatan National Forest. Functional alternatives, like Transportation System Management were eliminated at an early stage in proceedings. Two variations on upgrading the existing US 70 highway corridor were considered, with one being eliminated at a very early stage, and the other not being considered as a detailed study alternative. Of the three alternatives that were considered in detail, Alternative 3 was selected.[189] The decisions about alternatives were made as early as 1996, well before FHWA and NCDOT began to work on this Draft EIS.

Discussion of alternatives other than a new location bypass occupy only eight pages of the DEIS. The DEIS rejects all reasonable alternatives to the proposed action on the basis that they are incapable of meeting the goal of "enhancing the ability of US 70 to serve the regional transportation function in accordance with the Strategic Highway Corridors Plan[190] which is, in short, to build a freeway.

Response No. 28

See Response Nos. 1 and 2 regarding the upgrade existing alternatives, the project's purpose and need, degree of impacts, and reasons why they were eliminated from further study.

Under the NEPA/404 process and CEQ regulations, it is both efficient and lawful to develop and remove preliminary alternatives (with suitable reason) before detailed study is conducted.

The commenter asserts that every preliminary alternative would require the same high level of detailed analysis before an alternative could be eliminated – even if sufficient information is available to warrant said elimination. This is not the case. The alternatives development process is explained in detail in the Draft EIS and the Final EIS.

Comment 29:

C. The DEIS focus on the US 70 Corridor Project artificially narrows the basis for selection of alternatives.

NEPA regulations require the Agencies to provide a statement specifying "the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action."[191] An agency may not "narrow the objective of its action artificially and thereby circumvent the requirement that relevant alternatives be considered,"[192] rendering the EIS a "foreordained formality."[193] One of the primary purposes of the project is to enhance the ability of US 70 to serve the regional transportation function in accordance with the Strategic Highways Corridors Plan.[194] Here, the DEIS becomes a formality because of the focus on completing the bypass as a part of the US 70 corridor project, and the justification for the US 70 Corridor project itself is questionable.

The Super 70 project, also called the U.S. 70 Corridor project was designated as one of North Carolina's priority long-range, statewide transportation projects in 2004.[195] The Super 70 commission aims to provide freeway access that extends from I-40 to the port in Morehead City.[196] The principle goals of the Highway 70 corridor are to "enhance the economic prospects of North Carolina's southeast region by providing efficient movement of travelers and goods along the corridor from the central region of the state to important shipping ports and vacation destinations on the coast, and to increase travel safety."[197] The goals of the US 70 Corridor project are unrealistic and unlikely to be achieved by completion of the Havelock Bypass.

First, the construction of the new location bypass without upgrading the existing route through Havelock has not been shown through quantifiable data to improve safety within the US 70 Corridor. Then, long term freeway access with no lights from Raleigh to Morehead City is also unlikely, as the induced growth at the termini of the Havelock Bypass will likely result in a need to control access, thus requiring a re-introduction of traffic signals. Next, the economic goals of the Super 70 Corridor project are unlikely to be achieved, as getting travelers to the port and vacation destinations on the coast, has not been shown to create enough commerce along the route to offset the loss of commerce to bypassed businesses. Further, getting freight to and from the small port at Morehead City has not been shown to significantly contribute to economic growth in southeastern

North Carolina.[198] The viability of the port as an economic engine for the state is highly questionable based on this data, and the DEIS does not show otherwise.

For these reasons, The US 70 Corridor Project artificially narrows the selection of alternatives, and is unproven in its potential to benefit eastern North Carolina.

Response No. 29

FHWA and NCDOT do not agree with this comment. The project limits constitute independent and logical termini which provide ample room to consider alternative corridors and improvement types.

Strategic Highway Corridors (now STC) comprise an important component of NCDOT's long-range planning, which is not only required by federal law – but clearly supported as a viable element of Purpose and Need. See Response Nos. 1 and 2 regarding the improve existing alternatives and the project's purpose and need. The FEIS thoroughly presents a Purpose and Need justification. Safety is a secondary Purpose; however the FEIS also points-out how travel on a Bypass is safer than on existing US 70. The Port at Morehead City is North Carolina's only deep water port and generally considered to be a critical element of the state's economy. The Port relies on an efficient highway network throughout the state for the distribution of goods to and from the facility. All of these factors are integral and important elements in the state's economy.

The 2010 Strategic Transportation Investments (STI) Law (House Bill 817) established the Strategic Mobility Formula, a new way of allocating available revenues based on data-driven scoring and local input. The Strategic Mobility Formula is a data-driven analysis that evaluates, among other factors, how a project fits in with local priorities. The FEIS reflects final results of the Strategic Mobility Formula analysis. Resolutions of local support for the proposed project are appended to this document.

Comment 30:

D. The DEIS fails to provide quantifiable data to determine if the detailed study alternatives actually meet the project goals of safety and improved mobility.

1. The DEIS fails to provide sufficient data on Levels of Service at intersections along the existing route, including safety.

First, while the DEIS claims that levels of service are improved by selecting the preferred alternative over the no-build alternative, it does not provide sufficient data to substantiate the claim. Level of Service ("LOS") is the effect of a number of factors such as speed, travel time, traffic interruptions, freedom to maneuver, driving comfort, convenience and safety.[199] Six levels are defined, from A to F, with A being the most desirable level.[200] In this case, the data on levels of service at intersections should assist the decision-maker in discerning how a particular intersection functions. It provides a basis for comparing whether changes will allow it to function at a higher level of service.

The DEIS states that two of the fourteen intersections with traffic signals were operating at undesirable levels of service in 2008, but only provides level of service information for four of the intersections, and not the other ten.[201] Based on the information provided in the DEIS, the decision-making agencies cannot know whether these four intersections are the root cause of congestion or whether factors at the other ten contribute to the problem.

The DEIS also notes that "None of the existing signalized intersections will accommodate the forecasted design year 2035 design hour traffic at an acceptable level of service" under a no-build scenario, but also show that after construction "the existing route, while improved from the no-build option, will still experience poor traffic operations with local traffic use by the design year."[202] The statement that existing US 70 would be "improved from the no-build option" is misleading. Under the No-Build scenario the intersections would provide a level of service of seven instances out of eight, with the eighth providing LOS E. Constructing the bypass would raise only one of these instances from F to D.[203]

The selection of the detailed study alternatives is also not supported through the data on safety in the project study area. The DEIS must consider alternatives to the proposed action that may partially or completely meet the proposal's goal and it must evaluate their comparative merits.[204] One of the proposed goals of the proposal is to improve safety, but the preferred alternative has not been shown to significantly advance that purpose relative to other potential investments. For instance, Craven County had the highest number of crashes of all the Super 70 counties over 3 years at 1,194.[205] The Bypass area has a crash rate of 150.18 I 100 MVMT, above the county average along US 70 of 116.29.[206] However, the Bypass would only avoid one of the four most dangerous intersections along US 70 in Craven County, US 70 and NC 101 I Fontana Boulevard I Miller Boulevard in Havelock.[207] The other three, US 70 and Williams Road in James City,[208] US 70 and Grantham Road in James City,[209] and US 70 and US 17 in New Bern[210] would be unaffected. Likewise, the Bypass would only avoid one of the two most dangerous sections of US 70, between Webb Street and Shepard Street in Havelock."[211] While the DEIS notes that crash rates along existing US 70 exceeded the state averages for four lane roads with partial or fully controlled access, the DEIS provides no quantifiable data that a new location bypass will actually reduce accident rates along this section of road.[212]

Response No. 30

FEIS Chapter 2.8.3 includes a travel time analysis that was developed to demonstrate the results of the traffic capacity analysis shown in the DEIS. It is noted that the comparison of No-Build versus Build shows a travel time reduction for every growth scenario presented. The DEIS Reevaluation contains an updated traffic analysis for existing US 70 intersections. The analysis shows that only a freeway facility meets LOS performance criteria and also demonstrates that design-year traffic along existing US 70 requires a bypass in order to function at an acceptable level of service.

An updated accident analysis is also provided in Chapter 1.10.

Comment 31:

2. The narrow goal of "uninterrupted service" for the project area is not supported by data on through and local trip times.

The narrow purpose espoused in the DEIS foreordains the selection of a new location bypass as the recommended alternative. It is rooted in an artificially constricted conception of the project need: namely, US 70's diminished ability "to function as envisioned in the Strategic Highway Corridors Plan."[213] The DEIS chooses to find needs in the claim that "[t]he lack of access control ... substantially reduces the mobility of this corridor and that [t]raffic signals prohibit uninterrupted service[.]"[214]

While there may be a need identified in the statement-to improve the safety and mobility of the corridor, the language chosen by the Transportation Agencies blames the absence of uninterrupted service as the root of the problem without adequate justification. Instead of seeking to improve mobility along the corridor, with a variety of solutions, the Transportation Agencies have chosen to seek uninterrupted service, necessarily requiring a bypass. The DEIS thus views the absence of a freeway in the corridor as a specific need to remedy.

Because the DEIS frames the problem of US 70 as the lack of a freeway, the analysis that follows, including the project purpose, necessarily restricts itself to this narrow framework. Although the project purpose cites a need "to improve mobility" within the study area, the DEIS specifies that the solution must provide "uninterrupted service" as well to "meet the goals and long-term visions of the Strategic Highway Corridors Plan ("SHC")."[215] Of course, the SHC Plan "is ultimately envisioned as a controlled access, median-divided freeway[.]"[216] In short, the project's purpose is to improve mobility by building a freeway. The project's purpose does not include improving mobility by adopting any alternative other than a freeway. This condition thus collapses the project purpose into the narrow goal of building a freeway. The DEIS appears to advance the notion that the SHC concept and other "tools to influence" planning should displace an objective analysis of alternatives under NEPA. They do not.

The DEIS does not support this narrow goal with any specific, empirically verifiable data such as average travel times between the Port of Morehead City and Interstate 95, average trip times between Raleigh and beaches in Carteret County or local commute times. In the eight references to travel times in the DEIS, the document states simply that travel times will be reduced by construction of the Havelock Bypass.[217] The study does not include actual current travel times vs. projected future travel times for the Bypass or for any other alternative. Further, while there are at least seven mentions of how traffic lights slow traffic on the existing route, there is no comparison of how the existing route could be improved by enhanced timing signalization.[218]

Response No. 31

NCDOT does not agree with the comment. The DEIS and FEIS present non-freeway alternatives. See Response Nos. 1, 2 and 17 which describe the travel time analysis results and updated traffic analysis, discuss the purpose and need, and then discuss why alternatives were eliminated.

Comment 32:

E. The DEIS fails to adequately consider a cumulative, reasonable upgrade existing alternative.

The consideration of alternatives is "the heart of the environmental impact statement."[219] The EIS must consider alternatives to the proposed action that may partially or completely meet the proposal's goal and it must evaluate their comparative merits.[220] Considering alternatives that only partly meet the project goals allows the decision maker to consider whether meeting part of the goal with less environmental impact may be worth the tradeoff with a preferred alternative that has greater environmental impact.[221] A feasible alternative to the proposed action, that can still address the project goals of improving safety in the corridor and enhancing mobility, should be considered. That alternative combines access management, converting some segments of the existing corridor to a "superstreet" design and increased rail capacity.

Response No. 32

The FEIS presents the project's two distinct primary purposes. Any alternative that clearly fails to meet one of those primary purposes is not reasonable and should be eliminated in accordance with CEQ guidelines.

See Response Nos. 1, 2, and 31 with respect to the improve existing alternatives. Of the two improve existing alternatives, the six-lane Expressway option would remove driveway connections and maintain major signalized intersections much in the same way that a modified superstreet system would. However, upgrading the existing highway to an Expressway-level facility does not provide a consistent operational LOS of D or better in the design year. The alternative does not meet one of the two primary purposes, and is therefore unreasonable, and was appropriately rejected during the early scoping stage of the project.

FEIS Chapter 2.4.2 includes a discussion of rail alternatives. As discussed in the FEIS, the NC Maritime Strategy states, "For the most part, North Carolina's rail network offers sufficient capacity to accommodate additional rail trips that would be generated by the market opportunities identified by the Maritime Strategy" but notes that highway and rail investments are needed to improve cost and operational efficiencies, including: a new intermodal terminal east of Charlotte; improvement of rail-related traffic impacts in Charlotte (being addressed through the NCDOT CRISP Program) and the subsequent expansion of the existing CSC Charlotte intermodal terminal, relocation of the rail line in Morehead City; the development of inland rail ramps at certain industrial sites; and the Pembroke Connector (STIP No. P-4900).

One of the most crucial needs with respect to a rail or multimodal alternative would be the relocation of the rail line extending from the Port through Morehead City. The rail line is located in the middle of the Arendell Street median and has 30 at-grade crossings along the 3.5-mile length west of the port. The at-grade crossings on Arendell Street could be blocked for upward of 12 minutes while trains are assembled and another 20 minutes while the train is moving through the area. The current speed through Morehead City is a maximum of 10 miles per hour, but it is likely lower due to the high number of at-grade crossings.

As further stated in the Strategy report, "Low historical rail freight volumes to both Wilmington and Morehead City have resulted in high per-unit rail costs, making rail transport less competitive as compared to truck transport within the state." Table 3 of the report shows that over 90% of shipments within and originating from NC are made by truck. The report also states, "The dominance of truck freight for North Carolina is expected to persist through 2040."

A number of the rail improvement projects listed above are currently being studied or implemented, but they are not considered to be "reasonable alternatives" as part of this project. Given the state's overwhelming reliance on trucking, a large number of rail improvements would be needed to considerably reduce truck traffic on US 70 through Havelock. Rail improvements are planned for the state; however, there is no single or specific set of rail improvements or combination of multimodal improvements that would reduce truck traffic on US 70. As such, there is no reasonable alternative that includes rail improvements.

Comment 33:

1. *Incorporation of short term and long term suggestions from its own US 70 Access Management Study in the DEIS.*

In July 2005, NCDOT released the "US 70 Access Management Study"[222] for the portion of US 70 running from Clayton to Morehead City, NC. The study "evaluate[s] existing operational characteristics and safety concerns along the corridor and develop[s] a conceptual access management plan that reinforces the primary function of this strategic corridor for providing mobility between regional destinations."[223] The study underscores the importance of access management as a tool for improving roadway performance. It states that "[o]ne of the most useful tools employed by transportation professionals for protecting mobility within these types of corridors is access management, whereby the location, spacing, design, and operation of driveways, median openings, and street connections are controlled in a systematic, predictable manner."[224] Importantly, the study states that in general "no single improvement will solve transportation issues along US 70, but together, the phased improvements recommended in the plan facilitate a safer, more systematic, predictable and efficient transportation corridor."[225]

Six of the segments examined in the study are located in Craven County. Three of these segments (Craven-1, Craven-2 and Craven-3) are located west of the proposed bypass. The three remaining segments (Craven-4, Craven-5 and Craven-6) either connect to the proposed bypass or will be circumvented by the bypass.[226]

The study provides short-term and long-term recommendations for each segment. Short-term recommendations include median closures, mainline directional crossovers, signal removal, median U-turns, raised medians and signal coordination. The long-term recommendations for Craven-4, Craven-5 and Craven-6 assume the building of the Havelock Bypass (e.g., "connections to TIP# R-1015 Havelock Bypass"). They also, however make numerous recommendations including service road extensions, closure of access points and median openings, ramp-over interchanges, installation of raised medians, signal removal and cross parcel access streets. The study states specifically that "coordination of traffic signals in the more urban areas of the corridor could demonstrate improved travel times and safety along US 70."[227]

Similar enhancement measures are addressed in a cursory fashion in the Transportation System Management ("TSM") section of the DEIS. The Agencies describe TSM measures as traffic signal timing optimization, speed restrictions, access control, and physical improvements such as turning lanes, high-occupancy vehicle ("HOV") lanes and intersection realignments.[228] After setting out what TSM measures are, the DEIS goes on to dismiss the measures as being unable to reduce traffic congestion enough to improve the levels of service on US 70 to an acceptable level; but provides no data to substantiate the statement. In fact, discussion of TSM in the DEIS is less than four pages.

As a measure that forms part of a viable alternative to building a bypass around US 70 in Havelock, the DEIS should include additional data about the costs and effectiveness of access management. The Agencies should update and expand the US 70 Access Management Study and further analyze the measures proposed by that study, and they should outline the costs and effectiveness of access management measures associated with more minor improvements such as closing median breaks and rerouting driveway access along US 70. Combined with other measures, access management could improve mobility more than a bypass alternative at a lower cost, but there is no way of knowing with any certainty on the basis of the cursory description offered in the DEIS.

Response No. 33

NCDOT agrees that there are benefits of access management, and that "coordination of traffic signals in the more urban areas of the corridor could demonstrate improved travel times and safety along US 70." However, it is faulty to assume that access management strategies "could improve mobility more than a bypass alternative."

See Response No. 1 regarding the improve existing alternatives. The Upgrade Existing: Expressway alternative incorporated access management strategies into the concept. Yet as described in Chapter 2, that alternative does not improve traffic operations substantively. Chapter 2.6.6 of the FEIS states that the US 70 Access Management Study acknowledges the need for the proposed bypass.

Comment 34:

2. The DEIS fails to consider upgrading the existing route through a superstreet alternative.

While the DEIS considered an Improve Existing alternative, it did not fully examine all upgrade options for the existing road. One option not considered was upgrading the existing US 70 to a superstreet.[229] A superstreet would meet all or most of the underlying aims of the purpose and need.[230] Superstreets are specifically designed to handle congestion caused by traffic signals and left-turning traffic.[231] Because a superstreet does not impact adjacent businesses in the same manner as many other upgrades, they are less likely to cause the negative economic impacts associated with restricted access options or a bypass.[232] They can be built without traffic signals, although signals may be necessary in busy locations. At a cost of $105,000 per intersection, they are much less expensive than a bypass and can save money in the long run.[233]

Superstreets can provide traffic benefits when other alternatives are unavailable or unfeasible, and have been shown to reduce travel time in multiple situations.[234] In fact, a study commissioned by the NCDOT concluded that superstreets are "a viable option for upgrading arterials where low volume, two-lane roads meet a high-volume, divided, four-, six-, or eight- lane arterial."[235] The study noted that superstreets are "best suited for divided arterials with high through and left turn volumes on the major road."[236] That study also recommended "building superstreets as a corridor rather than a single, isolated intersection where possible."[237] In sum, the study concluded that superstreets are a viable option for roads such as US 70 though Havelock. As such, superstreets in combination with other upgrades should be considered in the revised DEIS as an alternative upgrade to the existing roadway.

Response No. 34

See Response No. 1 regarding the improve existing alternatives and superstreet designs.

As described in FEIS Chapter 2.6, the "Upgrade Existing: Expressway Alternative" was eliminated due to a number of reasons. The proposed facility performed poorly with design year traffic levels, presented operational challenges to local traffic, and was not compatible with goals detailed in the City of Havelock's Comprehensive Plan to "set a new vision for the US 70 Corridor that will transform Main Street back into a community asset."

Comment 35:

3. The DEIS fails to adequately consider rail to reduce demand on US 70, thereby improving level of service.

a. Freight rail

While further improvements to infrastructure are planned to start in Morehead City to facilitate increased freight travel by rail,[238] railroads are only mentioned as a mode of transportation in three locations in the DEIS. In each instance, the DEIS states that there are two freight railroads operating in the project area, one privately owned and one owned by the federal government, and that neither offer passenger service.[239] The US 70 Commission recognizes the need for rail service between the port in Morehead City and Global TransPark to avoid congestion on US 70.[240] For example, one planned improvement is for North Carolina Railroad ("NCRR") to install a second line along more sections of track and to upgrade signals.[241] These upgrades would allow freight trains to reach speeds of up to 79 MPH.[242] NCDOT is also studying whether to relocate existing train tracks from their downtown locations to follow the Super 70 corridor.2[43] Still, in the DEIS, rail is dismissed from consideration as a component of a multi-modal transportation system without any analysis. There are currently 3,230 miles of freight railroads in North Carolina.[244] Freight rail employs 2,237 people in North Carolina with average wages and benefits of $92,300.2[45] Adjusted for inflation, the cost of freight rail in the U.S. has dropped by more than 50% over the past 30 years.[246] As a result, freight rail rates in the U.S. are the lowest in the world.[247] Because of the benefits of freight rail and its potential to be enhanced in the project study area, it should have been more thoroughly studied in the DEIS.

Response No. 35
See Response No. 32.

Comment 36:
b. Passenger rail

The DEIS correctly notes that there are two railroads currently servicing Havelock and that neither offers passenger service at this time. However, Amtrak announced in a presentation to the Super 70 Highway Commission in January of this year that it was considering expanding service into eastern North Carolina.[249] The company is considering two dedicated thruway routes in eastern North Carolina, one of which would stop in Havelock.[250] That train would depart Raleigh and stop in Wilson, Greenville, Kinston, New Bern, and Havelock before ending in Morehead City.[251] Amtrak predicts a first-year ridership of 13,000 trips for this route.[252] Amtrak has specifically cited the military population of eastern North Carolina as a reason for considering expansion into the area.[253] Amtrak has seen a 54% increase in ridership in North Carolina in the past five years, reaching 800,000 boardings and de-boardings in North Carolina in 2010.[254] As was noted at the presentation, a majority of Amtrak services travel at relative high rates of speed, which would make them a time effective alternative means of transportation for vacationers travelling between Raleigh and the beach.[255] The Amtrak plan received interest from the Super 70 Highway Commission and has been endorsed by local governmental agencies.[256] Because the Amtrak plan is supported by the Super 70 Highway Commission, because it could alleviate through-traffic congestion on the existing corridor and because it could provide access for travelers to Morehead City and Carteret county beaches, passenger rail should have been considered in greater detail in combination with other upgrade existing alternatives.

Response No. 36

Due to the level of forecasted traffic volumes and substantial proportion of regional through traffic (vs. local traffic), passenger rail was not deemed to be a feasible alternative to a bypass. Implementation of future rail is also still uncertain with no defined programming.

Comment 37:

V. Alternative 3 Cannot Be Selected as the Least Environmentally Damaging Practicable Alternative.

The stated project purpose- to build a freeway- essentially restates the specific project design desired from the outset by the Transportation Agencies, rather than identifying the primary underlying purpose of the project. As such, it is too narrow to support consideration of the reasonable range of alternatives required by the National Environmental Policy Act. Consequently, it is also insufficient to support the identification and permitting of the least damaging practicable alternative that meets the underlying purpose of the project, as required under Section 404 of the Clean Water Act.

Under Section 404 of the Clean Water Act, permits for dredged or fill material must be evaluated through the application of the 404(b) Guidelines.[257] Those Guidelines provide that a permit application must be denied if there is a practicable alternative to the proposed project that has a less adverse effect on the aquatic ecosystem, if the proposed project would result in significant degradation, or if there is not sufficient information to make a reasonable judgment that the project will comply with the guidelines.[258] A permit application must be rejected if it meets any of these conditions.

The DEIS omits the information that is necessary to conduct the analysis required by the 404(b)(1) Guidelines. Those Guidelines require the DOT to evaluate the effect of the proposed project on substrate, water circulation, turbidity, contamination, and aquatic ecosystems and organisms. The DEIS's discussion of the potential impacts of the proposed highway is cursory, superficial, and fails to make an effort to compare and contrast these potential impacts between alternatives. Without support, it summarily states that "[n]o substantial adverse long- term impacts on water quality are anticipated as a result of any of the alternatives for the proposed project."[260] The project cannot be authorized based on the DEIS because "[t]here does not exist sufficient information to make a reasonable judgment as to whether the proposed discharge will comply with the [] Guidelines."[261]

In addition, the DEIS fails to document any efforts that have been made to avoid and minimize impacts to streams and wetlands within the alternative corridors. Protection of aquatic ecosystems under the Clean Water Act and the state program is based on a sequential analysis of avoiding impacts that can be avoided, minimizing impacts that cannot, and mitigating for harm from unavoidable impacts.[262] Yet the DEIS assumes that the proposed impacts for each alternative are justified without providing any analysis demonstrating that appropriate avoidance and minimization of impacts has implemented. The LEDPA cannot be selected based on the DEIS because the alternatives analysis "does not include all appropriate and practicable measures to minimize potential harm to the aquatic ecosystem."[263]

Moreover, based on the information contained in the DEIS, Alternative 3 cannot be selected as the Least Environmentally Damaging Practicable Alternative ("LEDPA"). Notably, the DEIS does not eliminate either Alternative 1 or 2 as impracticable. According to the DEIS, Alternative 2 affects significantly fewer wetlands (>30%) than Alternative 3 overall.[264] Alternative 1 affects fewer

streams and wetlands both overall and within the Croatan.[265] Although significantly more analysis under the 404(b)(1) Guidelines is necessary to evaluate the difference in these impacts, it does not appear that Alternative 3 can be selected as the LEDPA because "[t]here is a practicable alternative to the proposed discharge that would have less adverse effect on the aquatic ecosystem."[266]

Response No. 37

This comment is a combination and summary of previous comments. See Response Nos. 1-5.

Comment 38:

VI. The DEIS Unlawfully Excludes a 4(f) Analysis.

Under federal law, the U.S. DOT "shall not approve any program or project ... which requires the use of any publicly-owned land from a public park, recreation area, or wildlife and waterfowl region of national, State or local significance."[267] The EIS appropriately identifies this restriction on DOT action, but then inappropriately restricts its scope and determines that it is inapplicable to the proposed project. As discussed below, DOT must conduct a 4(f) analysis before any impacts to the Croatan National Forest can be approved because each of the proposed corridors would affect designated wildlife areas, gameland, and significant natural heritage areas that are protected by the statute.

Section 4(f) recognizes the importance of public lands and requires their essential purposes to be protected. As FHWA's regulations implementing the statutory requirements detail, the prohibition on impacts to public lands apply to any lands "which function for, or are designated in the plans of the administering agency as being for, significant park, recreation, or wildlife and waterfowl refuge purposes."[268] This recognition of that public lands that either function or are designated for the protected purposes fall under the statute's protections has been recognized by the Second Circuit. It held that the plain language of the statute had "no requirement that the public parklands to which it applies be permanently designated as such, and we decline judicially to engraft such a requirement on the statute, given the Congressional policy expressed in the statute that parklands be afforded heightened protection."[269] In other words, land is a Section 4(f) resource if it is "'designated or administered, formally or informally[,]' for a purpose identified in section 4(f)."[270]

To be sure, any of the three proposed corridors studied in detail in the DEIS would significantly affect public lands that function for, or are designated as, wildlife and recreational areas. These public lands require a 4(f) analysis because of their recognition as RCW habitat, black bear habitat, gamelands, and significant natural heritage areas.

Most notably, the area that would be affected by the proposed highway functions as habitat for RCW and large portions has been designated as habitat management areas for future expansion of RCW populations. As noted in the DEIS, the proposed bypass would affect six current RCW colonies and four recognized HMAs. These areas an HMAs are critical to meeting the LRMP's long-range goal of"[r]ecover[ing] a viable population" and would directly affect the objective of"[m]aintain[ing] the existing 12,000 acres of long leaf pine forest type as pine savanna."[271]

Moreover, portions of the property are designated as black bear sanctuary by the N.C. Wildlife Resources Commission. As part of the LRMP, the Forest Service has identified a goal [sic] of providing "suitable habitat conditions for long-term viability of the black bear population on the CNF."[272] To do so, the plan aims to provide "landscape linkages to other bear habitat and potential foraging areas on public and private land."[273] The sanctuary land that would be affected by the proposed highway currently connects public and private land, providing this type of landscape

linkage. In its recent draft Black Bear Management Plan, the N.C. Wildlife Resources Commission reports that nearly a quarter of all black bear harvest on game lands in the Coastal Bear Management Unit occurred in the Croatan.[274]

As the DEIS acknowledges, two natural areas that have been specially recognized by the N.C. Natural Heritage Program would be affected by the proposed project, though the extent depends on the chosen alternative. The Southwest Prong Flatwoods Natural Area is recognized as being state significant, meaning it is among the best occurrences of that type of wildlife community in North Carolina. The Havelock Station Flatwoods and Powerline Corridor Natural Area has been recognized as regionally significant, meaning that it is among the most outstanding examples of that wildlife community in the surrounding region.

The portions of the Croatan that would be affected by the project also hold recreational value. Recreation is, in fact, one of the Forest Service's priorities under its current plan. The LRMP identifies increasing non-traditional recreational opportunities such as biking and equestrian as well as expanding hunting, fishing, and wildlife-related recreational opportunities as two issues to be addressed in management decision making.[275] The DEIS recognizes these uses, describing the forest as "gameland open to fishermen and hunters with the proper licenses and permits."[276]

In addition, staff at both the FWS and FHWA has recognized that this project must undergo 4(f) review because of its impacts on the Croatan National Forest. In 1998, the FWS criticized the EA for being incomplete for failing to address Section 4(f) based on the "understanding that National Forests have been established using Federal funding and among their purposes are use and enjoyment of recreational opportunities by the public."277 More recently, an FHWA engineer observed that "[t]here seem to be 4f issues associated-with this project. Given that the proposed bypass will destroy portions of USFS lands designated for recovery of the federally endangered RCW, how would this not be a 4f issue?"278

The proposed project would significantly and detrimentally impact public lands that function, and are designated in the Forest Service's LRMP, for the purpose of recreation and wildlife protection, and are designated as state and regionally significant natural communities. FHWA staff has rightly asked, "how would this not be a 4f issue?" Based on the established uses present in the Croatan National Forest and the designations of sections of the forest as natural areas, wildlife management areas, gameland, and black bear sanctuary, DOT must fully evaluate the proposed project under 4(f).·

Response No. 38

Response No. 8 specifically answers the Section 4(f) comment.

Response Nos. 4 and 24 specifically address RCW concerns.

With regard to black bear and other species (including plants): the FEIS discusses development of the project through technical studies, avoidance, minimization, commitments, and mitigation. These efforts were undertaken to resolve habitat concerns of the proposed Havelock Bypass project. For example, the Management Indicator Species report specifically addressed black bears while commitments and the Biological Evaluation contain measures to minimize impacts to areas of sensitive habitat.

See Response No.4 and FEIS appendices that contain a November 2014 letter to USFS. The letter contextually explains how, after considering project impacts - that transferring the Croatan

Wetland Mitigation Bank to USFS ownership provides a net benefit to the CNF, which will enhance the overall management mission and objectives identified in the Land and Resource Management Plan (2002).

SELC Footnotes

[1] DEIS at S-2.
[2] http://www.ncdot.org/projects/US70corridor/
[3] DEIS at 1-8.
[4] Id.
[5] Id. at 4-33.
[6] Id. at 4-66
[7] Id. at 1-7.
[8] Id.
[9] Id. at 2-31.
[10] Id. at 2-19.
[11] Id. at 1-21.
[12] Fla. Key Deer v. Brown, 364 F.Supp.2d 1345, 1361 (S.D. Fla. 2005).
[13] 16 U.S.C. § 1532(3).
[14] 16 U.S.C. § 1536(a)(2).
[15] U.S. Fish and Wildlife Service, Recovery Plan for the red-cockaded woodpecker *(Picoides borealis):* second revision at 4 (2003) ("Recovery Plan").
[16] Recovery Plan at 5.
[17] Id.
[18] Id.
[19] Id.
[20] Id. at 6.
[21] Id. at 10.
[22] Id. at 7.
[23] Id. at 8 (emphasis added).
[24] Id.
[25] Id.
[26] U.S. Department of Agriculture, Forest Service, Southern Region, Croatan National Forest Land and Resource Management Plan at 71 (2002)("LRMP").
[27] See Recovery Plan at 140-41.
[28] Id. at 22.
[29] Id. at 150.
[30] Id. at 146.
[31] Id.
[32] Id. at 149.
[33] See id. at 134.
[34] Id at l33.
[35] LRMP at 71.
[36] Recovery Plan at 162.
[37] Id. at 8.
[38] Id. at 24.
[39] Id. at 25.
[40] Id.
[41] Id. at 26.
[42] Id. at 27.
[43] See id. 30.
[44] Id at 22.
[45] Id. at 52 (fig. 1).

[46] Id. at 69, 113.
[47] Id. at 70.
[48] Id. at 106.
[49] Id. at 41; LRMP at 38.
[50] Recovery Plan at 71.
[51] Id. at 105.
[52] LRMP at 36.
[53] Recovery Plan at 105.
[54] LRMP at 38.
[55] Recovery Plan at 20.
[56] Id. 202.
[57] Id. at 111.
[58] LRMP at 23.
[59] DEIS Figure 3-2.
[60] See DEIS at 4-67.
[61] DEIS at 4-67.
[62] Recovery Plan at 8.
[63] DEIS at 4-67.
[64] Id. at 4-63
[65] Recovery Plan at 166.
[66] DEIS at 4-68.
[67] DEIS at 4-71.
[68] See id. at 4-67.
[69] See 16U.S.C. § 1536(a)(1).
[70] See Interagency Prescribed Fire: Planning and Implementation Procedures Guide, Appendix 2 (July 2008).
[71] DEIS at 4-74.
[72] Id. at 4-74.
[73] Id. at S-15
[74] Id. at 4-74.
[75] See Notes by Gary Jordan, 10/18/2010 Meeting with USFS, NCDOT, FHWA, and JCA; Notes by Gary Jordan, 10/6/2010 Meeting with USFS in Raleigh (Attachment 1).
[76] DEIS at4-71.
[77] See Email from Gary Jordan, FWS, to Mark Pierce, NCDOT (Oct. 7, 2010) (Attachment 2).
[78] DEIS at 4-70.
[79] Id. at 4-73.
[80] Id.
[81] Id. at4-74.
[82] Id.
[83] Id. at 4-75; see id. at 6-64.
[84] 16 U.S.C. § 1536(a)(l), (2).
[85] Tenn. Valley Auth. v. Hill, 437 U.S. 153, 180 (1978).
[86] Nat'l Wildlife Fed'n v. Coleman, 529 F.2d 359, 373 (5th Cir. 1976) (quoting D.C. Fed'n of Civic Ass'ns v. Volpe,
459 F.2d 1231, 1239 (D.C. Cir. 1972)).
[87] Id.
[88] ld. at 374.
[89] fl. Key Deer, 364 F.Supp.2d at 1355.
[90] 42 U.S.C. § 4321 et seq.
[91] Hughes River Watershed Conservancy v. Glickman, 81 F.3d 437, 443 (4th Cir. 1996).
[92] Natl. Audubon Soc'y v. Dept. of the Navy, 422 F.3d 174, 184 (4th Cir. 2005).
[93] Id.
[94] 42 U.S.C. § 4332(c).

[95] 422 F.3d at 194.
[96] 40 C.F.R. § 1500.1
[97] 40 C.F.R. § 1502.5.
[98] Concerned About Jet Noise, Inc. v. Dalton, 48 F. Supp. 2d 582, 607 (E.D. Va. 1999).
[99] 40 C.F.R. § 230.10, et seq.
[100] 40 C.F.R. § 1508.8(b).
[101] DEIS at S-6.
[102] Id. at 1-14.
[103] Id. at 4-11.
[104] Economic Effects of Highway Relief Routes on Small and Medium-Sized Communities at 1, 93.
[105] California Bypass Study: The Economic Impacts of Bypasses, Vol. 1, Planning Reference at 3. Economic Impacts of Highway Bypasses on Communities- Summary at 4.
[106] DEIS at 4-11.
101 Id.
[108] Impact of a New Bypass Route on the Local Economy and Quality of Life at ii.
[109] DEIS 3-9, Table 3-9.
110 Id.
[111] California Bypass Study: The Economic Impacts of Bypasses, Vol. 1, Planning Reference at 3. Economic Effects of Highway Relief Routes on Small and Medium-Sized Communities at 98.
[112] California Bypass Study: The Economic Impacts ofBypasses, Vol. 1, Planning Reference at 3.
[113] Case Studies of the Economic Impact of Highway Bypasses in Kansas at 60, 64, 68.
[114] Case Studies of the Economic Impact of Highway Bypasses in Kansas at 64, 68.
[115] Case Studies of the Economic Impact of Highway Bypasses in Kansas at 64, 68.
[116] 40 C.F.R. § 1508.8(b); Mullin v. Skinner, 756 F. Supp. 904,917 (E.D.N.C. 1990) ("It is an irrefutable reality that the easier it is to get somewhere, the more people will be inspired to do so.").
[117] 40 C.F.R. § 1508.8(b).
[118] City of Carmel-by-the-Sea v. United States DOT, 123 F.3d 1142, 1162 (9th Cir. 1997).
[119] Economic Effects of Highway Relief Routes on Small and Medium-Sized Communities at 97.
[120] Id. at 2-8.
[121] Id. at 1-13, 3-26.
[122] Id. at 3-17.
[123] Id. at 1-12,3-17.
[124] Economic Effects of Highway Relief Routes on Small and Medium-Sized Communities at 98.
[125] DEIS at 4-94.
[126] California Bypass Study: The Economic Impacts of Bypasses, Vol. I, Planning Reference at 4. Case Studies of the Economic Impact of Highway Bypasses in Kansas at 55.
[127] Case Studies of the Economic Impact of Highway Bypasses in Kansas at 55.
[128] Impact of a New Bypass Route on the Local Economy and Quality of Life at ii.
[129] DEIS at 4-95.
[130] DEIS at 4-14, 4-94 to 4-95.
[131] http://www.claytonnewsstar.com/2011108/07*I*1396887*I*council-approves-bypass-overlay.html.
[132] http://www.claytonnewsstar.com/2011108/07/1396887/council-approves-bypass-overlay.html.
http://www.claytonnewsstar.com/2011/07/20/1577740/encouraging-development-should.html.
[133] http://www.claytonnewsstar.com/2011/09/25/1515165/development-coming-to-nc-42.html.
[134] http://www.claytonnewsstar.com/2011109/25/1515165/development-coming-to-nc-42.html.
[135] DEIS at 1-12. "As the commercial district along US 70 in Havelock generates more business, more traffic signals become warranted to safely allow access to and across the route. Each new signal delays through-traffic and deteriorates...traffic service along the route. Without improvements to accommodate the anticipated increases in traffic, the level of traffic service along US 70 will continue to deteriorate."
[136] 40 C.F.R. § 1508.25(c)(3). Cumulative impacts are distinct from cumulative actions. Cumulative actions are those "which when viewed with other proposed actions have cumulatively significant impacts and should therefore be discussed in the same impact statement." 40 C.F.R. § 1508.25. This requirement prohibits "segmentation," and requires those actions which are all really part of the same project to be considered together, rather than separated

into multiple NEPA documents. Meanwhile, cumulative impacts are impacts from past, present and future actions that may have an incremental impact on resources, and are not necessarily elements of the same project.

[137] N.C. Alliance for Transp. Reform, Inc. v. U.S. DOT, 151 F. Supp. 2d 661, 698 (M.D.N.C. 2001).

[138] 40 C.P.R. § 1508.7 (emphasis added.)

[139] Western N.C. Alliance v. N. C. Dept. of Transp., 312 P.Supp.2d 765, 771 (E.D.N.C. 2003) (quoting Sierra Club v. Marsh, 976 P.2d 763, 767 (1st Cir. 1992)).

[140] Id. (quoting Sierra Club, 976 P.2d at 768).

[141] N.C. Alliance for Transp. Reform, 713 F. Supp. 2d at 522 (M.D.N.C. 2010) (quoting Sierra Club v. Marsh, 976 P.2d 763, 768 (1st Cir. 1992) (stating that projects must have "sufficient specificity to make their consideration useful").

[142] Western N.C. Alliance, 312 P.Supp.2d at 771-73.

[143] Id.

[144] Id. (holding that future projects were reasonably foreseeable where right of way acquisitions had been scheduled and the NCDOT had decided on minimum design specifications).

[145] DEIS 1-15.

[146] 40 C.P.R.§ 1508.25(a).

[147] See, e.g., Wetlands Action Network v. U.S. Army Corps of Eng'rs, 222 F.3d 1105, 1118 (9th Cir. 2000).

[148] 40 C.F.R. § 1508.25(a)(2). "Similar actions, which when viewed with other reasonably foreseeable or proposed agency actions, have similarities that provide a basis for evaluating their environmental consequences together, such as common timing or geography. An agency *may* wish to analyze these actions in the same impact statement. It *should* do so when the best way to assess adequately the combined impacts of similar actions or reasonable alternatives to such actions is to treat them in a single impact statement." 40 C.F.R. § 1508.25(a)(3) (emphasis added).

[149] 40 C.F.R. § 1508.7.

[150] Western N.C. Alliance, 312 F.Supp.2d at 771 (quoting Sierra Club v. Marsh, 976 F.2d 763, 767 (1st Cir. 1992)).

[151] North Carolina Department of Transportation Program Development Branch, Northern Carteret Bypass Feasibility Study 2 (July 22, 2009).

[152] http://www.ncdot.org/projects/US70corridor/.

[153] Northern Carteret Bypass Feasibility Study, at 2.

[154] US 70 Corridor Commission, March 12,2009 Meeting Minutes at 3.

[155] Northern Carteret Bypass Feasibility Study, at 10.

[156] US 70 Corridor Project Status Map, http://www.ncdot.org/projects/US70corridor/.

[157] US 70 Corridor Commission, January 13, 2011 Meeting Minutes at 3. US 70 Corridor Commission, October 14, 2010 Meeting Minutes at 6.

[158] NCDOT Project Details: TIP R-3307, available at http://www.ncdot.org/projects/search/details.html#id=1678. US 70 Corridor Project Status Map, http://www.ncdot.org/projects/US70corridor. US 70 Corridor Commission, July 2011 Director's Report at 6.

[159] US 70 Corridor Project Status Map, http://www.ncdot.org/projects/US70corridor. July 2011 Director's Report, at 2. May 12, 2011 Meeting Minutes, at 2. October 14,2010 Meeting Minutes at 6. August 12, 2010 Meeting Minutes at 7.

[160] US 70 Corridor Project Status Map, http://www.ncdot.org/projects/US70corridor. July 14, 2011 Business Meeting Minutes, at 2. January 13, 2011 Meeting Minutes at 3.

[161] July 2011 Director's Report at 6 (Down East Rural Transportation Planning Organization). March 12, 2009 Meeting Minutes at 4-5 (Carteret County Board of Commissioners, Craven County Board of Commissioners, Down East Rural Transportation Planning Organization, Havelock City Counsel).

[162] US 70 Corridor Project Status Map, http://www.ncdot.org/projects/US70corridor.

[163] http://www.ncdot.org/projects/US7Ocorridor/

[164] DEIS at 1-15.

[165] May 16, 2007 email from Mary E. Frazer, NCDOT to Steve Simon, USFS quoting email from Mary E. Frazer, NCDOT to Mark Pierce, NCDOT "Steve Simon has been very insistent that we include other road projects especially the..(Havelock Connector) in the discussion of cumulative impacts. The cumulative impacts regs that USFS is using…are from NEPA, same as we use. However, Steve argues that the [Havelock Connector] is 'reasonably forseeable,' even though it is not on the TIP schedule, and is concerned about how this creates potential for a lawsuit. He says that USFS will NOT accept the EIS without consideration of these cumulative effects. How shall we proceed?"

[166] See March 20, 2007 email from David G. Modlin, TGS Engineers to Mark Pierce, NCDOT, ("it is my understanding that KO will not be producing an air quality analysis and that you will be cutting and pasting the standard verbiage to be used in the DEIS Report").
[167] 40 C.F.R. § 1502.24.
[168] 40 C.F.R. § 1500.1(b); see N.C. Alliance for Transp. Reform, Inc. v. United States DOT, 151 F. Supp. 2d 661, 695 (M.D.N.C. 2001) (holding that an air quality analysis that used outdated technology violated NEPA where the agency's "decision not to update the FEIS with more accurate air quality data prevented decision-makers and the public from more fully understanding the effect on air quality that the [proposed project] would have").
[169] DEIS at 1-1.
[170] Id. at 1-1 to 1-2, 1-5.
[171] Id. at 2-33, 2-34.
[172] ld. at 1-2, 2-34.
[173] Id. at S-7, 1-2 to 1-4,2-34.
[174] Id. at 1-3, 1-4,2-34.
[175] Id. at 2-34.
[176] Id. at 2-20 to 2-21, 2-27.
[177] Id. at 2-20 to 2-21,2-27,2-34.
[178] Id. at 2-19,2-27.
[179] 40 C.F.R. § 1502.16.
[180] 40 C.F.R. § 1502.16(d). Accordingly, the impacts must be discussed "in proportion to their significance." Citizens Against Burlington, Inc. v. Busey, 938 F.2d 190, 200 (D.C. Cir. 1991).
[181] 42 U.S.C. § 4332(C)(iii).
[182] 40 C.F.R. § 1502.14(a).
[183] Friends of Southeast's Future v. Morrison, 153 F.3d 1059, 1065 (9th Cir. 1998).
[184] 40 C.F.R. § 1502.14(b).
[185] 40 C.F.R. § 1502.14(a).
[186] Piedmont Heights Civic Club Inc. v. Moreland, 637 F.2d 430,436 (5th Cir. 1981).
[187] Keith v. Volpe, 352 F. Supp. 1324, 1336 (D. Cal. 1972).
[188] Rankin v. Coleman, 394 F. Supp. 647, 659 (E.D.N.C. 1974).
[189] DEIS at 2-33.
[190] Id. at 2-2.
[191] 40 CFR § 1502.13.
[192] City of New York v. Dep't of Transp., 715 F.2d 732,743 (2d Cir. 1983)
[193] Citizens against Burlington, Inc., at 196.
[194] DEIS at 1-7.
[195] Kleckley, James. U.S. Highway 70 in Eastern North Carolina: Improvement Impact on Local Economies and Inter-Modal Transportation. Bureau of Business Research, East Carolina University (March 2011), p.l.
[196] "This partnership is represented by the US 70 Corridor Commission, whose vision is to transform US 70 into a freeway from Interstate 40 to the coast." http://www.super70corridor.com/
[197] Kleckley, James. U.S. Highway 70 in Eastern North Carolina: Improvement Impact on Local Economies and Inter-Modal Transportation. Bureau of Business Research, East Carolina University (March 2011), p.2.
[198] Port business at Morehead has declined. Over the last ten years, traffic to the port trended downward, reaching a low point in 2009. At its highest point over the past decade, in 2001, 2,757,176 tons of cargo came through the port. In 2010, 1,768,712 tons of cargo entered the port. Not surprisingly, the number of ships and barges passing through the port have also varied and trended downward over the last ten years. At its high point in 200 I, 177 ships and 521 barges entered the port whereas in 2010 only 122 ships and 465 barges entered. North Carolina Port Authority, Statistics, available at:
http://www.ncports.com/userfiles/MHC%20FY%202010%20STATS%20WEBSITE%20UPDATE.pdf
[199] DEIS at 1-17 to 1-18.
[200] Id.at1-17to 1-18.
[201] Id. at 1-6, 1-19.
[202] DEIS at 1-20,2-28 to 2-29.
[203] Id. at 1-20, 2-29.

[204] Natural Resources Defense Council v. Callaway, 524 F.2d 79, 93 (2d Cir. 1975).
[205] US 70 Corridor Commission, Crash Summary 2004-2007: Craven County at 2.
[206] Id. at 1-2.
[207] Id. at 2.
[20s] Id.
[209] Id. North Carolina Department of Transportation Traffic Safety Systems Section, 2010 North Carolina Highway Safety Improvement Program (April2010) (hereinafter 2010 HSIP) at 25.
[210] 2011 HSIP at 53.
[211] Crash Summary 2004-2007: Craven County at 2.
[212] DEIS at 1-7.
[213] Id. at 1-6.
[214] Id. at 1-6.
[215] Id. at 1-6.
[216] Id.
[217] Id. at 1-7, 1-14, 4-8, 4-9, 4-11, 4-17, 4-81 and 4-89.
[218] Id. at 1-6, 2-3, 2-8, 4-8, 4-11 and S4.
[219] 40 C.F.R. § 1502.14.
[220] Natural Resources Defense Council v. Callaway, 524 F.2d 79, 93 (2d Cir. 1975).
[221] North Buckhead, 903 F.2d at 1542.
[222] Kimley-Horn and Associates, Inc. 2005. US 70 Access Management Study Clayton to Morehead City. NC, July 2005.
[223] Kimley-Horn and Associates, Inc. 2005. US 70 Access Management Study Clayton to Morehead City, NC, July 2005,p. 1.
[224] US 70 Access Management Study, p. 1-2. (emphasis added)
[225] US 70 Access Management Study, p 22.
[226] Maps of these segments are available at: www.ncdot.org/projects!US70corridor/download/phase2_maps_17- 22.pdf and www.ncdot.org/projects!US70conidor/download/phase2_maps_23-27.pdf.
[227] US 70 Access Management Study, p. 20.
[228] DEIS at 2-2.
[229] Superstreet Benefits and Capacities at iv, 1.
[230] http://www.ncdot.org/doh!preconstruct/tpb/shc/pdf/Superstreet_Brochure.pdf
[231] Guidance on the Safe Implementation of Unconventional Arterial Designs at 1, 4, 16.
[232] Superstreet Benefits and Capacities at 1. Economic Effects of Access Management Techniques in North Carolina at iv-vi.
[233] Guidance on the Safe Implementation of Unconventional Arterial Designs at 4, 10. Superstreet Benefits and Capacities at 128.
[234] Superstreet Benefits and Capacities at 1, 54, 124.
[235] Superstreet Benefits and Capacities at 128.
[236] Superstreet Benefits and Capacities at 128.
[237] Superstreet Benefits and Capacities at 128.
[238] Highway 70 Corridor Commission, March 17, 2011 Meeting Minutes at 5.
[239] DEIS at 1-10 to 1-11, 2-7, 3-30.
[240] March 17, 2011 Meeting Minutes at 5.
[241] Id.
[242] Id. at 6.
[243] Id. at 5.
[244] Association of American Railroads, Freight Railroads in North Carolina at 1.
[245] Id. at 1.
[246] The Economist, American Railways: High-Speed Railroading (July 22, 2010), available at http://www.economist.com/node/16636101. Association of American Railroads, The Cost Effectiveness of America's Freight Railroads at 1 (2011).
[247] Carolina Railroad Company, Track Improvements, available at http://www.ncrr.com/ncrr-track.html at 2.
[248] DEIS at 1-10, 2-7.

[249] Super 70 Corridor Commission Meeting Minutes (January 13, 2011). Super 70 Corridor Commission Meeting Minutes (March 13, 2011).
[250] Super 70 Corridor Commission Meeting Minutes (January 13, 2011).
[251] Super 70 Corridor Commission Meeting Minutes (January 13, 2011).
[252] Super 70 Corridor Commission Meeting Minutes (January 13, 2011).
[253] Super 70 Corridor Commission Meeting Minutes (January 13, 2011).
[254] Super 70 Corridor Commission Meeting Minutes (January 13, 2011).
[255] Super 70 Corridor Commission Meeting Minutes (January 13, 2011).
[256] Super 70 Corridor Commission Meeting Minutes (January 13, 2011). Super 70 Corridor Commission Meeting Minutes (March 13, 2011).
[257] 33 U.S.C. § 1344(b).
[258] See 40 C.F.R. § 230.12(a).
[259] 40 C.F.R. § 230.11.
[260] DEIS at 4-49.
[261] 40 C.F.R. § 230.12(iv).
[262] See 15A N.C. Admin. Code 02H.0506.
[263] 40 C.F.R. § 230.12(iii).
[264] DEIS at 4-51.
[265] Id.
[266] 40 C.F.R. § 230.12(i).
[267] 23 U.S.C. § 138(a).
[268] 23 C.F.R. § 774.11(d).
[269] Stewart Park and Reserve Coalition v. Slater, 352 F.3d 545, 555, 564 (2nd Cir. 2003).).
[270] Mullin v. Skinner, 756 F. Supp. 904, 924 (E.D.N.C. 1990) (quoting Coleman, 529 F.2d at 370); see also Stewart Park, 352 F.3d at 550, 557 (holding that the "uninterrupted and purposeful use by the public" of the affected lands for "hunting, fishing, hiking, biking, birdwatching, horseback riding, and numerous other outdoor pursuits" for almost 30 years made that land a 4(f) resource, despite being originally acquired for transportation purposes and never permanently designated as parkland).
[271] LRMP at 46.
[272] LRMP at 48.
[273] Id.
[274] North Carolina Wildlife Resources Commission, Draft Black Bear Management Plan: 2011-2021 at 39 (June 8, 2011).
[275] LRMP at 50-51.
[276] DEIS at 3-50.
[277] Letter from J. Hefner, FWS, to D. Robinson, NCDOT (Apr. 20, 1998), DEIS Appendix AI.
[278] Memo from R. Lucas, FHWA (July 13, 2010) (Attachment 3).

Southern Environmental Law Center
Supplemental Comments on the DEIS
October 30, 2012

Comment 39:
In September 2011, the North Carolina Department of Transportation ("NCDOT") published a Draft Environmental Impact Statement ("DEIS") for the Havelock Bypass pursuant to the National Environmental Policy Act ("NEPA"). On behalf of the North Carolina Wildlife Federation, the Cypress Group of the North Carolina Chapter of the Sierra Club, and North Carolina Coastal Federation, the Southern Environmental Law Center submitted comments on that document on November 21, 2011. Since that time additional concerns have come to light about the project. Accordingly, we offer these further comments for your consideration. We urge NCDOT to consider these important issues prior to proceeding further with this project.

Cumulative Impacts of the New Bern Bypass
In our previous comments, we raised the concern that the DEIS fails to consider the cumulative impacts of the Havelock Bypass and other closely related NCDOT projects including the Northern Carteret Bypass and the Gallants Channel Bridge. In addition to these projects, NCDOT has recently begun to move forward with another proposed highway that is closely connected to the Havelock Bypass and would also affect the Croatan National Forest, the New Bern Bypass, which forms part of the "Super 70" initiative to improve US-70 from Raleigh to Morehead City. This project, TIP # FS 1202B, would stretch from the existing US 17 Bypass of New Bern, across Craven County, to connect with the Havelock Bypass. NCDOT conducted a community meeting about the project in September 2012, and has stated that it intends to complete a feasibility study by Spring 2014.

As we explained previously, when preparing an EIS, an agency must consider the cumulative impacts of its proposed project. 40 C.F .R. § 1508.25(c)(3). The analysis of those cumulative impacts is necessary for "a complete understanding of the environmental effects a proposed action will cause." N.C. Alliance for Transp. Reform, Inc. v. US. DOT, 151 F. Supp. 2d 661, 698 (M:D.N.C. 2001). All reasonably foreseeable future actions must be considered in the NEPA document, including projects that are not yet fully finalized, and for which no funding has yet been allocated. Western N.C. Alliance v. N.C. DOT, 312 F.Supp.2d 765, 771 (E.D.N.C. 2003) (quoting Sierra Club v. Marsh, 976 F.2d 763, 767 (1st Cir. 1992)). The New Bern Bypass, while not yet funded or finalized, is sufficiently foreseeable such that a consideration of its impacts combined with those of the Havelock Bypass, the Northern Carteret Bypass and the Gallants Channel Bridge must be included in the DEIS. Failure to do so violates NEPA.

Response No. 39
See Response No. 12.

Comment 40:
Reasonable Assumptions
In our earlier comments, we raised concerns about the assumptions in the DEIS regarding the US Forest Service's ability to manage the Croatan Forest and the many threatened and endangered species that inhabit it. As we detailed extensively, the importance of fire to redcockaded woodpecker ("RCW") habitat cannot be overstated. Indeed, fire suppression has played a major role in the degradation of habitat and the resulting decline in populations in the Croatan. Fire is critical to each aspect of RCW habitat and resulting individual fitness. DOT has recognized that "no other methods

of habitat maintenance achieve the same level of effectiveness as burning. "1 If the Bypass is constructed, prescribed burning will not be able to occur at a sufficient level to maintain existing habitat and the long term existence of the RCW will be threatened. Despite the importance of burning, NCDOT failed entirely to demonstrate that sufficient burning will occur if the Havelock Bypass is constructed, and instead, relied on vague promises and assumptions. Since publication of the EIS, NCDOT has stated its intent to allow burning, but again has failed to provide the detail required to satisfy NEP A under recent Fourth Circuit Court of Appeal rulings. Those two recent rulings underscore the fact that blanket reliance on unsubstantiated material assumptions violates NEP A. See Friends of Back Bay v. United States Army Corps of Eng'rs, 681 F.3d 581 (4th Cir. 2012); N.C. Wildlife Fed'n v N.C. DOT, 677 F.3d 596 (4th Cir. 20 12). In Friends of Back Bay, the Fourth Circuit held that the US Army Corps of Engineers' assumption regarding the effectiveness of a mitigation measure, absent any evidence that it would be adequately enforced, was arbitrary and capricious. Id. at 588-89. Specifically, the Corps claimed that a No Wake Zone would mitigate the impacts of motorized watercraft to Back Bay National Wildlife Refuge. The NEP A document prepared by the Corps, however, offered no indication that the No Wake Zone would ever be recognized or followed by the public, and thus provided no reasonable basis to conclude that the No Wake Zone would be an effective mitigation tool.

Just like the environmental documentation in Back Bay, the DEIS prepared for the Havelock Bypass operates under an unsubstantiated material assumption- specifically that NCDOT will close the Bypass as needed to allow prescribed burning to take place in the appropriate season and at a sufficient level to sustain the habitat needed for the RCW population. 1 Letter from Terry Gibson, NCDOT, to Marisue Hilliard, USPS, at 1 (Jan. 9, 2012). See Attachment A.
2
The EIS offers no detail about how and when future burning will occur and no commitment from NCDOT that the road will be closed to allow for prescribed burning in the future. Moreover, even if the NCDOT does close the highway, the DEIS lacks any analysis explaining how the USFS will overcome historical difficulties that the agency has had burning near populated areas with the added impediment of the Bypass. See SELC Comments at 10-11 (Nov. 21, 2011). Terry Gibson's January 9, 2012 letter to Marisue Hilliard ("Gibson Letter") does not ameliorate this fundamental flaw. The letter restates the assumptions included in the DEIS and states that "[u]nder these general conditions" and the meeting minutes describing them,2 NCDOT agrees to close the Havelock Bypass "when necessary." The letter fails to provide any additional details about the scheduling of prescribed burns, avoids discussion of any of the practical issues involved with conducting prescribed bums, and omits criteria and procedures that would be used to determine whether and how to close the road. Moreover, complete discretion whether closing the road is "necessary" lies with NCDOT.

The assumption in the Havelock DEIS and the Gibson Letter that a sufficient level of burning will occur is no different than the assumption made by the Corps in the Back Bay case regarding the No Wake Zone." There, the Corps assumed that a No Wake Zone would protect habitat and relied on that assumed protection as the basis for its evaluation of environmental impacts. Here, NCDOT and USFS have assumed that the NCDOT will close the Bypass and the USFS will carry out prescribed burning and relied on that assumption when evaluating environmental impacts. Just as the No Wake Zone was a "foundational proposition" upon which the NEPA document was based, so is the assertion that NCDOT will close the Bypass to allow, and USFS will conduct, a sufficient level of prescribed burning to sustain essential habitat. As with enforcement of the No Wake Zone, commitments and details about the closure of the Bypass and the proposed burning are entirely absent from the DEIS.

Without specific, enforceable commitments and further details about the plan for prescribed burning, the public and resource agencies are helpless to comment on the impact and efficacy of proposed options, and the alternatives provided in the EIS, and thus the purpose of NEPA is eviscerated. See NC. Wildlife Fed'n, 677 F.3d 596, 603 n.2. Eliciting that comment is an essential purpose of the Act and, for that reason, general conditions cannot satisfy NEP A. If the USFS and NCDOT contend that burning will occur east of the proposed bypass- and FWS is to rely on that assumption -the agencies must develop a specific, enforceable plan that both confronts the complexities of prescribed burning and transfers discretion to close the proposed bypass to USFS. The mandatory nature of those requirements is at the heart of the Fourth Circuit's Back Bay decision, which rejected the Corps and FWS's plan because it "neither mandate[d] enforcement of the NWZ nor guarantee[d) funding therefore," but instead relied on the hope of compliance. 681 F .3d at 587. NCDOT, USFS, and FWS are duplicating that exact error here by relying on vague, unenforceable assumptions regarding prescribed burning east of the proposed bypass and, as a result, join the Back Bay defendants in violating NEPA. Here, that error is compounded by the effect of relying on those vague assumptions on an endangered species.

In light of these fundamental flaws in the DEIS and those detailed in our earlier comments, we urge the Transportation Agencies to revise their analysis of alternatives and impacts according to the recommendations set forth herein and to issue a supplemental Draft Environmental Impact Statement for public review and comment.

Response No. 40

See Response No. 4.

The FEIS presents concrete evidence of a NCDOT commitment to allow prescribed burns. NCDOT has committed to temporarily close the bypass to allow prescribed burns to occur as needed by the USFS. Specific detail, beyond the letter and description included in the FEIS is currently being developed in coordination with the USFS. NCDOT has provided a project commitment to this effect. It should be noted that NCDOT does not conduct prescribed burns, nor can it require other agencies to do so.

1577 Holly Ave.

Eugene, OR 97408

November 20, 2011

Dr . Gregory J Thorpe

North Carolina Department of Transportation

1548 Mail Service Center

Raleigh, NC 27699-1548

Dear Dr. Thorpe,

My comments on the Draft Environmental Impact Statement for R-1015, Havelock Bypass are as follows:

The EA Fails to analyze all reasonable alternatives.

As pointed out in the March 6, 2003 Sierra Club letter to the FHA (copy to NCDOT) the "Freeway" and "Expressway" sub-alternatives (as described in the NCDOT EA) are so designed (6 lanes and 6 interchanges) that severe impacts to the town make the bypass alternatives appear to be the only reasonable alternatives. The letter suggested that DOT develop other sub-alternatives designed to produce lesser impacts on the town. This suggestion was ignored as the DEIS repeats the same alternative (unchanged), and proposes no other reasonable alternatives. DOT should design an alternative that will provide satisfactory traffic flow through Havelock using the existing 4 lanes by upgrading existing city streets such as the service roads that parallel US 70 in the northern section, adding overpasses over the bypass, and providing access by merging traffic in a few (e.g. 3) locations in lieu of the huge interchanges that are now part of all three alternatives. Such a design would not look like the typical NC Interstate, or other freeway, but it should be acceptable given the benefits that would be realized in the form of protection of natural resource values in the CNF.

The three bypass alternatives are as designed from the earliest days of project development. Since then additional thoughts and ideas have surfaced which could have been incorporated into at least one other bypass alternative that would do less damage to CNF resource values.

The Bypass Alternatives Threaten Populations of Red-cockaded Woodpecker & Numerous Other Listed Species:

The DEIS fails to provide assurance that the bypass will not contribute additional stresses on RCW subpopulation 3. Such stresses could prevent establishment of this population which is intended to be a link between subpopulations 2, 4, and 5. This in turn would exacerbate the current CNF-wide population decline.

That the bypass alternatives would cause the direct loss of existing, and future forage habitat as well as potential future nesting habitat is obvious. RCW populations will also be threatened by the inability of

the USFS to conduct burning projects on existing, and potential future habitat that would lie between the town of Havelock and the bypass. It is theoretically possible that burning could be achieved if the bypass is closed during the period when burning is done. However, no agreement between the USFS and DOT has been reached on that issue. It should therefore be assumed that USFS burning targets cannot be achieved in any of the 3 bypass alternatives.

The proposed Lake Road Interchange in Alternatives 1 & 3 poses significant secondary impacts as a result of subsequent economic development. These impacts are in the form of a barrier to dispersal of numerous wildlife species -- including the red-cockaded woodpecker. No mitigation is proposed -- such as a land transfer to the USFS. It would be best to eliminate this interchange.

The DEIS asserts that the preferred alternative (Alternative 3) is least damaging to interior forest species because it fragments a smaller proportion of the CNF. However, the acreage differences between Alternative 3, and Alternative 1 are not great, and more importantly the habitat islands that would remain under Alternative 1 are larger. This makes Alternative 1 better habitat for interior forest species under the principle that larger islands support a larger number of species, and they are better habitat for any particular interior forest species. So, with regards to fragmentation, Alternative 1 is least damaging to Red-cockaded woodpecker habitat - as well as numerous other rare, threatened, and endangered species -- as on federal, state (NC Natural Heritage Program), and USFS lists (see below).

With regard to other listed species, no appropriate surveys (growing season for plants) were conducted on lands inside the project area, but outside the corridors for any of the non-federally listed species. This leaves open the question of whether the bypass might seriously damage, or destroy a viable population of one or more species unique to the CNF. Since to do so would violate National Forest Policy this is a serious deficiency.

The DEIS Fails to Recognize Impacts to Other Key Species:

The Preferred Alternative will run directly through one great blue heron nesting colony in East Prong Slocum Creek, and adjacent to another in Southwest Prong Slocum Creek. Anhingas, a locally rare species, have also nested (2007, 2008 & 2011) in the sites that support the heronries. This is the **only** nesting of anhingas in the CNF . They will also be impacted by Alternative 3. The DEIS not only fails to analyze impacts to these 2 very obvious species it ignores ALL species that are not "listed", e.g., songbirds (neotropical migrants and others), corvids, raptors, etc., species unique to the longleaf ecosystem, and species such as amphibians, wood duck, and wading birds that are dependent upon ponds and vernal pools in the designated natural areas. These species are ignored in the DEIS apparently because a unique DOT classification system does not recognize them as "protected."

The DEIS Fails to Recognize the Ecological Significance of the Longleaf Pine Ecosystem:

The longleaf pine ecosystem is endemic to the Southern Region of the United States. It is a unique ecosystem and one that has been reduced to less than 3% of its original range in the last several decades. Because of this reduction, and its uniqueness a special program has been established throughout the South to restore the ecosystem on National Forests. The Croatan National Forest is a

partner in this effort. It is to be restored as the CNF meets its biological diversity goals established in its land use plan. One would never know this by reading the DEIS. The DEIS gives the impression that longleaf is just a one of several species of pine in the "mesic pine flatwoods" type. No longleaf acreage figures are apparent in the description of the biotic environment, or the section on environmental impacts. One would also not know from reading the DEIS that the stands of longleaf in the bypass project area are considered medium to high quality due to the presence of medium to good ground cover of native herbaceous species, including wiregrass. Wiregrass is essential for making restoration work by carrying ground fires, and it is very, very hard, and very expensive to restore. This ground cover in the project area (Southwest Prong Flatwoods, and Havelock Station NA) is one of the main reasons the project area is so important -- native ground cover has been severely degraded on almost all of the loamy soil longleaf areas in the middle and northern sections of the CNF, i.e., from about Havelock north. So, these stands are unique in that they occupy a wide range of soil types -- including types that rarely support longleaf pine since they have been converted to agriculture & intensive silviculture, etc. Discussion about longleaf in the DEIS is inadequate and misleading.

The DEIS Proposal for Mitigation of Adverse Impacts to Wetlands is Inadequate.

The Sierra Club's March 2003 letter explains this concern in detail, so I will not repeat it here. Worth repeating, however is the concern about use of the Croatan Wetlands Mitigation Bank. Contrary to the DEIS, the Croatan Wetland Mitigation Bank should not be used for double mitigation, i.e., to mitigate losses wetland losses in the six county area, and use the same acreage to mitigate loss of longleaf pine uplands in the project area. This is especially pertinent since the Croatan Wetland Mitigation Bank does not contain anything similar to the high quality longleaf pine flatwoods, or other un-logged sites that will be lost to the bypass. Also, the DEIS fails to evaluate the loss of wetland functioning due to substituting logged-over habitat in the wetland mitigation bank for forested wetland sites destroyed by the bypass.

"The EA is in error relative to Section 4(f) of the Department of Transportation Act of 1966".

This was the Sierra Club's statement in the March 2003 letter, and it is still true with regard to the DEIS -- as is the paragraph that explained the statement. One thing overlooked then was the black bear sanctuary that is apparently crossed by Bypass Alternatives 2 & 3. In my opinion this is clearly a Section 4(f) issue that the DEIS fails to recognize.

CONCLUSION:

Obviously the best option for protection of natural resources in the CNF is the "Upgrade US 70 Freeway" alternative as described in the DEIS. However, were I the decision maker I would not want to lay the destruction that it would cause on the citizens of Havelock. Neither would I want to inflict on the CNF damage that any of the three Bypass Alternatives would cause.

I would opt to order the engineers, and other responsible folks at NCDOT to develop another "Upgrade US 70 Freeway" alternative that minimizes damage to the town yet creates improved (speedier) flow of traffic through the town of Havelock. This should be done in recognition of the fact that the alternative created would NOT meet NCDOT's normal/standard criteria for a bypass design, but that it is acceptable

in order to meet the objective of protecting certain natural resource values in the Croatan National Forest.

Charles L. Thomas, Wildlife Biologist

USDI - BLM (Retired)

Member Sierra Club

Past Member Cypress Group

November 21, 2011

Mark Pierce
Project Planning Engineer
NCDOT - Eastern Project Development Unit
1548 Mail Service Center
Raleigh, NC 27699-1548
mspierce@ncdot.gov

Re: Draft Environmental Impact Statement for Havelock Bypass

Dear Mr. Pierce;

I write to comment critically on Project R-2015ce

I. There is a false general presumption made by NCDOT:

In the DEIS for NCDOT project R-1015 there is a statement that Havelock is bounded on the East side by the Cherry Point Marine Base. Therefore, a conclusion is made to only consider routes for the project on the West side.

This is very presumptive. Havelock is also bounded on the West side. There, it is bounded by the Croatan National Forest.

Apparently at some level there is a presumption that the National Forest is there for the taking for highways. Worse still, there seems to be a presumption, perhaps also held by the administration of our National Forests, that building a highway though the forest is not inconsistent with the purpose and mission of National Forests in general or, at the very least, not inconsistent with the purpose and mission of the Croatan National Forest.

Actually such presumptions have no validity. Evidence for this is that a Special Use Permit must be issued for NCDOT to build a road in the Croatan National Forest.

While I admit that I do not know what criteria need to be satisfied to obtain a Special Use Permit, it seems obvious that no permit should be issued for any project which interferes with the purpose, mission, or administration of the Croatan. (Certainly if NCDOT proposed to interfere with the purpose, mission, or administration of Cherry Point Marine Station, the Defense Department would not issue a Special Use Permit.)

It is obvious from the DEIS for R-1015 that this project interferes in multiple ways with the purpose, mission, and goals of the Croatan National Forest.

As a citizen who personally endorses of the mission of our National Forests and, in particular, the mission of the CNF I would feel betrayed if a Special Use Permit is issued for R-1015. I also feel it would be a betrayal of the interests of all citizens in our National Forests .

Therefore, in my judgment, any proposal to address congestion along the corridor of US 70 through Havelock must be addressed within that corridor. I ask that NCDOT creatively address improvements within this corridor rather than to choose to impact either the purpose of a Nation Forest or the purpose of a Marine Station.

I also fail to see any reason why our National Forest should be used to relieve congestion. This is especially true when: 1. the cause of the congestion has been failure by the FHA & NCDOT to control local land uses along this strategic highway and 2. Long leaf pine ecosystems, which are seriously threatened and in decline, would be impacted by this project.

There now remain only precious remnants of the natural Long Leaf Pine Ecosystems. Management and restoration of these LLPE is fundamental to the mission of the Croatan NF as stated in the 2010 Management Plan.

II. There are flaws in the Project Commitments Section:

1. Assurance that these commitments are fulfilled is a vital element of assessing the impact of the proposed project. These should or must therefore be part of the body of the DEIS. In the body of the document the only recognition given to fire as a necessary management tool is a statement that NCDOT makes "conceptual" recognition of fire in the management of these systems. This is simply inadequate. Assurance and authority by the USFS to close the proposed bypass for burning when needed must be absolutely guaranteed.

   I am also concerned that commitments presented outside the body of the document have no guarantee of fulfillment.

2. The listed commitments are for future actions, many of which should have been completed as part of the DEIS. In some cases these "commitments" are actually citations of tasks which should be a part of the DEIS itself. As an example, NCDOT, in item number two, proposes to perform biological assessment of the effect on the RCW after the preferred alternative is chosen. We need to know this assessment before choosing the preferred alternative.

3. The wetlands mitigation plans need to be presented before the preferred alternative is selected, not afterward. The public should know the details of these plans now, not later. I believe there is a need to assess the mitigation plans being proposed because these plans themselves may have serious faults.

4. The Hydraulics unit should coordinate with the N.C. Floodplain Mapping Program to determine the applicability of the Memorandum of Agreement and present this as part of this DEIS, not after the DEIS hearing.

III. I have criticisms and suggestions of the body of the DEIS

1. Chapter 4.2. The Lake Road interchange will surely develop into a wide commercial strip as highway dependent businesses now in Havelock along US 70 relocate to serve travelers. As the properties along Lake Road are developed RCW clusters will be further isolated. Such

development will also hinder attempts at the required and promised management by prescribed fire.

2. A declaration was made that "this user group would not directly benefit from Multi-modal alternatives to reduce congestion. Therefore Multimodal Alternatives were not considered." It was also declared that "these results were not compatible with the purpose of the project."

   Well, of course the results would not be compatible. As long as every individual transportation link by highways is analyzed in this manner there will never be a multimodal opportunity. NCDOT, by this type of analysis, makes multimodal projects never possible to consider. Other possible, more efficient , transportation systems are rejected not because of long range utility, they are rejected at these small scale project levels and thereby, in sum, will never be found beneficial. In short, if your purpose is highways you will never get rails.

   I comment on this, not as much to make a point for consideration of a Multimodal Alternative in this project, as I do to illustrate that this DEIS is generally flawed from start to finish. It seems written not very much as a fair environmental impact statement to provide a basis for evaluating the environmental impact of the project. Instead it seems to be written with some guiding hand toward a precluded preferred alternative. Impacts on habitats seem to be poorly done, glossed over, or dismissed with general declarations of proposed accommodations. Criticism number three which follows is an example.

3. The coordination with the CNF to assess the impacts on management of wildlife habitat and recreational use is declared to be mitigated by transfer of the adjacent Croatan Wetland Mitigation Bank property to the USFS.

   It is hard to believe a property transfer of a Wetland Mitigation Bank, especially one already in use for that function, can offset the impacts on management of wildlife habitat and recreational use. Furthermore, it seems that the wildlife habitat and recreational uses which are to be mitigated cannot possibly be mitigated because the wetlands referenced are not equivalent in function to the functions where the wildlife is impacted. Simple declaration of a property transfer fails to mitigate environmental impacts.

4. The following paragraph from the DEIS (*in italics*) shows that the DEIS presumes any damage at the preferred alternative can be remedied by finding additional information through a biological assessment after the choice of alternative is made. I believe the biological assessment should be done before the preferred alternative can be chosen.
   "Although the surveys and alternatives analysis have provided substantial additional information regarding the project effects to the RCW, once a Least Environmentally Damaging Practicable Alternative (LEPDA) is chosen, completion of a Biological Assessment (BA) by NCDOT, and a Biological Opinion (BO) by the USFWS regarding the BA are needed to initiate and conclude formal consultation under Section 7 of the Endangered Species Act."

   Biological assessment needs to be completed equally on each of the alternative routes prior to selecting which route, if any, is preferred.

5. I question the projected volumes of traffic and the reduction in travel times included in this DEIS. In recent several trips through the current corridor I have timed my travel. Obeying

speeds
posted. ~~This is a trivial delay in a trip from Raleigh to the coast;~~ I have traversed the section to be bypassed in 10 to 13 minutes. The proposed alternatives at 70 mph would require about 8 minutes. This is a trivial delay in a trip from, say, Raleigh to the coast.

Furthermore, the projections do not consider that there are already severe limits to additional traffic loads on this route because, even now, there is no parking at the coastal destinations this highway supports – almost none at the public beach access points. Only if the traveler owns or rents an accommodation can parking be available

Based on these criticisms I reject this project as properly analyzed and justified. I urge the Transportation Agencies to reconsider the feasibility of the current proposal, ~~and~~ the choice of the preferred alternative, and even whether any bypass is warranted.

Sincerely,

Bernard E. Kane Jr.
1706 Canterbury Road
Greenville, NC, 27858

cc: Tim Gestwicki, North Carolina Wildlife Federation
Mary, Cypress Group, NC Chapter of Sierra Club
Todd Miller, North Carolina Coastal Federation
USFWS
NCDENR
USFS
John F. Sullivan, FHWA
Secretary Gene Conti, NCDOT
Leigh McNairy, Board, NCDOT
Chris Militscher, USEPA
Durwood Stephenson, Chair, Super 70 Commission

~~The US 70 highway corridor under this system is~~ a ~~secondary travelway with high use and the people using the highway probably have moderate interest in the scenery they are driving past.~~
~~Seen~~

1412 Shepard Street
Morehead City, NC 28557
21 November 2011

Mark Pierce
Project Planning Engineer
NCDOT—Eastern Project Development Unit
1548 Mail Service Center
Raleigh, NC 27699-1548

Re: Draft Environmental Impact Statement for Havelock Bypass

Dear Mr. Pierce:

I would like to submit the following comments on the Havelock Bypass Draft Environmental Impact Statement (DEIS).

The Havelock Bypass DEIS is not adequate for making a well-informed decision as to what alternative is least environmentally damaging, or whether existing US 70 could be upgraded such that there is no need for a bypass.

In terms of DIRECT impacts, it is obvious that Alternative 3 (DOT's preferred alternative) should NOT be considered the least environmentally damaging alternative, particularly in regard to longleaf pine, significant natural communities, rare plant and animal species, and Forest Service land.

In terms of DIRECT impacts, it is obvious that Alternative 1 (outermost alternative) should be considered the least environmentally damaging alternative, particularly in regard to longleaf pine, significant natural communities, rare plant and animal species, and Forest Service land.

Enough new information has been brought out since the 1990's to challenge the assumption of the 1998 Environmental Assessment that Alternative 3 should be considered the Least Environmentally Damaging Practical Alternative. In the 1998 EA, a major justification for Alternative 3 was that it would impact the least amount of wetland acreage. However, based on information provided by doing detailed wetland assessments of all three alternatives for the current DEIS, we now know that that major assumption is false.

It should be noted that in 2004 the U.S. Forest Service requested that concurrence point No. 3 (selected alternative) be revisited.

In terms of INDIRECT impacts, it is impossible to make a well-informed decision as to which alternative is the least environmentally damaging based on the information provided in the DEIS. The DEIS does suggest various types of indirect impacts that might occur as a result of the introduction of a bypass, but the discussions about the likelihood of such impacts are vague, especially in regard to the expected degree of severity of such impacts. More importantly, there is no analysis showing the expected severity of secondary impacts among the various alternatives. Thus, the reader is left with no firm conclusions about which alternative will ultimately be most damaging and which will ultimately be least damaging.

Actually, in terms of indirect impacts, the DEIS seems to "argue both ways", apparently to justify Alternative 3 as the least environmentally damaging alternative. For instance, the DEIS argues that two of the most potentially damaging types of secondary impacts should in actuality not be very severe: 1) the DEIS argues that it will still be possible for the Forest Service to carry out prescribed burning on lands fragmented by the bypass, and 2) the DEIS argues that because of current land ownership patterns in the project area, the introduction of the bypass is not likely to cause much change in the degree of development. On the other hand, the DEIS frequently argues that Alternative 3 may not be as damaging as Alternative 1 because of the likelihood of secondary impacts. Obviously, for Alternative 1 to ultimately be worse than Alternative 3, then secondary impacts will have to be substantial. Again, the reader is left with no firm conclusions about which alternative is likely to ultimately be least damaging.

It is obvious that the DEIS has a bias toward Alternative 3; continually the text "promotes" Alternative 3. It is obvious that DOT wants to justify their original choice and not be open to new information that is inconsistent with that choice.

The DEIS is woefully inadequate in recognizing the overall ecological significance of the Forest Service lands that will be impacted by the project: two recognized state natural areas (one of state-wide significance, one of regional significance—these wordings are not mentioned in the DEIS), extent of longleaf pine, maturity of longleaf pine (mostly about 75 to 90 years old), integrity of the ground cover, presence of longleaf pine on various soil types (including some that today are very rarely associated with native plant communities—this has implications for top-down preservation of native biodiversity), and cluster areas for numerous rare species—especially ones associated with loamy soils.

On the other hand, many of the discussions about the project area are rather boilerplate—they may have been written about "anywhere Coastal Plain North Carolina". Indicative of how little appreciation there is for the longleaf pine-dominated portion of the project area is the discussion under Biotic Communities that claims a deviation from "natural" conditions and claims that a more natural condition would be for the area to consist of various different-aged seres resulting from severe, stand-replacing fires. This discussion is completely at odds with current understanding of longleaf pine ecosystems (which are naturally uneven-aged systems, maintained by frequent, low-intensity ground fires)(as discussed in the book, "Looking for Longleaf", by Lawrence Earley, 2004) and is at odds with the Reference Condition for pine savannas described in the current Croatan Management Plan.

The discussion on page 4.72 related to the extent of longleaf pine that will be directly destroyed by the project seems intended to understate the significance of the loss. It might be mentioned that this evaluation was based largely on remote sensing (satellite imagery) and that the evaluation is based primarily on how dense the midstory vegetation was at the time of the imagery. Thus a site that might rate "medium" quality on one date, might, a few days later, after a prescribed burn, then rate a "good" level, because of the thinning out of the midstory vegetation. An evaluation and comparison of impacts on longleaf would be of more value if it focused on attributes of the area that are more "constant" and more representative of an area's potential for relatively simple restoration to desired condition for RCW's and other pine savanna species, i.e. the age of the longleaf (mostly 75 to 90 years in the project area) and the integrity of the ground cover, especially wiregrass. The DEIS does mention that wiregrass is major component of the herbaceous ground cover in the project area, but does not mention the significance of this fact.

The DEIS does correctly report that some of the power line corridors are important habitat for rare plant species, but does not adequately convey the importance of the habitat. The DEIS states that the introduction of power line corridors has "created" suitable conditions for rare pine savanna plant species. This statement is largely not true. The best evidence is that the presence of power line corridors have helped to maintain pre-existing pine savanna species, because the frequent mowing mimicked the effects of fire, which were reduced in frequency for many years (before being re-introduced/increased in frequency in the last several years). Further, relatively few sites within these power line corridors are very good habitat for rare pine savanna plant species. For most of these species, severe ground disturbance results in unsuitable habitat.

The power line corridors of the project area are particularly noteworthy as refugia for pine savanna species associated with loamy soils. Some of the largest populations of certain rare loamy soil pine savanna species in the Croatan, such as LeConte's thistle (*Cirsium lecontei*), occur in the project area. The destruction or deterioration of these power line corridor populations of rare plants would be very damaging to the overall goal of maintenance of biodiversity in the Croatan NF. Note that the maintenance of native biodiversity is an overriding goal of the Croatan NF Plan.

Where highway construction occurs in proximity to power line corridors, the power line corridors will likely be impacted severely, even if they lie outside of the highway corridor. This is a secondary impact that is virtually inevitable, even if steps are taken to prevent it. Highway construction is messy business, with large equipment to park, inevitable stockpiling of materials, etc.

The project area supports a large number of rare and declining species, with most of these being pine savanna species. There is one endangered species, at least 8 Federal Species of Concern (with habitat present for several others), at least 19 state-listed species, and at least 32 watch-list species (which are borderline rare species). Many of the above are Forest Service PETS species; most or all of these species occur exclusively or predominantly on Forest Service land. In terms of DIRECT impacts, it is obvious that Alternative 1 will be least damaging to most or all of these species. However, the DEIS does not provide enough information to judge which alternatives will ultimately be most damaging/least damaging to the rare species of the project area.

The DEIS does not adequately describe the damage that will occur or is likely to occur within the Southwest Prong Flatwoods Natural Area as a result of either Alternative 3 or Alternative 2 from direct and indirect impacts.

The DEIS does not adequately describe the damage that will occur or is likely to occur within the Havelock Station Natural Area as a result of from any of the alternatives.

The DEIS does not even mention the presence of two heron nesting colonies (one in the East Prong of Slocum Creek within the Alternative 3 corridor, one in the Southwest Prong of Slocum Creek adjacent to the Alternative 3 corridor). One of these heron nesting colonies was discussed in a draft Environmental Services report to DOT (October 2004), but it was left out of the final report and was not included in the DEIS. Anhingas nested in the Southwest Prong colony in 2007 and in the East Prong colony in 2008 and 2011. The project area is the only location within the Croatan where this species is currently known to nest.

The DEIS is overly optimistic as to which rare species (in the project area) might benefit from the Croatan Wetland Mitigation Bank (as compensation for their destruction by the project). Obviously the Wetland Mitigation Bank will provide very good habitat for species like black bear and black-throated green warbler. However, it simply is not, and never will be, suitable habitat for many of the rare savanna species that are likely to be impacted by the Bypass project.

The DEIS states that power poles in some sections of power line corridors may need to be relocated where they are affected by the new highway. This obviously has implications for several rare plant species found in power line corridors in the project area. Although these species persist because of regular mowing within the corridors, large scale operations, such as the relocation of power poles, present the potential to destroy populations. The DEIS should compare the likely impacts to rare plant species between alternatives because of such potential action. (The DEIS states that **after** a preferred alternative is selected, then such actions will be evaluated.)

The DEIS does not do a good job of presenting the goals of the Croatan Plan, especially as they may relate to the project area. The major overriding goal of the Croatan Plan is maintenance of native biodiversity, especially in regard to preserving rare species (most of which in the Croatan are associated with pine savanna habitat), recovering the red-cockaded woodpecker, and restoring longleaf pine.

The DEIS mentions the possibility of invasive species being introduced into the project area by the introduction of a bypass. However, it does not present any information that would enable one to decide which of the alternatives might be worst in terms to their promotion of this problem. It would seem that Alternative 1 would be least likely to cause the introduction of invasive species into sites having rare plants in the project area.

The DEIS gives conflicting information as to whether it is likely that prescribed burning will still be carried out after a highway goes in. There are statements that suggest burning could still take place, but there are also statements such as (page 4-74) "....however, decisions to burn are determined at the last minute based on wind speed and direction, humidity, etc., and it would be logistically difficult to close the highway on short notice."

A long-term secondary impact of a highway introduction that is not mentioned in the DEIS is: Once a highway goes in, it will very likely become THE corridor of the future for many infrastructure type needs. Even if extraordinary measures are taken during the initial highway construction to preserve environmental values in the project area (such as rare plants in power line corridors), they will continue to be threatened by future actions.

Sincerely,

John Fussell

Cypress Group of the Sierra Club
103 Cabana Road
Belhaven, NC 27810
malsentzer@gotricounty.com

Dr. Gregory J. Thorpe
North Carolina Department of Transportation
1548 Mail Service Center
Raleigh, NC 27699-1548
November 21, 2011

Re: Draft Environmental Impact Statement for R-1015, Havelock Bypass

Dear Dr. Thorpe:

The Cypress Group of the NC Sierra Club, an all-volunteer organization representing over 1,000 Sierra Club members in 23 counties of eastern North Carolina, has followed the issue of constructing a Highway-70 bypass around the City of Havelock for many years. Detailed comments regarding the DEIS for R-1015 are being submitted by the Southern Environmental Law Center. We have cosigned these comments and are in full agreement with them. It is our opinion that letters the Cypress Group has submitted in the past on this subject (many of which are found in the DEIS), as well as those of some other environmental groups and biologists, are still applicable with regard to this DEIS, and **we do not believe that the current DEIS offers information detailed enough to justify proceeding with any one of the three bypass alternatives discussed as the least environmentally damaging practicable alternative.**

Lack of up-to-date data to justify alternative selections

We continue to assert that all reasonable alternatives have not been adequately discussed; i.e., we feel that other alternatives, although mentioned, have been prematurely dismissed. Because some of the data collected in support of the Alternatives 1, 2, and 3 as well as data used to justify the disregard of other alternatives is often several years old, we feel it may no longer accurately reflect the current social/economic reality of the area. It must be updated before improvements to the current highway are dismissed as a possible practicable alternative.

Issue of Requisite Prescribed Burnings not resolved

The major goals of the Croatan Plan that are particularly relevant to the project area are

1. to conserve native biological diversity,
2. to restore longleaf pine/wiregrass, and
3. to recover red-cockaded woodpeckers (RCWs).

In order to accomplish these goals a definitive plan of prescribed burnings is requisite and must be carried out.

The Cypress Group questions whether any of the three bypass alternatives described in the document will allow for the achievement of these three stated Forest Service (FS) goals. The DEIS does not adequately address likely impacts associated with future ability/inability of the Forest Service to burn lands fragmented in any of the alternatives. Certainly, alternatives leading to the loss of lands fragmented by the bypass or an inability to manage fragmented lands with the requisite frequency of prescribed burning will have a detrimental impact on the RCW habitat in the forest (populations of which are not increasing at this time). Any of the three alternatives discussed is likely to lead to the inability to provide contiguous habitat for the various woodpecker subpopulations. It is also questionable as to whether in the absence of regular controlled burnings the forest will be able to maintain its native biological diversity or allow for the restoration of long-leaf pine/wiregrass habitat.

In the DEIS we find no evidence of any kind of agreement between the Forest Service and the Department of Transportation (DOT) that will allow the FS to maintain with certainty an effective burning program. The DEIS does not deal with the reality of this management tool, rather it is stated that the DOT agrees with the "concept" of allowing the Forest Service to be able to continue to burn. Looking at the past record of controlled burnings (or lack thereof) in the forest we must question whether the reality of carrying out prescribed burnings will, in fact, satisfy the FS restoration management strategies. **It is imperative that a formal, interagency agreement be reached between the DOT and the FS addressing the subject of prescribed burning before an EIS is approved.**

Wetland mitigation and Biological Assessments

The DEIS contains very little information about the ecological significance of the Forest Service land in the project area and what impacts might be expected to occur to rare species, habitats, etc. We do not agree that a biological assessment can/should be made after an alternative has been chosen, rather it should be an integral part of the comparative evaluation process so that effective conservation and mitigation can be planned. Detailed wetland mitigation plans and biological assessments for each alternative must be completed before a decision is made as to which is the least damaging alternative. We question whether the Croatan Wetland Mitigation Bank (CWMB) will adequately replace the **functional values** of wetlands lost in any of the project alternatives, and we are particularly skeptical that the CWMB will ever provide adequate

compensation for the various types of rare pine savanna habitats and rare pine savanna species that will be impacted by the project.

Past Comments of the Cypress Group still valid

In 2002 and 2003, the Cypress Group officially commented on particular facets of alternatives being considered for the bypass for the Environmental Assessment at that time. While most of these were documented and presented in the DEIS, there was one omission, that we would like to see included in the final EIS, our letter to FHA, cc to DOT, Forest Service, 6 March, 2003. We would like to see this letter included and its contents considered in the Final DEIS. The positions taken and issues we raised in that letter remain.

The Cypress Group of the Sierra Club requests that the Department of Transportation take these comments and those of the SELC into consideration and revise its DEIS on R-1015 for further public comment.

Sincerely,
Mary Alsentzer, Chair

cc
Lee Thornhill

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Appendix E

NEPA/404 Merger Team Coordination

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US 70 Havelock Bypass, TIP Project No. R-1015
Section 404/NEPA Interagency Merger Process Team Concurrence Meeting for Corridor Selection (CP3 Revisited)

Meeting Date: April 10, 2012
Distribution: October 23, 2012 Revision (Original September 10, 2012)

Place/Time: NCDOT Structure Design Conference Room, Raleigh 9:00 am

Attendees:
Jessi O'Neal Baker, NC Division of Marine Fisheries {via phone}
Amy Billings, NCDOT – Hydraulics Unit
Gordon Box, NCDOT – Geoenvironmental Unit
Joseph Carter, III, J.H. Carter & Associates
Gordon Cashin, NCDOT – Natural Environment Section
Hardee Cox, NCDOT – NCDOT TIP Unit
Andrea Dvorak-Grantz, Stantec
Tristram Ford, NCDOT – Human Environment Section
Mary Frazer, NCDOT – Natural Environment Section
Rob Hanson, NCDOT – Eastern Project Development Section
Phil Harris, NCDOT – Natural Environment Section
Jim Hauser, NCDOT – Natural Environment Section
Larry M. James, Jr., NCDOT – Utilities Unit
Gary Jordan, US Fish & Wildlife Service
Drew Joyner, NCDOT – Human Environment Section
Paul Koch, Stantec
Neil Lassiter, NCDOT – Highway Division 2
Ed Lewis, NCDOT – Public Involvement & Community Studies
Ron Lucas, Federal Highway Administration
Elizabeth Lusk, NCDOT – Natural Environment Section
Kevin Markham, Environmental Services, Inc.
Scott McLendon, US Army Corps of Engineers
Art McMillan, NCDOT – Hydraulics Unit
Colin Mellor, NCDOT – Natural Environment Section
Chris Militscher, US Environmental Protection Agency {via phone}
Glenn Mumford, NCDOT – Roadway Design Unit
Cyrus Parker, NCDOT – Geoenvironmental Unit
Mark Pierce, NCDOT – Eastern Project Development Section
Rachelle Powell, US Forest Service
Chris Rivenbark, NCDOT – Natural Environment Section
Jeanette Sabo, J.H. Carter & Associates
Ron Sechler, NOAA-Fisheries
Amy Simes, NC DENR
Matt Smith, Environmental Services, Inc.
Steve Sollod, NC Division of Coastal Management
James Speer, NCDOT – Roadway Design Unit
Mark Staley, NCDOT – Roadside Environmental Unit
Tom Steffens, US Army Corps of Engineers
Greg Thorpe, NCDOT PDEA Unit
James Upchurch, NCDOT – Transportation Planning Branch
David Wainwright, NC Division of Water Quality
Allison White, NCDOT – Roadway Design Unit
Travis Wilson, NC Wildlife Resources Commission
Brian Yamamoto, NCDOT – Eastern Project Development Section

Reference: R-1015 US 70 Havelock Bypass Corridor Selection (CP3 Revisited)

PURPOSE OF MEETING:
The purpose of the meeting was to reinitiate the merger process due to the amount of time elapsed since the last interagency team meeting. The purpose also included selecting the Least Environmentally Damaging Practicable Alternative (LEDPA) based on updated studies and the updated (2003) Red-cockaded woodpecker (RCW) Recovery Plan. The currently recommended LEDPA is Corridor 3. An exhibit showing alternative Corridors 1, 2, and 3 is attached.

AGENDA TOPICS:
The Concurrence Point 3 handout included the following agenda for the meeting:

1. Meeting Purpose and Agenda
2. Project Information
3. Merger Process History
4. Reinitiate Merger Process
5. Updated Technical Reports & Environmental Documents
6. Comments on Draft EIS
7. Comments from Corridor Public Hearing
8. Evaluation of Corridors and Impact Matrices
9. Corridor Selection Discussion
10. Next Steps
11. Summary & Action Items

ITEMS OF DISCUSSION:
The following paragraphs summarize the discussions and decisions resulting from this meeting:

Project Information and Merger Process History:
An overview of the project's history was presented that included previous decision points and milestones. NCDOT presented a graphic on the white board showing how the project had progressed through Concurrence Point 3 (LEDPA) and Concurrence Point 4B (Hydraulic Design). It was explained that due to elapsed time and project developments, specifically changing the document type from an Environmental Assessment (EA) to an Environmental Impact Statement (EIS) and the update of the RCW Recovery Plan, the merger process is being reinitiated at Concurrence Point 3. Below are project milestones that were reviewed in the discussion of project history:

- (1996) Original CP3 Meeting
- (1997) NCDOT purchased Croatan Wetland Mitigation Bank
- (1998) Approved Environmental Assessment
- (2000) CP 2A Agreement on bridge lengths
- (2002) CP 4B, 30% hydraulic review
- (2003) RCW Recovery Plan
- (2003) Determined EIS as appropriate document format
- (2006 – 2010) Updated Environmental Studies
- (September 2011) Approved Draft Environmental Impact Statement
- (December 2011) Corridor Public Hearing

Reinitiate Merger Process:
The team discussed reinitiation of the merger process at Concurrence Point 3 (LEDPA). It was also discussed that there has been inconsistent reporting of the proposed bridge lengths for hydraulic crossings along the project. Specifically the lengths previously shown for Concurrence Point 2A (Bridging Decisions and Alignment Review), Concurrence Point 4B

(30% Hydraulic Review), and within the Draft Environmental Impact Statement (DEIS) are not the same. The group discussed that the re-initiation of the merger process would begin with Concurrence Point 3 and then the associated bridge lengths would need to be re-verified.

Updated Technical Reports & Environmental Documents:
A summary was verbally provided to the team listing the status of the environmental document and updates of associated technical reports. The DEIS was approved in September 2011 and the FEIS is currently in development. Reports that are in the process of being updated since the approval of the DEIS include the Proposed, Endangered, Threatened, and Sensitive (PETS) species surveys and report, the RCW presence/ absence surveys and report, and the traffic noise analysis and report. These studies are all being conducted in 2012.

Comments on Draft EIS:
Comments that had been received on the DEIS were discussed to provide clarification or to discuss their relevance to the selection of the LEDPA. The comment discussions, by subject, are provided below:

Traffic Forecasting and Capacity Analysis
The U.S. Environmental Protection Agency (EPA) comments requested clarification of the traffic analysis summary in the DEIS. Specifically that the results show levels of service (LOS) on US 70 will still be at failing levels in the Build condition.

NCDOT responded that if the bypass is in place, the traffic forecast shows it would divert 10,000-15,000 vehicles per day (vpd) off of US 70. Although many of the intersections along existing US 70 are predicted to still have undesirable design year LOS in the Build scenario, this reduction of vehicles will result in a major reduction in delay and queue lengths. NCDOT also described the City of Havelock's plans for existing US 70 once the bypass is constructed, which include transforming existing US 70 to a "complete streets" facility.

The EPA requested providing more detailed traffic summary information prior to the next meeting. The EPA stated that this traffic information is critical to their selection of a LEDPA and needs to be presented in more detail in the environmental document.

Stream Mitigation
During the meeting, the EPA asked how stream mitigation was being provided for the project and if the Croatan Wetland Mitigation Bank (CWMB) was intended to provide stream mitigation. NCDOT responded that the CWMB is intended to address stream mitigation needs for the project, and that details of the stream mitigation elements of the CWMB would be included in the FEIS.

Red-cockaded Woodpecker and Section 7 Consultation
The U.S. Fish & Wildlife Service (USFWS) comments on the DEIS indicate that the USFWS does not oppose Corridor 3 as the Preferred Alternative and that formal Section 7 consultation is not needed. USFWS clarified that these comments are based on the assumption that NCDOT allows road closures and that USFS is able to conduct prescribed burns per the NCDOT prescribed burn commitments.

The group discussed that there were some inconsistencies in the DEIS regarding agreements and discussions to-date with respect to RCW impacts. USFWS pointed out that there were several inconsistencies within the document regarding whether or not the project

would have an adverse effect on RCW. Some of these inconsistencies were due to the timing of final documentation of NCDOT's commitment to closing the bypass for prescribed burns versus the publication of the DEIS. The USFWS and others confirmed that, with the NCDOT commitment and agreement to allow prescribed burns, there would not be an adverse effect on RCWs. NCDOT responded that the commitments to prescribed burning and bypass closure; and the associated no adverse effect would be clearly stated in the FEIS. The group also acknowledged the potential for some small effects to other T&E species that are currently being studied in technical report updates. These affects, if any, will be clearly represented in the FEIS.

NCDOT noted that updated PETS Species Surveys, including RCWs, are being conducted from April 2012 to September 2012.

EPA asked which corridor has the most impact regarding RCWs. USFWS responded that based on the RCW guidelines, all three corridors are below the threshold for a "take" and therefore it is a "no adverse effect" for each of the three corridors.

Hickman Hill Convenience Center

EPA commented that the project may result in the loss of the only solid waste facility in the area (the Hickman Hill Convenience Center). EPA asked where citizens will take their trash if there is not a transfer facility and commented that this is an unresolved issue. In the discussion, USFS noted that they had been approached by Havelock to use National Forest Service lands for a new transfer facility. However, the USFS has told the city this would not be an option.

NCDOT responded that during right of way acquisition, NCDOT will work with Havelock on purchasing and relocating to a new site, but it is up to the city to choose the new site. As an action item, NCDOT is continuing to coordinate with Craven County to ensure that the County is aware of the impact to this facility.

US 70 Median Project in Havelock

The U.S. Army Corps of Engineers (USACE) asked how the recent median construction on US 70 was currently affecting traffic. NCDOT responded that there have been reductions in left turn movements and that the project was considered a safety improvement.

Residential Relocations for Corridor 2

USACE asked about the residential relocation numbers in the impact summary table; specifically that they show Corridor 2 a magnitude higher than Corridors 1 or 3 for relocations.

NCDOT responded that the estimated relocations were based on preliminary plans and right-of-way relocation reports. The group added that there was a HUD apartment complex on Lake Road accounting for many of the 133 relocations on Corridor 2. The apartment complex is shown in the footprint of the proposed interchange and indicated on the relocation reports in the DEIS. USACE asked if the relocations at the proposed Lake Road interchange could be minimized.

Comments from Corridor Public Hearing:

A summary of the December 6, 2011 public hearing comments was presented to the team. The summary provided statistics of the written and verbal comments. Of the 37 written and 21 verbal comments, roughly half of the input opposed the project and/or supported study of an Improve Existing Alternative. It was pointed out that this feedback is consistent with other

regional projects where locally impacted residents are not necessarily the beneficiaries of the intended regional travel benefits.

It was noted that an NCDOT project to install medians on US 70 had gotten underway just prior to the hearing. Many citizens were unhappy with the median project, and that sentiment was carried into the Havelock Bypass Hearing.

EPA asked if the citizen comments opposing the project seemed to mostly be based on environmental effects or on effects to existing businesses and properties. NCDOT responded that most of the comments verbalized seemed to be based on effects to businesses and properties.

Evaluation of Corridors and Impact Matrices:

The comparison matrix of alternatives was presented in the Concurrence Point 3 packet. The Impacts comparison table is shown below:

Updated Comparison of Bypass Alternatives from DEIS (2011)			
	Alternate 1	**Alternate 2**	**Alternate 3**
Length (miles)	10.85	9.91	10.31
Costs (year dollars)			
Construction (08)	$156,400,000	$138,800,000	$149,600,000
Utility Relocation (07)	1,600,000	2,800,000	2,800,000
Right of Way (09)	9,800,000	29,000,000	10,600,000
TOTAL	**$167,800,000**	**$170,600,000**	**$163,000,000**
Relocations (2009)			
Residences (minorities)	13 (0)	133 (18)	16 (0)
Churches (members)	0	0	0
Businesses (employees)	1 (2)	3 (9)	1 (2)
Non-profit	1 (3)	1 (3)	1 (3)
TOTAL	**15**	**137**	**18**
Physical Environment (Based on ROW)			
Croatan National Forest (acres)	189	225	240
Potentially-Contaminated Sites	1	1	1
Major Stream Crossings	3	3	3
Natural Resources (Acres)			
Prime Farmland by Soils in R/W	66	112	71
Jurisdictional Areas (Based on Slope Stakes +25 feet on each side)			
Wetlands (acres)	109	78	115
Streams (lin. ft.)	2,581	3,094	2,505
Neuse River Riparian Buffers (sq. ft.)	69,534	142,025	106,647
Jurisdictional Areas on National Forest System Lands (Based on Slope Stakes +25 feet on each side)			
Wetlands (acres)	81	67	88
Streams (lin. ft.)	1,012	1,764	1,387

Reference: R-1015 US 70 Havelock Bypass Corridor Selection (CP3 Revisited)

Updated Comparison of Bypass Alternatives from DEIS (2011)			
	Alternate 1	**Alternate 2**	**Alternate 3**
RCW (USFS Field Survey, Fall 2011)			
Active clusters (58 & 902)	2	2	2
Inactive clusters	2 N, 2 R*	1 N, 2 R*	2 N, 2 R*
	* N=Natural, R= Recruitment		

Corridor Selection Discussion:
After presenting the comparison of impacts for each alternative, NCDOT asked if the team concurred with reaffirmation of Corridor 3 as LEDPA. Reasons for recommending Corridor 3 as LEDPA are listed below:

Corridor 3 provides:

- 2nd lowest number of relocations
- Lowest stream impacts
- 2nd lowest prime farmland impacts
- 2nd shortest project length
- Best compromise between impacts to the Croatan National Forest and Town of Havelock
- Lowest cost

The following items were discussed in relation to the selection of LEDPA.

The N.C. Division of Water Quality (DWQ) noted that Corridor 3 has the highest wetland impacts and that although the reasons for selecting it as LEDPA were understood, asked if further reduction of wetland impacts could be considered. NCDOT noted that Corridor 3 was recommended as a compromise between Corridors 1 and 2 (Corridor 1 has greater impacts to USFS lands and Corridor 2 has greater relocation impacts).

EPA pointed out that the impacts table indicates that Corridor 1 has the least impacts and could be considered LEDPA. The U.S. Forest Service (USFS) responded that Corridor 1 would have greater effect on RCWs because it would make prescribed burning extremely difficult; it would make it more difficult to manage RCW clusters and would make it difficult to access and manage lands. USFWS reinforced that Corridor 1 would make it more difficult to manage RCW clusters.

WRC stated concurrence with Corridor 3 as LEDPA, noting that indirect and cumulative effects and fragmentation are higher with Corridor 1. EPA suggested that the impacts table should attempt to capture some of the decision-making features, such as habitat fragmentation, so that the LEDPA decision is more clearly presented in the FEIS. DWQ also commented that it would be important to carefully document these other LEDPA-decision factors in the FEIS.

NCDOT noted that the results of the latest PETS studies still support recommendation of Corridor 3 as LEDPA and that these recommendations have been documented in correspondence. EPA asked if any of the updated studies changed the decision factors regarding LEDPA. NCDOT confirmed that none of the updated studies changed the recommendations.

Reference: R-1015 US 70 Havelock Bypass Corridor Selection (CP3 Revisited)

The USACE reminded the group that the proposed bridge lengths for the project are inconsistently reported between the DEIS and the Concurrence Point 4B recommendations. NCDOT acknowledged the inconsistent documentation of lengths and responded that the bridge lengths will be reviewed and follow-up coordination will be conducted with the Interagency Team.

The group discussed the need to create a new concurrence form. But it was decided that since the current form had not been rescinded and the recommendation for LEDPA was unchanged, there was no need for a revised form. FHWA confirmed that the current CP3 Concurrence Form was still valid and that the minutes of this meeting would be sufficient to verify the previous LEDPA decision.

Concurrence Decision:
Team members representing the following agencies at this April 10, 2012 meeting verbally reaffirmed and reached concurrence on Corridor 3 as the Least Environmentally Damaging Practicable Alternative (LEDPA):

- Federal Highway Administration
- US Army Corps of Engineers
- US Fish and Wildlife Service
- NC Wildlife Resources Commission
- US Forest Service
- NC Department of Transportation

Corridor 3 was selected for the following reasons:

- 2nd Lowest number of relocations
- Lowest stream impacts
- 2nd lowest prime farmland impacts
- 2nd shortest project length
- Lowest cost
- Minimizes fragmentation of Red-cockaded Woodpecker habitat

The EPA abstained from concurrence stating that no significant updates regarding the previous LEDPA decision had occurred and that more clarity is needed in the documentation of the decision factors. EPA did not state any opposition to the recommendation of Corridor 3 as LEDPA.

Summary of Action Items:
The following items discussed at the meeting warranted further action or follow up. An update on the resolution or continuing efforts for each of these action items is described in the next section.

- The EPA requested further clarification on the details of the traffic analysis.
- The USFWS requested that NCDOT's prescribed burn commitments and the associated No Adverse Effect for RCW need to be better clarified in the FEIS.
- The EPA requested further clarification on the relocation of the county waste transfer facility (Hickman Hill Convenience Center).
- The EPA requested more information regarding stream mitigation for the project.
- The group discussed the need to clarify and finalize the proposed bridge lengths associated with Corridor 3.
- The USACE requested further discussion of relocation impacts, specifically the higher estimates for Corridor 2 (how they were estimated, opportunities for minimization) as the project moves forward.

Reference: R-1015 US 70 Havelock Bypass Corridor Selection (CP3 Revisited)

Update on Action Items Since CP3R Meeting:
The following action items were generated prior to or during the April 10, 2012 meeting. An update on the resolution of each action item is presented in italics.

Traffic Forecasting & Capacity Analysis
Mr. Chris Militscher (U.S. Environmental Protection Agency) requested clarification of the capacity analysis summary that was presented in the Draft Environmental Impact Statement, and requested more detailed information regarding traffic volumes.

Resolution - Mr. Militscher, Mr. Darryl Austin (NCDOT Transportation Planning), Ms. BenJetta Johnson (NCDOT Congestion Management), and Mr. Mark Pierce (NCDOT Project Development) met by telephone on May 3, 2012 to review the presentation of the traffic volumes and capacity analysis in the Draft Environmental Impact Statement. The group discussed the no-build and build forecasts, the traffic forecast diagrams, the level of service tabulation, and the anticipated volumes on the proposed bypass. Mr. Militscher requested and Mr. Pierce agreed that NCDOT will expand the discussion of the capacity analysis and the discussion of the benefits of the proposed bypass in the Final Environmental Impact Statement.

Red-cockaded Woodpecker
Mr. Gary Jordan (U.S. Fish and Wildlife Service) stated that, with prescribed bums, there would not be an adverse effect to the Red-cockaded Woodpecker species and formal Section 7 consultation would not be needed. However, Mr. Jordan requested that the discussions regarding impacts to RCWs need to be documented more clearly in the Final Environmental Impact Statement.

Resolution- NCDOT is preparing an update of the RCW Analysis that will be documented and submitted to the resource agencies during late 2012 or early 2013, and included in the Final Environmental Impact Statement. NCDOT will clarify the RCW discussions to be included in the Final Environmental Impact Statement and will continue coordination with USFWS on this issue.

Hickman Hill Convenience Center
Mr. Chris Militscher (U.S. Environmental Protection Agency) requested that NCDOT coordinate further with Craven County to ensure that the waste transfer station (Hickman Hill Convenience Center) can be relocated prior to construction of this project.

Resolution- On May 22, 2012, Mr. Mark Pierce (NCDOT Project Development) and Mr. Rusty Cotton (Director of the Craven County Department of Solid Waste & Recycling) spoke by telephone regarding the proposed bypass project with respect to the waste transfer station (Hickman Hill Convenience Center) and the closed landfill immediately adjacent to the transfer station. Mr. Pierce summarized the telephone conversation via an e-mail to Mr. Cotton on May 22, 2012. Mr. Pierce also provided Mr. Cotton with a link to the Public Hearing Map and a graphic showing the bypass corridors, parcels owned by the U.S. Forest Service and other parcels in Township 6 of Havelock.

Mr. Pierce called Mr. Cotton on July 11, 2012 to follow up on the County's review of the mapping and information e-mailed to him on May 22, 2012. Mr. Cotton said that Craven County is aware that the bypass will affect the convenience center and will require relocation of the facility. Mr. Cotton also said that the County is reviewing their options for relocation of the facility to private lands. NCDOT will continue dialog with Craven County on relocation of the Hickman Hill Convenience Center during the Right of Way Acquisition Process, which is currently scheduled to begin in fiscal year 2014.

Reference: R-1015 US 70 Havelock Bypass Corridor Selection (CP3 Revisited)

Stream Mitigation

Mr. Chris Militscher (U.S. Environmental Protection Agency) inquired about mitigation for stream impacts. Mr. Mark Pierce (NCDOT Project Development) responded that the Croatan Wetland Mitigation Bank provided mitigation for wetland impacts, stream impacts, and habitat fragmentation.

Resolution - Mr. Pierce further responded to this issue via the an e-mail to Mr. Militscher on April 30, 20I2 including a copy of the "Croatan Mitigation Bank Addendum to the NCDOT UMBI (May 2009)." Pages 9 and 10 describe the determination of credits. Approximately 140 acres of riverine wetlands have been classified as riparian headwater stream mitigation, which resulted in almost 61,000 linear feet of stream, or approximately 34,700 credits. Mr. Militscher reviewed this information and determined that stream mitigation issues have been addressed as noted in an e-mail dated May 1, 2012.

Bridge Lengths

During a telephone conversation with Mr. Mark Pierce (NCDOT Project Development) on December 1, 2011, Mr. Tom Steffens (U.S. Army Corps of Engineers) noted a discrepancy in the bridge lengths listed in the Draft Environmental Impact Statement (September 6, 2011) as compared with the bridge lengths presented in the minutes from the Avoidance & Minimization (CP4B) Concurrence Meeting (June 20, 2002). Mr. Steffens also documented his comment on the bridge lengths in a December 2, 2011 letter including this and other formal comments by the U.S. Army Corps of Engineers on the Draft Environmental Impact Statement, which were discussed during this meeting.

Resolution - The NCDOT Hydraulics Unit reviewed their files including the original Bridge Survey Reports and meeting minutes. They concluded that the bridge length for the Southwest Prong of Slocum Creek was incorrectly stated at the CP4B Meeting as 899 feet rather than 925 feet. After review of the East Prong of Slocum Creek, they noted that the approximate length of 1,476 feet was for a skewed crossing and that the adjusted perpendicular length is 1,618 feet. Therefore, NCDOT is now recommending the following for the three major crossings and requests that the Interagency Merger Process Team offer their comments or concurrence. An e-mail dated July 17, 2012 was sent to the Interagency Merger Process Team providing more details on the bridging decisions summary and revised recommendations.

Tributary of Tucker Creek:	*Double Box Culvert at 9 'x 7 ' x 384'*
Southwest Prong of Slocum Creek:	*925-foot Bridge*
East Prong of Slocum Creek:	*1,618-foot Bridge*

Corridor 2 Relocations

Mr. Scott McLendon (U.S. Army Corps of Engineers) and Mr. Tom Steffens (U.S. Army Corps of Engineers) requested that NCDOT review the relocations for Corridor 2 since they are much higher than Corridors 1 and 3. In particular, Mr. McLendon and Mr. Steffens requested that NCDOT review the type and location of the Lake Road Interchange to determine whether shifting to the east or west would reduce the number of relocations for Corridor 2.

Resolution - Mr. Steffens, Mr. Robert Woodard (NCDOT Right of Way Branch), Mr. Fred Barkley (NCDOT Right of Way Branch), and Mr. Mark Pierce (NCDOT Project Development) met in the Transportation Building in Raleigh on May 9, 2012 to discuss types of interchanges that could be utilized at Lake Road and Corridor 2. Shifting the interchange to the east or west, to further minimize residential relocations in that vicinity, was also reviewed. As discussed during the meeting, the location of Corridor 2 was

Reference: R-1015 US 70 Havelock Bypass Corridor Selection (CP3 Revisited)

selected to "hug" the western limits of Havelock in order to minimize impacts to the Croatan National Forest, and, in particular, RCW Cluster 902. Therefore, numerous multi-family dwellings located on Lake Road would be directly affected. We also discussed that NCDOT had previously studied a diamond interchange, a compressed diamond interchange, and a half-clover interchange to minimize relocations in this vicinity, and previously studied shifting the interchange eastward or westward to minimize relocations. NCDOT concluded that the interchange could not be shifted enough eastward or westward to avoid impacts to the multi-family dwellings. Mr. Pierce summarized the May 9, 2012 meeting via an e-mail to Mr. Steffens on May 23, 2012.

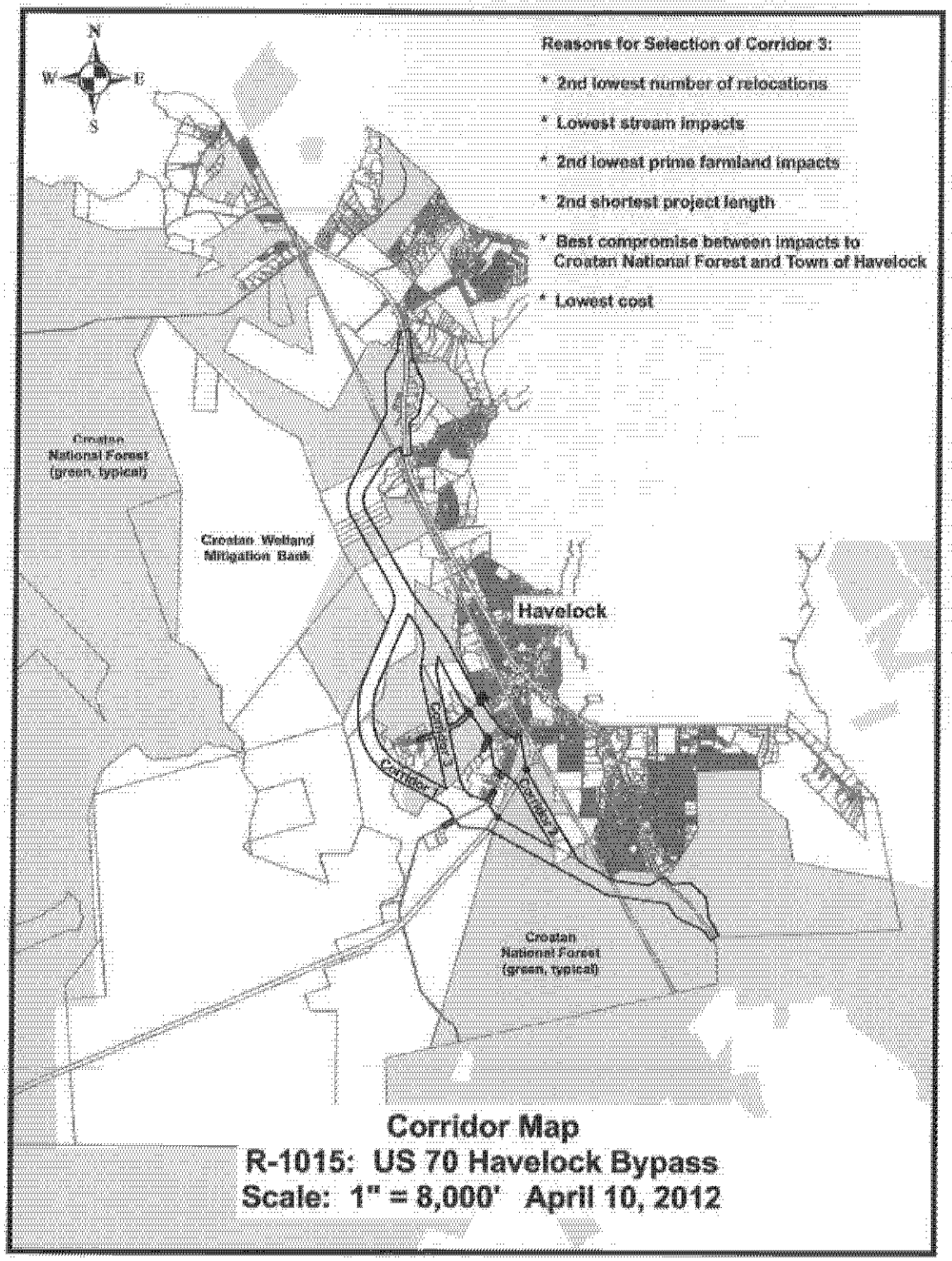
CORRECTIONS & OMISSIONS: This summary is the writer's interpretation of the events, discussions, and transactions that took place during the meeting. If there are any additions and/or corrections please inform Mark Pierce at (919) 707-6035 or at mspierce@ncdot.gov, or Paul Koch at (919) 865-7394 or at paul.koch@stantec.com.

Paul R. Koch, PE
Project Manager
paul.koch@stantec.com

PRK/

attachment: corridor map
cc: attendees
file

Reference: R-1015 US 70 Havelock Bypass Corridor Selection (CP3 Revisited)



Stantec

Meeting Minutes

US 70 Havelock Bypass, STIP Project No. R-1015

NEPA/404 Merger Team Meeting – Concurrence Point 4A

Date:	August 20, 2014
Place/Time:	Century Center Building A, Structure Design Conference Room
Attendees:	Rachelle Beauregard, NCDOT Natural Environment Section Amy Billings, NCDOT Hydraulics Unit Gordon Cashin, NCDOT Natural Environment Section Karen Compton, US Forest Service Ted Devens, NCDOT Project Development – Eastern Region Ed Eatmon, NCDOT Division 2 Patrick Flanagan, Down East RPO (via phone) Mary Frazer, NCDOT Natural Environment Section Rob Hanson, NCDOT Eastern Project Development Section Jim Hauser, NCDOT Natural Environment Section Gary Jordan, US Fish & Wildlife Service Paul Koch, Stantec Stephen Lane, NC Division of Coastal Management Ron Lucas, Federal Highway Administration Colin Mellor, NCDOT Natural Environment Section Stephen Morgan, NCDOT Hydraulics Unit Glenn Mumford, NCDOT Roadway Design Unit Brian Radakovic, NCDOT Hydraulics Unit Chris Rivenbark, NCDOT Natural Environment Section Amy Sackaroff, Stantec M.G. Shailch, NCDOT Hydraulics Unit Matt Smith, Environmental Services, Inc. Steve Sollod, NC Division of Coastal Management James Speer, NCDOT Roadway Design Unit Mark Staley, NCDOT Roadside Environmental Unit Tom Steffens, US Army Corps of Engineers David Stutts, NCDOT Structures Unit Cynthia Van Der Wiele, US Environmental Protection Agency David Wainwright, NC Division of Water Quality Allison White, NCDOT – Roadway Design Unit Travis Wilson, NC Wildlife Resources Commission Brian Yamamoto, NCDOT Project Development – Eastern Region
Distribution:	Attendees Maurizia Chapman, New Bern Area MPO Jessi O'Neal Baker, NC Division of Marine Fisheries Fritz Rohde, National Marine Fisheries Service

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The NEPA/404 Merger Team met on August 20, 2014 to discuss the proposed Havelock Bypass. The purpose of the meeting was to provide an update on project activities and current status; reach agreement on Concurrence Point 4A (CP4A) (Avoidance and Minimization); and, determine next steps. (A separate CP4B meeting immediately followed, which involved the Hydraulics Unit guiding the Merger Team through plan sheets.)

MEETING HIGHLIGHTS: Updates were provided on major project actions since the DEIS, stream/wetland impacts, and avoidance/minimization measures included in the design to date. It was also noted that CP4A was originally discussed and agreed upon on January 18, 2001. Corrections to wetland calculations were shared, as were additional stream impacts due to new jurisdictional status. The Merger Team reviewed the proposed avoidance and minimization measures, including those identified on the 2001 CP4A signature form, and reached concurrence on an updated signature form (attached). There was brief discussion of other topics including the Hickman Hill Convenience Center and impacts to the longleaf pine forest community within the Croatan National Forest (CNF).

ITEMS OF DISCUSSION AND DECISIONS: The following bullets summarize the discussion items and conclusions reached.

CORRECTED WETLAND CALCULATIONS – A systematic error in the calculation of wetland impacts was discovered subsequent to the publication of the DEIS. The error resulted from conversion/scaling issues in transferring data between GIS and Microstation (highway design software). The miscalculation resulted in reporting the wetland impacts for each of the Preliminary Alternatives lower than actual measured areas. The conversion error only applied to wetland impacts. FEIS Chapter 2.10.3.3 will include discussion of this error and updated impact quantities. Team members agreed that the calculation error was not substantive such that an additional re-visit of the selected LEDPA was unnecessary.

UPDATED STREAM CALCULATIONS – Since the publication of the DEIS in 2011, total stream impacts for the LEDPA increased by 443 feet as a result of stream and wetland delineations conducted in 2013. Areas adjacent to Stream 7 (S7) and Stream 9 (S9) were originally considered part of Wetlands 10 and 13, respectively; however, the stream lines were extended in 2013 to reclassify areas previously categorized as wetlands. Team members agreed that the calculation error was not substantive such that an additional re-visit of the selected LEDPA was unnecessary.

RED-COCKADED WOODPECKER – Gary Jordan explained that restricting the clearing limit width to 200 feet for the refined 5,500-foot section of the project is necessary so that habitat to the east can be counted toward the minimum basal area and acreage necessary to maintain an RCW foraging partition, which avoids a "take" under ESA regulations. Gary also stated that ESA coordination is different from USFS requirements under the CNF Forest Plan. Karen Compton noted that RCW management has to be contained within the CNF. Rachelle Beauregard stated that the Biological Assessment only considers lands within the CNF.

HICKMAN HILL CONVIENIENCE CENTER – Cynthia Van Der Wiele requested an update on coordination efforts regarding the relocation of the convenience center and stated that it needs to be relocated to an area that would not cause additional jurisdictional impacts. Ted Devens noted that the project commitments state that NCDOT will coordinate with the City of Havelock on the relocation and that NCDOT is proactively coordinating with the City on this effort.

> ***After-Meeting Update: Ted Devens spoke with Rusty Cotton (Director, Craven County Solid Waste & Recycling Department) and was informed that his department is currently coordinating with the County Planning Department to actively search for a new location for the center. DENR Solid Waste Management is also aware of the planning effort.***

RIPARIAN BUFFER IMPACTS – It was asked why Zone 1 buffer impacts decreased but Zone 2 increased.

After-Meeting Update: Stantec reviewed riparian buffer impact calculations after the CP4A meeting. As noted above, stream impacts for the LEDPA increased by 443 feet as a result of updated stream and wetland delineations. S9 did not affect buffer calculations; however, the extension of S7 added 21,094 square feet of impact (Zone 1: 12,748; Zone 2: 8,346) to the total buffer impacts. Although stream impacts increased (due to reclassification), overall buffer impacts were reduced due to minimization measures that reduced the project footprint (area). FEIS Table 2.10.4 shows updated buffer impacts for the Preferred Alternative.

LONGLEAF PINE HABITAT – Karen Compton stated that the USFS is evaluating whether the Croatan Wetland Mitigation Bank (CWMB) will provide sufficient habitat to offset impacts to longleaf pine forest within the CNF. She noted that the project impacts longleaf pines estimated to be between 40 and 80 years old in some areas and in other areas greater than 80 years old. The Forest Plan directs the USFS to protect longleaf pine forests within the CNF. The USFS is also assessing logistics associated with conducting prescribed burns within the CWMB. Tom Steffens stated that the Corps would be agreeable to discussing prescribed burn logistics for the CWMB.

CONCURRENCE POINT 4A – The signed CP4A form (attached) includes the following measures:

- No new ditching in wetlands with inverts below existing wetland elevations. Relocated ditches shall match ditch elevations.
- 46-foot median (original CP4A 1/18/01)
- Bridge structures (reaffirmed CP3 4/10/12):
  - Tributary of Tucker Creek – Double Box Culvert at 10' x 8' x 400'
  - Southwest Prong of Slocum Creek – ~~925'~~ **945'** bridge
  - East Prong of Slocum Creek – ~~1,618'~~ **1,620'** bridge
  - Tucker Creek – retain and extend existing triple 9' x 7' box culvert approximately 25 feet upstream and 78 feet downstream
- Minimization efforts reflect that right-of-way limits (and clearing limits) do not exceed 200 feet in width for the 5,500-foot section from Station 338+00 to Station 393+00 (with the exception of very specific spot locations such as driveway entrances or drainage conveyance), to minimize impact to RCW habitat.

After-Meeting Update: During review of the draft CP4A meeting minutes, it was noted that the bridge lengths shown on the CP4A form did not match the lengths shown on the preliminary designs reviewed and concurred upon by the Merger Team at the CP4B meeting. The proposed bridge lengths should reflect an increase from 925' to 945' for the Southwest Prong of Slocum Creek and an increase from 1,618' to 1,620' for the East Prong of Slocum Creek.

ACTION ITEMS:

- USFS and USACE to discuss logistics associated with conducting prescribed burns on the CWMB and coordinate with NCDOT to update CWMB MOU as appropriate.
- NCDOT and USFS to coordinate on access needs. Project impacts subject to change based on USFS requests for access.

After-Meeting Update: A coordination meeting was held in Havelock, with the NCDOT project team, Karen Compton, and CNF staff, on August 26, 2014. At the meeting, the group identified and agreed upon potential access points along the bypass for USFS land

management (with FHWA approval), discussed a conceptual landscape plan, herbicide management aspects, and timbering issues.

CORRECTIONS & OMISSIONS: This summary is the writer's interpretation of the events, discussions, and transactions that took place during the meeting. If there are any additions and/or corrections please inform Ted Devens at 919-707-6018 or tedevens@ncdot.gov.

Amy C. Sackaroff, AICP
amy.sackaroff@stantec.com

cc: File

Attachments:
CP4A signature form
USFS correspondence on CP4A

NEPA/404 MERGER TEAM MEETING AGREEMENT
Concurrence Point No. 4A: Avoidance & Minimization

PROJECT NO./TIP NO./ NAME/DESCRIPTION:
TIP Project Number: R-1015
TIP Description: US 70 Havelock Bypass in the vicinity of the City of Havelock in Craven County, North Carolina

Avoidance and Minimization Measures (items 1-3 are carried forward from 1/18/01 meeting):
(italics denotes a modification from 1/18/01 merger meeting)

1) No *new* ditching in wetlands *with invert below existing wetland elevation. Relocated ditches shall match existing ditch elevations.*
2) Forty-six (46) foot median (original CP4A 1/18/01)
3) Bridge structures as listed below (reaffirmed CP3 4/10/12):
   - *Tributary of Tucker Creek – Double Box Culvert at 10 'x 8 ' x 400' (modified from 9' x 7'x 384' length at 1/18/01)*
   - Southwest Prong of Slocum Creek – 925-foot Bridge
   - East Prong of Slocum Creek – 1,618-foot Bridge
   - *Tucker Creek – retain and extend existing triple 9' x 7' box culvert approx. 25 feet upstream and 78 feet downstream.*
4) *Minimization efforts reflect that right-of-way limits (and clearing limits) do not exceed 200-feet in width for the 5,500-foot section from Station 338+00 to Station 393+00 (with the exception of very specific spot locations such as driveway entrances or drainage conveyance), to minimize impact to RCW habitat.*

After-Meeting Update: During review of the draft CP4A meeting minutes, it was noted that the bridge lengths shown on the CP4A form did not match the lengths shown on the preliminary designs reviewed and concurred upon by the Merger Team at the CP4B meeting. The proposed bridge lengths should reflect an increase from 925' to 945' for the Southwest Prong of Slocum Creek and an increase from 1,618' to 1,620' for the East Prong of Slocum Creek.

The Project Team concurred on this date of August 20, 2014 with the avoidance and minimization measures listed above, as indicated by the signatures below.

US Federal Highway Administration
NC Department of Transportation
US Army Corps of Engineers
US Environmental Protection Agency
US Forest Service — USFS TO SEND A LETTER (COVENS)
US Fish and Wildlife Service
National Marine Fisheries Service
NC Wildlife Resources Commission
NCDENR, Division of Coastal Management
NC Department of Cultural Resources
NCDENR, Division of Marine Fisheries
NCDENR, Division of Water Quality
Down East RPO

USDA United States Department of Agriculture | Forest Service | National Forests in North Carolina Supervisor's Office | 160 Zillicoa St Ste A Asheville NC 28801-1082 828-257-4200

File Code: 2730
Date: November 7, 2014

Mr. Ted Devens, PE
Project Manager
North Carolina Department of Transportation
1548 Mail Service Center
Raleigh, NC 27699-1548

After-Meeting Update: During review of the draft CP4A meeting minutes, it was noted that the bridge lengths shown on the CP4A form did not match the lengths shown on the preliminary designs reviewed and concurred upon by the Merger Team at the CP4B meeting. The proposed bridge lengths should reflect an increase from 925' to 945' for the Southwest Prong of Slocum Creek and an increase from 1,618' to 1,620' for the East Prong of Slocum Creek.

Dear Mr. Devens:

This letter is in response to your request regarding our concurrence with Concurrence Point 4A (Avoidance and Minimization) for the improvement of US 70 Havelock Bypass in the vicinity of the City of Havelock in Craven County (T.I.P. Project R-1015). The United States Forest Service concurs with the Avoidance and Minimization Measures that were discussed and approved at the August 20, 2014 Merger Team meeting. The items approved include:

1) No new ditching in wetlands with invert below existing wetland elevation. Relocated ditches shall match existing ditch elevations
2) Forty-six foot median (original CP4A 1/18/01)
3) Bridge Structures as listed below (reaffirmed CP3 4/10/12)
   - Tributary of Tucker Creek – Double Box Culvert at 10' X 8'X 400' (modified from 9' X 7' X 384' at CP4A on 1/18/01)
   - Southwest Prong of Slocum Creek - 925 foot bridge
   - East Prong of Slocum Creek - 1,618 foot bridge
   - Tucker Creek – Retain and extend existing triple 9' X 7' box-culvert approximately 25 feet upstream and 78 feet downstream.
4) Minimization efforts reflect that right-of-way limits (and clearing limits) do not exceed 200-feet in width for the 5,500 foot section from Station 338+00 to Station 393+00 (with the exception of very specific spot locations such as driveway entrances or drainage conveyance), to minimize impacts to RCW habitat.

The United States Forest Service concurs with the above listed avoidance and mitigation measures and will continue to work with the North Carolina Department of Transportation on any additional mitigation measures that are necessary for the protection of National Forest System lands. We look forward to continuing to participate in the merger process for the Havelock Bypass Project. If you have any questions regarding this, please contact Karen Compton at (828) 257-4230.

Sincerely,

Kristin M. Bail

KRISTIN M. BAIL
Forest Supervisor

FINAL MINUTES OF INTERAGENCY 4B MEETING

PROJECT R-1015 (HAVELOCK BYPASS)

August 20, 2014

Team Members: See attached

Participants: See attached

R-1015

NCDOT Hydraulics began the meeting at 2:45 p.m. following the Avoidance and Minimization (4A) meeting. The first issues addressed were the changes that have occurred since the previous 4B Meeting on June 20, 2002 followed by a general discussion of the project. These issues include the following:

- The project is now labeled R-1015 and includes the previous separate projects R-1015A and R-1015B.
- The project has been converted from metric to English.
- The typical section now includes a 46' median and 10' paved outside shoulders.
- The culvert at Tucker Creek is now extended both up and downstream. Previously the extension was only on the upstream side. This may be an area of environmental concern (AEC) with CAMA. DCM will further investigate.
- Wetlands and streams have been re-verified in 2013, and the wet file has been updated. (See CCP 4A meeting minutes.)
- There have been several changes in personnel with the team members since 2002.
- The project is still mostly on fill except for the tie-ins at both ends of the project.
- In 2002, USACE noted that as long as new roadway ditches are at the same elevation as the existing roadway ditches that no additional impacts would need to be considered to the wetlands adjacent to the new ditch. This is still the case.
- In 2002, CAMA wanted equalizer pipes buried 1'. This is no longer the case. Now the pipes will not be buried 1'.
- In 2002, it was noted that it is acceptable to place 2GI's (median drainage inlets) on equalizer pipes. It is still acceptable, as long as the boxes are not very deep and the cross pipe is not that large.
- Bridge deck drains are not discharging directly over surface waters.
- There will be further discussions to see if impacts with detours on –Y3- and –Y4- are permanent or temporary.
- Temporary work bridges will be used during construction of both bridges and need to be noted on permit drawings.
- Hydraulic Design is complete. Bridge and Culvert Reports are complete and are included with the 4B packet.
- Southwest Prong of Slocum Creek and Tucker Creek both have "in-water" moratoriums according to DEIS.
- Note that the wetlands extend beyond the right-of-way line, but the wetlands were clipped at the right-of-way line in these drawings.

With no further comments or discussion, NCDOT proceeded to discuss the project sheet by sheet. Attached to these minutes are pdf files with suggested revisions to the drainage plans.

Plan Sheets

Only sheets with comments are noted below.

Sheet 4

The existing pipes will be extended at the beginning (-L- Sta. 33+00 +/-) of the project. This is non-jurisdictional stream.

Sheet 7

EPA suggested using the teardrop-shaped area inside the loop as treatment for the stormwater if the area would be a total take. The feasibility was discussed. The team decided to keep this area as is, and it would not be a total take for the permit drawings. Clearing limits will be 10' beyond the slope stake line. The team mentioned that any small wetland less than ¼ acre would be considered a total take. The team concurred that equalizer pipes used on this project do not need their inverts buried 1 foot.

Sheet 10

Add equalizer pipe in vicinity of wetland around Station 130+00 –L- per USACE recommendation.

Sheet 12

Add equalizer pipe in vicinity of wetland around Station 158+50 –L- and Station 161+50 –L- per USACE recommendation.

Fix property owner name to say "United States Department of Agriculture" for Croatan National Forest (CNF) property per USFS.

Sheet 13

The proposed bridge (total length=1620' with 12 spans at 135' on 72" pre-stressed concrete modified bulb tees) at East Prong of Slocum Creek (Jurisdictional Stream 'S1') was discussed. DWR suggested using rip rap pads to prevent erosion in the vicinity of deck drains. The vertical clearance on this bridge ranges from 6' to 18'. There will be further discussions with Division to see if some rip rap pads are warranted to disperse the flow. There were similar deck drain situations on the Washington Bypass. The bridge over East Prong of Slocum Creek will require a temporary work bridge.

Sheet 14

Account for rip rap pads in permit drawings.

Sheet 15

Move equalizer pipe from Sta. 210+00 –L- to Sta. 208+50 –L-.

Sheet 17

-Y3- Detour impacts will be considered temporary impacts. DWR suggested showing anything inside the temporary slope stakes as temporary impacts. If re-vegetation does not occur, then it will be considered permanent impacts. DCM suggested putting in geotextile fabric under temporary impacts. The stream shown on Sheet 17 is Jurisdictional Stream 'S6'. It was also suggested by the team to use enlargements where necessary.

Sheet 18

Jurisdictional stream ('S9') is shown at the end of driveway around Station 267+00 –L- (Lt). No impacts are indicated at this location.

Sheet 19

Jurisdictional Stream ('S9') will be impacted. There will be stream and buffer impacts at this location. If there is fill outside the R/W, an easement will be required. This stream was not on previous wetland files.

Sheet 20

Southwest Prong of Slocum Creek (Jurisdictional Stream 'S10') will have buffer impacts due to interior bents located in the buffer zone. There will also be temporary impacts due to the work bridge at this location. The proposed bridge will have a total length of 945' and will use 72" modified bulb tees (7 spans at 135'). There will be easements added in the vicinity of the fill slopes near the bridge. Deck drains at this location will be discussed with DCM, Area Bridge Engineer and Division personnel.

Sheet 21

Angle the cross pipe in the vicinity of Station 310+00-L- to match wetland angle.

Sheet 22

Wetland on this sheet will be a total take.

Sheet 23

An easement may be required alongside the proposed ditch. The proposed ditch should match the invert of the existing wetland. May add note, "Do not cut below wetland elevation" at this location. This wetland will be a total take.

Sheet 24

The beginning of this sheet (Station 338+00 –L-) is the beginning of the RCW habitat. The right of way is reduced from 250' to 200' for the next several sheets. There are some easements in this stretch of the project. USFWS indicated that small deviations from the 200' requirement would be ok as long as the majority of the project in this area is within 200'. The old recovery plan that used 200' is being updated and the new distance will be greater than 200'. The update will not take place any time soon. NCDOT Hydraulics may change the cross pipe at Station 342+50 –L- to go diagonally across –L- to reduce

footprint. Per Division, this project will use Method 3 clearing. Label easements as temporary or permanent.

Sheet 25/26

Label easements as temporary or permanent. Easements shown are temporary construction easements.

Sheet 27

At Station 393+00 –L- is the end of the RCW habitat. Right of way limits goes from 200' to 250' here.
Add equalizer pipe near Station 393+75 –L- (near the right edge of the sheet).

Sheet 32

Verify the cross pipe around Station 459+00 –L- is not for a jurisdictional stream.
Add equalizer pipe at Station 463+50 –L-.

Sheet 33

NCDOT will verify if toe protection can be removed near Station 470+60 –L-.

Sheet 34

Remove pipe at Station 487+00 –L-. The team agreed that is was ok to have 2GIs in median on cross pipes as long as the pipe is not very large and the cross pipe is not very deep.

Sheet 36

Verify fill slope lines around bridges (including bridges that cross railroads). There is a proposed culvert at UT to Tucker Creek (double 10'x8' RCBC). Fix label inside culvert report on plan view. This is a Jurisdictional Stream (S22/S23). Show Buffer Zones.

Sheet 41

Rip rap was added near the Havelock City Limit to prevent headcutting near the channel. This is not a Jurisdictional Stream.

Sheet 44

-Y3- detour impacts will be temporary wetland impacts.

Sheet 45

If the pond is a JS (S20b), there should be buffer zone lines around the entire pond. Upstream is JS (S20a).

Sheet 46

Double 72" pipes are located at JS (S19b and S19a). Show Buffer Zones lines correctly.

Sheet 47/48

Tucker Creek is Jurisdictional (S30a/S30b). Show Buffer Zones. The proposed culvert extension (3@ 9'x7' RCBC) is both upstream and downstream. Originally there was an extension only on the upstream side. There is no low flow barrel. Normal water depth is approximately 5'. This may be an area of environmental concern/ public trust area. This finding may trigger a CAMA permit. DCM will make a determination at this site.

End of sheet discussion.

NCDOT showed the team some GIS layers that could be made available if the team would like them. These layers show the project location, design, and impacts. This is not an official product that NCDOT produces. The team would like to have this information if available. NCDOT asked the team to provide feedback on this information as well as other ways to improve the effectiveness of the meetings and the review process.

The meeting adjourned at 5:00 p.m.

Addendum:

See DCM response in attached email (No CAMA permit required; concurrence needed)

R-1015
HAVELOCK BYPASS
MERGER PROCESS 4b MEETING
WEDNESDAY AUGUST 20, 2014

Sign in Sheet

NAME	ORGANIZATION	PHONE NUMBER
Brian Yamamoto	NCDOT- PDEA	919-707-6000
Ron Lucas	FHWA	919 747-7019
Steve Sollod	NC DCM	919-707-9152
David Wainwright	NCDWR	919-707-8787
Travis Wilson	NCWRC	919-707-0370
Ed Eatmon	NCDOT- DIV. 2	252-439-2812
Stephen Lane	NCDCM	252-808-2808
Jim Hauser	NCDOT-NES	919-707-6125
Gordon Cashin	NCDOT- NES	919-707-6107
Colin Mellor	NCDOT- NES	919 707-6139
Matt Smith	ESI	910-520-0784
Rob Hanson	NCDOT- PDEA unit	919-707-6024
Chris Rivenbark	NCDOT- PDEA NES	919 707 6152
M. C. Shaldi	NCDOT- Hyd.	919-707-6717
Amy Billings	NCDOT- Hydro	707-6709
Stephen Morgan	NCDOT- Hydro	707-6739
Brian Radakovic	NCDOT- Hydro	707-6747
TED PEVENS	NCDOT- PDEA	707-6018
Amy Sackaroff	Stantec	919 851 6866
Paul Koch	Stantec	919 865-7394
Mark Staley	NCDOT- REU	919-707-2948
James Speer	NCDOT - Roadway Design	919-707-6320
Allison K. White	" Roadway Design	919-707-6341
David Stutts	NCDOT- Structures	919 707-6442
CYNTHIA VANDERWIELE	USEPA	919.450.6811
Karen Compton	USFS	828-257-4230
Gary Jordan	USFWS	919-856-4520 x.32
TOM STEFFENS	USACE	910-251-4615

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Appendix F

Tribal Coordination

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U.S. Department of Transportation
Federal Highway Administration

North Carolina Division

310 New Bern Avenue, Suite 410
Raleigh, NC 27601
(919) 856-4346
(919) 747-7030
http://www.fhwa.dot.gov/ncdiv/

January 6, 2014

In Reply Refer To:
HDA-NC

Chief Leo Henry
Tuscarora Nation
2006 Mt. Hope Road
Lewiston, NY 14092

Dear Chief Henry:

The North Carolina Department of Transportation (NCDOT) proposes to construct a four-lane, divided roadway on new location in the vicinity of the City of Havelock in Craven County, North Carolina. The length of the project is 10.1 miles. This transportation improvement project is identified in the 2013-2023 Draft Statewide Transportation Improvement Program (STIP) as Project No. R-1015.

The study area for this project includes an identified archeological site that may have relevance to the Tuscarora Nation. **We are requesting your review of the enclosed information and appreciate any input you may have. A response by February 14, 2014, is requested.** The enclosed exhibits show the project study area vicinity and the Preferred Alternative. A summary of the project's history, purpose and need, and archaeological resources is included below.

Project History
NCDOT began the initial planning and environmental studies for the Havelock Bypass project in the early 1990's. These studies included an analysis of improving the existing highway versus various proposed bypass routes (corridors) with respect to potential impacts to the human and natural environment resources in the project study area.

NCDOT presented the findings of the initial planning studies in the Environmental Assessment (EA) that was approved by the Federal Highway Administration (FHWA) on Jan. 27, 1998. That document included a recommendation for the selection of Corridor 3 as the Preferred Alternative because it generated the lowest environmental impacts and was the most cost effective route.

After the EA was distributed for review and comment, NCDOT held a Corridor Public Hearing in May 1998, to present three bypass corridors for review and the majority of the public, the municipal officials, and the Interagency Team supported Corridor 3.

After the Corridor Public Hearing, FHWA, NCDOT, and other members of a federal and state "Interagency Team" selected Corridor 3 as the Preferred Alternative. NCDOT subsequently

prepared preliminary design plans for Corridor 3, as the associated potential impacts were assessed and evaluated.

Based upon the magnitude of the potential impacts from Corridor 3, it was determined that an Environmental Impact Statement (EIS) would be needed to assess the potential impacts from each of the three bypass corridors in greater detail.

In order to prepare the EIS, design plans needed to be refined, and existing features such as historic architectural and archaeological sites, streams, wetlands, threatened and endangered species, and the existing and predicted land uses needed to be updated and documented for each of the three bypass corridors. Indirect and cumulative impacts resulting from the construction of the project also needed to be considered and discussed in the Environmental Impact Statement. Those studies were updated during 2007 and 2008 to determine the potential impacts related to the bypass corridors.

NCDOT presented the findings of those updated environmental studies in the Draft EIS that was approved by FHWA on Sept. 6, 2011, and distributed during September (a CD with the DEIS is affixed). NCDOT began the public comment period for the document on Sept. 9, 2011. NCDOT held a Pre-Hearing Open House & Corridor Public Hearing on Dec. 6, 2011.

Preparation of the Final EIS is currently in progress, with completion anticipated for the summer of 2014. After the Final EIS is approved and circulated, a Record of Decision (ROD) will be issued by the FHWA. The current project schedule is for right of way acquisition to begin in 2014 and for construction to begin in 2016.

Project Description and Purpose and Need

The US 70 corridor connects Raleigh, Smithfield, Goldsboro, Kinston, New Bern, Havelock and Morehead City. Regionally, US 70 provides connectivity with the Port of Morehead City, Global TransPark, industries in New Bern and Craven County, Cherry Point US Marine Corps Air Station, Camp Lejeune and other military facilities, and it functions as a primary route for seasonal beach traffic.

The lack of highway access control on US 70 through Havelock, with its 14 signalized intersections and numerous unsignalized street and driveway connections, substantially reduces the mobility of this corridor. Commercial, institutional, and residential growth in the City of Havelock and an increasing regional reliance on US 70 has led to a deterioration of traffic operations along the existing route. The capacity of US 70 is currently limited by the operational capabilities of its signalized intersections. In 2008, the level of service (LOS) performance of two of the major existing signalized intersections along US 70 (at NC 101 and SR 1765, Catawba Road) were already undesirable. By the design year 2035, none of the major existing signalized intersections will operate at an acceptable LOS without substantial improvements.

Because US 70 is the state's primary connection to the Port of Morehead City and a main route between military facilities and the port, the NCDOT Strategic Highway Corridors (SHC) Program goal to protect the mobility and connectivity of critical highway facilities is particularly relevant to the proposed project. The North Carolina Maritime Strategy Final Report identifies the proposed Havelock Bypass as one of a number of recommended infrastructure projects to

improve the regional transport of goods. US 70's function as part of the US Department of Defense Strategic Highway Network for moving military personnel and equipment also illustrates the regional need for the proposed project.

Archeological Resources

Between March 18 and June 11 of 1999, an intensive archaeological survey was conducted within the study area of the proposed US 70 Havelock Bypass preferred corridor. All fieldwork was designed to comply with guidelines established by the Secretary of the Interior's Guidelines and Standards for Archaeological Documentation (Federal Register 48: 44734, September 29, 1983). A report, An Intensive Archaeological Survey of the Preferred Corridor for the US 70 Havelock Bypass, Craven County, North Carolina, was prepared in April of 2000. A copy of this report is enclosed. It was the finding of that report that one site was eligible for listing in the National Register of Historic Places (Site 31CV302). This site is a Woodland Period Site and is located approximately 1148 feet north of Tuckers Creek and 246 feet west of US 70. The artifacts recovered were prehistoric potsherds representing the Middle and Late Woodland periods. The diversity reflected in the ceramic assembly may merely be the result of using a variety of clay sources or may reflect trade or use of the site by different cultures over time. With regard to the latter, the site is located at the point where the Tuscarora, Algonquian, and Waccamaw linguistic groups are thought to have overlapped (Phelps 1983: 37)

Given its location at the interface of three cultural groups, and cultural diversity represented in the recovered assemblage, additional work at this site would provide further information on pre-historic socio-economic and political aspects of the region, making it eligible for listing in the National Register of Historic Places. The site will be preserved in place. A redesign of the proposed US 70 Havelock Bypass has effectively avoided the site. No impacts will occur as a result of the proposed project, but it is recommended that further work be undertaken at Site 31CV302 if it is threatened in the future.

Section 4(f) of the Federal-Aid Highway Transportation Act of 1968, (PL-90-495), requires consideration of cultural resources, particularly preservation-in-place, of archaeological resources that are eligible for the National Register. If potentially significant sites are found within the Preferred Alternative and, based on a program of site testing, such sites are determined eligible for the National Register; it is most likely that a data recovery program will be the appropriate form of mitigation.

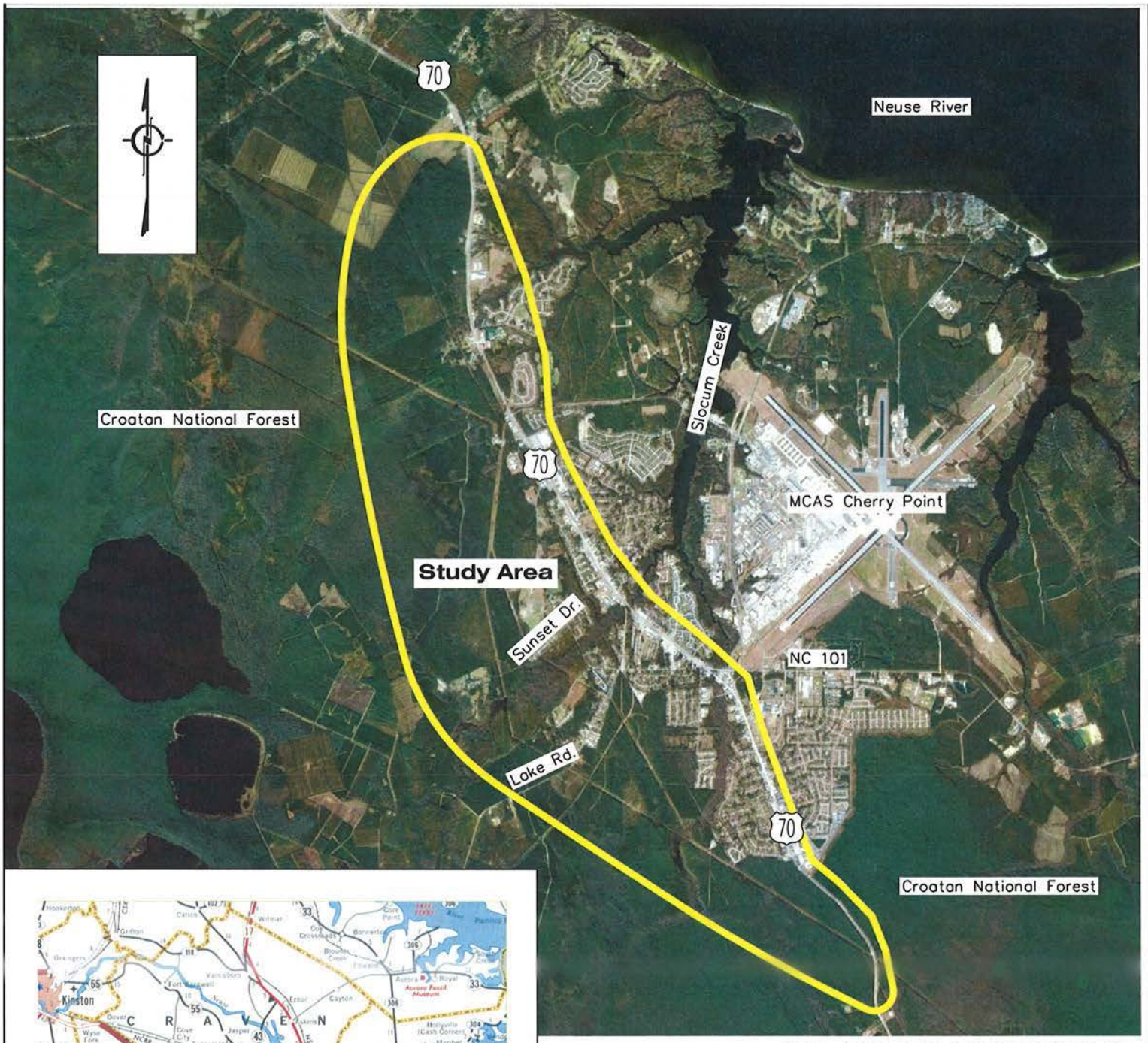
We would appreciate any information you might have that would be helpful in identifying and evaluating archeological resources within the project corridor. Please identify any areas of concern and indicate in writing if the Tuscarora Nation would like to request consulting party status under 36 CFR 800.3(f)(2).

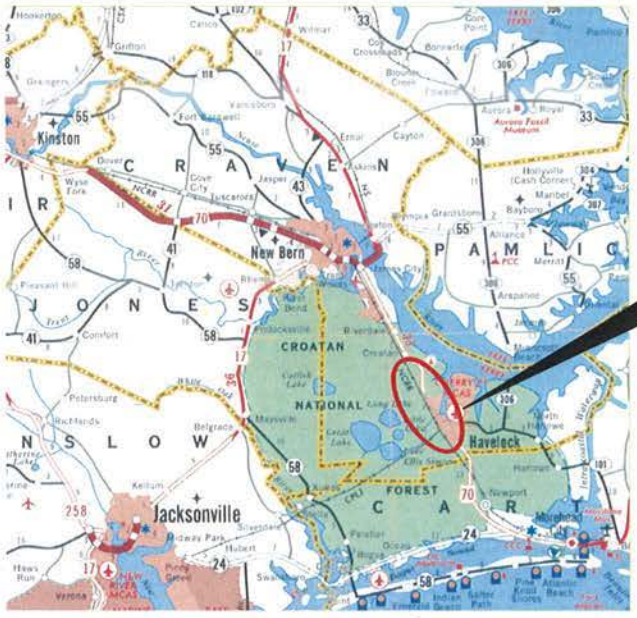
If you have any questions concerning the subject project, please contact me at (919) 747-7019 or Ron.Lucas@dot.gov.

Sincerely,

For John F. Sullivan, III, P.E.
Division Administrator

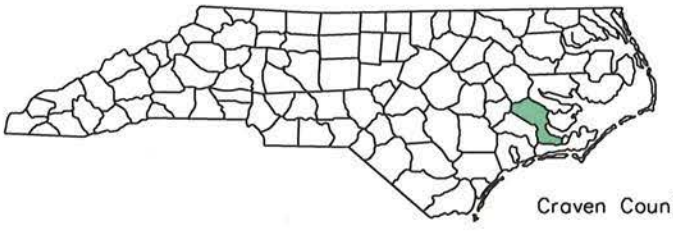
Enclosures: 2000 Archeological Study
Exhibits 1 and 2
2011 DEIS





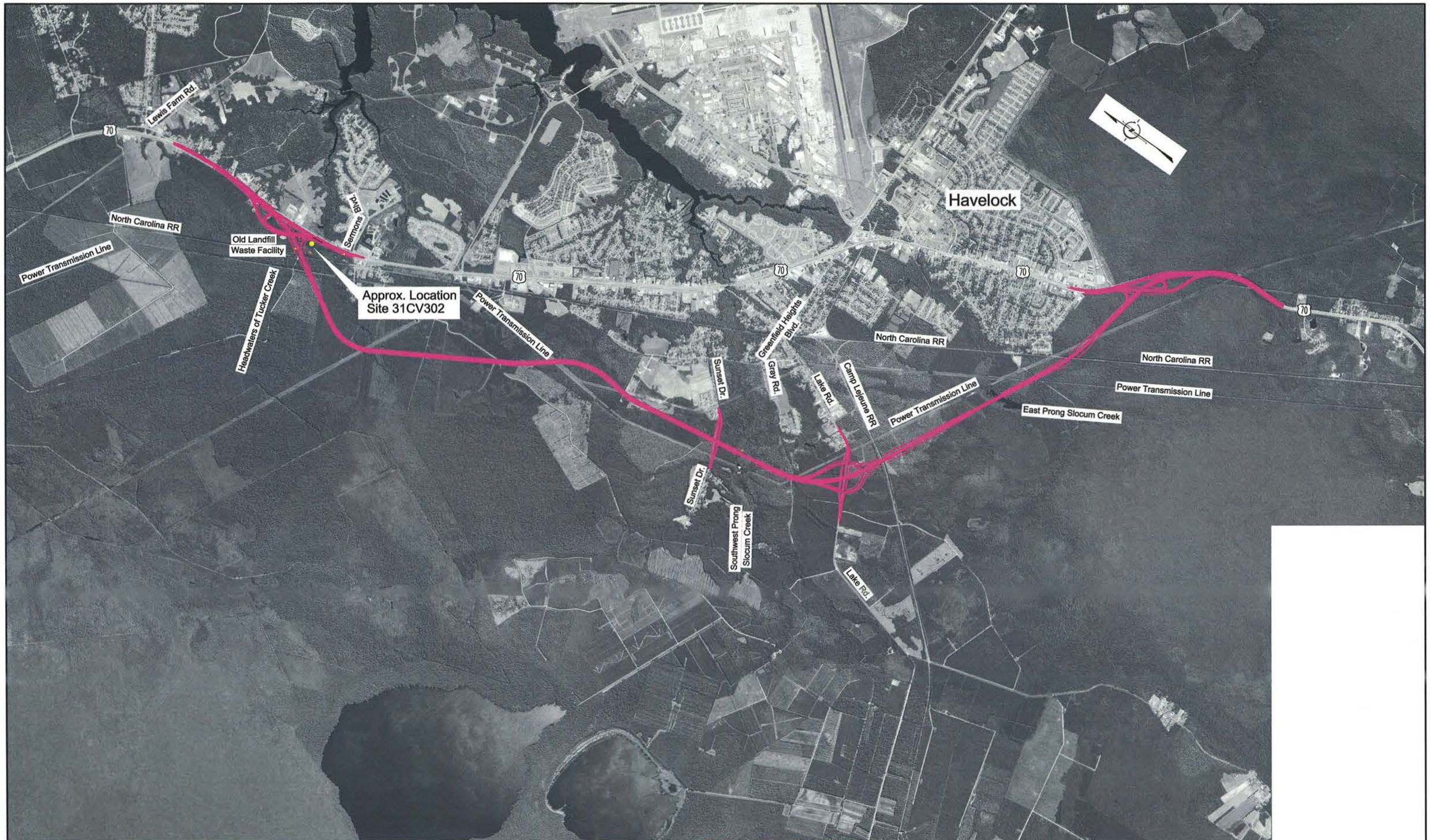
Note: Aerial photo from Google Earth Pro.

Project Location



US 70, Havelock Bypass
TIP No. R-1015
Craven County, North Carolina

Project Vicinity
Not to Scale
Exhibit 1



US 70, Havelock Bypass

Craven County, North Carolina

TIP No. R-1051

Preferred Alternative
Scale: 1" = 1 mile
Exhibit 2

Sackaroff, Amy

From: Sackaroff, Amy
Sent: Wednesday, July 09, 2014 11:46 AM
To: bprintup@hetf.org
Cc: Koch, Paul; Devens, Thomas E (tedevens@ncdot.gov)
Subject: RE: R-1015: Request for Input from Tuscarora Nation re: Havelock Bypass in North Carolina

Good morning, Brian – We're approaching completion of the preliminary draft Final Environmental Impact Statement for the Havelock Bypass project in Craven County, NC and wanted to provide you with an update on actions related to archaeology. As mentioned in previous emails, **no archaeological sites would be affected by the proposed project**; however, NCDOT is taking additional precautions to ensure that the closest site (Site 31CV302, located roughly 300 feet away from the construction limits of the project) is protected throughout the duration of the project's construction.

The project commitment below will be included in the FEIS. Please respond to this email to let us know if you are agreeable to the commitment as proposed.

Thank you!
Amy

Site 31CV302 is recommended as eligible for the National Register of Historic Places (NRHP).
Before final design is completed, Roadway Design will verify that the archaeological site is avoided by any right-of-way or easement. If design plans change, thereby causing an adverse impact to the site, then Roadway Design will immediately notify the PDEA project manager and the NCDOT Archaeologist to initiate additional coordination to comply with historic preservation laws.

Final Plans will identify the installation of High-Visibility Fencing around Site 31CV302, which is to be labeled as: "PROTECTED AREA." Final Plans will indicate the fence boundary and also provide a table of Northing and Easting coordinates. Project specifications should indicate that High-Visibility Fencing will be installed along the site boundary, prior to any clearing and grubbing operations. The contractor must pre-coordinate with NCDOT Archaeology (tel. 919-707-6000) so that an archaeologist field-verifies fence location or is on-site when the fence is installed. The fence will be maintained for the construction duration, and will be removed by the contractor only just before final project inspection. NO construction equipment or personnel shall enter the fenced area.

From: Sackaroff, Amy
Sent: Tuesday, January 21, 2014 3:42 PM
To: bprintup@hetf.org
Cc: Koch, Paul; Devens, Thomas E (tedevens@ncdot.gov); Ron.Lucas@dot.gov; Wilkerson, Matt T; Speer, James A; White, Allison K
Subject: RE: R-1015: Request for Input from Tuscarora Nation re: Havelock Bypass in North Carolina

Good afternoon, Brian! Ted Devens asked that we follow up on our original email to provide you with a supplemental map that shows the archaeological site referenced in the January 6th letter (attached) with respect to where the proposed bypass is located. As shown in the attached pdf, Site 31CV302 is within a proposed interchange area ***but would not be affected by the project.*** The construction limits of the project are approximately 300 feet away from the site. I hope this helps to clarify things – if you need any additional information, please feel free to contact me or Ted.

Thank you,

Amy

PS – The FTP site referenced below expires today. Let us know if you were not able to retrieve the files and we will set up a new site. Thanks!

Amy C. Sackaroff, AICP
Senior Environmental Planner
Stantec
801 Jones Franklin Road, Suite 300 Raleigh NC 27606-3394
Phone: (919) 851-6866
Cell: (919) 414-7895
Fax: (919) 851-7024
amy.sackaroff@stantec.com

Design with community in mind
stantec.com

From: Sackaroff, Amy
Sent: Wednesday, January 08, 2014 3:24 PM
To: bprintup@hetf.org
Cc: Koch, Paul; Devens, Thomas E
Subject: RE: R-1015: Request for Input from Tuscarora Nation re: Havelock Bypass in North Carolina

Hi, Brian – Please find attached the letter Ted referenced in his email to you yesterday. I've also included below a link to an FTP site where you can find electronic copies of the Archaeological Study and Draft Environmental Impact Statement. As noted below, this site is temporary and expires on January 21, 2014. Let me know if you have any trouble accessing the files.

Thanks!
Amy

Please use the automatic login link below to access your site. You have also been provided a manual link, username and password in case your computer disables the automatic login link.

NOTE: FTP Sites are not included in Stantec daily backups and are only intended to be used as a means of transferring large files between offices, clients, etc.

Automatic Login

FTP site link: ftp://s0121101808:7556333@ftptmp.stantec.com
By clicking on the link above (or pasting the link into Windows Explorer) you will be automatically logged into your FTP site.

Manual Login

FTP link: ftp://ftptmp.stantec.com
Login name: s0121101808
Password: 7556333
Disk Quota: 2GB
Expiry Date: 1/21/2014

Amy C. Sackaroff, AICP
Senior Environmental Planner
Stantec
801 Jones Franklin Road, Suite 300 Raleigh NC 27606-3394
Phone: (919) 851-6866
Cell: (919) 414-7895
Fax: (919) 851-7024
amy.sackaroff@stantec.com

Design with community in mind

stantec.com

From: Devens, Thomas E [mailto:tedevens@ncdot.gov]
Sent: Tuesday, January 07, 2014 4:51 PM
To: bprintup@hetf.org
Cc: Koch, Paul; Sackaroff, Amy
Subject: R-1015: Request for Input from Tuscarora Nation re: Havelock Bypass in North Carolina

Hi Brian,

It was a pleasure talking with you.

To summarize our phone conversation:
For the highway project that proposes to bypass Havelock, NC: The NC Dept of Transportation will send Chief Henry a hardcopy of the "request for input" letter (which also has a CD with the large files for the environmental impact statement and archaeological surveys). And, as an advanced courtesy, we will send you an email with the letter. We'll also email you some exhibit maps and possibly an archaeological survey, but unfortunately some other electronic files may be too large for email. You'll get the CD very soon that has all the files.
Also – here are the two websites that I'd mentioned to you – which had old contact names and outdated telephone numbers. Best of luck with making those corrections.

http://www.epa.gov/region2/nations/tusca.htm

http://www.fws.gov/northeast/nativeamerican/pdfs/tribecontacts.pdf

By the way: Stantec Engineering is our project manager for this project, so I've cc'd Paul Koch and Amy Sackaroff. They will be the ones sending the info to you. If you have ANY questions or concerns, we're here to help.

STAY WARM up there!
Regards,

Ted Devens
NCDOT Project Manager for the Havelock Bypass project

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Appendix G

Relocation Report

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EIS RELOCATION REPORT

RECEIVED BY MSP DATE 2/12/2013
R-1015

North Carolina Department of Transportation
RELOCATION ASSISTANCE PROGRAM

☒ E.I.S. ☐ CORRIDOR ☐ DESIGN

WBS ELEMENT:	34360.1.1	COUNTY	CRAVEN	Alternate 1 of 1 Alternate	
T.I.P. No.:	R-1015		CORRIDOR 3		
DESCRIPTION OF PROJECT:		US 70 (HAVELOCK BYPASS) FROM S OF CARTERET/CRAVEN CRAVEN COUNTY LINE TO S OF SR1176 (CAROLINA PINES BLVD)			

ESTIMATED DISPLACEES

Type of Displacees	Owners	Tenants	Total	Minorities
Residential	1	15	16	4
Businesses	3	0	3	0
Farms	0	0	0	0
Non-Profit	1	0	1	0

INCOME LEVEL

0-15M	15-25M	25-35M	35-50M	50 UP
0	0	4	10	2

VALUE OF DWELLING / DSS DWELLING AVAILABLE

Owners		Tenants		For Sale		For Rent	
0-20M	0	$ 0-150	0	0-20M	0	$ 0-150	0
20-40M	0	150-250	0	20-40M	0	150-250	0
40-70M	0	250-400	0	40-70M	20	250-400	6
70-100M	1	400-600	15	70-100M	37	400-600	35
100 UP	0	600 UP	0	100 UP	282	600 UP	95
TOTAL	1		15		339		136

ANSWER ALL QUESTIONS

Yes	No		*Explain all "YES" answers.*
	X	1.	Will special relocation services be necessary?
	X	2.	Will schools or churches be affected by displacement?
X		3.	Will business services still be available after project?
X		4.	Will any business be displaced? If so, indicate size, type, estimated number of employees, minorities, etc.
	X	5.	Will relocation cause a housing shortage?
		6.	Source for available housing (list).
	X	7.	Will additional housing programs be needed?
X		8.	Should Last Resort Housing be considered?
	X	9.	Are there large, disabled, elderly, etc. families?
	X	10.	Will public housing be needed for project?
X		11.	Is public housing available?
X		12.	Is it felt there will be adequate DSS housing housing available during relocation period?

REMARKS (Respond by Number)

3. THERE WILL BE AN AMPLE SUPPLY OF SIMILAR BUSINESS

4. IF DESIGN CANT PIPE IN DITCHES TO REDUCE RW THEN;
MARINE FEDERAL CREDIT UNION-SM-8 EMPLOYEES
BANKS EYE CARE-SM-4 EMPLOYEES
SMITHFIELD BBQ-MED-12 EMPLOYEES
CRAVEN COUNTY COLLECTION CENTER-NON-PROFIT-3EM

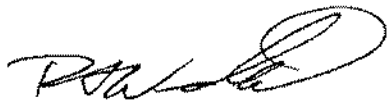
6. & 14. MLS, REALTORS, NEWSPAPERS, ECT.

8. AS MANDATED BY LAW.

11.NUMEROUS WITHIN THE COUNTY.

12. OR BUILT IF NECESSARY.

	X	13. Will there be a problem of housing within financial means?	
X		14. Are suitable business sites available (list source).	
		15. Number months estimated to complete RELOCATION?	18

	02/05/2013			2/12/13
James M. Latham Right of Way Agent	Date		Relocation Coordinator	Date

FRM15-E

Appendix H

Public Involvement Materials

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NCDOT Project Newsletter

US 70 Havelock Bypass in Craven County

(NCDOT Project No. R-1015)

Issue 4, November 2011

Project Description

NCDOT proposes to improve U.S. 70 in the vicinity of the City of Havelock in Craven County. The proposed improvements to U.S. 70 are included in the State Transportation Improvement Program (TIP) as project R-1015. The project begins north of Havelock and extends southward approximately 10 miles to the Carteret County Line (see the Project Vicinity Map on the back of this newsletter). The estimated cost for the proposed four-lane, median-divided highway is $160,000,000. The current project schedule is for right of way acquisition to begin in 2013 and for construction to begin in 2015.

Project History & Current Status

NCDOT began the initial planning and environmental studies for the Havelock Bypass Project in the early 1990s. These studies included an analysis of improving the existing highway versus various proposed bypass routes (corridors) with respect to potential impacts to the human and natural environment resources in the project study area. NCDOT presented the findings of the initial planning studies in the Environmental Assessment (report) that was approved by the Federal Highway Administration (FHWA) on Jan. 27, 1998. NCDOT included a recommendation in the assessment for the selection of bypass corridor 3 as the preferred alternative because it generated the lowest environmental impacts and was the most cost-effective route.

After the environmental assessment was distributed for review and comment, NCDOT held a Corridor Public Hearing in May 1998 to present three bypass corridors for review and comment (see the Study Corridors Map on the back of this newsletter). The majority of the public, the municipal officials, and the Interagency Team supported corridor 3.

After the Corridor Public Hearing, FHWA, NCDOT, and other members of the Interagency Team selected corridor 3 as the preferred alternative. NCDOT subsequently prepared preliminary design plans for corridor 3, and the associated potential impacts were assessed and evaluated. Based upon the magnitude of the potential impacts from corridor 3, it was determined that an Environmental Impact Statement would be needed to assess the potential impacts from each of the three bypass corridors in greater detail.

In order to prepare the Environmental Impact Statement, design plans needed to be refined, and existing features such as historic architectural and archaeological sites, streams, wetlands, threatened and endangered species, and the existing and predicted land uses needed to be identified and documented for each of the three bypass corridors. Indirect and cumulative impacts resulting from the construction of the project also needed to be considered and discussed in the Environmental Impact Statement. Those studies were updated during 2007 and 2008 to determine the potential impacts related to the bypass corridors.

NCDOT presented the findings of those updated environmental studies in the Draft Environmental Impact Statement that was approved by FHWA on Sept. 6, 2011 and distributed during September. NCDOT began the public comment period for the document on Sept. 9, 2011 and will close the comment period on Nov. 21, 2011.

The next step in the planning and design process is to conduct a Corridor Public Hearing. The purpose of the hearing is to receive public comments on Corridors 1, 2, and 3.

NCDOT Invites You to a Corridor Public Hearing !

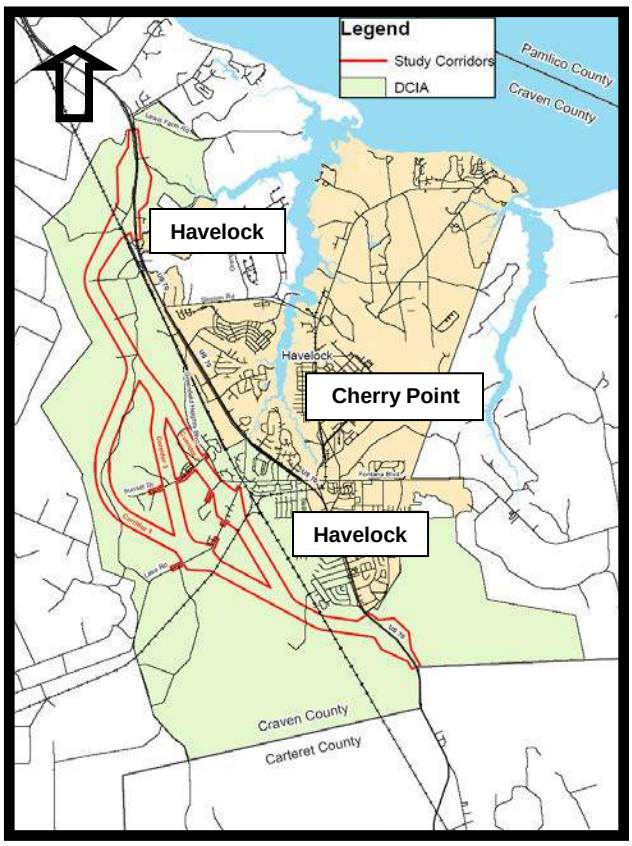
NCDOT invites you to a Corridor Public Hearing and a Pre-Hearing Workshop on Tuesday, Dec. 6, 2011, at the Havelock Tourist & Event Center, 201 Tourist Center Drive, Havelock, 28532.

The Pre-Hearing workshop will be held from 4:30 to 6:30 p.m. This is an informal, open-house-style public meeting. The Corridor Public Hearing will begin at 7 p.m. and includes a formal presentation of the bypass corridors followed by an opportunity for public comment.

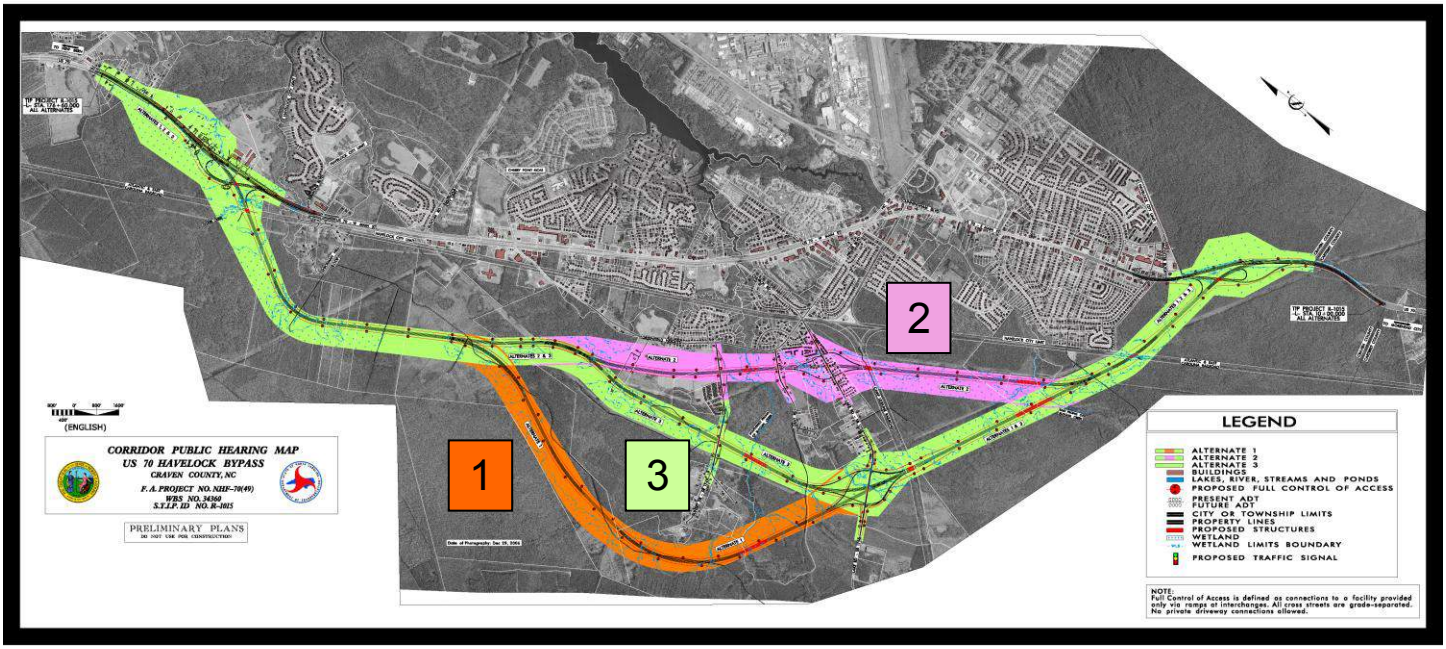
Contact Us With Your Comments and Questions

Mr. Mark Pierce, P.E.
Eastern Project Development Unit
N.C. Department of Transportation
1548 Mail Service Center
Raleigh, NC 27699-1548
Direct: (919) 707-6035
Fax: (919) 250-4224
E-mail: mspierce@ncdot.gov

200 copies of this public document were printed at a cost of 14¢ per copy.



Project Vicinity Map



Study Corridors Map

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

PROPOSED US 70 HAVELOCK BYPASS

TIP PROJECT NO. R-1015

WBS No. 34360

Craven County, NC

Corridor Public Hearing

Tuesday, December 6, 2011

Informal Open House - 4:30 p.m. – 6:30 p.m.
Formal Presentation - 7:00 p.m.

Havelock Tourist and Event Center
201 Tourist Center Drive
Havelock, NC 28532

250 copies of this handout were reproduced at a cost of $0.19/copy

PURPOSE OF PUBLIC HEARING

Today's hearing is another important step in the North Carolina Department of Transportation's (NCDOT) procedure for making you, the public, a part of the project development process. The purpose of the hearing is to obtain public input on the alternative corridors being considered for the project.

Planning and environmental studies on the highway project are provided in the planning and environmental document – Draft Environmental Impact Statement (DEIS). Copies of this report along with today's hearing maps have been available for public review at the following locations and will remain there for 30-days following tonight's meeting:

- City of Havelock - City Clerk's Office, 1 Governmental Drive, Havelock, and;
- Havelock Tourist and Event Center, 201 Tourist Center Drive, Havelock

Copies of the map are also available on the project website at:
http://www.ncdot.org/doh/preconstruct/highway/roadway/hearingmaps_by_county/

YOUR PARTICIPATION

Now that the opportunity is here, you are encouraged to participate by making your comments and/or questions a part of the public record. This may be done by having them recorded at the formal Public Hearing or by writing them on the attached comment sheet. Several representatives of the North Carolina Department of Transportation are present. They will be happy to talk with you, explain the project to you and answer your questions. You may write your comments and/or questions on the attached comment sheet and leave it in the comment box provided, email or mail them in by January 6, 2012, to the following address:

Ms. Eileen Fuchs
NCDOT - Human Environment Section
1598 Mail Service Center
Raleigh, NC 27699-1598
Phone: (919) 707-6067
Email: eafuchs@ncdot.gov

Everyone present is urged to participate in the proceedings. It is important, however, that **THE OPINIONS OF ALL INDIVIDUALS BE RESPECTED REGARDLESS OF HOW DIVERGENT THEY MAY BE FROM YOUR OWN.** Accordingly, debates, as such, are out of place at public hearings. Also, the public hearing is not to be used as a POPULAR REFERENDUM to determine the location and/or design by a majority vote of those present.

WHAT IS DONE WITH THE INPUT?

A post-hearing meeting will be conducted after the comment period has ended. NCDOT staff representing Planning, Design, Traffic Operations, Division, Right of Way, Natural Environment, Public Involvement and Community Studies, and others who play a role in the development of a project will attend this meeting. The project will also be reviewed with federal agencies such as the Federal Highway Administration (FHWA), and the US Army Corps of Engineers (USACE), as well as state agencies such as the NC Department of Environment and Natural Resources. When appropriate, local government staff will attend.

All spoken and written issues are discussed at the post-hearing meeting. Most issues are resolved at the post-hearing meeting. The NCDOT considers safety, costs, traffic service, social impacts and public comments in making decisions. Complex issues may require additional study and may be reviewed by higher management, Board of Transportation Members and/or the Secretary of Transportation.

Minutes of the post-hearing meeting will be summarized and are available to the public by noting your request on the attached comment sheet.

CORRIDOR SELECTION PROCESS

Although all three bypass alternates are still under consideration, Alternate 3 was originally identified as the Least Environmentally Damaging Practicable Alternative (LEDPA) by the project steering committee, which consists of Federal and State review agencies. In 1998, the NCDOT Corridor Selection Committee approved Alternate 3 as the LEDPA. The Corridor Selection Committee is comprised of representatives from the NCDOT, federal and state environmental resource and regulatory agencies, such as the USACE, the US Environmental Protection Agency, the NC Division of Water Quality, the NC Wildlife Resources Commission, the NC Department of Environment and Natural Resources and the State Historic Preservation Office. Other agencies are invited as appropriate.

Although all three alternates have been re-studied since the 1998 Environmental Assessment document was prepared, Alternate 3 remains as the identified **Preferred Corridor Alternate**. A final decision on the alternate selection by the NCDOT and the FHWA will not be made until all comments have been received on the DEIS document and the corridor public hearing, and have been thoroughly considered. Note: The location and selection of an alternate is not based on any one single comment as this does not reflect popular or majority preference.

WHAT HAPPENS NEXT

After selection of the Preferred Corridor Alternate, a news release announcing the selected corridor will be sent to the local media for publication. The preliminary roadway designs for the preferred alternative will be refined and will include efforts to further minimize impacts to the human and natural environments. Further studies and surveys will be conducted on the preliminary findings collected from the corridor studies, such as hazardous materials, historic and archaeological sites, and access to residences and businesses. A mitigation plan for unavoidable impacts to streams and wetlands will be developed in consultation with the USACE. The NCDOT purchased what was to become the Croatan Wetland Mitigation Bank in 1997 in order to mitigate project impacts to the natural environment.

Another environmental document – the Final Environmental Impact Statement (FEIS) - will be prepared based on the results of the items above, and circulated for public and agency review. A Design Public Hearing will be held to receive public comments on the refined design of the Preferred Corridor Alternate.

PURPOSE AND NEED OF PROJECT

The purpose of the project is to improve the traffic operations for regional and statewide traffic along the US 70 corridor, reduce congestion along existing US 70, and enhance the ability of US 70 to serve the regional transportation function in accordance with the Strategic Highway Corridors Plan.

The proposed project is expected to address the following needs and provide the following benefits:

- **Increased traffic demand has diminished the ability of US 70 between Morehead City and Raleigh to function as envisioned in the Strategic Highway Corridors (SHC) Plan**

The increasing regional use of US 70 has led to a deterioration of traffic operations along existing US 70, causing undesirable levels of traffic service. The level of service (LOS) of a roadway is a measure of the traffic-carrying ability. LOS ranges from A to F, "A" being the best scenario with unrestricted maneuverability and operating speeds, and "F" being the worst scenario where travel on a roadway is characterized by "stop and go" conditions. Existing intersections along US 70 have been analyzed and currently operate at an undesirable level of service. Without improvements to accommodate traffic growth, the level of service along US 70 will continue to deteriorate.

The lack of access control, with numerous street and driveway connections to adjacent development, and heavy traffic substantially reduces the mobility of the existing US 70 corridor. Currently fourteen traffic signals prohibit uninterrupted service along the existing corridor through Havelock.

US 70 is one of only three routes providing highway access into the City of Havelock and the Cherry Point Marine Corps Air Station (MCAS). The other two are NC 101 and SR 1756 (Lake Road), both of which end in Havelock. The project will improve access for area commuters to the Cherry Point MCAS and Naval Aviation Depot, which is the principal employer for civilian and military personnel in Craven County and the City of Havelock.

- **The US 70 corridor is a SHC Plan route that connects the cities/towns of Raleigh, Smithfield, Goldsboro, Kinston, New Bern, Havelock and Morehead City, a length of 148 miles. The plan recommends that this section of US 70 through Havelock be upgraded to a freeway with full control of access (no driveways or traffic signals), and be a minimum of four travel lanes with a median.**

By altering the existing state of the corridor in the area that currently contains many at-grade intersections and driveway connections, the project will enhance the safety of long-distance motorists and reduce crash rates by providing four lanes of divided roadway with full control of access.

The project will reduce the travel time for motorists, such as commercial carriers and vacationers, to the Carteret County beaches and the Port of Morehead City.

The US 70 Corridor has also been identified by the NC Division of Emergency Management as a major hurricane evacuation route. The project will improve the area's hurricane evacuation ability by providing more traffic carrying capacity

The proposed US 70 Havelock bypass project is consistent with the long-range transportation plans for the study area. Local governments within Havelock and the Down East Rural Planning Organization, as well as NCDOT, have adopted this plan.

PROJECT DESCRIPTION

The NCDOT, Division of Highways, under project R-1015, proposes to construct about a 10-mile, four-lane divided, controlled access freeway, with no driveways and no traffic signals, on new location around the southwest side of the City of Havelock and the Cherry Point USMC Air Station (MCAS) in Craven County. The proposed project will provide a high-speed alternative to the heavily congested existing US 70 highway through the City of Havelock.

Due to access restrictions through the Cherry Point MCAS, all of the bypass alternates are located around the southwestern side of the City of Havelock and the Cherry Point MCAS. Full interchanges are included at both ends of the bypass and at Secondary Road (SR) 1756 (Lake Road). The remaining local secondary roads and railroads are to be grade-separated from the bypass by bridges.

US 70, HAVELOCK BYPASS STUDY ALTERNATES

The preliminary alternates that could not fill the purpose and need for the project had excessive undesirable impacts or were considered impractical and were eliminated from consideration for the proposed US 70 Havelock Bypass. Three bypass alternates remain (see enclosed Corridor Public Hearing Map). The proposed bypass is on new location, and consists of a four-lane, median-divided freeway.

All of the new location alternate corridors tie into existing US 70 far enough from the City of Havelock to avoid the strip development and the signalized intersections through the City. At the southeastern end of the project, the alternates will have an interchange with existing US 70 southeast of SR 1824 (McCotter Boulevard). At the northwestern end of the project, the alternates will have an interchange with existing US 70 just west of SR 1760 (Hickman Hill Loop Road).

The southeastern tie-in to US 70 is located as close to the City limits as possible to avoid a large wetland area in the Croatan National Forest. The northeastern tie-in to US 70 allows the bypass to extend beyond the developed areas of Havelock and also allows enough distance between the proposed interchange and with US 70 and the North Carolina Railroad (NCRR) so the bypass can be elevated to cross over the railroad.

The proposed bypass crosses a tributary of Tucker Creek, south of the NCRR, then the shared Alternates (1, 2 and 3) turn east and continue until they reach a Croatan National Forest (CNF) access road.

At the CNF access road, **Alternate 1** (the outside corridor) turns southwest and continues south along the west side of the CNF access road, crosses the Southwest Prong of Slocum Creek, on a bridge south of the southern end of SR 1791 (Pulley Road), then continues southeast to the new interchange with SR 1756 (Lake Road) where it joins Alternate 3. Then, Alternates 1 and 3 continue southeast over another bridge crossing the Camp Lejeune Railroad, crossing the East Prong of Slocum Creek, the NCRR and the power line easement.

At the CNF access road, **Alternate 2** (the inside corridor) continues south, crossing SR 1747 (Sunset Drive) at a proposed grade-separation (bridge), crosses the Southwest Prong of Slocum Creek, crosses SR 1746 (Gray Road), continues southeast and crosses SR 1756 (Lake Road) at the proposed interchange, then crosses the NCRR and parallels the power line easement, crosses the East Prong of Slocum Creek and rejoins Alternates 1 and 3 to continue southeast to existing US 70.

Alternate 3 (the middle corridor) turns southwest from Alternate 2 at the CNF access road crossing, continues along the eastern side of the power line easement, crosses over SR 1747 (Sunset Drive), bridges over the Southwest Prong of Slocum Creek, then turns back to the southeast before rejoining Alternate 1 at the interchange with SR 1756 (Lake Road), then continues on to tie into the interchange at existing US 70.

SUMMARY OF ALTERNATES

In summary (refer to Table No. S. 1. On the next page), all three bypass alternates have three major stream crossings. They may impact a potentially-contaminated former landfill site near the northwestern end of the project, which will be fully evaluated and remediated if necessary.

Alternate 1 is expected to have the least number of relocations and take the least amount of right-of-way from the CNF. However, Alternate 1 is furthest away from the City of Havelock and fragments (cuts up) the largest area of the CNF between the bypass and the City.

Alternate 1 is estimated to cost less than Alternate 2, but cost more than Alternate 3. Alternate 1 will impact less wetlands and prime farmlands than Alternate 3, but fragments the CNF and impacts more footage of streams than Alternate 3.

Alternate 2 is the closest corridor to the City of Havelock and fragments the smallest area of the CNF. However, Alternate 2 has the highest number of residential relocations and is the most costly of the three alternates. Alternate 2 also takes more right-of-way from the CNF than Alternate 1, but less than Alternate 3.

Alternate 3 is located between Alternates 1 and 2. It has the lowest estimated total cost and the least amount of stream impacts, but does require the most wetlands of all the bypass alternatives. Alternate 3 also requires the largest amount of right-of-way from the CNF, is further from the City of Havelock than Alternate 2, fragments more of the CNF than Alternate 2, but less than Alternate 1. Alternate 3 is also expected to require slightly more residential relocations than Alternate 1, but way less than Alternate 2.

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PROJECT INFORMATION

Length: Varies: 9.91 - 10.85 miles (see Table No. S.1., previous page)

Typical Section: a 4-lane (two, 12-foot lanes in each direction) divided freeway with a 46-foot median (minimum)

Right of Way: A minimum right-of- way width of approximately 250 feet was established with additional right of way required at interchanges and grade separations.

Access Control: Full Control of Access***:***
Access is only provided via ramps at interchanges. No private driveway connections will be allowed.

Relocatees: See Table No. S. 1.

Project Costs: See Table No. S. 1.

Current Schedule: Right of Way Acquisition **–** Fiscal Year 2013
Construction **–** Fiscal Year 2015

Note: The tentative schedule is shown above. A number of factors can affect a project schedule, so schedules are subject to change.

RIGHT-OF-WAY PROCEDURES

After decisions are made regarding the final design, the proposed right-of-way limits will be staked in the ground. If you are an affected property owner, a Right-of-Way Agent will contact you and arrange a meeting. The agent will explain the plans and advise you as to how the project will affect you. The agent will inform you of your rights as a property owner. If permanent right-of-way is required, professionals who are familiar with real estate values will evaluate or appraise your property. The evaluations or appraisals will be reviewed for completeness and accuracy, and then the Right-of-Way Agent will make a written offer to you. The current market value of the property at its highest and best use when appraised will be offered as compensation. The Department of Transportation must:

1. Treat all owners and tenants equally.
2. Fully explain the owner's rights.
3. Pay just compensation in exchange for property rights.
4. Furnish relocation advisory assistance.

RELOCATION ASSISTANCE

If you are a relocatee, that is, if your residence or business is to be acquired as part of the project, additional assistance in the form of advice and compensation is available. You will also be provided with assistance on locations of comparable housing and/or commercial establishments, moving procedures, and moving aid. Moving expenses may be paid for you. Additional monetary compensation is available to help homeowners cope with mortgage increases, increased value of comparable homes, closing costs, etc. A similar program is available to assist business owners. The Right-of-Way Agent can explain this assistance in greater detail.

NOTE: PAMPHLETS SUMMARIZING RIGHT OF WAY AND RELOCATION PROCEDURES ARE AVAILABLE AT THE SIGN-IN TABLE.

TITLE VI PUBLIC INVOLVEMENT FORM

*Completing this form is **completely** voluntary. You are not required to provide the information requested in order to participate in this meeting.*

Meeting Type: Corridor Public Hearing **Location:** Havelock Tourist & Event Center	**Date:** December 6, 2011
TIP No.: R-1015 **Project Description:** US 70 Havelock Bypass	

In accordance with Title VI of the Civil Rights Act of 1964 and related authorities, the North Carolina Department of Transportation (NCDOT) assures that no person(s) shall be excluded from participation in, denied the benefits of, or subjected to discrimination under any of the Department's programs, policies, or activities, based on their race, color, national origin, disability, age, income, or gender.

Completing this form helps meet our data collection and public involvement obligations under Title VI and NEPA, and will improve how we serve the public. Please place the completed form in the designated box on the sign-in table, hand it to an NCDOT official or mail it to the NCDOT Office of Civil Rights, Title VI Section at 1511 Mail Service Center, Raleigh, NC 27699-1511.

All forms will remain on file at the NCDOT as part of the public record.

Zip Code: _____

Street Name:
(i.e. Main Street) _____

Total Household Income:

- ☐ Less than $12,000
- ☐ $12,000 – $19,999
- ☐ $20,000 – $30,999
- ☐ $31,000 – $46,999
- ☐ $47,000 – $69,999
- ☐ $70,000 – $93,999
- ☐ $94,000 – $117,999
- ☐ $118,000 or greater

Gender: ☐ Male ☐ Female

Age:

- ☐ Less than 18
- ☐ 18-29
- ☐ 30-44
- ☐ 45-64
- ☐ 65 and older

Have a Disability: ☐ **Yes** ☐ **No**

Race/Ethnicity:

- ☐ White
- ☐ Black/African American
- ☐ Asian
- ☐ American Indian/Alaskan Native
- ☐ Native Hawaiian/Pacific Islander
- ☐ Hispanic/Latino
- ☐ Other (please specify): _____

National Origin: (if born outside the U.S.)

- ☐ Mexican
- ☐ Central American: _____
- ☐ South American: _____
- ☐ Puerto Rican
- ☐ Chinese
- ☐ Vietnamese
- ☐ Korean
- ☐ Other (please specify): _____

How did you hear about this meeting? (newspaper advertisement, flyer, and/or mailing) _____

For more information regarding Title VI or this request, please contact the NCDOT Title VI Section at (919) 508-1808 or toll free at 1-800-522-0453, or by email at slipscomb@ncdot.gov.

Thank you for your participation !

COMMENT SHEET

US 70 Havelock Bypass, Craven County
R-1015 - Corridor Public Hearing

NAME:

ADDRESS:

EMAIL:

COMMENTS and/or QUESTIONS:

Comments may be mailed by January 6, 2012 to:

Ms. Eileen Fuchs
NCDOT - Human Environment Section
1598 Mail Service Center
Raleigh, NC 27699-1598
Phone: (919) 707-6067 Fax: (919) 212-5785
Email: eafuchs@ncdot.gov

OFFICIAL PUBLIC HEARING TRANSCRIPT
Corridor Public Hearing R-1015 – Craven County
For the Proposed U.S. 70 Havelock Bypass

Havelock Tourist and Event Center
201 Tourist Center Drive
Havelock, NC 28532

Tuesday, December 6, 2011

Good evening. It's 7:00. Is everybody ready? My name is Eileen Fuchs. I'm the Senior Public Involvement Officer for the North Carolina Department of Transportation out of Raleigh, North Carolina. This is the Corridor Public Hearing for R-1015. R stands for Rural Project and its Transportation Improvement Project Program.

Did everyone get a copy of the handout that was given at the front desk? If not, raise your hand and we will make sure you get one. Can everyone hear me alright back there? Okay, everyone got signed in at the sign in table. You noticed there were some white sheets to sign in, that was just to have you on our mailing list and to update our mailing list. And if you signed the yellow sheet, which I have it here if at the time you did want to speak, I will call those names in the order in which you signed in. *(Audience participant coughs)* And because we got quite a few, we're going to limit everyone to 3 minutes. And Ed here is going to be the time keeper and he's going to hold up a sign to let you know you're at the 1 minute warning and then he's going to tell you to stop. And then once I get through the list, if there are other people that want to come up and state other comments, we'll go from there and I'll either have you line up or come up one by one or whatever you want to do.

First of all I want to make some introductions. We've got plenty of people here tonight. Our Local Elected Official...we did meet with some of them today and our Board of Transportation Member was here, Mr. Hugh Overholt, I don't believe he's still here. From the City of Havelock, we have Diane Miller. And we have Stephanie Duncan, who's the Director of Chamber of Commerce. Tim Newton, who's the Chair of the Chamber of Commerce and Amanda Ohlensehlen, she is with the city of Havelock.

Our NCDOT crowd here tonight is from Division 2, which handles this area. Our Division Engineer is Neil Lassiter and then we have Ed Eatmon, Betty Caldwell, and Dwayne Alligood. From the Federal Highway Administration, we have Mr. Ron Lucas. Our Rural Planning Organization, our RPO for Craven County was Robert Will, he was here earlier; he could not stay. And now for our group, the PDEA is a branch…is now a unit, it's called Project Development and Environmental Analysis and we call it PDEA for short. And our Project Development Team from tonight, those are the ones that produced this document here, which is the big one you see on all the tables and that is Rob Hanson, Brian Yamamoto, and Mark Pierce.

And also working with us here tonight is our Consultant that's been hired by PDEA, which is Mr. Paul Koch and he's with Stantec. And our Local Design Team, we have Ted Walls, Allison White, and Jim Speer. Our Division 2 Right-of-Way Agent is Doug Askew. And then tonight from my group, I am with Human Environment and Community Studies on the Public Involvement, and my Supervisor, Ed Lewis. And with our Community Studies Group, we have Steve Gurganus and Tris Ford. I hope I got everyone. Did I miss anyone who would like to be recognized?

Audience Participant: I've got a question. The answer and question period, does that count on my 3 minutes or anybody else's 3 minutes that's got something to say?

Moderator: When I…no. When I call you as soon as you start speaking then we start timing you, but I'm going to do…

Audience Participant: What I'm saying is if someone got a question in the answer period that won't count on my time does it?

Moderator: No, because you'll get to come up and do that after I do the presentation.

Audience Participant: Thank you.

Moderator: Okay. I'll clean it up. *(Moderator continues on with the presentation.)*

So what we'll do is first I want to go through the handout that everybody got and that way we can all be sort of on the same page. And then I will go through the map presentation and then I'll start calling names off of this yellow sheet of paper for those that did sign up to speak.

Okay, everybody has a handout. First page is just basic information. We have a project number, Craven County, the fact that you had an informal open house. I do hope that everybody got a chance to go in there and watch the PowerPoint Presentation on the good overview of the Bypass Project. And then the informal part, we had a couple of sets of maps around. A couple sets of those documents that people wanted to look through those as well. We had a comment table, a big comment table because we really want to get comments based on the feedback from tonight.

Okay, if everyone will go to the first page, the ***purpose of the public hearing***. We do these public hearings and they're a very important step in the North Carolina Department of Transportation for making you, the public, a part of the project development process. And the purpose of this hearing is to obtain your input on the alternative corridor that is being considered for the project.

The Draft Environment Impact Statement, which is this same document that I was holding, and the set of maps that you saw, a smaller size of the maps have been on public

display at the City of Havelock, at the City Clerk's Office, and also Amanda has them here at this Tourist Event Center. They've been on display for 30 days and they will continue to be on display for another 30 days if you still have comments or if you want to go in there and make comments and you need something else to look at to help you make that decision. And then you can also do it at the website. That very, very long website is there in yellow in the last part of the purpose of the public hearing.

Your participation, we encourage you to participate by making your comments or questions part of the public record. This part of the presentation is being digitally recorded as we speak. It's going to become part of the public record and a legal transcription will be transcribed from this. You can get a copy of that transcript if you like. It may be pretty long but you can request that and you can request that on the comment sheet.

Okay, so again we want your comments. We are going to record them here tonight so that we have them verbally. But if you want to write them on that very last page of your handout, the written comments count the same amount of weight as your verbal comments. So, if you just want to write those in or email them in all of my contact information is right there on that page. My email address, my phone number so if you want to mail those in later on, you don't even have to use the comment sheet that's attached. It can be on your company letterhead or whatever you want to do, but if you would refer to the R-1015, so we'll know that you're talking about the US 70 Havelock Bypass Project, because we do have many, many projects going on.

No decisions will be made tonight. We're strictly here to get public input. Everyone present, we would like to have your input. We know that everyone has different opinions and that's okay we just want to be respectful of each other. And we welcome all of your opinions and your comments, but just be respectful of others that may disagree with yours.

Okay, we can go to the next page. So ***what do we do now with this input***? We get the public comments. After this we hold what we call a post-hearing meeting. We do this after every part at this stage. We always come back to the public each time after a new phase or anything that's changed about a previous project. So, we do a post-hearing meeting and when we are going to conduct that we have a lot of our Project Team. They represent planning, the design, the traffic folks, right-of-way, our Natural Environment Unit, Public Involvement Group, and Community Studies, and any others who play a role in the development of a project will be at this meeting and that's the Project Team.

And the project is also reviewed by anybody that oversees this area like the US Army Corps of Engineers, being wetlands and streams, and the US Forest Service as well as other state agencies, the North Carolina Department of Environment and Natural Resources and when appropriate, local government will attend from the City of Havelock and Craven County.

As I said, all spoken and written issues are discussed. We take them all into account and then we do actually type up minutes of the post-hearing meeting and they're summarized and you can also request those on that comment sheet if you want to if you would like to get a copy of those. And I can either email them to your or mail them to you or whatever you request.

Okay, the next section is the ***corridor selection*** process. Although all 3 Bypass Alternatives are still under consideration, because you've seen these before, Alternate 3 was originally identified as the LEDPA, which stands for the Least Environmentally Damaging Practicable Alternative by the Project Steering Committee. This committee consists of the Federal and State Review Agencies. And then in 1998, the Corridor Selection Committee actually approved Alternative 3 as the LEDPA to give you a little history. And they're comprised of representatives from DOT, Federal and State Resources and Federal Regulatory Agencies, NC Wildlife Resource Commission, State Historic Preservation Office, and other agencies are invited as appropriate.

Since all 3 of these have been restudied, another document was prepared. And that was the one I showed you tonight, the Draft Environmental Impact Analysis, the Impact Statement. Alternate 3 remains as the identified preferred corridor alternate, but we are here and all 3 are still on the table and we will not make that decision until after all these post-hearing meetings have taken place. And then we sit down and we meet with the regulatory agencies, then that final decision will be made and a LEDPA Alternate will be picked.

Okay, once that's picked…if you want to go to the next page. After selection of that corridor we will release it to the news. It'll be a news blurb and we'll send it to our Communications Office as well that announces the selected corridor and it'll be sent to the local media and publication. *(Moderator is clearing her throat.)* After that once that preferred alternative is picked, we will continue to further minimize impacts, we'll tweak the design a little bit more, and further studies and surveys will be conducted such as hazardous materials; because we do know that waste transfer plant on the northwest end of the project, and other historic and archaeological sites will be further studied.

Any unavoidable environmental impacts will be mitigated. So, our attempt is to avoid at all times, minimize the impacts to anything or mitigate where possible…where we have to. And then another environmental document after this will be the Final Environmental Impact Statement, which is called the FEIS. That will be based on the results of all the items after the next study, after they determine the LEDPA. Then we'll come back and we'll hold a design public hearing where that 1 alternate will be shown, it will be blown up on a larger scale and you will be able to see in more detail and we will even tweak the design a little bit more following that.

Okay, this is a Federal-Aid Project. So, 80% of the project is funded with federal funds and 20% is funded with state funds. Our Board of Transportation is responsible for the selection and scheduling of the projects. And then they follow up with the location and

design and they cover the cost after construction. And then FHWA, Ron's Group, reviews and approves all the activities that are done throughout the process.

The purpose and need of the project…the purpose of this project is to improve the traffic operations for regional and statewide traffic along the US 70 Corridor to reduce the congestion along existing US 70 and enhance the ability of US 70 to serve the regional transportation function that coordinates with the Corridor Strategic Highway Corridor Plan. And then we explain what that plan is. It is an initiative. It's a vision that has been identified to protect and maximize the use of highway corridors that play *(Audience participants coughing)* a typical role in regional and statewide mobility in an ongoing effort to enhance transportation, economic development, and environmental stewardship throughout North Carolina. That's why it's on this list.

Okay, the first highlighted bullet, oh actually I have some these reports up here. It's for the *(inaudible)*. If you want more information on that I have that at the sign in table now *(Audience participant coughs)* for the Strategic Highway Corridors and how we come up with those. Okay, the first bulleted area there, increased highway demand has diminished the mobility of US 70 between Morehead City and Raleigh to function as envisioned according to this plan. The regional use of 70 has led to the deterioration of traffic operation along US 70 causing very undesirable levels of traffic service.

We grade the roads on an A to F system. We call them Level of Service of a roadway is the measure traffic carrying ability. A is the best scenario and F is the worst scenario. And US 70 is not operating very well at all so the existing intersections along US 70 have been analyzed and are currently operating at an undesirable level of service. And without improvements to accommodate traffic growth, the level of service along 70 will continue to deteriorate.

Okay, go to the next page please. The project will mostly improve the accidents for area commuters for Cherry Point, Newport Air Station, and Naval Aviation Depot, which is the principle employer for civilians and air carrying personnel in Craven County and the City of Havelock. The US 70 Corridor, again, is a Strategic Highway Corridor Plan Route that actually connects the cities and towns of Raleigh, Smithfield, Goldsboro, Kinston, New Bern, Havelock, and Morehead City, which is a length of 148 miles. So, this plan recommends that this section of 70 through Havelock be upgraded to a freeway with full control of access, which means no driveways, no traffic signals, and it's going to a freeway and it'd be a minimum of 4 travel lanes with a median.

And the last paragraph in that section there, the proposed US 70 Bypass is consistent with the Long Range Transportation Plans for the study area. Local governments within Havelock and the Down East Rural Planning Organization, our RPO that was here tonight, are all in agreement as well DOT that we all have adopted this plan.

Okay, I'll go over a brief description of the project on this page and then I have a more detailed one on the next page but I'm not going to read all of that to you all, I'll go through the map on that one. The project basically calls for R-1015 proposes to construct

about a 10 mile, 4 lane divided control of access freeway, no driveways, no traffic signals, on a new location around the southwest side of Havelock and the Cherry Point US Marine Corp Air Station in Craven County. And the reason they're doing this is because all of that is on the other side of Highway 70. So, all 3 alternates are on the southwest side of the city. The proposed project will provide a high speed alternative to the heavily congested existing US 70 Highway to the City of Havelock. The bypass will take a lot of the traffic off of US 70 making that less congested for the folks that are traveling through to go on to other parts of Carteret County. Okay, as I mentioned, access restrictions through Cherry Point and the City of Havelock that's why everything is arranged to the south.

It will be full interchanges are included at both ends of the bypass in the green areas and on the secondary roads, which you all know as Lake Road is secondary road 1756 and the remaining local secondary roads and railroads are to be grade separated. That means there's going to be a bridge over, a bridge under it, by the bypass.

Again, I'm going to skip over to the next page. And then there's a summary of the alternatives. And I have automatically referred to the very next page, which is Table S1. And this is the one where it comes from. It's basically a summarization of that big fat book with all of the alternatives. They've been upgraded since the last study was done. And there's the length of around 10 miles but they're all broken down into Alternate 1, 2, and 3.

And on the very next page is your basic project information, with Table S1 being a little bit more specific; but the length varies and is about 9.99 miles from each side depending on the alternate we're looking at that the typical section, which is like a cross view of it, like if you're standing on the roadway in the median with 2 foot travel lanes this way and 2 foot travel lanes this way, they'll be 12 foot in each direction. We're looking at a 46 foot median in the middle that would be 250 feet that would be the right-of-way. And we're going to need a little bit more room at the interchanges on where the green areas are on both of those because we'll have to make full diamond interchanges and we'll need to have more room there to apply the right-of-way.

A full control of access means that access only provided via the ramps at the interchanges, we cannot connect to the freeway; no driveways from people's homes can be connected there. The relocatees in the project columns here are little more specific. They're broken down on that Table S1. So, that's why you will want to refer back to that for a little bit more detail.

Right now, our schedule is looking at right-of-way acquisition to begin in 2013, not far from now. And the construction will usually follow about 2 years after, so we're looking at 2015. These dates can change, but we'll keep you updated as the project progresses.

The next sheet is your pullout. It's just a mini version of what you see up here just so you have an idea of where the alternates are. *(Audience participant coughs)* And that you take home. That one

And the next page is the right-of-way procedures. The current market value of the property is at its highest and best use when appraised. Our division, Doug Askew's Office, is the Right-of-Way Agent and we also have an appraiser office and they will work with you to get…They have to do 4 things. They have to treat all owners and tenants equally; they fully explain the owner's rights; they pay just compensation in exchange for your property rights; and they furnish relocation advisory assistance. And I do have some Relocation Brochures and some Right-of-Way Brochures at the front desk if you did not get that during the open house portion.

Okay, the next page is called our ***Title VI Public Involvement Form***. And it's kind of a demographic form and it's totally voluntary. If you do want to fill that out tonight, it gives us a better idea of who lives in the area. I filled in the project information for you but if you just want to fill in that lower square, you can tear that piece of paper off or you can fold it over and mail it in to me. But there is a box left in the large room next door if you do want to put those forms in there, I will take them home tonight.

And then most importantly is the ***comment sheet***. I ask you to print because it's easier to interpret all your comments and your questions if we can read your writing. *(Audience participant coughs)* So, we ask you to print and I made large lines on there, but if you need extra paper and you need to email it to me, whatever you need to do. But again, do refer to R-1015 so we'll know what project your comments are talking about. Okay, and again that one you can tear off the very back that's why it's strategically put there so you can tear off. You can leave it with us tonight, if not, we would like them back by January 6th and you can email or whatever you need to do so we can get to the next step, the post-hearing. So, the faster we get all the comments in…so you can continue to send them in but we would like to have them in by the 6th so that we can start making some decisions.

Okay, that's the handout. So, make sure that you go home with one of those. Okay, can everybody hear me? Okay, this is the map. We put it together as our match lines meet, you are actually here right now. This is the Tourist Event Center. We put maps together so that you could get a really good idea of what the project will look like and where all of the alternates are actually going to start.

I want to go over the map. This is the north arrow. Even though you think you're going east to the coast, it's actually kind of southwest. This is the northwest end of the project where it starts here in the green. And Alternate 1, 2, and 3 all come together on both ends of the project. And that's where there's going to be an interchange. We're not sure about the design there, we're talking about they call it kind of a Trumpet Interchange, but we may tweak that as we get further down the line.

Now, Alternate 1 is green comes down to here and right about here is where all 3 Alternates kind of split. So, Alternate 1 is going to be green and then it's going go orange and it's going go back to the green and it's going to carry on through and it's going to end up at the Carteret-Craven County Line. That was the one that was the most furthest to the west from US 70, so that's the longer, furthest away bypass. Alternate 2, it goes

green, pink, and then green and ends up in the same spot at the Carteret County Line. And Alternate 3 is all green and it goes through there.

The other colors on the map, we have your brown areas. These are your buildings, businesses, dog houses. This is an older map so it has not been updated but when we come back to the design public hearing we'll have a better map so you can see the right-of-way better. The blue is our streams and lakes. The control of access lines are these red lines around here that's where I was saying that its full control of access meaning you will not be able to put your driveway or your business or connect to these areas that are surrounded by the red dots. Because that's going to be your freeway and you won't be able to just put your driveway out there.

Our ADT, we do all of our projects now and we kind of look at the year of 2035 now because we know there's a lot of traffic now, so that's kind of something that we're doing just to kind *(Audience participant coughs)* of give you an idea. We've done traffic capacity analyses and all kinds of formulas to come up with these numbers so, there's going to be a big increase come year 2035.

The city limits are in black and the proposed property lines. The red lines here that you see are going to be your proposed structures that were normally going to be bridges. The wetlands are kind of a dotted sketchy little area in here. They're kind of hard to see where you are and then it has a WLB for the Wetland Limits Boundary. And then proposed traffic signals are shown at the interchanges here. We do not show any of the existing traffic signals along 70 because that's not part of the project. We're only showing them along here *(Audience participant coughs)* where we're proposing to put them.

Okay, I'm going to move here a little bit closer. Alright, so the alternates start here and come down here, it's northwest of Hickman Hill Loop Road. Again, they branch off right here and again, a lot of this property is owned by the US Forest Service, Weyhauser, NCDOT owns portions up in here. Alternate 1 comes down, this is a corridor. It's a 1000 foot wide. Now, this road whenever it is put in there, whether it's here, here, or here that road…existing roadway that 250 width can wiggle waggle anywhere in there. So, that swatch of color is not where the road is going. That's just showing where it could be within that corridor.

So, it comes down and Alternate 2 and Alternate 3 are actually going to be grade separated, not with Alternate 1 for Sunset Drive. Sunset Drive is actually going to be running over the bypass for both 2 and 3. And it's not impacted by Alternate 1. It is too far west for that. And then we'll carry on and then the next interchange, it will be a diamond interchange for both Alternate 2 and for Alternate 3. And again, the signals will be at the top of both of the ramps at both of the interchanges. And then we carry on through and like I said some of these bridges are going to be longer than the other depending on what they're going over, the stream width or whatever happens to be there, the wetland area. Smaller bridges over the railroad station…railroad crossings there and then it ends up at the interchange here. If you're coming from US 70, you'll carry on out US 70. If you want to go in back into town, you can take any of these roads as you do

now. You'll just be going through interchanges. So, that pretty much sums up the maps of the 3 Alternates.

Okay, I'm going to read off the list, Curly.

John Brazelton (Curly): Yes.

Moderator: You are number one.

John Brazelton (Curly): Thank you, I appreciate that number one.

Moderator: When you come up if you wouldn't mind if you would state your name and address, so we can have it on the recorder.

John Brazelton (Curly): John T. Brazelton, 1000 Sunset Drive, Havelock.

Moderator: Okay, would you like to come up and speak to the crowd?

John Brazelton (Curly): Yes, I would love to.

Moderator: Okay.

John Brazelton (Curly): I don't believe that I am going to need that mic, okay. All the speeches that I make throughout the different boards that I go to I don't use a mic. Beverly got us to do that at the last one because she was there. But anyway, let me get back to what I'm going to talk about. You ain't starting my timing is you?

Moderator: No, go.

John Brazelton (Curly): Thank you very much. If you have any questions, what I'm going to tell you is the truth. Most of this is documented. Everything I'm telling you is documented in these folders here. Starting with, do we have any DOT people here that have been with DOT over 34 years? We don't have any, so you all are off the hook. You all are here because you were told to be here. The part I'm getting at this bypass of Havelock, I knew that when it was Sunset. And it started in 1977. That's when it started; and also, with a $13,900,000 price tag that's documented and I've got proof in this folder here.

Myself, 24 years in the Marine Corp heavy equipment, got out, retired in 70. I used to tend storage *(inaudible)* corn on this property, getting on back to the…served on the Governor Hunt's Highway Efficiency Committee in 81; I've got to tell you a couple things. I know Secretary Robinson was the DOT man back in them days. And all of this stuff that I got here that I talk about is documented in one of my DOT folders.

I took a picture one time of DOT blacktopped this road and when the marked it, I took this picture and my carbon copy here. I've got a copy of it also to Secretary Robinson.

What had happened a rabbit got run over in the road. He says Curly get up and talk about this rabbit. He said I know it's a damn rabbit because it's got ears on it and a tail on it. That was in the center of the road and when they marked the road they marked right over the rabbit. But anyway *(audience laughs)* that's neither here nor there.

Prisoners going up the highway picking up trash, they were going up the highway, 6 of them picking up trash and one of them had an orange bag. One of them had an orange bag. I took a picture of that. The police said from now on you will see prisoners with an orange bag. I know. I'm authorized to pick up prisoners in Craven County and do and fix up the roads around Havelock. Greenfield Heights Boulevard and also Sunset Drive where I live. He says Curly why are you picking up Sunset Drive last? I said I won't dare pick it up first. Anyway, that's not neither here nor there. I'm authorized to do that. I reckon I'm the only person in Craven County.

I serve on 4 of the boards. I don't want to mention the boards that I'm on but they are pretty important boards, thank you. Okay, let me get on with the...I'm serving on 4 boards now, picked up trash on the highway, talk about 5 roads.

I want to talk about 5 roads off limits to government vehicles from Cherry Point to Camp Lejeune. We've got 5 roads off limits tonight. Hibbs Road…talk about it might be off limits one of these days. How do you get to Camp Lejeune? You go all the way down to Morehead and turn right like I used to when I was a Commander and General driving 50 on 24 and go on down to Camp Lejeune. The 5 roads, I can tell you every one of them. I'm going to take up my time, but I need about an hour to talk about DOT, because my 3 main subjects are teachers, DOT, and state employees. That's my 3 main problems I talk about. They ain't problems.

We got some outstanding people. I got a son that's works for them in Carteret and Craven County. And everybody is from around here I think most of them know him. But anyway, let's get off that ticket. Talked about 5 roads off limits, I've done that. Roads around Havelock. I call it a road around Havelock because the city limits just runs right up here almost to the Carolina Line.

Smithfield Barbecue, I dug a footing for that one. All of the Bojangles and Smithfield, I've done them all. They're old ones so, I believe I'm qualified and I need to talk to you people here tonight. Getting back to that…stop…see what I mean that 3 minutes. Anybody else got any questions, I hope you have.

Audience Participant: I got one.

Audience Participant: Okay, go ahead?

Moderator: You can come back up.

John Brazelton (Curly): No, I just want to tell them about these folders here.

Moderator: But we're going to go through this list and if you want to come back up, we'll let you come back up. Will that be alright?

John Brazelton (Curly): Yeah, great.

Moderator: Okay, next on our list is Vilas Geier. Am I saying that right?

Vilas Geier: No, I don't need to get up now.

Moderator: Okay, so you're going to pass, alright thank you. Hubert C. Pulley? He's not here. Mary Alsentzer.

Mary Alsentur: Thanks, Mary Alsentur, 103 Banner Road, Belhaven. I am the current Chair of the Sierra Club that covers northeastern North Carolina. We have 23 counties included in our group of the North Carolina's Sierra Club. And I heard from a couple of people this evening that there's some misconception that the Sierra Club or some groups anyway they mentioned Sierra Club and that's the one I know about has supported or said we don't like one of these alternatives or the other. I just want to set the record straight. We have not taken a position on an alternative. We did submit some comments from the DEIS and at that time and still at this time we feel that information on environmental things in the DEIS is not detailed and adequate enough for us to choose any of these alternatives.

If we had to support something, it would be the betterment and improvement of the current highway, which would leave the environment pretty much alone and the people who live in these corridors on the map alone. Again, we've submitted our written comments. We joined the comments from the Southern Environmental Law Center, which also is requesting that there be more information gathered and presented before an alternative is selected. So, I just wanted share that and I'm delighted that they're sending people through here.

Moderator: Thank you. Next, Sandra Hardy.

Sandra Hardy: I was prepared to speak, but I think I got most of my questions and comments answered...

Moderator: Okay. Alex Rickard.

Alex Rickard: Thank you. Alex Rickard. Eastern Carolina Council of Government, 233 Middle Street, New Bern and I'm here tonight because the Eastern Carolina Council is working with DOT Bike and Pedestrian Division as well as the Croatan National Forest, State Parks and Recs, City of Havelock, and our other local governments on a Regional Bicycle Plan.

And we have 2 requests for the DOT related to this bike path on behalf of that project. The first is that our region lacks connectivity of bicycle and pedestrian facilities, not just

Havelock, Craven, Carteret, Pamlico, Jones and Onslow County. Some of our municipalities have fantastic facilities but who wants to walk from Havelock to Newport today. You're stuck with either Highway 70 or Highway 101. And options going up to New Bern aren't much better.

So, the first request that we have is no matter which alternative is selected, we'd like to make sure that DOT ensures that all interchanges and overpasses are designed in such a way that they will accommodate future bicycle and pedestrian facilities, whether those be bike lanes, sidewalks, or multiuse paths. So, that is the first request especially the 2 interchanges on either end of Havelock also Lake Road and of course Sunset also.

The second request is in 2000 State Parks and Recreation adopted the Mountains to Sea Trail Plan and there are some Mountains to Sea Trail folks here tonight. That Mountains to Sea Trail is a hiking trail. It runs from the mountains of North Carolina out to Jockeys Ridge on the Outer Banks and it is slated to come through the Croatan National Forest. The Havelock Bike Path presents a great opportunity for that trail. We're talking about like a 10 foot national hiking surface and we'd like to ask DOT to consider including that 10 foot of right-of-way in again whichever alternative is selected.

So Ed, I don't know if I give you this map or who? But…

John Brazelton (Curly): Wait a minute…make it wider than what you just said?

Alex Rickard: by 10 foot. Again, so the request is to make sure that all interchanges and overpasses will accommodate future bicycle and pedestrian facilities, because whichever road we select we're going to be with it for a very long time. So, thank you.

John Brazelton (Curly): We do have a follow up at your house.

Moderator: After we go through the list, you can come up okay. Barney Kane.

Audience Participant: Can you tell me again how many vehicles you get for 2035 because I forgot.

Moderator: It's up here in this corner here, okay for which road, on 70?

Audience Participant: Yes.

Moderator: Okay, they're looking at between 5800 to the north *(inaudible)*. There's 36 now. They have proposed here for the southern bypass 22,900.

Audience Participant: Okay, thank you.

Barney Kane: I'm Barney Kane and I live in Greenville. I go to the beach sometimes and I hope I got time to make 5 points. One is should really be directed to the National Forest System, I fundamentally object to using the National Forest to alleviate municipal congestion. It's not in their mission or their purpose.

The second objection I have is facilitating an easy access for some 20,000 ding batters from Raleigh to bypass Havelock on their way to Atlantic Beach *(inaudible)* the beaches and the coastal waters and screw them up the way they been doing.

Also, I think that if you're going to spend $167,000,000, you'd better give that money to the City of Havelock and let them decide how they want to spend this on community improvements. *(Audience applauding)* I'm a liberal but that's a conservative saying, which you should have local control over what's done to you.

I think the route impacts of the routes cannot be assessed by either people in Havelock or any other person viewing this until you know for sure what will happen to the land between the farthest out route and the closest in one as the existing 70. If you don't know whether they are going to continue to manage that by fire as National Forest or you don't know that if it will become part of the *(inaudible)* City of Havelock, then how can you use which one you want.

The DEIS is actually written in my opinion by a guided hand to select the green route. Otherwise, why is the green route selected shown in green, the same as the rest of them? And I also want to clear up one thing about environmental groups who have said to the Havelock News that they're opposing to the damages to the Red-Cockaded Woodpecker. It is not the damage to the Red-Cockaded Woodpecker; it's actually the whole Longleaf Pine Ecosystem that will be shattered by this, which includes all the habitats associated with that. In all of the south, the Longleaf Pine Ecosystem used to be the dominate forest cover and now we only have 2 or 3% left, of which some of it is on this bypass, which would be shattered by it. And so, that's all my comments, thank you.

Moderator: Thank you Mr. Kane. *(Audience applauding)*

Barney Kane: *(Made a statement about the 3 minutes, which caused the audience to laugh).*

Audience Participant: Good job.

Moderator: Jeff McCamy.

Jeff McCamy: I'm Jeff McCamy. I have a business on 509 Highway 70 West here in Havelock. I'm speaking on behalf of the retailers here in the building that didn't feel like they wanted to get up, may be a done deal, may not but our company is a 30 year company. We have 2 of our 6 retail stores here in the Havelock area. We are totally against this bypass. 40% of our business come out of not out of the local zip code, it comes from far away as Raleigh, Goldsboro, Fuquay going down towards the beach.

With the military cutbacks that they're talking about and we see less business and less traffic on the road anyway; if you look at it, it only takes about 10 minutes to get through this town. And with the median you've already put down our throat, now that you've messed up our road in town, and now you want to take our traffic off of Havelock.

So, I just wonder if it's the same pencil pushers that decided the median is going through this bypass. If you think about this bypass in a little town south of Wilmington, going towards Myrtle Beach, I believe the town is Bolivia. Probably nobody in this building has been through it because they did a bypass around this town, so I'm worried about Havelock becoming like another Bolivia, thank you. *(Audience applauding)*

Moderator: Nancy Paul.

Nancy Paul: Hi my name is Nancy Paul. I live at 801 Greenfield Heights Boulevard and I want to talk a little bit about the economics of doing this. We've heard from our retailers about lost business but there are other things that come into contact too. 17% of North Carolina state workforce is agriculture or agricultural business related. 20.3% of the state's income comes from agriculture. It's the number 1 industry in North Carolina.

Havelock is blessed for having some farmland. In the 1930s and 40s, the majority of Havelock's farmland was taken to provide Cherry Point. Most of the farmland that is currently left in the Havelock area is right under where the proposed Alternate 2 is going. Since 2002, North Carolina leads the country in the loss of agricultural lands. Almost 7% of its farmland has disappeared in the last 9 or 10 years.

The other thing I want to talk about is if you look at other cities that are along the corridor, I'm talking about Kinston, Goldsboro, they had bypasses that were put in them about 40 years ago. Business has grown come up to the bypass and now they're having to build 40 years later another bypass around Kinston, around Goldsboro.

And although we are looking at control of access on this one, growth is going to happen. Actually the city can only grow in one direction because of the bases on the north and the east side. We're surrounded by federal lands. We can't really go where the forest is. So any place Havelock can go…the only place that is left is whatever is inside this new bypass. If you build it so close in that Havelock becomes restricted, almost with a noose around its neck, you know it has nowhere to grow. 40 years down the road, North Carolina is going to say hey we need another bypass around Havelock and as taxpayers of North Carolina that we're having to re-do this one more time, thank you. *(Audience applauding)*

Moderator: Larry Paul.

Larry Paul: You know she's bit of a tough act to follow. *(Audience laughing)* I'm married to her. I know.

Audience Participant: Is that so?

Larry Paul: Yeah. First of all I just want to look out and thank everybody. There are a lot of people here tonight. I was surprised how many people came out. But I think that reflects how important this issue is to people. And I think the thing we're trying to do tonight is decide 1, 2, or 3. And everyone here that does not one of those corridors included should come up and say and make a comment especially about Number 2. Number 2 will destroy us. Nancy mentioned about the noose it will put around the city. I think that's a good analogy.

All 3 of these corridors are going to affect some people. 2 and 3 are going to affect my family, my kids, either one of them. We understand that may happen. We can encompass it. Number 2 would devastate us. Everyone that would be affected by Number 2 probably should in some way come up and state that let them know that Number 2 should be off the board.

Now about the natural forest and folks just left. I live by the natural forest. We love it. I've seen the woodpeckers in amongst them. We want the woodpeckers. We want them to be there and I do think the woodpeckers could make it with anyone of these options. I think people have said these are going to destroy the woodpecker to overstate the case. Folks the birds are going to make it and we've got some foresters to going to make sure that happens. So, I don't think that's really an issue.

Finally, I think best would probably be 1 *(inaudible)*. The further out we could get it the better off we'd be. I've think they've pretty much decided that 3's going to be the one anyway, but I would like to make sure that Number 2 is not the one and that it's totally taken off the board.

Finally, I had a question for someone. I asked some of the members that were here about what's going to happen to the Croatan land sweep within the new bypass. If you remember back when this came down…I'm going to have to start talking fast, I've got 1 minute. The Oaks Property was purchased *(inaudible)* the best out of this whole deal. There was 4,453 acres that DOT purchased to trade for lands to get this bypass. That was a jewel for Croatan National Forest and that sit in the middle of them and that was something they wanted for years. And I think that we as people that want the Croatan to make it need to find out some ways that some lands can be traded and they can quickly get this property faster. I think right now DOT owns it. Does anyone know how that works within DOT that's here? How that's being transferred over to Croatan? And is there any way I can find out?

Audience Participant: You're ain't going to find out.

Larry Paul: Oh, we're not going to find out, okay.

Audience Participant: I know exactly…

Audience Participant: That's incorrect. That's incorrect.

Moderator: There's some mitigation that we do…

Larry Paul: Right.

Moderator: With the Croatan Wetland National Mitigation Bank and it's basically a land swap.

Larry Paul: Who is managing it now?

Moderator: The US Forest overseen by FHWA, correct?

Audience Participant: *(inaudible)* property is what you're talking about.

Larry Paul: I think you just closed up the ditches in the floods. I don't think that's a good management plan. That's all I heard about…

Moderator: We can investigate that more.

Larry Paul: And get back to me?

Moderator: Yes.

Larry Paul: I think it would be good that land was turned over to the Croatan as soon as possible.

Moderator: Let me verify that. *(Audience applauding)* Herbert Smith. Hubert Smith.

Herbert Smith: I'm going to save my question for the comment sheet.

Moderator: Okay. Jayesh Patel, am I saying that right?

Jayesh Patel: Hi guys, I'm Jayesh Patel. I don't know how much money they've spent on this researching to build the highways. We should spend a little bit money for just timing this traffic light and the street lights, *(Audience participant coughs)* your traffic will flow through it in a very, very cheaper way, thanks. *(Audience applauding)*

Moderator: Thank you sir. And that's all the people that I had signed up. Would anyone else like to come up and speak?

Cheryl Newlon: My name is Cheryl Newlon and I live at 100 E. Larriat Lane here in Havelock. I wasn't going to speak but I have to put my 2 cents in because I

live in the pink area and if they did choose to, which I hope they don't, my house would be gone. Basically…sorry, I'm nervous. I don't like to talk in front of people.

First off when we moved here 2 years ago. The military brought us here. I had no desire ever to come to North Carolina, but once I came here I fell in love with it. We bought a home and now 2 years later we're finding out we're possibly…a month ago I found out we're possibly in a bypass area, which I had no clue about.

Just FYI, people talk about all this traffic in Havelock. Havelock really doesn't have a lot of traffic. Yes it does in Havelock but I lived in San Diego, I've lived in Okinawa. It takes 20 minutes to get 5 miles. That's traffic. Havelock, takes me maybe 5 minutes to get to the end of town.

I live off of Lake Road and I would really love to see them spend money on sidewalks for our side roads that are well walked by our school children. You know high schoolers that are coming home from school. There's not a whole lot of pedestrian crossings on the 70. How do people cross the street? They jaywalk constantly. They're putting all these nice medians in but did they think about pedestrians. That really concerns me.

When we spend a lot of money on a corridor and don't invest in the City of Havelock itself, transportation wise for pedestrians, bikes, etc. Like I said, the traffic here, I've actually enjoyed it. It's a very nice change from what I'm used to. Where it would take me an hour to get only 20 miles to work, it would take me an hour here. You know it doesn't take me any time to get to base 5 minutes from me.

My biggest thing is if they do put this corridor in, I'm really hoping that you don't use 2 and add sidewalks to Lake Road for those people that are there that have small children so that we don't have to worry about them. I thank you for your time.

Moderator: Thank you. *(Audience applauding)*

John Brazelton (Curly): A question about what he said a while ago. A question.

Moderator: Okay, who was that?

Audience Participant: About the bicycle lanes?

John Brazelton (Curly): Oh no, not you. The other one.

John Brazelton (Curly): The one that said it takes 10 minutes to drive through Havelock. I want to answer to his question. Its 14 stoplights through Havelock. If you stop at every light…if you stop at every light going through Havelock, it'll take you 14 minutes or less. I done tried it. I done done it.

Moderator: We've got people that got more comments.

John Brazelton (Curly): Okay.

Moderator: We'll get you back up here. Come up sir.

Jeff McCamy: Thank you Curly.

William Kornahrens: My name is William Kornahrens and I live on 205 Gray Road. I'm speaking also for my aunt who lives at 202 Gray Road. My aunt is 88 years old and she lived here in Havelock since the *(inaudible)* I think. She's lived on Gray Road for probably at least 50 years. She owns some of the property that this Number 2 is going to cross. I'll have to remove her from her house. Me as well because I'm right in the right-of-way and we're opposed to Number 2. That's all I have, thank you.

Moderator: Thank you sir. *(Audience applauding)* Okay sir.

Reverend Jim Daub: Reverend Jim Daub, 702 Lee Drive, Havelock, North Carolina. As a resident here for 10 years, I echo your traffic, whatever it's like. I lived in Orlando where to go 7 miles it used to take me…good day 45 minutes, a bad day 2.5 hours. When they said traffic in Havelock was bad I laughed.

Two questions, as a statistic reader in college, could you please provide if possible, statistics in your paragraph where you say the project will reduce the travel time for motorists such as commercial carriers and vacationers to Carteret County Beaches and port of Morehead City. What is the statistics of how many commercial carriers use the Highway 70 Corridor through Havelock?

Also, you said that it would provide…improve the area's hurricane evacuation ability. Living in a parsonage that backs up to Highway 70, during Hurricane Irene I watched our City of Havelock's finest police during the evacuation and it was the smoothest that I've ever seen where there was no problem with the evacuation in there. Is there statistics where Havelock Highway 70 is a problem for evacuation during the hurricanes?

Also, might the DOT provide the statistics of how many businesses have closed in other cities where the DOT has put bypasses around it; such as Little Washington, Goldsboro, also the name of the city that you mentioned…

Audience Participants: Bolivia.

Reverend Jim Daub: before of how many businesses have closed because of bypasses?

And then the last question that I had is could you please provide the reasoning as to why the DOT is spending several million dollars on a median that they have shoved down our cities' residents throats if they are going to be doing this bypass so as to alleviate traffic

in a city that they're now going to be bypassing? If we're spending $167,000,000 and we could've put that $3,000,000 to help offset the cost of that, thank you. *(Audience applauding)*

Moderator: Thank you Reverend.

Tim Newton: Yes?

Audience Participant: About time.

Tim Newton: I don't know if you all can hear me. I haven't had dinner yet. My stomach is rumbling pretty loud.

Audience Participant: Crabby patty's for dinner.

Tim Newton: Crabby patty's for dinner. It's a good commercial. *(Audience laughing)* My name is Tim Newton. I own an auto dealership here in Havelock for 18 years. And when this bypass was first brought up to me and this was many, many years ago I thought we might need it. Since that time there has been military cutbacks here in Marine Corps Air Station and Cherry Point, probably 50%.

You look at all the people that go to the beach, they talk about the beach. Well, if you go to the beach right now, there are more properties for sale. There are more subdivisions that have failed that have gone bankrupt, empty. Golf courses closing. I just see less and less need for this bypass right now. With times the way they are, with money being tight, education is hurting, I think this money could go to better things other than the bypass.

And obviously being a business owner it's going to hurt my business. We sell a lot of vehicles to people that are coming through Havelock. And with all the new medians and the crossovers that are being redone right now, making it where you can't actually go through Havelock a lot more safely than before.

So, I think it ought to be delayed for at least 10 years. Let's see what's going to happen with the military, with Cherry Point and that's how I feel, thank you. *(Audience applauding)*

Audience Participant: Can I borrow your mic?

Moderator: Sure.

George Corbin: My name is George Corbin, 202 Poplar Road here in Havelock. Like the gentleman right here said earlier, just out of curiosity I have caught the light right there at McCotter. I have driven through Havelock and depending on the time of day, you can catch all the lights the right way I'll take me 7 or 8 minutes to get down here to the last light. That would be West End Fire Station, Hickman Hill Loop Road.

On a bad day, depending on the traffic how you catch the lights, it might take you 12 or 14 minutes. Okay, it's never taken me 14 because I…12 minutes at the most, anyway. Now other…I guess the speed limit is going to 55 mph…

Audience Participant: 70.

George Corbin: It's going to be 70 mph. Okay, how long is it going to take to get from this same light right here all the way down to the other end down here; 7 or 8 minutes? Other than having the opportunity to waste another $180,000,000 by the time you get through with it because it's going to cost not a $167, everything is going to go up between now and then, you're going to waste $180,000,000. Why waste that money for 3 minutes? I don't care who you are. If its 3 minutes right through there, what is that? If you want to waste your money, if you want to spend that money, write us a check. We could do good work with it that down here, thank you. *(Audience applauding)*

Howard Babbitt: My name is Howard Babbitt. I wasn't going to talk this evening. A lot of people have come up and told why they don't want it to affect them. No one wants it to affect them. I don't want it to affect me. Option Number 2 or 3 does affect me and my business. No one wants that.

But like some of the other people have said, let's look at what's actually needed. Do we really need it? How's it going to affect Havelock? How's it going to affect the businesses in Havelock? Is there any way to improve on the current road system, instead of looking at options that going to be very expensive and hopefully make some improvement to how it's really going to impact the community?

I've heard a lot of people say how it's going to affect their businesses. In today's economic times, that's something we need to look at is how it's going to affect the businesses. How is it going to affect job growth? How is it going to affect people's incomes?

You're going to take all this traffic that's going through Havelock now and bypass it. How many people go through to the beach? How much more can a beach actually grow? You know in today's…people thought, it's tough economic times. I don't see them building anymore at the beach. So, in 20 or 30 years what is the beach count? Is it going to look much different than it does now? If they're talking about another 25,000 people per day coming through Havelock; can they grow the beach that much?

I personally don't like any of the options. Keep it the way it is. Improve on the road system we have today. *(Audience applauding)*

Jim Kohr: My name is Jim Kohr. I'm the Pastor of Freedom Baptist Church at Lake Road, which is right in the pink there on Lake Road and…which leads me to my first point in the Alternate 2 here you see where it says 133 residents and zero churches. Now I had the gentleman explain to me is that they're actually counting is what's actually

between the red lines not everything that's in the quote pink zone there. But there is potential to wiggle one way and we have to relocate our church so I would say that would affect 35 members of our church. And so, I just wanted to make that clear.

And then secondly, if could be possibly provided the grading system here between A to F; and we're told here in this purpose and need of the project that the Highway 70 has deteriorated but we're not given our grade. Are we a B-, a C, what is our grade? If that could be provided, I'd really like to know that.

And then lastly, if I could just mention about the safety on Lake Road; it's already been mentioned about the need for sidewalks. We do have obviously buses traveling up and down there dropping off young people and then if we do put the interchange there now we're going to have more traffic on Lake Road and we already know how the corner of Lake and Miller is trying to get around right there. Now, we're going to have to improve that and put a light there and the list goes on and on and on, and so there are many other factors that I think need to be figured out where it's already been said 1, 2, or 3 but can we improve on what we already have, thank you. *(Audience applauding)*

Ryan Willet: Good evening, my name is Ryan Willet, 197 Pine Cliff Road, outside of town. I lived in the city limits of Havelock for 9 years. I'm still very close to them…very passionate about the bypass, not doing it. I don't think we were ever given the option of it not coming. If we did, I totally missed that. Maybe it was 35 years before my time and Curly was here…you know long before me, but Option 2 is absurd.

To the DOT, you're going right through people's houses, right through farmlands, horse farms, it's just absurd. It shouldn't even be a concept. I think you put it there to make us feel better about the other 2 options. *(Audience laughing)*

Option 3 and 1, you're eating up all kinds of Croatan. That should be nonnegotiable. That's a national forest. It was made a national forest for a reason so that you wouldn't build roads in it. The idea of building or buying 4000 acres 15 miles away as a mitigation factor doesn't relocate all of the breeding ducks and geese that live in the swamps underneath the bridge in the middle of Option 3. It's ludacris. You put the bridge right on top of a beaver dam, great job folks.

Somebody asked earlier about statistics. I'd like to see the soil studies and a recalculation of your wetlands. 115 acres is about 1/3 of what you're actually displacing for wetlands. I don't know how many of you all have actually walked that property, but it's well over 300 acres of wetlands. That's all I have, see you watching the stopwatch. Have a good night. *(Audience applauding)*

Audience Participant: Am I next?

Moderator: Yes ma'am.

Jeannie Eberle: I'm Jeannie Eberle. I live at 106 Daniels Court in Havelock. And I have been sitting here listening to the pros and cons. And I wanted to say to you and all of the DOT people here, we had this median stuff shoved down our throats even though nobody in Havelock wanted it. Does it really matter what our opinion means tonight? Are they going to do it anyway?

Audience Participant: Yes.

Jeannie Eberle: That's what I was wondering. That's it.

Audience Participant: Thank you. *(Audience applauding)*

Kevin Newlon: Kevin Newlon, live at 100 East Larriat. My question is can we just put this whole thing on hold. They just started and had not completed yet our new median. *(Audience participant coughs)* This is a completely new traffic pattern for Havelock. Let's conduct some studies and find out how that improves the situation. Ten years down the road let's pick this back up and see if it's still needed. But right now we have a brand new thing and we don't know whether it's fixed it, maybe we don't need the bypass. *(Audience applauding)*

Audience Participant: Well said.

Moderator: Okay, now in the purple shirt. *(Audience participants coughing)*

M.C. Skipper: My name is M.C. Skipper, 200 Ketner Boulevard. I've been arguing with myself for 30 minutes don't you dare get up and say anything. *(Audience laughing)* I fought this median for about 18 months 3 years ago over the Ketner Intersection and I lost. You can't win against DOT because they own the highway.

The way we spend money, I can't help but to remember and laugh every time I drive through James City at the pedestrian overpass that's down… *(Audience laughing and applauding)* About 20 years ago and I'll be dead honest serious, I say I counted 6 people in 20 years…

Audience Participant: I haven't seen anybody.

M.C. Skipper: Am I exaggerating, I might be. This is one of 5 bypasses. It isn't by itself. It is a result of a dream that a gentleman had when he was the member of the transportation board. His name is Cameron McRae. He lives in Kinston. He's a very, very wealthy gentleman. He owns about 47 Bojangles in eastern North Carolina. He had a vision that people who live in the Triad and the Triangle and the Capital could get to the beach quicker and easier if they had a freeway style highway all the way to Morehead City. This is what this is. This is his vision.

I'm not in favor of this, but in defense of this let me honestly tell you that if you don't take advantage of it now, you'll probably never see it again. We had this on the books

maybe 20 years ago and a county north of here took it that's how Washington got its bypass. That was Havelock's money but Havelock lost out because of the environmental issue here. So, we lost an opportunity. But if we lose it this time we may never see it again, so, keep that in the back of your mind.

You've got bypasses in Clayton, Goldsboro, Kinston, New Bern, Havelock, and Carteret County. I don't know what the answer is but give it a lot of thought and I'm sure you have. I think I'll just sit down but this is a result of a vision of one individual. And next time you go eat Bojangles be sure to tell Mr. McRae you appreciate it. *(Audience laughing and applauding)*

Moderator: Anybody else want to talk? Okay.

Mike Thorsby: Hello my name is Mike Thorsby. I'm affected by a whole lot of these alternates up here. I'm not 100% sure what everything means but I know enough to be dangerous. This affects my home, my business, and my future business. I'm anticipating building another business at some point and things like this will make a decision. If a bypass goes through Havelock, I will not bring any more money to Havelock. I will go outside to consumer getting business that relies on outside income because there are only so many people in Havelock.

In addition, it's going to be a huge economic impact and an environmental impact that is unprecedented and you just can't calculate. Some of these numbers are…I'm a numbers guy myself and you…a lot of this is a great hypothesis that can't be concluded in a general study. There are a lot of people that talk about certain things and it needs to go a lot deeper than it has to prove to somebody.

I live over here on this left side, green and I am affected. I'm 1 of 2 drains. There are only 2 ditches off of Highway 70 off the service road, right here. So, all that highway water, all that oil, that waste, everything runs straight through my land and it pretty much goes to nowhere. It just stops. It's supposedly contributory to the river, but it just sits there. And the problem I have with that is that DOT said they don't want to have anything to do with it. It's my land. They can't fix it. They can't maintain it. But yet they want to have a say so as the whether I clear it or fill it in or any the above. That doesn't just happen there. And when these bypasses are done and however many thousands of cars that is supposedly coming through that still has to go somewhere. Now that oil that is dripping from your car, that gas, all the litter that comes from people driving through, it has go somewhere. So, each of these alternatives is going to affect me even further and the DOT can't fix the stuff that's already in place. And cannot…and I understand that they can't fix everybody's yard all the way to the ends of the earth, but they can't maintain the certain things right here. Then how are they going to maintain the new structure?

And what I would say I don't know how they can allocate this money any further. I don't know if they are allowed to allocate to sidewalks, bicycle trails, or what they're allowed to do with it, or if we're just going to lose it if we say no or vote against it. I don't know how that works but my main point would be we have to fix the roads in Havelock first. I

don't know how many times I've done the Dukes of Hazzard style going over that railroad track by Dunkin Donuts, *(Audience laughing)* it's been numerous times and you can only do but so much. If the roads were done better and not just scraped as they have done in years past, you know scrape the top layer off, it they're done better, done professionally, and the right timing, and the right…how do I want to explain it…if it's done correctly, a lot of these vehicles are going to move a whole lot faster. So, we need to start with that first and then go further.

I'm not completely opposed to it, but I haven't been convinced of good reason to put a bypass in. *(Audience applauding)*

Moderator: Okay, anyone? Yes ma'am.

Sandra Hardy: I just want to say that I had planned on…Sandra Hardy from Gray Road. I just wanted to say that I planned on coming and accusing the Department of Transportation of doing it anyway. They're just pulling the wool over our eyes.

Audience Participant: Can't hear you.

Sandra Hardy: I'm sorry. I said I thought when I came up here I was going to accuse the Department of Transportation of already having this planned out to use the Number 2 Route. But if you cut the woods down across the street all the way down Gray Road on the opposite side of the national forest and I thought that was regulatory to putting the bypass there. But they convinced me otherwise.

And then I was going to play on their sympathy a little bit. And talk about Gray Road. It's kind of ironic that this meeting is being held in the Tourist Center because I don't know if everybody's looked at the old Havelock room in there with all the photographs and stuff. Well, most of them were donated by me from this county. And if you go in there, there's a picture of an elderly man with his white beard and his wife and 2 children and another child on his lap. Well he homesteaded Gray Road way, way back. And to this day, my property runs right along Gray Road. My taxes are listed as the Russell Homestead. That's the homestead that so far and so far 6 generations of our family has been raised there. And almost all of the land on Gray Road is owned by family members. And most of us are a little bit too old to start over and where would we go. I'm just going to end it by saying since when do woodpeckers take preference over people. And that was all I was going to say. Thanks. *(Audience applauding)*

Moderator: Alright, we'll be here for a little while if you have any questions and want to continue to look at the maps. We definitely want to get your comments, big table in there tonight, leave them or all of my contact information is in your handout. A couple of people left their handouts up here when they spoke, so pick up one on the table out front. Thank you.

Audience Participant: Where do the answers come from? There were a lot of questions asked of the DOT, what are the answers provided? Where?

Moderator: We get together and put all of the comments together…

Audience Participant: Go ahead and finish please. We put the comments together…

Moderator: We get together at that post-hearing meeting in Raleigh and get all the comments hopefully by January 6th and we review them all to get to the next step. *(Moderator continues to try to talk to audience participant over the noise of the crowd leaving about the post-hearing meeting and getting information and answers to questions that were asked during the hearing.)*

Hearing Adjourned.

Eileen Fuchs, Moderator
Public Involvement Unit
Tuesday, December 6, 2011

Typed by Johnetta Perry

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

BEVERLY EAVES PERDUE
GOVERNOR

EUGENE A. CONTI, JR.
SECRETARY

MEMO TO: Post-Hearing Meeting Attendees
File

FROM: Gregory J. Thorpe, PhD
Manager, NCDOT Project Development & Environmental Analysis Unit

DATE: February 2, 2012

SUBJECT: US 70 Havelock Bypass. Federal Aid Project No. NHF-70(49). WBS No. 34360. STIP Project No. R-1015, Carteret County. Corridor Public Hearing Comment Summary.

Executive Summary

The Formal Public Hearing for the subject project was held on December 6, 2011 at the Havelock Tourist and Event Center located at 201 Tourist Center Drive in Havelock. The hearing was preceded by a Local Officials meeting at 2:00 p.m. and an informal Pre-Hearing Open House which was held from 4:30 p.m. to 6:30 p.m. The formal presentation began at 7:00 p.m. Maps were available for viewing and staff was available to answer questions. Handouts, including a comment sheet were distributed. Approximately 136 citizens signed-in during the open house and formal presentation. Twenty people spoke at the formal hearing. NCDOT received a total of 37 written comments, letters, emails, and telephone calls about the project during the 30-day comment period following the hearing.

Ms. Eileen Fuchs started the formal hearing by introducing local officials and the NCDOT project team. She then reviewed the hearing handout, which provided information on the hearing purpose and procedures and an overview of the US 70 Havelock Bypass project. Ms. Fuchs then reviewed the maps on display, pointing out the locations of the three build alternatives. The Hearing was then opened for speakers. Each speaker was allowed three minutes for their comments.

The majority of verbal and written comments received from the Hearing opposed the project as presented and some requested that NCDOT improve existing US 70 through Havelock. The majority of comments were submitted by local residents.

MAILING ADDRESS:
NC DEPARTMENT OF TRANSPORTATION
PDEA - HUMAN ENVIRONMENT SECTION
1598 MAIL SERVICE CENTER
RALEIGH, NC 27699-1598

TELEPHONE: 919-707-6000
FAX: 919-212-5785
WEBSITE: WWW.NCDOT.GOV

LOCATION:
PDEA - HUMAN ENVIRONMENT SECTION
CENTURY CENTER, BLDG B
1020 Birch Ridge Drive
Raleigh, NC 27610

Several comments oppose the project and/or recommend improving existing US 70, but still identify a favored alternative. These comments included statements such as, "If a vote for upgrading existing US 70 would be considered by NCDOT to be a non-vote, or worse, a vote for the preferred alternative (by default), then I choose…" or "If we must choose one, I choose…" Other comments reflected negative public opinion of the US 70 median project and what they perceive as NCDOT planning to construct the bypass regardless of the amount of public opposition.

The majority of comments received in favor of the project expressed preference for Alternative 3. Among the positives mentioned were that: Alternative 3 is the best choice to effectively meet the purpose and need, has the least effect to homes, and provides more growth opportunity for Havelock. One comment stated that the bypass "should have happened 10 years ago!"

Summary of Written Comments

A total of ***37*** comment sheets were received either at the hearing or by email, mail or telephone in the days following the hearing. A summary of the comments follows. As stated previously, some comments stated a primary position as well as a secondary position on the build alternatives. These secondary positions are identified under their respective primary comments below with the phrase, "If… then."

- Oppose bypass project – ***11 (30%)***
  - *Comments stating secondary position in support of Alt. 3 –* ***1***
  - *Comments stating secondary position in support of Alt. and opposing Alt. 2 –* ***2***
  - *Comments stating secondary position in support of Alt. 1 –* ***1***
- Oppose bypass and requesting improvements to existing US 70 – ***9 (24%)***
  - *Comments stating secondary position in support of Alt. 1 or 3, but opposing Alt. 2 –* ***1***
  - *Comments stating secondary position in support of Alt.1 –* ***1***
- Favor Alternative 1 – ***1 (2.6%)***
- Favor Alternative 1 or 3 – ***1 (2.6%)***
- Favor Alternative 3 – ***5 (14%)***
- Oppose Alternative 2 – ***1 (2.6%)***
- Miscellaneous comments/questions – ***9 (24%)***

The No-Build Alternative and Improve Existing Alternative received the most public preference (54%). Of the comments in favor of the project, Alternative 3 was most favored; no support of Alternative 2 was expressed by hearing attendees.

Written Comments Summarized by Alternative

No-Build Alternative

Jason Corey – Abandon the bypass, STOP the median [on existing US 70] and leave Havelock alone. Cherry Point Air Station is downsizing in the future so what is the point?

Mark Beall – I see no point in putting in a bypass. It is obvious that the project has already been approved and will go forward if we the citizens of Havelock want it or not.

Tim Newton – Bypass no longer needed due to military cutbacks. We have 50% fewer marines and sailors at MCAS Cherry Point. With the median project in place, traffic will flow properly. Environmental impact to some of NC's natural forest and wetlands will be huge. If it has to happen use Alternative 3.

Mary E. Armstrong – It is my opinion there is no benefit to the City of Havelock or myself, as I own and have owned for many years a lot of property it will cross. I would like to go on record as being against Corridor #2. Havelock doesn't need this bypass going right through town. If you must build one, build Corridor #1.

William J. Kornahrens – It is my opinion there is no benefit to the City of Havelock or myself. I would like to go on record as being against Corridor #2. Havelock doesn't need this bypass going right through town. If you must build one, build Corridor #1.

William M. Romps – We don't need another road to maintain. We can't maintain what we have because the State is hurting for money. State employees, teachers, police are all in some form or fashion either losing their jobs or their hours are being cut. If bypass must be built, my choice is Alternative 3, wish Alternative 1 was still a choice.

Emy Meadows – I choose no bypass. This project has no benefit to the Havelock community or the State of NC and is a waste of taxpayer money!!! The proposed project destroys National Forest and disrupts red-cockaded woodpecker population. Also asked about US 70 LOS and access to MCAS Cherry Point.

Megan Squire – I am writing to register my opposition to the US 70 bypass going through the Croatan National Forest. The "Super 70" will not be so super for the woodpeckers whose habitat it will be ruining. This road will also cause the black bears in a nearby sanctuary to have their habitat divided which will lead to unnecessary deaths. Please do not build this highway.

Harry Phillips – Please consider not building the US 70 bypass in the Croatan National Forest. This new road construction would save a few minutes of driving time for commuters rushing to Raleigh and, in return, we would have fewer longleaf pine forests, fewer wild areas, and possibly ruin the recovery of the Red-cockaded Woodpecker whose numbers are already low.

James – Please do not proceed with project; strongly against. Note longleaf pine forest and red-cockaded woodpecker concerns, black bear sanctuary. Project would be tragic for the state.

Jeffrey Katrencik – We have enough roads. We do not need another one through the Croatan National Forest. Let's start with smaller vehicles and more bikes to reduce traffic.

Improve Existing Alternative

Havelock Chamber of Commerce (Stephanie Duncan, Executive Director) – It is recommended by the Havelock Chamber of Commerce that the NCDOT look to no cost or low

cost alternatives for the proposed bypass. Some examples of the alternatives are: Port traffic (to and from) should be scheduled at night when there is less traffic on US Highway 70, coordinate the traffic lights through Havelock so vehicles are able to travel through the City of Havelock at the posted speed limit with fewer stops.

Michael Thorsby – I am not completely opposed to this bypass plan, but I do have some reservations. The current roads through Havelock have not been well maintained and currently reduce the flow of traffic due to pot holes, uneven pavement, rough roads, railroad ramps, service roads, cyclists, foot traffic, mopeds, etc. These factors cause traffic to slow down, often to even below posted speed limits. If those roads were better maintained, along with the current median construction and stop light restrictions, it would provide a better estimate of flow restrictions. If the current roads can't be maintained in an appropriate manner, I see the bypass being more of a stressor for future maintenance and budget factors.

Howard Babbitt – Under "PURPOSE AND NEED OF PROJECT", it states "the increasing regional use of US 70 has led to a deterioration of traffic operations along existing US 70, causing undesirable levels of traffic service." My questions are: 1) how long ago were these observations recorded? 2) Has the economic recession been taken into account for future growth along the coast? 3) How much more if any can the coastal communities grow? 4) Has the military's plan on reducing the number of marines stationed at MCAS Cherry Point been taken into account? 5) Has anyone looked at the economic impact to the business located along the current US 70 that will lose traffic and exposure and ultimately business? 6) Has any effort been put into improving the current US 70? I do know that they are just finishing the median construction which is designed to improve traffic flow, has this had ample time to prove it worked or failed? Can this road be widened or improved to allow better flow of traffic? Everyone can agree, Havelock's traffic problem is slight compared to numerous roadways throughout our state. Yes, traffic is greater than it was 30 years ago. However, have the citizens of Craven County and our state become so impatient that an extra 5 minute wait should cost $165,000,000?

Mr. Babbitt identified Alternative 1 as a preference over Alternative 3 and stated that he did not support Alternative 2. He also asked questions specific to Alternative 2 and 3 with respect to the design at Sunset Road, stormwater management, and noise abatement.

John Fussell – My preference for this project is that no bypass be built, but that existing US 70 through the Town of Havelock be upgraded. Favors Alternative 1 over the other alternatives if NCDOT is committed to the project.

Carteret County Wildlife Club (CCWC) – The NCDOT should not proceed with either Alternative 1, 2, or 3. The CCWC recommends smart upgrades to the existing US 70 through Havelock. Elevated overpasses at intersections and restricted entry service roads offer significant alternatives to catastrophic natural habitat loss.

Michelle Covi – I think this project is ill-conceived as a bypass. The best option for the community of Havelock and the Croatan National Forest is to improve the existing road. This will waste valuable funds that can be used to repair and improve existing roadways.

Terry L. Smith – Don't build a bypass around Havelock. Use smarter traffic flow decisions to improve the existing US 70.

George Ellsworth – As a local, I strongly feel our town is choked on the west side by the only two bridges on US 70. Just give us an access bridge so our town can grow.

Marta Pearson – I believe that building a US 70 bypass at Havelock NC is an extremely large waste of government money, will be extremely harmful to the Croatan National Forest, and put human lives and safety at risk. …timing the 5 traffic lights and controlling access to the current highway by means of the current lights and service roads would make much more practical sense and financial sense. Large animals such as deer and black bear are commonly seen crossing local highways that go through forested areas and can cause serious injuries or fatalities from a car collision, which is a very real danger [that] is unlikely to happen in the middle of town.

Alternative 1

Ralph Fuller – I favor #1 bypass option.

Nathaniel H. Johnson – Please go with Alternate 1 or 3. This will impact less homes in the area and Havelock can continue to grow.

Alternative 2

Richard Wynne – I pray that the powers that be will recognize the effect this is having on the Wynnes, their friends & relatives, as well as the huge number of people that area likely to be similarly affected if Alternate 2 is selected by NCDOT. It would appear that objectively, with appropriate weight given to people problems (so many more lives uprooted, the trauma of loved ones' remains disinterred, the future income/reductions/increased living expenses, and unknown negatives, etc.) that Alternate 2 would be eliminated.

Alternative 3

Carteret County Chamber of Commerce (Mike Wagoner, President) – We commend the NCDOT for designating Alternative 3 as the Least Environmentally Damaging Practicable Alternative (LEDPA) and endorse this alternative as the best choice that effectively addresses the Purpose and Need of this project.

Rosemarie O'Connor – I would like to see the bypass go through Corridor 3. Corridor 2 would affect my home as it is in the direct line of the bypass.

Sandra Hardy – I would prefer that Route 3 be used for the bypass. So many houses will be affected if Route 2 is used.

James H. Coleman – I think the Alternative 3 is the most sensible choice. It would be the least disruptive to established families and homesteads. I believe Alternative 3 would leave open land area that can be used for future growth of Havelock.

Gene A. Bell – The bypass needs to happen! It should have happened 10 years ago! I also think that the preferred corridor is the best choice. Hopefully funds will be available to complete this project promptly.

Miscellaneous Comments and Questions

Alex Rickard, East Carolina Council of Government – I would like to request that NCDOT consider the Havelock Bypass as a potential alternative corridor for the Mountains to Sea Trail. Please consider a 10-foot natural hiking trail during your right-of-way acquisition. Please ensure that all interchanges and overpasses for this bypass will accommodate future bicycle and pedestrian facilities. This is an important corridor for the Mountains to Sea Trail and also the East Coast Greenway Coastal Route.

John Jaskolka – As a 45-year resident of Craven County and a former resident of Havelock, I am interested in the bypass in general, but as a member of the friends of the Mountains to Sea Trail, I am specifically interested in what the bypass will do to our long term plans to put the trail in this area. Asked for a copy of meeting minutes.

Bernard E. Kane, Jr. – I hold as an absolutely essential element of the final EIS for this project inclusion of an absolute commitment by the NCDOT and by the Federal Highway Administration conveying to the National Park Service the authority to close the bypass whenever necessary for the required burns. … There should also be an absolute assurance from the National Forest Service of the agency's intent to retain these lands with firm commitment to manage and restore the long leaf pine habitat by the necessary controlled burns. Without such assurance a proper and forthright DEIS for R-1015 would state that the separated forest lands, including several hundred acres of Long Leaf Pine Habitat, will be forever sacrificed by the project described.

Betsy Davis and Leslie Davis (2) – My family owns property off Hickman Hill Road. The new road will split our property. We will not be able to access half of this property. What are you going to do about this situation?

William E. Scoby – 1) When and who will make decisions for or against the bypass? 2) My property will be affected by the bypass. 3) How much will I be reimbursed?

Mary Alsentzer – Please send (email) me the transcript of tonight's public comments.

George E. Corbin – 1) If Alt. #1 is selected and no one has an idea as to projected traffic count for the Lake Rd. cutoff, why not come across from the junction to the intersection at 70 and Cunningham? 2) For emergency services to get on scene in a reasonable time, how far apart will turn-arounds for emergency vehicles be?

Ron Sage – 1) Walking pathways should be incorporated into the project under elevated crossings of the southwest and east prongs of Slocum Creek. This opportunity to incorporate this type of pedestrian movement can link up with the NC Parks efforts to incorporate a Mountains to Sea Trail effort in the Havelock area. 2) By incorporating option #3, would this encroach on the needed distances for the B & R gun range? My question is not from the entrance of this property, but the use of this property near a highway. 3) In order to support any of the 3 options, I believe

that NCDOT has to show how these options will impact the current traffic patterns, specifically the Lake Road/Miller Boulevard intersection, and then how NCDOT proposes to address these impacts with detailed specifications. 4) The proposal to elevate Lake Road over the highway is not right. During construction, how is NCDOT proposing for traffic to use this road at this spot, if this road will have to be elevated in the construction? The highway is the road being constructed, not Lake Road. So, as this is being constructed, why not elevate the highway, thus not interfering with any normal traffic through this area during construction? 5) [Prescribed burns] would create a substantial obstacle every year of burning, as the smoke becomes the roadway and accidents soon occur. No amount of signs placed will reduce the speed trying to get away/through this smoke. Why create such an atmosphere for the driver? 6) I see no considerations made for [the creek currently shown flowing through the center of the Lake Road interchange.] 7) I am attaching a map rendition of just option 3 with an over pass over Lake Road, [versus] making Lake Road the overpass. This should help my earlier emails concerning the same. 8) How is pedestrian movement, concerning bicycling from the New Bern area to Newport/Morehead City supposed to be accomplished at both the West and East ends connections if I have to ride with the traffic flow (south side of Hwy 70)? 9) How is pedestrian movement supposed to be accomplished at the Lake Road intersection? 10) Please include [attached photos of under road pedestrian pathways] in the US 70 bypass considerations.

Summary of Verbal Comments Received During the Hearing

A total of ***21*** verbal comments were made at the hearing and recorded in the transcript. A summary of the comments received follows:

- Oppose bypass project – ***7 (33%)***
- Oppose bypass and requesting improvements to existing US 70 – ***4 (19%)***
- Prefer Alternative 1 – ***2 (10%)***
- Oppose Alternative 2 – ***3 (14%)***
- Miscellaneous comments/questions – ***5 (24%)***

The No-Build Alternative and Improve Existing Alternative received the most public preference (52%). Of the comments in favor of the project, two expressed support for Alternative 1. No support was expressed for Alternative 2 or 3.

Comments Summarized from the Hearing Transcript

No-Build Alternative

Barney Kane – Fundamentally opposes using the National Forest to alleviate congestion and facilitate access for beach traffic. Cannot assess impacts until it is clear what will happen to the land between Havelock and the farthest alternative [See written comment.] Also notes longleaf pine forest community would be shattered by the proposed project.

Jeff McCamy – Opposes the project, citing negative impacts on businesses along US 70. Concerned that Havelock will become similar to Bolivia after being bypassed.

Reverend Jim Daub – Agreed with previous speaker (Newton) that traffic is not bad in Havelock. Requested statistics for sentence stating that project will reduce travel times for motorists, including commercial carriers and beach vacationers. Ask for statistical data on how many commercial carriers use US 70. Noted project's purpose to improve evacuation times and noted that there was "no problem with evacuation." Requested data demonstrating that US 70 is a problem for hurricane evacuation. Requested data on the economic conditions of bypassed towns such as Little Washington, Goldsboro, and Bolivia. Asked to be explained the rationale of constructing the median on US 70 if there's going to be a bypass.

Tim Newton – Noted high cutbacks in military personnel at Cherry Point. Noted reduction in the number of people with beach homes, bankruptcies, etc. Stated that project would have a negative effect on his business (an auto dealership) because a lot of his customers are traveling through Havelock. Stated that the project should be delayed 10 years and its need reassessed at that time.

George Corbin – Along with other meeting attendees, discussed that it can between 7 and 14 minutes to get through town. Stated that a three minute travel time reduction is not worth $180,000,000.

Ryan White – I don't think we were ever given the option of [the bypass] not coming. If we did, I totally missed that. Maybe it was 35 years before my time, long time before me, but Alternative 2 is absurd. Noted human impacts associated with Alternative 2 and environmental impacts associated with Alternatives 1 and 3. Requested to see soil studies and a recalculation of wetlands, stating that 115 acres is about half of what is actually being impacted.

M.C. Skipper – Stated that he is not in favor of the bypass but noted that there may not be funding in the future if the opportunity is not used at the current time.

Improve Existing Alternative

Mary Alsentzer, Sierra Club President – Improve existing highway.

Jayesh Patel – Investigate timing lights on US 70. It will improve traffic flow.

Howard Babbit – I personally don't like any of the options. Keep it the way it is. Improve on the road system we have today.

Mike Thornsby – Stated that the bypass would have a huge economic impact on and an environmental impact that is unprecedented and that [studies] need to go a lot deeper to prove things. Stated that NCDOT should improve the roads in Havelock first. Not completely opposed to it, but hasn't been convinced of a good reason for bypass.

Alternative 1

Nancy Paul – Noted percent of state economy that is comprised of agriculture or agricultural business related. Noted need for second bypass routes around Kinston and Goldsboro. Noted

Havelock's limitations for expansion and stated that there should be room left for the town to grow and so a second bypass won't be needed in the future.

Larry Paul – Stated his understanding that the meeting purpose was to decide on an alternative and urged others to express their opinions. Noted that all three alternatives would affect people and that Alternatives 2 and 3 would affect him and his family. Stated that Alternative 2 should be dropped from study. Stated that the [red-cockaded] woodpeckers would not be in jeopardy from the project. Expressed support for Alternative 1, noting that its farther distance from town would allow growth. Recommended that land in the Croatan Wetland Mitigation Bank be transferred to the US Forest Service as soon as possible.

Alternative 2

Cheryl Newton – Stated that Havelock's traffic issues are minor compared to other places she's lived. Requested sidewalks for side roads used by children. Stated opposition to Alternative 2 and requested that the selected alternative have sidewalks to Lake Road.

William Kornahrens (2) – Spoke on behalf of himself and his aunt, Mary Armstrong, who is 88 years old and has been living on Gray Road for at least 50 years. Stated that Alternative 2 would displace him and his aunt.

Alternative 3

None received.

Miscellaneous Comments and Questions

John Brazelton – Mr. Brazelton provided commentary on past events in the Havelock area and offered meeting attendees an opportunity to review documentation he's maintained on the proposed project.

Alex Rickard, East Carolina Council of Government – Consider the Havelock Bypass as a potential alternative corridor for the Mountains to Sea Trail. Consider a 10-foot natural hiking trail during your right-of-way acquisition. Ensure that all interchanges and overpasses for this bypass accommodate future bicycle and pedestrian facilities. This is an important corridor for the Mountains to Sea Trail and also the East Coast Greenway Coastal Route.

Jim Kohr – Noted an alignment change to Alternative 2 could impact Freedom Baptist Church (35 members) on Lake Road. Requested level-of-service data. Stated that there is a need for sidewalks regardless of which direction the project goes in.

Jeanie Eberle – Stated that median project was forced on town. Asked if public opinion matters and if project is going to happen anyway.

Sandra Hardy – Noted the community significance of the homesteads on Gray Road. Asked since when do woodpeckers take preference over people.

Summary of Impacts & Comparison of Alternatives

See attached.

Action Items / Responses

To be completed.

SUMMARY OF IMPACTS & COMPARISION OF ALTERNATIVES

	Alternate 1 (Outside)	Alternate 2 (Inside)	Alternate 3 (Combined)
Length(miles)	10.85	9.91	10.31
Costs (year dollars)			
Construction (08)	$156,400,000	$138,800,000	$149,600,000
Utility Relocation (07)	1,649,280	2,773,680	2,773,680
Right of Way (09)	9,800,000	28,975,000	10,625,000
TOTAL	$167,849,280	$170,548,680	$162,998,680
Relocations (2009)			
Residences (minorities)	13 (0)	133 (18)	16 (0)
Churches (members)	0	0	0
Businesses (employees)	1 (2)	3 (9)	1 (2)
Non-profit	1 (3)	1 (3)	1 (3)
TOTAL	13	137	18
Physical Environment			
Croatan National Forest (acres)	189	225	240
Potentially-Contaminated Sites	1	1	1
Major Stream Crossings	3	3	3
Natural Resources (Acres)			
Prime Farmland by Soils in R/W	66	112	71
Jurisdictional Areas			
Wetlands (acres)	109	78	115
Streams (lin. ft.)	2,581	3,094	2,505
Neuse River Riparian Buffers (sq. ft.)	69,534	142,025	106,647
RCW (June 2008 Evaluation, JCA)			
Active clusters	0	0	0
Inactive clusters	1 N, 4 R*	1 N, 3 R*	1 N, 4 R*
Future Recruitment clusters	1	1	1
Habitat management areas	3	3	3

* N=Natural, R= Recruitment

SOURCE: Draft Environmental Impact Statement for the US 70 Havelock Bypass (NCDOT, September 2011).

NCDOT Project Newsletter

US 70 Havelock Bypass in Craven County

(NCDOT Project No. R-1015)

Issue 5, July 2012

CORRIDOR 3 SELECTED AS PREFERRED ALTERNATIVE

(Details inside)

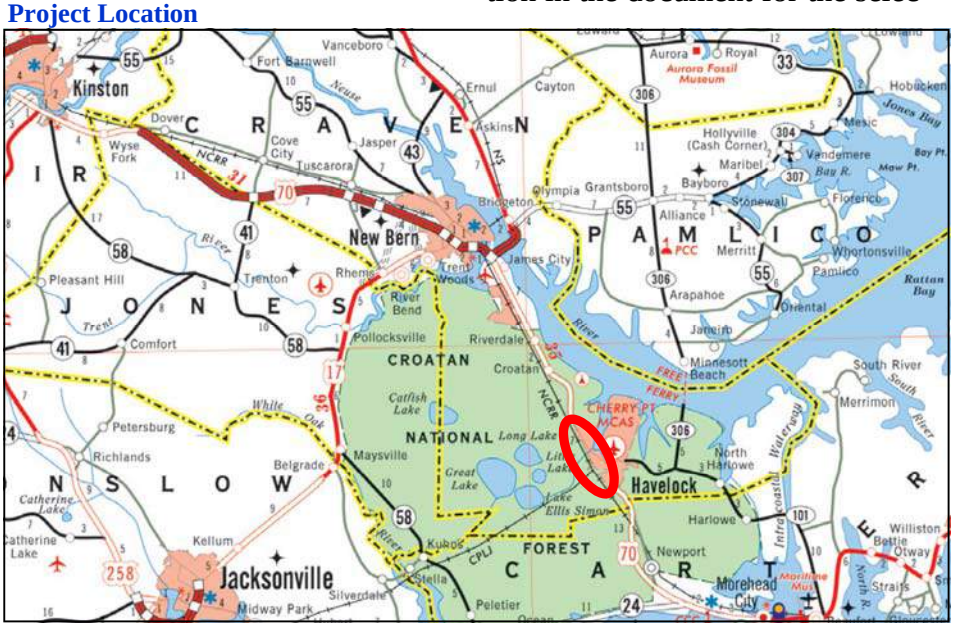
PROJECT DESCRIPTION

NCDOT proposes to improve US 70 in the vicinity of the City of Havelock in Craven County. The proposed improvements to US 70 are included in the State Transportation Improvement (STIP) as Project No. R-1015.

The project begins north of Havelock and extends southward approximately 10 miles to the Carteret County line. (See vicinity map below.) The estimated cost for the proposed four-lane, median-divided highway is $161,200,000.

The current project schedule is for right of way acquisition to begin in 2014 and for construction to begin in 2016.

Project Location



PROJECT HISTORY

NCDOT began the initial planning and environmental studies for the Havelock Bypass project in the early 1990's. These studies included an analysis of improving the existing highway versus various proposed bypass routes (corridors) with respect to potential impacts to the human and natural environment resources in the project study area.

NCDOT presented the findings of the initial planning studies in the Environmental Assessment (EA) (report) that was approved by the Federal Highway Administration (FHWA) on Jan. 27, 1998. NCDOT included a recommendation in the document for the selection of Corridor 3 as the Preferred Alternative because it balanced the project impacts and was the most cost effective route.

After the EA was distributed for review and comment, NCDOT held a Corridor Public Hearing in May 1998 to present three bypass corridors for review and comment (See corridor map on Page 2.) The majority of the public, the municipal officials, and the Interagency Team supported Corridor 3.

After the Corridor Public Hearing, FHWA, NCDOT, and other members of the Interagency Team selected Corridor 3 as the Preferred Alternative. NCDOT subsequently prepared preliminary designs plans for Corridor 3, as the associated potential impacts were assessed and evaluated.

Based upon the magnitude of the potential impacts from Corridor 3, it was determined that an Environmental Impact Statement (EIS) would be needed to assess the potential impacts from the project in greater detail.

Continued on page 2

Connecting people and places in North Carolina — safely and efficiently, with accountability and environmental sensitivity.

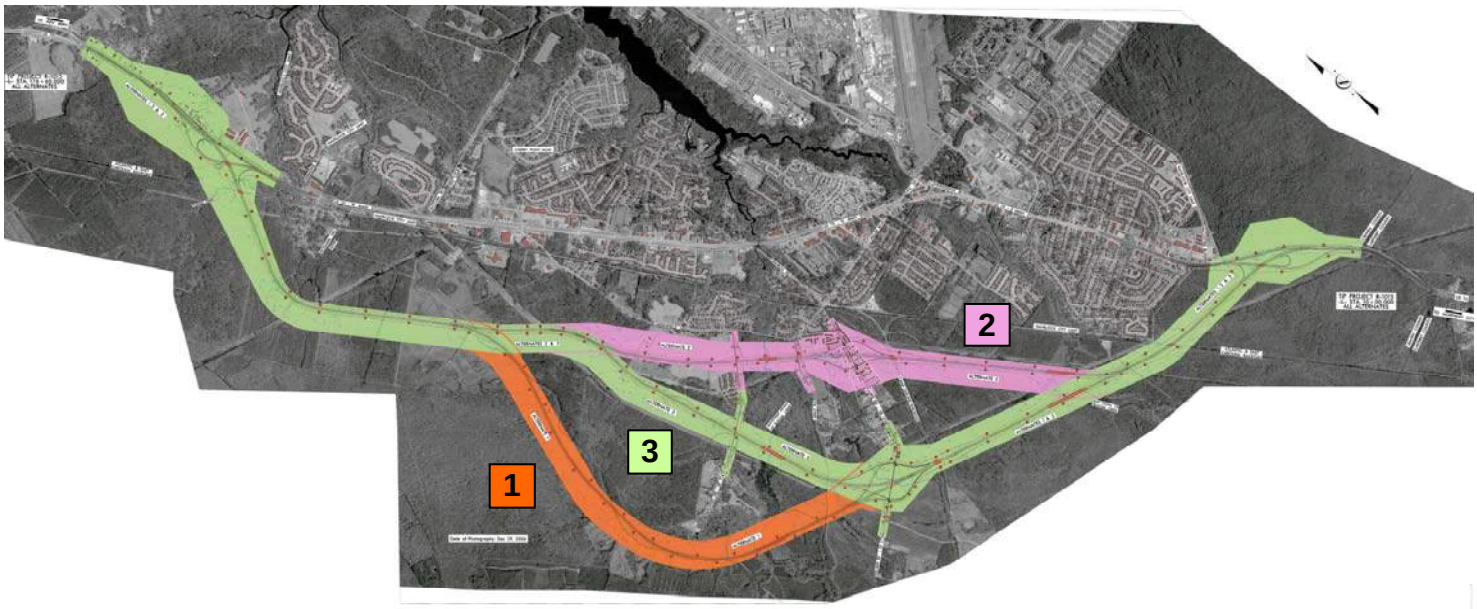
4,500 copies of this newsletter were produced at a cost of $1.87 per newsletter.

PROJECT HISTORY (cont.)

As part of initiating work on the EIS, the project development history documented in the EA was reviewed and the Interagency Team reconvened to provide an opportunity for the team to review and suggest changes to the proposed EIS process. Because of the higher level of public and interagency involvement, it was agreed that much of the project development work conducted during preparation of the EA should be retained for the EIS. New planning and design work included updating the traffic forecast, refining design plans, and reassessing the project study area for existing features such as historic architectural and archaeological sites, streams, wetlands, threatened and endangered species. Existing and predicted land uses were identified and documented for each of the three bypass corridors. Indirect and cumulative impacts resulting from the construction of the project were also considered and discussed in the EIS. Those studies were updated during 2007 and 2008 to determine the potential impacts related to the bypass corridors.

NCDOT presented the findings of those updated environmental studies in the Draft EIS that was approved by FHWA on Sept. 6, 2011 and distributed during September. NCDOT began the public comment period for the document on Sept. 9, 2011, and closed the comment period on Nov. 21, 2011.

NCDOT held a Pre-Hearing Open House & Corridor Public Hearing on Dec. 6, 2011. Project maps were on display and NCDOT representatives were available to answer questions and receive comments relative to the proposed project. The Corridor Public Hearing was held immediately after the Open House. After an explanation of the proposed project and corridor alternatives, the Hearing was opened for questions and comments. Comments on the project were also accepted during the 30-day period following the Hearing.



Study Corridors Presented at the Corridor Public Hearings in 1998 and 2011

A wide range of comments was received on the project. Of the 58 verbal and written comments, roughly half opposed the project and/or supported improving the existing highway. Of the comments in support of the project, half favored Corridor 3. Comments received from the Hearing were presented to the Interagency Team on April 10, 2012 for use in selecting the Preferred Alternative.

CURRENT STATUS

On April 10, 2012, the Interagency Team met to revisit the team's earlier decision to select Corridor 3 as the Preferred Alternative. It was determined that the original selection of Corridor 3 was still valid, as this alternative would be the least environmentally damaging practicable alternative.

SELECTION OF THE PREFERRED ALTERNATIVE

As a result of the April 10, 2012 Interagency Team Meeting, NCDOT has reaffirmed Corridor 3 as the Preferred Alternative for the following reasons:

- Corridor 3 has the lowest estimated cost
- Corridor 3 has the 2nd lowest number of relocations (three more relocations than Corridor 1, but 119 less than Corridor 2)
- Corridor 3 has the lowest stream impacts
- Corridor 3 is the 2nd shortest in length
- Corridor 3 has the 2nd lowest prime farmland impacts
- Corridor 3 minimizes impacts to the habitat of the protected red-cockaded woodpecker.

WHAT'S NEXT?

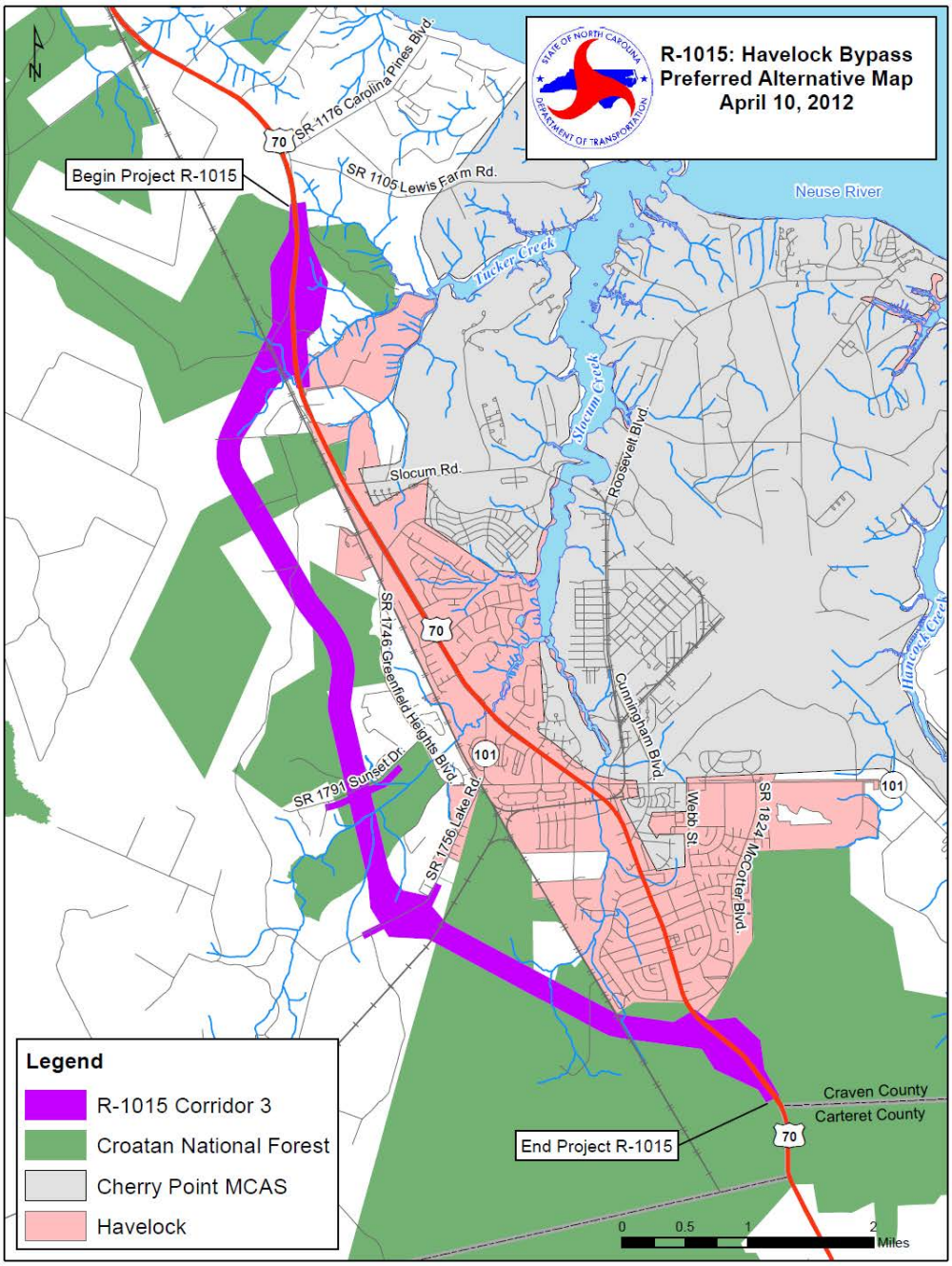
The next step in the planning and design process is the preparation of the Final EIS.

This document will include:

- A detailed discussion of the reasons Corridor 3 was selected as the Preferred Alternative;
- A summary of the public participation activities held after the publication of the Draft EIS, including the Corridor Public Hearing;
- Agency comments on the Draft EIS and NCDOT responses to those comments; and,
- Any new information or changes to existing conditions, socio-economic data, or demographic data.

Completion of the Final EIS is anticipated for the Summer of 2013. After the Final EIS is approved and circulated, a Record of Decision (ROD) will be prepared and approved by the FHWA.

The final step in the project development process will be the Design Public Hearing, where interested persons can view the roadway design plans for the project and make formal comments.



US 70 Havelock Bypass in Craven County (STIP Project No. R-1015)

North Carolina Department of Transportation
Project Development and Environmental Analysis Unit
1548 Mail Service Center
Raleigh, North Carolina 27699-1548

CONTACT US

Mr. Mark Pierce, P.E.
Eastern Project Development Section
NC Department of Transportation
1548 Mail Service Center
Raleigh, NC 27699-1548
Direct: (919) 707-6035
Fax: (919) 250-4224
mspierce@ncdot.gov

Mr. Paul Koch, P.E., A.I.C.P
Stantec Consulting Services Inc.
801 Jones Franklin Road, Suite 300
Raleigh, NC 27606
Direct: (919) 865-7394
Fax: (919) 851-7024
paul.koch@stantec.com

GET INVOLVED

You are invited to:

View project maps and documents. The Draft EIS and corridor maps displaying the proposed location of the U.S. 70 Havelock Bypass are currently available for public review at the City of Havelock City Clerk's Office, 1 Governmental Drive in Havelock; and Havelock Tourist and Event Center, 201 Tourist Center Drive in Havelock. The maps can also be found online at: *www.ncdot.gov/doh/preconstruct/highway/roadway/hearingmaps/hearingmaps_by_county/county/craven.html*

Arrange small group meetings. The project team is available throughout the study process to meet and discuss the project with neighborhood groups and civic organizations.

Add your name to the mailing list. If you would like to receive future newsletters or meeting notices, you may add your name to the mailing list at the workshop or by contacting Mr. Pierce or Mr. Koch at the addresses shown to the left.

Call or write the project team. Comments and suggestions will be considered during the entire study process. Contact Mr. Pierce or Mr. Koch at the addresses shown to the left.

U.S. 70 - Havelock Bypass

TIP Number: R-1015

THIS ISSUE

Why Is This Project Needed?

Increased traffic demand has reduced the ability of U.S. 70 between Morehead City and Raleigh to function as envisioned in the Strategic Highway Corridors (SHC) Plan.

* Strategic Highway Corridors now encompass all modes of travel and have been renamed Strategic Transportation Corridors (STC)

Aquellas personas que hablan español y no hablan inglés, o tienen limitaciones para leer, hablar o entende inglés, podrían recibir servicios de interpretación si los solicitan antes de la reunión llamando al 1-800-481-6494.

Design Public Meeting to be Held Monday, August 31 for Proposed U.S. 70 - Havelock Bypass Project

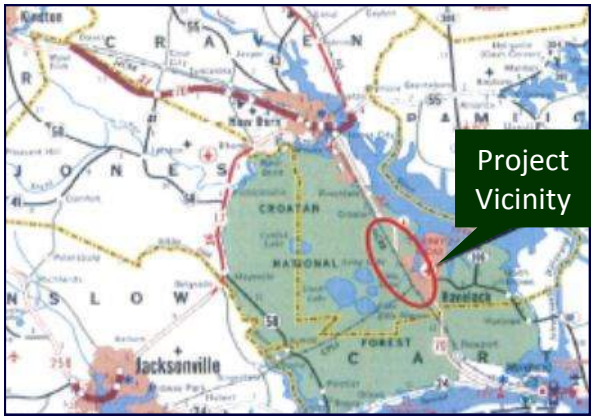
Project Description

The proposed project would be constructed on a new location (bypass) on the southwest side of Havelock and U.S. 70.

The bypass would begin north of the Havelock City limits and extend south for about 10 miles to the Craven-Carteret County line.

The roadway typical section consists of four 12-foot travel lanes with 12-foot outside shoulders (10-foot paved) and 6-foot inside shoulders (4-foot paved). The roadway would have a 46-foot wide median.

Two interchanges would connect the bypass to existing U.S. 70 on the north and south ends of the project, and a new interchange would be constructed just west of central Havelock - to provide access from S.R. 1756 (Lake Road).



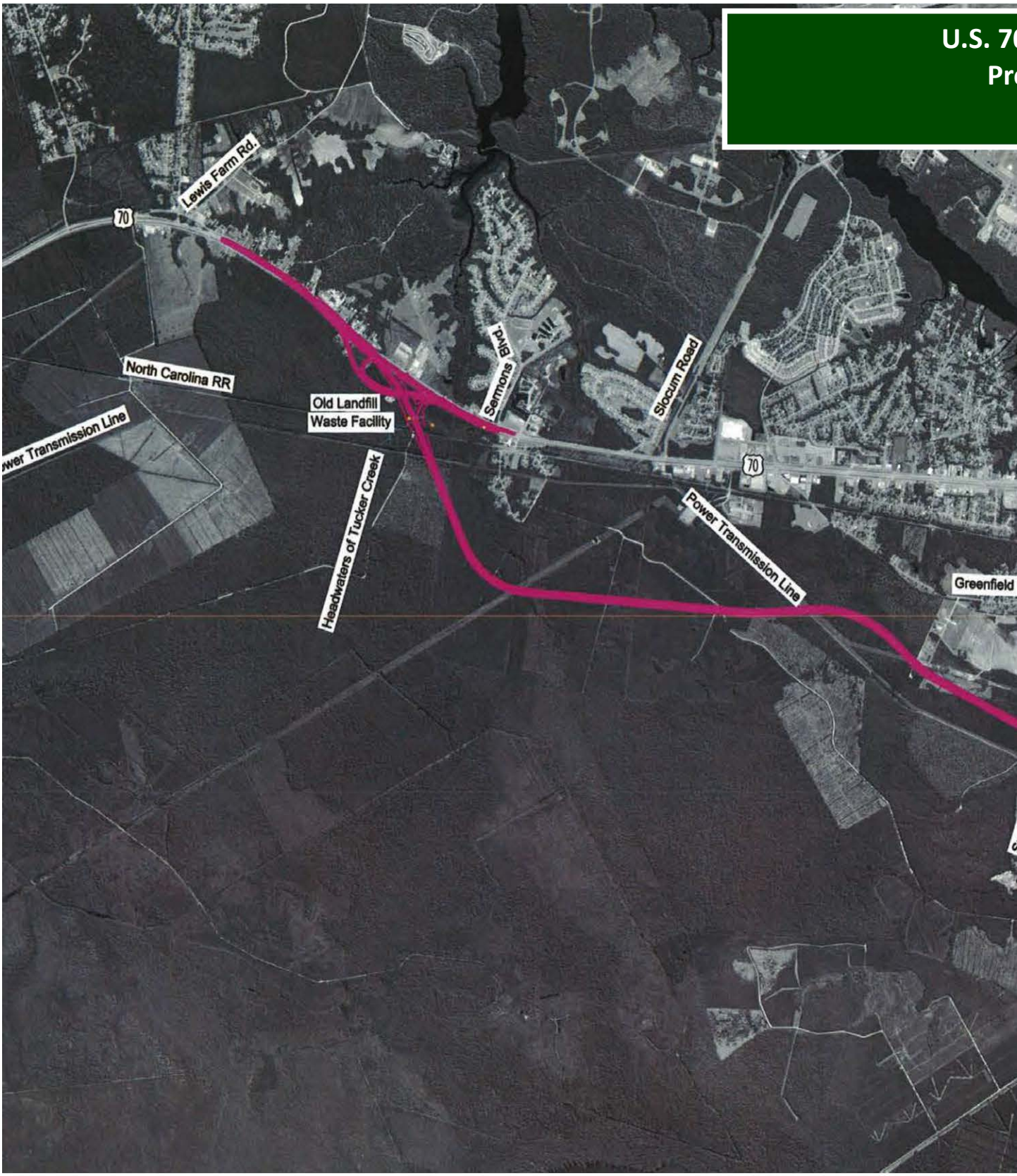
Design Public Meeting
Monday, August 31, 2015

Open House
4 p.m.—6:30 p.m.

Formal Presentation
7 p.m.

Havelock Tourist and Event Center
201 Tourist Drive
Havelock

Connecting people, products, and places safely and efficiently with customer focus, accountability and environmental sensitivity to enhance the economy and vitality of North Carolina.


U.S. 70
Pr
Lewis Farm Rd.
70
North Carolina RR
Old Landfill
Waste Facility
Sermons Blvd.
Slocum Road
70
Power Transmission Line
Headwaters of Tucker Creek
Power Transmission Line
Greenfield

0 - HAVELOCK BYPASS
eferred Alternative
(Alternative 3)

North Carolina Department of Transportation
Project Development and Environmental Analysis Unit
Attn: Diane Wilson
1598 Mail Service Center
Raleigh, North Carolina 27699-1598

Current Schedule and Cost

Right of Way Acquisition	- Winter 2015	$ 12.27 Million
Construction	- Winter 2016	$ 220 Million

Based on current (2016-2025) State Transportation Improvement Program.
Subject to Change based on funding availability.

Contact Us

Diane Wilson
NCDOT Senior Public Involvement Officer
Email: pdwilson1@ncdot.gov
Phone: 919.707.6073
1598 Mail Service Center
Raleigh, NC 27699-1598

If you have transportation questions about other projects, please call the NCDOT Customer Service Office at 1-877-DOT-4YOU or visit the NCDOT website at www.ncdot.gov.

Public Meeting maps are available for public review at the following locations and will remain there for 30-days following the meeting:

- **City of Havelock** – City Planning Office, 1 Governmental Drive, Havelock;
- **New Bern Area Metropolitan Planning Organization** 300 Pollock Street, New Bern;
- **NCDOT District Office**, 209 South Glenburnie Road, New Bern

250 copies of this public document were printed at a cost of $1.40 each.

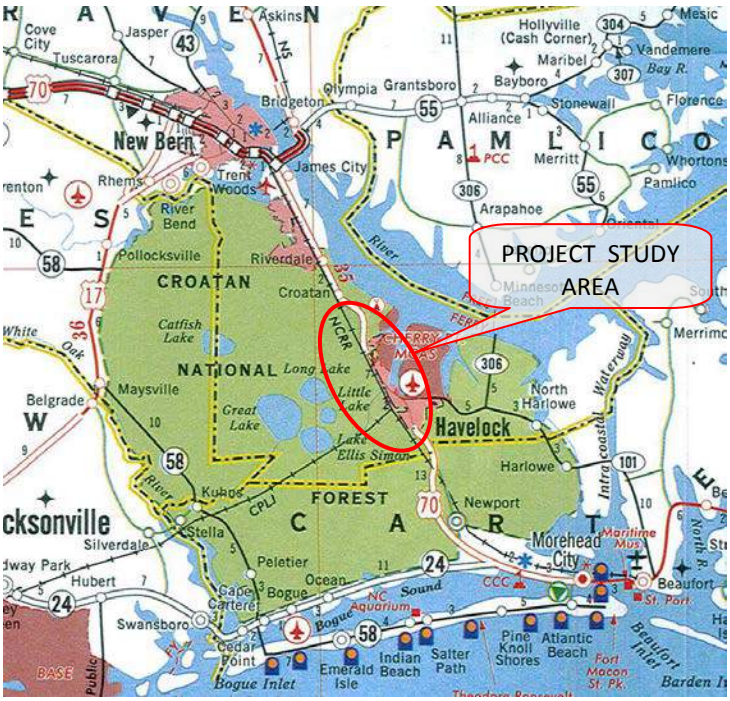
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

PROPOSED U.S. 70 HAVELOCK BYPASS

TIP PROJECT NO. R-1015

WBS No. 34360
Federal Aid Number: NHF-70(49)

Craven County, NC



Design Public Meeting

Monday, August 31, 2015

Informal Open House - 4:30 p.m. – 6:30 p.m.
Formal Presentation - 7:00 p.m.

Havelock Tourist and Event Center
201 Tourist Center Drive
Havelock, NC 28532

300 copies of this handout were reproduced at a cost of $0.62/copy

PURPOSE OF PUBLIC MEETING

Today's meeting is another important step in the North Carolina Department of Transportation's (NCDOT) process for making you, the public, a part of the project development process. The purpose of the meeting is to obtain public input on the preferred alternative and its refined design.

Public Meeting maps have been available for public review at the following locations and will remain there for 30-days following tonight's meeting:

- **City of Havelock**
  City Planning Office
  1 Governmental Drive, Havelock;

- **New Bern Area Metropolitan Planning Organization**
  300 Pollock Street, New Bern

- **NCDOT District Office**
  209 South Glenburnie Road, New Bern

Copies of the map are also available on the NCDOT Public Meetings website:

http://www.ncdot.gov/projects/publicmeetings

YOUR PARTICIPATION

The opportunity is here, and you are encouraged to participate by making your comments and/or questions a part of the public record. This may be done by having them recorded at the formal portion of tonight's Public Meeting or by writing them on the attached comment sheet.

Several representatives of the North Carolina Department of Transportation are present. They will be happy to talk with you, explain the project and answer your questions.

You may write your comments and/or questions on the attached comment sheet and leave it in the comment box provided, email or mail them in by September 28, 2015, to the following address:

Ms. Diane Wilson
NCDOT - Human Environment Section
1598 Mail Service Center
Raleigh, NC 27699-1598

Phone: (919) 707-6073
Email: pdwilson1@ncdot.gov

Everyone present is urged to participate in the proceedings. It is important, however, that **THE OPINIONS OF ALL INDIVIDUALS BE RESPECTED REGARDLESS OF HOW DIVERGENT THEY MAY BE FROM YOUR OWN.** Accordingly, debates, as such, are out of place at public meetings.

WHAT IS DONE WITH THE INPUT?

A Post-Design Public Meeting (DPM) will be conducted after the comment period has ended. NCDOT staff representing Planning, Design, Traffic Operations, Division, Right of Way, Natural Environment, Public Involvement and Community Studies, as well as others who play a role in the development of a project will attend this meeting. The project will also be reviewed with federal agencies such as the Federal Highway Administration (FHWA), and the US Army Corps of Engineers (USACE), as well as state agencies such as the NC Department of Environment and Natural Resources. When appropriate, local government staff will attend.

All spoken and written issues are discussed at the post-DPM meeting. Most issues are resolved at this meeting. NCDOT considers safety, costs, traffic service, social impacts and public comments in making decisions. Complex issues may require additional study and may be reviewed by higher management, Board of Transportation Members and/or the Secretary of Transportation.

Minutes of the post-DPM meeting will be summarized and are available to the public. If you wish to receive a copy of the minutes, please indicate by noting your request on the attached comment sheet and provide an address where these should be mailed/e-mailed.

STATE-FEDERAL RELATIONSHIP

This proposed project is a Federal-Aid Highway Project and thus would be constructed under the State-Federal Aid Highway Program. Financing of this project would be 80% Federal funds and 20% State funds.

The Board of Transportation is responsible for the selection and scheduling of projects on the Federal-Aid System including their location, design and maintenance cost after construction.

The Federal Highway Administration (FHWA) is responsible for the review and approval of the previously mentioned activities to ensure that each Federal-Aid Project is designed, constructed and maintained to Federal-Aid Standards.

PROJECT DESCRIPTION

The NCDOT, Division of Highways, under project R-1015, proposes to construct a 10-mile, four-lane divided, controlled access freeway, with no driveways and no traffic signals, on new location around the southwest side of the City of Havelock and the Cherry Point Marine Corps Air Station (MCAS) in Craven County. The proposed project would provide a high-speed alternative to the heavily congested existing U.S. 70 highway through the City of Havelock.

Due to access restrictions associated with the Cherry Point MCAS, all of the bypass Alternatives were located around the southwestern side of the City of Havelock and the Cherry Point MCAS. Full interchanges are included at both ends of the bypass and at S.R. 1756 (Lake Road). The remaining local secondary roads and railroads are to be grade-separated from the bypass by bridges.

PURPOSE AND NEED OF THE PROJECT

The purpose of this project is to improve traffic operations along the U.S. 70 corridor and enhance regional connectivity in eastern North Carolina.

The U.S. 70 corridor is 148 miles long and connects Raleigh, Smithfield, Goldsboro, Kinston, New Bern, Havelock and Morehead City. Regionally U.S. 70 provides connectivity with the Port of Morehead City, the Global TransPark (a 2,500 acre multimodal industrial park in Kinston), industries in New Bern and Craven County, Cherry Point Marine Corps Air Station, Camp Lejeune and other military facilities, and functions as a primary route for seasonal beach traffic.

The proposed project is expected to address the increased traffic demand that has diminished the ability of U.S. 70 between Morehead City and Raleigh to function as envisioned in the Strategic Highway Corridors (SHC) Plan now referred to as Strategic Transportation Corridors (STC).

Increasing regional use of U.S. 70 has led to a deterioration of traffic operations along the existing roadway, causing undesirable levels of traffic service. The level of service (LOS) of a roadway is a measure of the roadway's traffic-carrying ability. Levels of service range from A to F, "A" being the best scenario with unrestricted maneuverability and operating speeds, and "F" being the worst scenario where travel on a roadway is characterized by "stop and go" conditions. Existing intersections along U.S. 70 have been analyzed and currently operate at an undesirable level of service. Without improvements to accommodate traffic growth, the level of service along U.S. 70 will continue to deteriorate.

The lack of access control (numerous street and driveway connections to adjacent development) and heavy traffic substantially reduce the mobility of the existing U.S. 70 corridor. Currently thirteen traffic signals prohibit uninterrupted service along the existing corridor through Havelock. By the design year 2035, only five of the thirteen signalized intersections will operate at an acceptable level of service.

An accident study of U.S. 70 in Havelock was conducted to determine the accident potential and relative safety of the existing roadway. A total of 527 reported accidents occurred along the studied portion of U.S. 70 during the period between October 1, 2009 and September 30, 2012.

ACCIDENT TYPE	NUMBER	PERCENT OF TOTAL
Rear-end	272	51.6
Turning Movement	71	13.5
Angle	44	8.3
Sideswipe	59	11.2
Ran off Road	27	5.1
Other	54	10.2

Two crashes (1%) involved fatal injuries, 129 (24%) involved nonfatal injury crashes, and 396 (75%) resulted in property damage-only crashes. The 527 reported accidents resulted in an estimated $1,759,297 loss in property damage during that 3 year period.

U.S. 70 is one of only three routes providing highway access into the City of Havelock and the Cherry Point Marine Corps Air Station (MCAS). The other two are N.C. 101 and S.R. 1756 (Lake Road), both of which end in Havelock. This project would improve access for area commuters to the Cherry Point MCAS and Naval Aviation Depot, the principal employer for civilian and military personnel in Craven County and the City of Havelock.

By altering the existing state of the corridor in the area that currently contains many at-grade intersections and driveway connections, the project would enhance traffic safety and reduce crash rates by providing four lanes of divided roadway with full control of access.

The project would reduce the travel time for motorists, such as commercial carriers and vacationers, to the Carteret County beaches and the Port of Morehead City.

U.S. 70 has also been identified by the NC Division of Emergency Management as a major hurricane evacuation route. The project would improve the area's hurricane evacuation capabilities by providing more traffic carrying capacity.

The proposed U.S. 70 Havelock bypass project is consistent with long-range transportation plans for the study area. Local governments within Havelock and the Down East Rural Planning Organization, as well as NCDOT, have adopted this plan.

U.S. 70, HAVELOCK BYPASS STUDY ALTERNATIVESS

Initially, a number of alternatives were presented for study. These included a No-Build Alternative, Multimodal Alternatives, Transportation Systems Management (TSM) Alternatives, and Mass Transit Alternatives. The preliminary alternatives that could not fill the purpose and need for the project, had excessive undesirable impacts or were considered impractical were eliminated from consideration for the proposed U.S. 70 Havelock Bypass. Three bypass alternatives were ultimately carried forward for study.

All three of the new location alternative corridors tie into existing U.S. 70 far enough from the City of Havelock to avoid the existing strip development and the signalized intersections through the City. At the southeastern end of the project, there is a proposed interchange with existing U.S. 70 southeast of McCotter Boulevard (S.R. 1824). At the northwestern end of the project, there is a proposed interchange with existing U.S. 70 just west of Hickman Hill Loop Road (S.R. 1760).

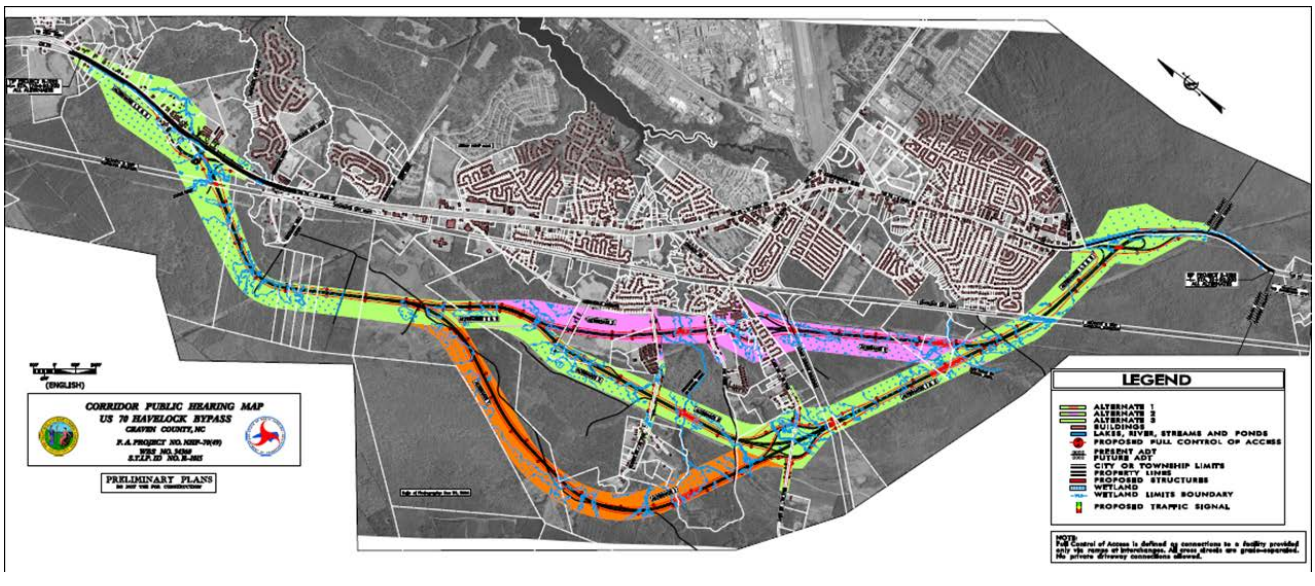


TABLE PM-1
COMPARISON OF BYPASS ALTERNATIVES

ENVIRONMENTAL FEATURES	ALT. 1 (2011)	ALT. 2 (2011)	ALT. 3 (2011)	REFINED ALT. 3 (PREFERRED) (2014)
Length (miles)	10.85	9.91	10.3	10.3
Relocations Residential	13	133	16	16
Business	1	3	1	1
Non-profit	1	1	1	1
Minority/Low Income Populations - Disproportionate Impact	No	No	No	No
Historic Properties (adverse effect)	No	No	No	No
Community Facilities Impacted	No	No	No	No
Section 4(f) Impacts	No	No	No	No
Noise Receptor Impacts	31	31	31	43
Prime Farmlands	66	112	71	71
NFS Lands – acres	189	225	240	240
Forested Acres *(NFS lands)*	343 (188)	258 (213)	354 (244)	332 (204)
CNF Habitat Fragmentation	1,412	240	699	534
Wetland Acres *(NFS lands)*	135 (96)	109 (87)	140 (102)	131 (93)
Streams *(NFS lands)* – linear feet	2,581 (1,012)	3,094 (1,764)	2,505 (1,387)	2,948(1,232)
Riparian Buffer Impacts – sq feet *(NFS lands)* Zone 1	124,823 (46,344)	172,705 (91,341)	135,930 (69,698)	129,402 (54,884)
Zone 2	75,232 (23,190)	108,019 (50,684)	79,168 (36,949)	81,142 (33,524)
Total Buffer Impacts	200,055 (69,534)	280,724 (142,025)	215,098 (106,647)	210,544 (88,408)
100 Year Floodplain and Floodway Impacts – acres	1.3	1.3	1.6	1.6

CORRIDOR SELECTION PROCESS

Although three bypass alternatives were originally considered, Alternative 3 was identified as the Least Environmentally Damaging Practicable Alternative (LEDPA) by the project steering committee, which consists of Federal and State review agencies.

In 1998, the NCDOT Corridor Selection Committee approved Alternative 3 as the LEDPA. The Corridor Selection Committee was comprised of representatives from NCDOT, federal and state environmental resource and regulatory agencies, such as the USACE, the US Environmental Protection Agency, the NC Division of Water Quality, the NC Wildlife Resources Commission, the NC Department of Environment and Natural Resources and the State Historic Preservation Office. Other agencies are invited as appropriate.

All three alternatives have been re-studied since the 1998 Environmental Assessment document was prepared. Alternative 3 remains as the identified Preferred Corridor. Avoidance and minimization as well as mitigation plans were considered and adopted during preliminary and detailed alternative development.

Another environmental document – the Final Environmental Impact Statement (FEIS) has been prepared for the Federal Highway Administration (FHWA) and NCDOT in accordance with the requirements of the National Environment Policy Act (NEPA) of 1969, as amended, and the North Carolina State Environmental Policy Act (SEPA G.S. 113A, Article 1) to evaluate the potential impacts of this proposed transportation improvement project. This is an informational document intended for use by both decision-makers and the public. It represents a disclosure of relevant environmental information concerning the proposed action as well as all viable alternatives.

PREFERRED ALTERNATIVE – ALTERNATIVE 3

Alternative 3 was first recommended by NCDOT and the Corridor Selection Committee as the preferred alternative in January of 1998. Subsequent studies and the NEPA/404 Merger Team reaffirmed the selection in 2012.

Alternative 3 was selected as the preferred alternative because it:

- ***Provides the best balance of minimizing impacts to natural and human environmental resources, the Croatan National Forest and the City of Havelock***
- ***Is the least costly alternative***
- ***Has a small number of relocations***
- ***Minimizes habitat fragmentation effects***
- ***Has a "middle ground" impact to prime farmlands***
- ***Has a "middle ground" impact to riparian buffers***

PROJECT INFORMATION

Length: 10.3 miles

Typical Section: 4-lane (two, 12-foot lanes in each direction) divided freeway with a 46-foot median (minimum)

Right of Way: A minimum right-of- way width of approximately 250 feet was established with additional right of way required at interchanges and grade separations.

Design speed: 70 mph

Access Control: Full Control of Access*:*
Access is only provided via ramps at interchanges.
No private driveway connections would be allowed.

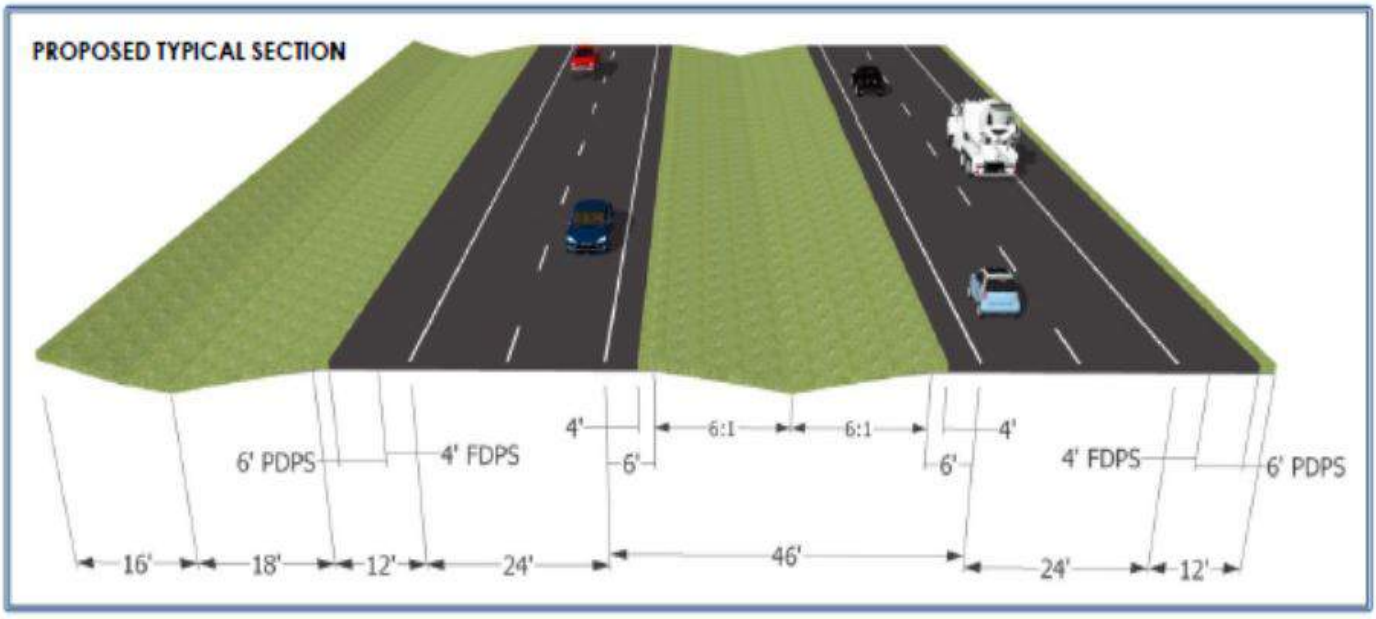
Relocatees: 16 Residences, 1 business, 1 non-profit

Project Costs:

Right of Way	$ 11,425,000
Utility Relocation	$ 845,000
Construction	$208,992,000
Total	$221,262,000

Current Schedule: Right of Way Acquisition – Winter 2015
Construction – Winter 2017

Note: The tentative schedule is shown above. A number of factors can affect a project schedule, so schedules are subject to change.



RIGHT-OF-WAY PROCEDURES

After decisions are made regarding the final design, the proposed right-of-way limits will be staked in the ground. If you are an affected property owner, a Right-of-Way Agent will contact you and arrange a meeting. The agent will explain the plans and advise you as to how the project will affect you. The agent will inform you of your rights as a property owner. If permanent right-of-way is required, professionals who are familiar with real estate values will evaluate or appraise your property. The evaluations or appraisals will be reviewed for completeness and accuracy, and then the Right-of-Way Agent will make a written offer to you. The current market value of the property at its highest and best use when appraised will be offered as compensation. The Department of Transportation must:

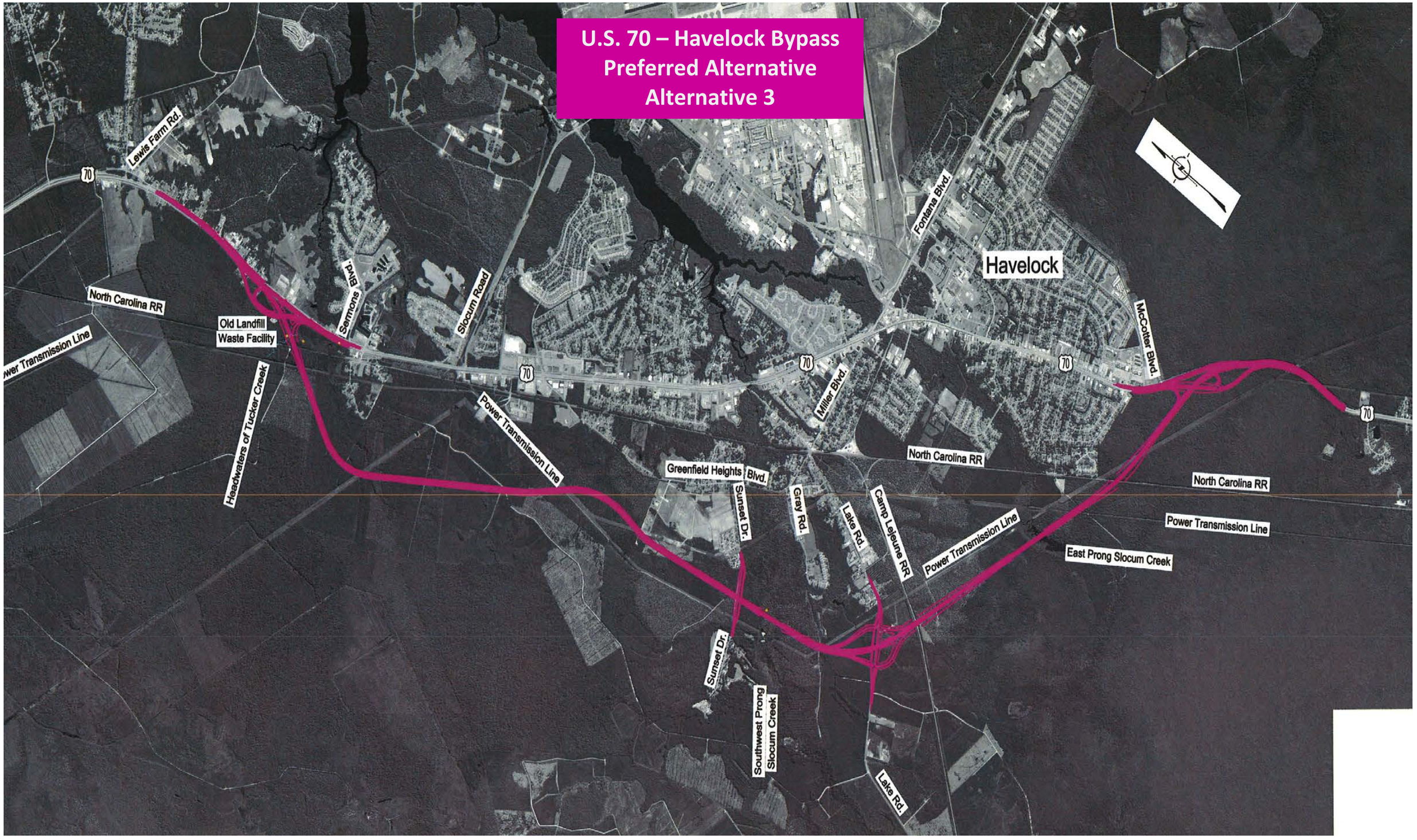
1. Treat all owners and tenants equally.
2. Fully explain the owner's rights.
3. Pay just compensation in exchange for property rights.
4. Furnish relocation advisory assistance.

RELOCATION ASSISTANCE

If you are a relocatee, that is, if your residence or business is to be acquired as part of the project, additional assistance in the form of advice and compensation is available. You will also be provided with assistance on locations of comparable housing and/or commercial establishments, moving procedures, and moving aid. Moving expenses may be paid for you. Additional monetary compensation is available to help homeowners cope with mortgage increases, increased value of comparable homes, closing costs, etc. A similar program is available to assist business owners. The Right-of-Way Agent can explain this assistance in greater detail.

NOTE: PAMPHLETS SUMMARIZING RIGHT OF WAY AND RELOCATION PROCEDURES ARE AVAILABLE AT THE SIGN-IN TABLE.

U.S. 70 – Havelock Bypass
Preferred Alternative
Alternative 3



TITLE VI PUBLIC INVOLVEMENT FORM

*Completing this form is **completely** voluntary. You are not required to provide the information requested in order to participate in this meeting.*

Meeting Type: Design Public Meeting **Location:** Havelock Tourist & Event Center	**Date:** August 31, 2015
TIP No.: R-1015 **Project Description:** U.S. 70 Havelock Bypass	

In accordance with Title VI of the Civil Rights Act of 1964 and related authorities, the North Carolina Department of Transportation (NCDOT) assures that no person(s) shall be excluded from participation in, denied the benefits of, or subjected to discrimination under any of the Department's programs, policies, or activities, based on their race, color, national origin, disability, age, income, or gender.

Completing this form helps meet our data collection and public involvement obligations under Title VI and NEPA, and will improve how we serve the public. Please place the completed form in the designated box on the sign-in table, hand it to an NCDOT official or mail it to the NCDOT Office of Civil Rights, Title VI Section at 1511 Mail Service Center, Raleigh, NC 27699-1511.

All forms will remain on file at the NCDOT as part of the public record.

Zip Code: _____

Street Name:
(i.e. Main Street) _____

Total Household Income:

- ☐ Less than $12,000
- ☐ $12,000 – $19,999
- ☐ $20,000 – $30,999
- ☐ $31,000 – $46,999
- ☐ $47,000 – $69,999
- ☐ $70,000 – $93,999
- ☐ $94,000 – $117,999
- ☐ $118,000 or greater

Gender: ☐ Male ☐ Female

Age:

- ☐ Less than 18
- ☐ 18-29
- ☐ 30-44
- ☐ 45-64
- ☐ 65 and older

Have a Disability: ☐ **Yes** ☐ **No**

Race/Ethnicity:

- ☐ White
- ☐ Black/African American
- ☐ Asian
- ☐ American Indian/Alaskan Native
- ☐ Native Hawaiian/Pacific Islander
- ☐ Hispanic/Latino
- ☐ Other (please specify): _____

National Origin: (if born outside the U.S.)

- ☐ Mexican
- ☐ Central American: _____
- ☐ South American: _____
- ☐ Puerto Rican
- ☐ Chinese
- ☐ Vietnamese
- ☐ Korean
- ☐ Other (please specify): _____

How did you hear about this meeting? (newspaper advertisement, flyer, and/or mailing) _____

_____

For more information regarding Title VI or this request, please contact the NCDOT Title VI Section at (919) 508-1808 or toll free at 1-800-522-0453, or by email at slipscomb@ncdot.gov.
Thank you for your participation!

COMMENT SHEET

U.S. 70 Havelock Bypass, Craven County
R-1015 – Design Public Meeting

NAME:

ADDRESS:

EMAIL:

COMMENTS and/or QUESTIONS:

Comments may be mailed by September 28, 2015 to:

Ms. Diane Wilson
NCDOT - Human Environment Section
1598 Mail Service Center
Raleigh, NC 27699-1598
Phone: (919) 707-6073 Fax: (919) 212-5785
Email: pdwilson1@ncdot.gov