North Carolina Department of Transportation
PROJECT ENVIRONMENTAL CONSULTATION FORM
I. D. No. R-2527

I. GENERAL INFORMATION

a. Consultation Phase: Right of Way Consultation

b. Project Description: NC 24-27 From NC 740 in Albemarle to the Proposed Troy Bypass (R-623), west of Troy
Stanly and Montgomery Counties, North Carolina

c. State Project: 35572.1.1
Federal Project: STBG-0024(083) (Planning document includes R-2350B & B-4974)

d. Document Type: Environmental Assessment 12/23/2011 Date

Finding Of No Significant Impact 4/10/2017 Date

II. CONCLUSIONS

The above environmental document has been reevaluated as required by 23 CFR 771. It was determined that the current proposed action is essentially the same as the original proposed action. Proposed changes, if any, are noted below in Section III. It has been determined that anticipated social, economic, and environmental impacts were accurately described in the above referenced document(s) unless noted otherwise herein. Therefore, the original Administration Action remains valid.

III. CHANGES IN PROPOSED ACTION AND ENVIRONMENTAL CONSEQUENCES

Though the FONSI comprised of three (3) projects, R-2530B, B-4974 and R-2527, this consultation will only pertain to R-2527. Projects R-2530B and B-4974 are in the construction phase. A construction consultation was completed December 2018.

DESIGN CHANGES

Since the signing of the FONSI, preliminary design plans have been completed. At the time of the FONSI, R-2527 was not funded; therefore, no design plans were available. The proposed project is approximately 8.25 miles long and involves widening NC 24-27 in Montgomery County from a two-lane facility to a four-lane divided facility with a 46 feet depressed grass median and 10 feet outside shoulders. The project limits extend from north of NC 73 to the Troy bypass. The proposed design speed will be 60 mph. It is anticipated that 150 to 250 feet of right of way will be required to accommodate the proposed improvements. The project will be designed with partial control of access. All intersecting roadways will cross the highway at grade and no grade separations or interchanges are proposed. The project also includes the

replacement of a rail line crossing over NC 24-27. The track is owned by Norfolk Southern Railway and is leased to Aberdeen Carolinas and Western Railway.

WATER RESOURCES

Water classification within the project area have not changed since the April 2017 FONSI. There are no streams within 1.0 mile of the project area listed on the 2017 FONSI 303(d) list of impaired waters for sedimentation or turbidity.

FEDERALLY PROTECTED SPECIES

As of December 5, 2018, United States Fish and Wildlife Service (USFWS) list two federally protected species for Stanly County and four for Montgomery County (Table 1).

Table 1: Federally protected species listed for Stanly and Montgomery County

Scientific Name	Common Name	Federal Status*	Habitat Present	Biological Conclusion	County
Helianthus schweinitzii	Schweinitz's Sunflower	E	Yes	MALAA – R-2530B MANLTAA – R-2527	Stanly/ Montgomery
Myotis septentrionalis	Northern Long-eared Bat	T	Yes	*	Stanly
Notropis mekistocholas	Cape Fear Shiner	E	No	No Effect	Montgomery
Picoides borealis	Red-cockaded Woodpecker	E	No	No Effect	Montgomery
Echinacea laevigata	Smooth Coneflower	E	Yes	No Effect	Montgomery

*May Affect – This project is in the compliance with the USFWS 4(d) rule.

HISTORICAL ARCHITECTURE AND ARCHEOLOGY

On December 11, 2018, a final Memorandum of Agreement (MOA) among FHWA, NCDOT, Catawba Indian Nation and NC SHPO was sent for review and agreement. The MOA has been signed by three primary signatories (NCDOT, SHPO and FHWA). In addition, it has been sent and signed by the United States Forest Service (USFS). The MOA has been sent to the Catawba Indian Nation for signature, they have responded with no concerns with the Data Recovery Plan. The MOA has been filed with the ACHP by the lead federal agency, FHWA.

US FOREST SERVICE COORDINATION

Since the signing of the FONSI, coordination has continued with the US Forest Service regarding issues related to USFS impacts as a result of project R-2527. Information presented to the USFS for consideration is listed below:

Comment: The Environmental Assessment (EA) is lacking in the analysis of effects to most environmental resources present in the study area. It is very difficult to review analysis that is not present in the document. Direct, indirect, and cumulative effects to all biological resources must be disclosed in the EA.

Response: Impacts within the Uwharrie National Forest (UNF) are captured in Tables 2 and 3 in this document and in the attached BE. Discussion of potential indirect and cumulative effects within the project's future land use study area are documented in the attached ICE screening report.

Comment: Evaluation of impacts on National Forest Service (NFS) lands need to be addressed specifically in the document i.e. not imbedded in the discussion of impacts to the entire project area in accordance with our Forest Plan.

Response: The following tables describe the amount of streams and wetlands impacts due to the preliminary design of the project through the UNF.

Table 2: Stream Impacts in the UNF Boundary for R-2527

STREAM ID	STREAM NAME	NCDENR STATUS CLASSIFICATION	PRELIMINARY DESIGN STREAM IMPACTS (FEET) ALTERNATIVE: BEST FIT
SD	Clarks Creek	Perennial	232
SF-B	Rocky Creek	Perennial	492
SJ	UT, Wood Run	Intermittent	135
SL-A	UT, Cattail Creek	Perennial	183
SW-A	UT, Cattail Creek	Intermittent	129
SW-B	UT, Lick Fork Creek	Intermittent	266
SX	UT, Lick Fork Creek	Perennial	432
SY-A	UT, Rocky Creek	Perennial	921
TOTAL STREAM IMPACTS FOR R-2527			**2,790**

- All impacts, but the USFS Forest Land acreage, are based on preliminary design slope stake limits plus 25 feet. The USFS Forest Land acreage is based on preliminary proposed right of way limits.

Table 3: Wetland Impacts in the UNF Boundary for R-2527

WETLAND ID	WETLAND TYPE	PRELIMINARY DESIGN WETLAND IMPACTS (ACRES) ALTERNATIVE: BEST FIT
WEE	Non-Riverine	0.05
WFF	Riverine	0.06
WGG	Non-Riverine	0.07
WH	Riverine	0.01
WHH	Riverine	0.02
WJ	Riverine	<0.01
WPP	Non-Riverine	0.01
WSS	Riverine	<0.01
SWW1	Riverine	<0.01
SWW2	Riverine	<0.01
TOTAL WETLAND IMPACTS FOR R-2527		**0.23**

- All impacts, but the USFS Forest Land acreage, are based on preliminary design slope stake limits plus 25 feet. The USFS Forest Land acreage is based on preliminary proposed right of way limits.

Comment: The EA does not discuss any mitigation options for loss of NFS lands or stream or wetlands impacts on NFS lands as a result of the proposed actions. The US Forest Service (USFS) would like to discuss possible mitigation for lost resources and unavoidable impacts to resources.

Response: NCDOT reviewed the R-2530B/R-2527 corridor for on-site mitigation opportunities in March 2014. No feasible on-site mitigation opportunities were identified. Therefore, unavoidable impacts to Waters of the U.S. will be offset by compensatory mitigation provided by the North Carolina Department of Environmental Quality (NCDEQ) – Division of Mitigation Services (DMS).

Comment: The determination of effect for Schweinitz's Sunflower is still being consulted on with the United States Fish and Wildlife Service (USFWS). USFWS has not yet agreed with the determination of effect for this species.

Response: A Biological Conclusion of May Affect-Likely to Adversely Affect has been rendered for Schweinitz's Sunflower. No Schweinitz's Sunflowers were found in the proposed roundabout area, but they were found elsewhere along the project (R-2530B). Surveys for Project R-2530B occurred in October 2017. The Biological Assessment has been completed and a Draft Biological Opinion (BO) was provided on November 26, 2018 for the R-2530B project. A Final BO was completed on December 12, 2018.

Surveys for this species were completed along Project R-2527 on September 26 and October 18, 2017. No species were found along R-2527. A Biological Conclusion of May Affect-Not Likely to Adversely Affect has been rendered for Schweinitz's Sunflower for R-2527. Concurrence from the USFWS is located in the Appendix.

Comment: The EA needs to state which power lines, water and sewer lines, and communication lines are located on the UNF. This can be done in the narrative or on maps that show both the line locations and the UNF boundaries.

Response: Utilities have not been identified as the design plans are preliminary. Once NCDOT utility unit completes their plans, they will be shared with USFS.

Comment: See comments on Summary of Environmental Effects p. vi. The information (Yes/No) provided for federally listed species habitat and rare plants gives no indication of the actual impact. For instance, for all the action alternatives that have rare plants, will the effects extend to the entire percent of all population or just a small portion? If rare plants are present, how many species and what percentage of the population would be affected?

Response: The Biological Evaluation (BE) lists the impacts to these rare plants within the project area. Please see the BE in the appendix.

Comment: The document states "A control of access fence is placed along the entire length of the facility, expect at intersections and driveway". What type of fencing and what are the dimensions? This information needs to be disclosed and the impacts of the fencing on wildlife crossing needs to be disclosed in the Environmental Effects section of the document.

Response: NCDOT's standard control of access fencing includes a woven wire fence with a standard height of 4 feet 10 inches. No fencing is proposed on USFS property or for this project. No impacts to wildlife crossing or access to USFS property is anticipated.

Comment: The document needs to give design details on the replacement of the railroad bridge crossing and any realignment of the railroad track that would be required. Norfolk Southern Railway has a right of way across NFS lands to operate their railroad. The bridge and this section of the railroad are located on NFS lands and movement of them will need to be coordinated with the USFS.

Response: Railroad coordination is underway and will continue to coordinate with USFS as designs are developed. NCDOT has made this a commitment on the greensheet.

Comment: The document states" Utilities along the project will be relocated prior to construction." The EA is not clear which, if any, of these utilities are located on the UNF. The types and locations of any utilities on the UNF that will need to be relocated or upgraded as a result of the proposed project must be identified along with a description of the proposed changes.

Response: Utilities have not been identified as the design plans are preliminary. Once NCDOT utility unit completes their plans, they will be shared with USFS.

Comment: All relocation of utilities including but not limited to power lines, water and sewer lines, and communication lines located on NFS lands must be coordinated with the USFS. Utility companies cannot use the easement granted to the North Carolina Department of Transportation for construction and operation of the highway for their uses. All utility companies must work directly with the USFS to modify their existing special use permits on relocations within the project area.

Response: Utilities have not been identified as the design plans are preliminary. Once NCDOT utility unit completes their plans, they will be shared with USFS. However, NCDOT has made this a commitment on the greensheet.

Comment: The document states "The project will also include standard landscaping as needed for erosion control purposes. No special landscaping is proposed as part of the projects". Landscaping and erosion control plants and seed mixes to be used on NFS lands must be discussed with the FS and disclosed in this document.

Response: Coordination is underway and will continue. NCDOT has made this a commitment on the greensheet.

Comment: The impacts to the Piedmont longleaf pine community located on the UNF and mentioned in a previous comment needs to be discussed. The analysis should determine how much of this existing habitat is present in the analysis area and how much will be impacted by the proposed project. It should also discuss the importance of prescribed burning in management of this community type and the impact the proposed four-lane roadway will have on the ability to prescribe burn.

Response: NCDOT will coordinate with USFS to develop a Forest Plan that promotes the restoration of longleaf pine to address concerns about ecosystem health, biological diversity, rare species, and communities that support rare species. This will result in USFS calculating cost of mitigations for the loss of the mature longleaf pine associated with the project.

Prescribed burning is an integral part of the longleaf pine ecosystem. Burning longleaf pine stands controls disease, reduces competition, provides for the establishment of native vegetation, and results in wildlife benefits. Prescribed fire controls brown spot disease in the young pine trees. The regular application of prescribed fire assists the longleaf to be more competitive by reducing the hardwood brush. The native plant community is restored and diversified with the proper use of prescribed fire.

Prescribed burning currently occurs along the NC 24-27 corridor. A widened roadway should not prohibit the activity in the future. 10.446 acres of longleaf pine habitat within the slope stakes are expected to be impacted, and 15.487 acres within the ROW are expected to be impacted.

Comment: The document needs to identify which population of Schweinitz's Sunflower are located on NFS lands. The railroad population south of NC 24-27 is mentioned but there is no reference that the species would be impacted (occurrence actually over 0.25 miles south of the existing road) by straightening the railroad as part of the proposed project.

Response: A Biological Conclusion of May Affect-Likely to Adversely Affect has been rendered for Schweinitz's Sunflower. No Schweinitz's Sunflowers were found in the proposed roundabout area, but they were found elsewhere along the project (R-2530B). Surveys for Project R-2530B occurred in October 2017. The Biological Assessment has been completed and a Draft Biological Opinion (BO) was provided on November 26, 2018 for the R-2530B project. A Final BO was completed on December 12, 2018.

Surveys for this species were completed along Project R-2527 on September 26 and October 18, 2017. No species were found along R-2527. A Biological Conclusion of May

Affect-Not Likely to Adversely Affect has been rendered for Schweinitz's Sunflower for R-2527. Concurrence from the USFWS is located in the Appendix.

Comment: The document states "An inactive cavity tree was observed in this stand". It appears from the location description that this tree may be located on NFS lands; if so, the USFS would like to know the exact location of the tree and if the cavity was enlarged. The potential foraging habitat located on the UNF needs to be better described in the document. The description should include the acres and quality of the habitat located within the survey boundaries. Impacts to that habitat as a result of the proposed project should also be discussed. Additional surveys will be required by the USFS of this habitat once five years have passed since the most recent surveys.

Response: Resurveying of the project area occurred Fall 2018. No cavity tree was observed during this time.

Comment: What in the past has been referred to as Forest Service PETS species are now referred to as TES (Threatened, Endangered, and Sensitive) species and LR (locally rare) species. There is no list provided of the TES&LR species that may occur in the project area and which species were surveyed for and why. There is no effects analysis on TES&LR species contained in this document.

Response: An Aquatic, Biological, Botanical and Terrestrial Resources Report was prepared for this project. These reports are included in the Appendix of this document. Effects to TES&LR species are noted in the report.

Comment: The EA should disclose which TES&LR species have habitat in the project area and the expected impacts of the proposed project on that habitat. The EA should disclose the effects to the other located non-federally listed species (smooth sunflower and large witch alder) and have a determination of effects for them on NFS lands. Once direct, indirect, and cumulative effects have been disclosed any potential mitigation or avoidance measures should be presented. The final EA should have an attached biological evaluation which discloses effects to these species on NFS lands. The FS will be unable to participate in the selection of the preferred alternative until effects on these species and their habitats are adequately disclosed.

Response: An Aquatic, Biological, Botanical and Terrestrial Resources Report was prepared for this project. These reports are included in Appendix of this document. Effects to TES&LR species are noted in the report.

Comment: Disclose which soil types are found within the project area on the UNF. Again the document does not disclose the effects to the resource. This section is a description of the existing environment not an effects analysis. The document must disclose the impacts to soils located on the UNF.

Response: Soils in the project footprint will be excavated, filled and/or paved between the slope stakes. A soils map of the project area is included in the Appendix.

Comment: No discussion or disclosure is made of the possible time and financial commitments needed to accomplish data recovery as described above. Nor are various mitigation strategies compared by alternatives. In addition, right of way widths of 250 feet and 150 feet may have different impacts on a historic property (Section 106 NHPA). Actual right of way widths will need to be known to identify the actual impacts to archeological resources present in the project area(s) and to prescribe mitigation for protection of those resources.

Response: A Memorandum of Agreement (MOA) was prepared by NCDOT in consultation with the Historic Preservation Office (HPO), the USFS, and other consulting parties that may be identified and invited by FHWA to participate. The MOA detailed the measures NCDOT plans to carry out to mitigate adverse effects to National Register of Historic Places Eligible archaeological sites. On December 11, 2018, a final MOA among FHWA, NCDOT, Catawba Indian Nation and NC SHPO was sent for review and agreement. The MOA has been signed by three primary signatories (NCDOT, SHPO and FHWA). In addition, it has been sent and signed by the USFS. The MOA has been sent to the Catawba Indian Nation for signature, they have responded with no concerns with the Data Recovery Plan. The MOA has been filed with ACHP.

Once ROW acquisition is complete for areas identified to involve archaeological resources, an assessment of data recovery will be completed. If needed, a Data Recovery plan for the impacted archaeological resources and coordination with the Office of State Archaeology will be completed. If USFS property is involved, NCDOT will consult with the USFS. Results of this coordination will be captured in a consultation document.

Comment: USFS and NCDOT still need to work together to come up with a means of compensatory restoration to make the USFS public trust resource whole for the adverse impacts to high quality, globally rare communities that will occur from this project. We look forward to discussing ways to offset these impacts with NCDOT.

Response: Impacts to high quality, globally rare communities are addressed in the BE included in the Appendix of this document.

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I. D. No. R-2527

IV. LIST OF ENVIRONMENTAL COMMITMENTS

See attached greensheet for Project Commitments.

V. COORDINATION

Project Management Unit personnel have discussed current project proposals with others as follows:

Project Manager:	Allison White	12/13/2018 Date
NES-PM:	Jeff Hemphill	12/13/2018 Date
FHWA:	Felix Davila	12/14/2018 Date

VI. NCDOT CONCURRENCE

Project Manager — Date: 5/24/19

Team Lead, Project Management Unit — Date: 5/24/19

VII. FHWA CONCURRENCE

For Felix Davila — Date: 5/24/19

Federal Highway Administration
Division Administrator

PROJECT COMMITMENTS

NC 24-27
From NC 740 in Albemarle
To the Proposed Troy Bypass (R-623), west of Troy
Stanly and Montgomery Counties
Federal Aid Project STBG-0024(083) – R-2530B
WBS Elements 35572.1.1

TIP Projects R-2527

Current status, changes, or additions to the project commitments as shown in the environmental document for the project are printed in *italics*.

Project Management Unit/ Natural Environmental Unit

NCDOT will coordinate with ~~Progress~~ Duke Energy regarding any requirements of the Federal Energy Regulatory Commission (FERC). Requirements from the FERC regarding approvals will be met prior to right of way acquisition.

~~*FERC coordination is currently underway and will be completed prior to construction.*~~
The Final FERC Application has been submitted to Duke Energy on May 15, 2019.

Project Management Unit, Roadway Design Unit, Rail Division

In the R-2527 project limits, the Norfolk Southern Railroad bridge crosses NC 24-27 within the Uwharrie National Forest which is under the US Forest Service's jurisdiction. NCDOT will ensure that the US Forest Service is part of the project's railroad design coordination process.

This commitment applies to project R-2527. This coordination is underway and will be completed prior to construction of project R-2527.

Geotechnical Unit

Preliminary site assessments will be conducted for ~~twenty-three~~ nineteen potentially contaminated sites within the proposed right of way prior to right of way acquisition.

~~*Site assessments will be determined and completed once final ROW plans become available and prior to ROW acquisition.*~~

Site assessments were completed, and recommendations submitted in January 2018. The USTs have not yet been removed and should be removed before date of availability.

Divisions 8 and 10 Construction Units

This project involves construction activities on or adjacent to the Federal Emergency Management Agency (FEMA) regulated stream. Therefore, the Division shall submit sealed as-built construction plans to the Hydraulics Unit upon completion of project construction. These plans should certify that the drainage structures and roadway embankment that are located within the 100-year floodplain were built as shown in the construction plans, both horizontally and vertically.

This is a standard project commitment.

Division 8 and 10 Construction and Wildlife Resources Commission

NCDOT commits to resurface and pave the Swift Island Boat access facility parking lot with the conditions that a de minimus determination will be rendered for the impacts to the property. WRC commits to allow NCDOT access to the property to complete these construction activities.

This commitment applies to R-2530B and B-4974 projects. ***NCDOT design plans shows resurfacing and paving the boat access facility parking lot.***

Hydraulics Unit

The Hydraulics Unit will coordinate with the Floodplain Mapping Program (FMP), the delegated state agency for administering FEMA's National Flood Insurance Program, to determine the status of the project with regard to applicability of NCDOT'S Memorandum of Agreement with FMP, or approval of a Conditional Letter of Map Revision (CLOMR) and subsequent final Letter of Map Revision (LOMR).

This commitment ~~will be~~ has been addressed during final design. The MOA approval was received from FMP on 11/19/18.

Division of Bicycle and Pedestrian Transportation, Project Management Unit, Roadway Design Unit

Fourteen foot outside travel lanes will be utilized for bicycle accommodations from NC 740 in Albemarle to SR 1731, Sweet Home Church Road. Four foot paved shoulders will be utilized for bicycle accommodations from SR 1731, Sweet Home Church Road to the proposed Troy Bypass, west of Troy.

The current design illustrates this commitment.

Bicycle and pedestrian accommodations will be further coordinated with the City of Albemarle prior to final project design. In accordance with the NCDOT Pedestrian Policy, NCDOT will bear the full cost to replace any existing sidewalks to be relocated by

the project along existing streets. The City of Albemarle will participate in the cost of new sidewalks in areas where sidewalks do not currently exist. A municipal agreement will be prepared prior to project construction.

This commitment applies to R-2530B project.

The City of Albemarle has committed to participate in sidewalk accommodations. The municipal agreement will be prepared prior to construction. Five-foot sidewalks are proposed on both the north and south sides of NC 24-27-73, within the Albemarle city limits and the southwest quadrant of NC 24-27-73 (Spaulding Street) and SR 1625 (Raleigh Highway) for approximately 325 feet.

The Municipal Agreement is underway.

Environmental Analysis Unit – Natural Environment Section

Due to the presence of Schweinitz's Sunflower within the project area as well as within 1-mile of the project area, a biological conclusion of "May affect, likely to adversely affect" has been given. Additional surveys will be required prior to project construction, and this biological conclusion will necessitate further coordination and consultation with the US Fish and Wildlife Service. A Biological Assessment and a Biological Opinion will be completed prior to the completion of the final environmental document.

~~*A Biological Assessment will be completed once surveys are updated for the proposed project. A Biological Opinion will be completed prior to construction.*~~

A Biological Conclusion of May Affect-Likely to Adversely Affect has been rendered for Schweinitz's Sunflower. No Schweinitz's Sunflowers were found in the proposed roundabout area, but they were found elsewhere along the project (R-2530B). Surveys for Project R-2530B occurred in October 2017. The Biological Assessment has been completed and a Draft Biological Opinion (BO) was provided on November 26, 2018 for the R-2530B project. A Final BO was completed on December 12, 2018.

Surveys for this species were completed along Project R-2527 on September 26 and October 18, 2017. No species were found along R-2527. A Biological Conclusion of May Affect-Not Likely to Adversely Affect has been rendered for Schweinitz's Sunflower for R-2527. Concurrence from the USFWS is located in the Appendix.

Per the BO with USFWS, the following are recommended:

1. *NCDOT will keep protected roadside populations of Schweinitz's Sunflower free of invasive species.*
2. *NCDOT will improve its roadside plant management program with more emphasis and attention to prevent roadside populations of Federally listed plant species from being treated with herbicides or mowed during the wrong time of the year.*

3. *NCDOT will provide the Service with a copy of any NCDOT databases used for tracking and monitoring roadside populations of Federally listed plant species. These data should be provided on an annual basis.*
4. *NCDOT will survey the construction site at EO 243 1-2 years after the site is stabilized to see if Schweinitz's Sunflowers have recolonized the new right-of-way.*

The proposed projects will have no effect on the Smooth Coneflower. However, due to the presence of potential habitat within the project area, additional surveys will be required prior to construction. Smooth Coneflower is listed only in Montgomery County.

Surveys for the Smooth Coneflower were completed in the Montgomery County portion of Project R-2530B on July 6, 2017 and none were found. Surveys for Smooth Coneflower were completed for R-2527 on May 22, 2018 and none were found.

Additional bald eagle surveys may be required within Montgomery County and Stanly County prior to project construction as specified by the Bald and Golden Eagle Protection Act. However, these surveys will be restricted to 660 feet from the edge of the project boundaries.

The Bald Eagle surveys were completed December 15, 2017. No nests or bald eagles were observed. Due to the survey results and minimal impact anticipated for this project, it has been determined that this project is not likely to adversely affect this species.

This project may impact individuals of the three S and LR species (Smooth Coneflower, Large Witch Alder and Heller's Rabbit Tobacco), but will not affect the viability of any of the three species across the forest. Discussions will occur with the USFS to determine avoidance and minimization options.

The project R-2527 may affect two LR species: Smooth Sunflower (Helianthus laevigatus) and Heller's Rabbit Tobacco (Pseudognaphalium helleri); and one S species, Large Witch Alder (Fothergilla major).

Surveys for Forest Service species along R-2527 started in September 2017 and were completed in September 2018. Results of the findings can be found in the appendix.

The Northern Long-eared Bat has been added to the species list since the completion of the EA. NCDOT has determined that the proposed action does not require separate consultation on the grounds that the proposed action is consistent with the final Section 4(d) rule, codified at 50 C.F.R. § 17.40(o) and effective February 16, 2016. NCDOT may presume its determination is informed by best available information and consider Section 7 responsibilities fulfilled for Northern Long-eared Bat.

Project Management Unit, Structure Management Unit

~~The proposed project will have "no adverse effect" on Bridge No. 51 if a responsible party agrees to take ownership of Bridge No. 51 and preserves it in place. A Section 4(f) evaluation and a Memorandum of Agreement (MOA) will be required for B-4974, Alternative 1 if a responsible party does not agree to take ownership of Bridge No. 51 and for B-4974, Alternative 4 since Bridge No. 51 will be removed.~~

Bridge No. 51 is proposed to be rehabilitated. Coordination with the SHPO and NCDOT Historic Architecture Section, rendered a no adverse effect determination for this improvement.

NCDOT Structure Management Unit will use the following requirements to document the historic architecture of Bridge No. 51:

Photographic Requirements

- *Elevations and oblique views of Bridge Number 51 with setting.*
- *Representative structural and ornamental details of the bridge.*

Photographic Format

- *Color digital images (all views). Images are to be shot on a SLR digital camera with a minimum resolution of 6 megabyte pixels, at a high quality (preferably RAW) setting, to be saved in TIF format as the archival masters and labeled according to the State Historic Preservation Office standards.*
- *All processing to be done to archival standards.*
- *The accompanying printed inventory of the images – including subject, location, date, and photographer information for each image – is to be completed according to the State Historic Preservation Office standards.*

Copies and Curation

- *One (1) set of all above mentioned photographic documentation, including a compact disc of labeled images, will be deposited with the North Carolina Office of Archives and History/Historic Preservation Office to be made a permanent part of the statewide survey and iconographic collection.*
- *One (1) contact sheet shall be deposited in the files of the Historic Architecture Section of NCDOT.*

This commitment applies to B-4974 project. Photography from drones and ground still are complete. A revisit is planned for May 29, 2019 to capture more photos from different angles. This project is currently in the initial phases of construction.

Environmental Analysis Unit – Human Environment Section

Multilingual public outreach measures will be taken on an "as needed" basis.

This commitment was satisfied during out public involvement process.

Divisions 8 and 10 Construction Units, Utilities Unit – Relocation of Utilities

All relocation of utilities including but not limited to power lines, water and sewer lines, and communication lines located on NFS lands must be coordinated with the USFS. Utility companies cannot use the easement granted to the North Carolina Department of Transportation for construction and operation of the highway for their uses. All utility companies must work directly with the USFS to modify their existing special use permits for utility relocations within Forest Service property.

This commitment applies to R-2527 project.

Divisions 8 and 10 Construction Units, Utilities Unit – Coordination of Utilities

Utilities have not been identified as the design plans are preliminary. Once NCDOT utility unit completes their plans, they will be shared with USFS.

This commitment applies to R-2527 project.

Divisions 8 and 10 Construction Units, Roadside Environmental – Landscaping and Erosion Control

Landscaping and erosion control plants and seed mixes to be used on NFS lands must be discussed with the FS and disclosed in this document.

Coordination with USFS is currently underway and applies to R-2527 project.

Roadside Environmental Unit, Division Resident Engineer – High Quality Waters

Given the potential for impacts to the resources during the project implementation, NCDWR requests that NCDOT strictly adhere to North Carolina regulations entitles Design Standards in Sensitive Watersheds (15A NCAC 04B .0124) throughout design and construction of the project. This would apply for any area that drains to streams having WS CA (Water Supply Critical Area) classifications.

Standard Procedure. This commitment will be implemented during construction.

Environmental Analysis Unit – Archaeological Section

*Six National Register of Historic Places (NRHP) eligible archaeological sites (31Mg1806, 31Mg1629, 31Mg321, 31St195, 31St196 and 31St204/204**) will be adversely affected by the undertaking per the 2014 Notification of Adverse Effect Finding. A Memorandum of Agreement (MOA) will be prepared by NCDOT in consultation with the Historic Preservation Office, the United States Forest Service (USFS) and other consulting parties that may be identified and invited by FHWA to participate. The MOA will detail the measures NCDOT plans to carry out to mitigate adverse effects to these sites. USFS is requiring actual Right-of-Way (ROW) widths to identify the actual impacts to archaeological resources present in the project area(s) and to prescribe mitigation for projection of historic resources. All required data recovery mitigation efforts will be initiated after ROW acquisition is completed relative to each site. No construction related activities are permitted within an individual site's limits until the field investigation/ mitigation requirements relative to that site have been completed. Each site will require six months after their respective ROW acquisition is complete in order to complete their respective field investigation/ mitigation requirements.*

On December 11, 2018, a final Memorandum of Agreement (MOA) among FHWA, NCDOT, Catawba Indian Nation and NC SHPO was sent for review and agreement. The MOA has been signed by three primary signatories (NCDOT, SHPO and FHWA). In addition, it has been sent and signed by the USFS. The MOA has been sent to the Catawba Indian Nation for signature, they have responded with no concerns with the Data Recovery Plan. The MOA has been filed with the ACHP by the lead federal agency, FHWA.

Environmental Analysis Unit – Human Environment Section – Traffic Noise & Air Quality Group

A Design Noise Report (DNR) will be completed during final design ***for all sections of the proposed project***.

A DNR was completed for R-2530B and B-4974 in June 2018. No noise abatement measures were recommended. No additional noise studies are needed unless warranted by a substantial change in the project's design concept or scope. A DNR for R-2527 was signed on March 6, 2019.

Project Management Unit, Roadway Design Unit and Division 8 Construction Unit

NCDOT is not proposing control access fence on this project. The only structure that will be marking the control access break will be concrete right of way markers. The control access right of way markers should remain at the control access break on the proposed right of way line.

Division 8 Construction Unit

NCDOT and Contractor will allow USFS to install portable, temporary signs within the NCDOT right-of-way as needed to warn motorists during prescribed burn activities.

Project Management Unit, Roadway Design Unit, Division 8 Construction Unit and US Forest Service

In regard to the Wood Run Trailhead in the Uwharrie Recreation Trailhead, NCDOT will continue coordination with USFS to ensure that road access control does not hinder trailhead access. NCDOT will move, restore and/or replace all USFS signage. NCDOT will continue coordination with USFS to re-establish parking within the area of the trailhead parking area from NC 24-27 on USFS property.

NCDOT will provide a 24' wide driveway for vehicles to have safe ingress/ egress from the trailhead parking from NC 24-27, with two-way traffic.

NCDOT will continue coordination with USFS that all USFS roads, shown in the maps in the appendix, that are currently accessible by NC 24-27 will remain accessible to fire and logging equipment.

NCDOT will use non-combustible material within the USFS property for guardrail.

Environmental Analysis Unit – Biological Surveys

For selected USFS rare species of concern that may be directly impacted by the project, relocation has been determined to be appropriate mitigation for two plant species: Large Witch Alder and Quillwort. Pre-construction surveys for Quillwort will be conducted with USFS to identify all individuals within the construction footprint. NCDOT will coordinate relocation efforts with the USFS and relocate these plants to a suitable location, to be identified in consultation with USFS.

The NCDOT will not hinder USFS' prescribed burning as recommended by the Forest's Fire Management Officer.

The removal of vegetation and grading for the initial project would follow installation of erosion and sedimentation control measures. Sediment and Tree Protection Fencing would be installed along the limits of the Project Area. These visual barriers would ensure construction equipment and contractors remain within approved disturbance limits. The NCDOT also commits to continue negotiations with the USFS to arrive at suitable mitigation for the loss of longleaf pine forest.

NCDOT does anticipate high rock lines along the project length that will require blasting. However, no reliable quantification of potential rock blasting within USFS property will be available until they are able to investigate those areas. Borings have

been laid out, but ST-299 permit was approved to continue these subsurface investigations. Approval of this document is required before that permit can be issued. If required, a blasting impact reduction plan is being developed for this project and would evolve through consultation with the USFS as information becomes available.

Potential impacts to hydric soils were investigated as part of this evaluation. All soils occurring within the Project Area are considered non-hydric according to the NRCS Web Soil Survey. However, wetland delineations have been conducted and 1.95 acres of wetland were delineated in the Study Area. The Project Area includes 0.49 acre of wetlands that may be directly affected by construction. As part of permitting unavoidable impacts to these areas, the US Army Corps of Engineers requires demonstration of avoidance and minimization of impacts. No construction would begin until USACE and NCDWR approvals are issued.

Erosion control measures will be designed for sensitive watershed standards in HQW Watersheds. This includes capturing runoff from larger storms and reducing the amount of exposed land and schedule for re-vegetation. Erosion Control measures (e.g., silt fence, matting, special sediment control fence, silt checks, skimmer basins, etc.) will be put in place during the clearing and grubbing, and final stages of construction to help limit erosion while temporary and permanent seeding become established. Grassed swales, dissipator pads, and rip rap lined channels were designed to promote stability in these areas. An erosion and sedimentation control plan will be developed to reduce erosion and turbidity.

The typical road section includes grassed swales and grassed shoulders to reduce flow velocity, promote sedimentation, infiltration, and runoff attenuation. The impervious percentage will increase; however, existing drainage patterns and outfalls were maintained as much as possible to minimize increases in flow and alteration of drainage patterns. Existing concerns are mainly due to undersized pipes that create increased velocities and scour holes at existing pipe outfalls. Receiving streams were visited to identify existing geometry and condition. This information was used to choose adequate and stable system outfalls. A 10 percent impervious assumption was used to accommodate any future projects upstream of these crossings. All outfalls were supplemented with rip-rap dissipator pads to help dissipate energy at the outlet.

A Burn Management Plan was prepared by NCDOT and provided to USFS. The plan was reviewed by Uwharrie National Forest Fire Management Officer, Kelly Cagle, and requested no revisions or changes on 2/20/2019. The Burn Management Plan is included in the BE as Appendix A. To mitigate potential blasting impacts, NCDOT is developing a plan to address direct and indirect impacts.

Access to the forest for maintenance, burning, and forest management is being considered during design. The road would be partial controlled access for much of its length, but NCDOT has committed to use no fencing; only concrete markers would be

utilized along the entire R-2527 project (Pam Williams (NCDOT) personal communication; NCDOT Draft Right-of-Way Consultation, February 2019).

Implementation of commitments and mitigation measures agreed to between NCDOT and USFS would minimize viability concerns that could result from direct impacts. These commitments and mitigation measures would include:

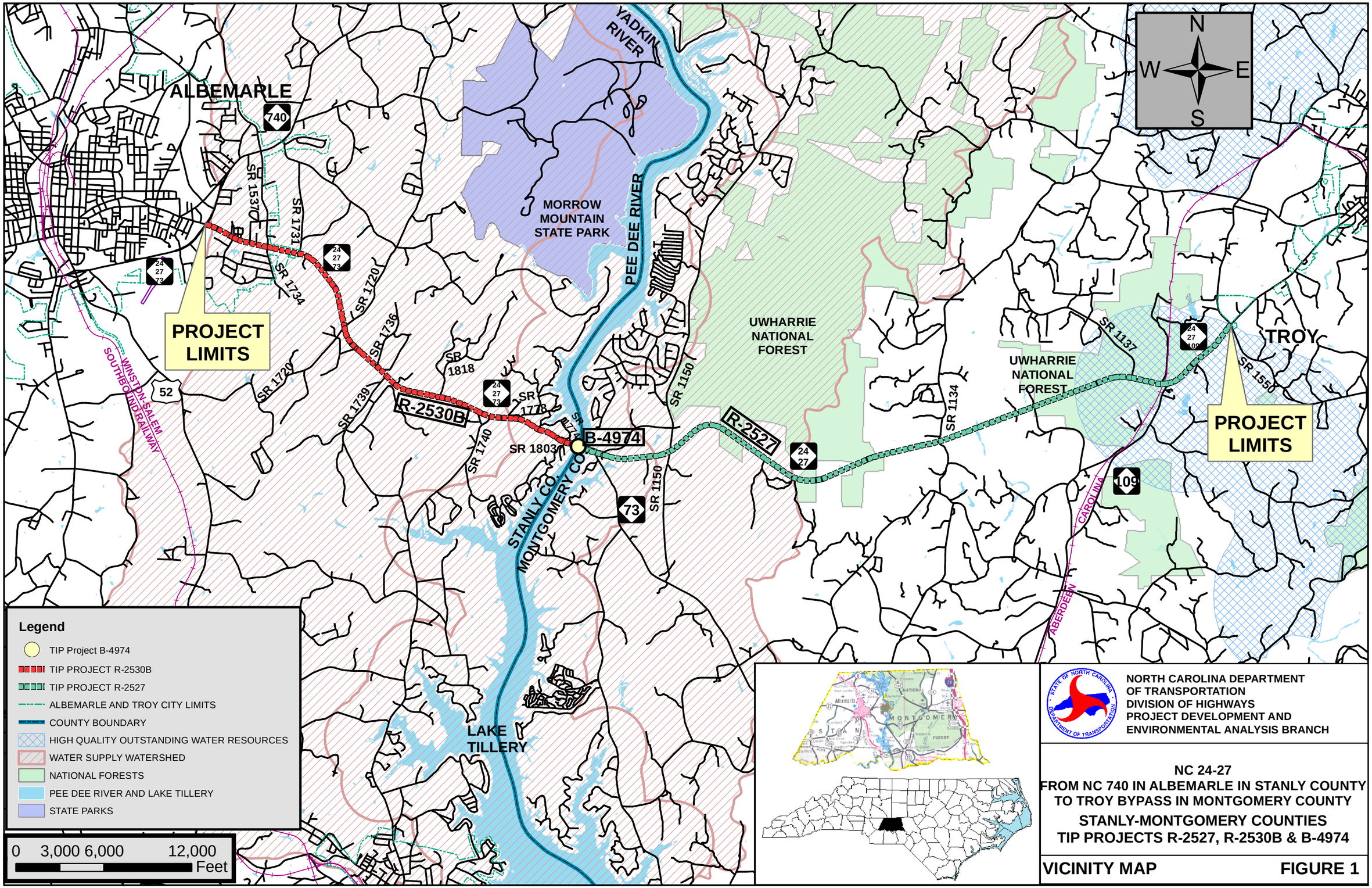
- *Include no fencing (except guardrails at localized areas with motorist safety concerns) and maintain access to the forest,*
- *Prior to construction, NCDOT will coordinate with the USFS to identify occurrences of USFS rare plant species near the project construction limits and put up protective orange fencing to be removed after completion of construction,*
- *Avoid placing staging areas within 250 feet of USFS rare plant species occurrences, where practicable,*
- *Prohibit the use of herbicides and pesticides, and*
- *NCDOT Division 8 forces will work with USFS staff on the periodic basis to control the presence of priority species of non-native plants along the NC 24-27 easement on UNF.*
- *NCDOT will also work on adjacent NCDOT ROW to prevent the encroachment of priority non-natives on to UNF. In turn, USFS will work cooperatively with NCDOT to identify and effectively control prioritized non-native invasive plant species.*

In coordination with USFS, NCDOT has developed commitments and mitigation measures to minimize the spread of non-native invasive species (NNIS) plant species on NFS lands within the UNF associated with the construction and maintenance of improvements to NC 24-27.

- *To prevent the spread of non-native invasive plant species on UNF 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 UNF construction areas.*
- *To control the spread of NNIS plant species on UNF lands, NCDOT, in coordination with the USFS, will locate and flag areas of NNIS plant species within the Study Area. 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 UNF. If NNIS 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 UNF.*
- *In consultation with the USFS, seed mixes of native grasses and forbs or non-aggressive, non-natives will be used on UNF lands for erosion control and revegetation.*
- *NCDOT will utilize seed mixes for erosion control and revegetation on the UNF will be developed in consultation with USFS.*
- *NCDOT will coordinate with the USFS on a landscaping plan for UNF lands. The plan will detail appropriate native seeding mixes for erosion control and site-specific control methods for invasive species. 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 project corridor.

With the implementation of these commitments and mitigation measures developed by NCDOT, in coordination with the USFS, the threat of spread of NNIS plants on UNF lands associated with the construction and maintenance of improvements to NC 24-27 is expected to be minimal.



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
PROJECT DEVELOPMENT AND ENVIRONMENTAL ANALYSIS BRANCH

NC 24-27
FROM NC 740 IN ALBEMARLE IN STANLY COUNTY TO TROY BYPASS IN MONTGOMERY COUNTY
STANLY-MONTGOMERY COUNTIES
TIP PROJECTS R-2527, R-2530B & B-4974

VICINITY MAP **FIGURE 1**

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
P.O. Box 33726
Raleigh, North Carolina 27636-3726

December 12, 2018

John F. Sullivan, III, PE
Division Administrator
Federal Highway Administration
310 New Bern Avenue, Suite 410
Raleigh, North Carolina 27601

Subject: Biological Opinion – NC 24/27 widening from NC 740 to east of Pee Dee River in Stanly and Montgomery Counties, North Carolina (STIP Number R-2530B)
FWS Log #: 42420-2008-F-0240

Dear Mr. Sullivan:

This letter transmits the enclosed Biological Opinion (BO) of the U.S. Fish and Wildlife Service (Service) for the NC 24/27 widening in Stanly and Montgomery Counties, North Carolina (the Action). The North Carolina Department of Transportation, in cooperation with the Federal Highway Administration, proposes to widen the existing two-lane NC 24/27 from NC 740 in Stanly County to a point approximately 800 feet west of River Road (SR 1150) in Montgomery County. The Service received on October 11, 2018 your letter requesting formal consultation for the Action described in *Biological Assessment, Schweinitz's Sunflower* (*Helianthus schweinitzii*), *NC 24/27 Widening from NC 740 to East of Pee Dee River, Stanly and Montgomery Counties, North Carolina*. You determined that the Action is likely to adversely affect Schweinitz's sunflower.

The enclosed BO answers your request for formal consultation, and concludes that the Action is not likely to jeopardize the continued existence of the species listed above. This finding fulfills the requirements applicable to the Action for completing consultation under §7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended.

Reinitiating consultation is required if the Federal Highway Administration retains discretionary involvement or control over the Action (or is authorized by law) when:

a. the amount or extent of incidental take is exceeded;
b. new information reveals that the Action may affect listed species or designated critical habitat in a manner or to an extent not considered in this BO;
c. the Action is modified in a manner that causes effects to listed species or designated critical habitat not considered in this BO; or
d. a new species is listed or critical habitat designated that the Action may affect.

A complete administrative record of this consultation is on file in our office at the letter-head address. If you have any questions about the BO, please contact Gary Jordan by phone at 919-856-4520 x.32 or by email at gary_jordan@fws.gov.

Sincerely,

Tom Augspurger

For Pete Benjamin
Field Office Supervisor

Enclosure

Electronic copy provided to:

Felix Davila, FHWA, Raleigh, NC
Andy Williams, USACE, Wake Forest, NC
Matt Haney, NCDOT, Raleigh, NC
Dale Suiter, USFWS, Raleigh, NC
Rebekah Reid, USFWS, Asheville, NC

Biological Opinion

NC 24/27 Widening from NC 740 to East of Pee Dee River in Stanly and Montgomery Counties, North Carolina (STIP No. R-2530B)

FWS Log #: 42420-2008-F-0240

Prepared by:

U.S. Fish and Wildlife Service
Raleigh Field Office
P.O. Box 33726
Raleigh, NC 27636-3726

Tom Augspurger / Deputy Field Supervisor — 12-12-2018

[NAME, TITLE] — Date

TABLE OF CONTENTS

CONSULTATION HISTORY

This section lists key events and correspondence during the course of this consultation. A complete administrative record of this consultation is on file in the Service's Raleigh Field Office.

2012-06-12 – The Service met with NCDOT staff on-site to discuss the need for Section 7 consultation.

2018-03-06 – The Service received a draft biological assessment (BA) for review.

2018-03-07 – The Service provided comments on the draft BA to NCDOT.

2018-08-15 to 2018-10-04 – The Service provided technical assistance in development of conservation measures to minimize adverse effects.

2018-10-11 – The Service received the final BA (dated 2018-09-00) and a letter from the Federal Highway Administration (FHWA) requesting initiation of formal Section 7 consultation.

2018-10-31 – The Service sent a letter to the FHWA stating that all information required for initiation of consultation was either included with their 2018-10-31 letter or was otherwise available.

2018-11-26 – The Service provided the FHWA and NCDOT with a draft Biological Opinion.

BIOLOGICAL OPINION

1. INTRODUCTION

A biological opinion (BO) is the document that states the opinion of the U.S. Fish and Wildlife Service (Service) under the Endangered Species Act of 1973, as amended (ESA), as to whether a Federal action is likely to:

- jeopardize the continued existence of species listed as endangered or threatened; or
- result in the destruction or adverse modification of designated critical habitat.

The Federal action addressed in this BO is the Federal Highway Administration (FHWA) proposed NC 24/27 widening from NC 740 to east of Pee Dee River in Stanly and Montgomery Counties, North Carolina (the Action). This BO considers the effects of the Action on Schweinitz's sunflower. The Action does not affect designated critical habitat; therefore, this BO does not further address critical habitat.

A BO evaluates the effects of a Federal action along with those resulting from interrelated and interdependent actions, and from non-Federal actions unrelated to the proposed Action (cumulative effects), relative to the status of listed species and the status of designated critical habitat. A Service opinion that concludes a proposed Federal action is *not* likely to jeopardize species and is *not* likely to destroy or adversely modify critical habitat fulfills the Federal agency's responsibilities under §7(a)(2) of the ESA. In this BO, only the jeopardy definition is relevant, because the Action does not affect designated critical habitat. "*Jeopardize the continued existence*" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR §402.02). The basis of our opinion for Schweinitz's sunflower is developed by considering the status of the species, its environmental baseline, the effects of the Action, and cumulative effects.

This BO uses hierarchical numeric section headings. Primary (level-1) sections are labeled sequentially with a single digit (e.g., 2. PROPOSED ACTION). Secondary (level-2) sections within each primary section are labeled with two digits (e.g., 2.1. Action Area), and so on for level-3 sections.

2. PROPOSED ACTION

The North Carolina Department of Transportation (NCDOT), in cooperation with the FHWA, proposes to widen the existing two-lane NC 24/27 from NC 740 in Stanly County to a point approximately 800 feet west of River Road (SR 1150) in Montgomery County (STIP No. R-2530B). The Action also includes the rehabilitation of the existing bridge over the Pee Dee River. The Action will be deconstructed into two components: 1) road widening and bridge rehabilitation and 2) conservation measures.

2.1. Action Area

For purposes of consultation under ESA §7, the action area is defined as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the

action" (50 CFR §402.02). The "Action Area" for this consultation includes the NC 24/27 corridor from NC 740 in the City of Albemarle, Stanly County, to a point approximately 800 feet west of River Road (SR 1150) in Montgomery County – a distance of approximately 7.1 miles (Figure 2.1).

2.2. Road Widening and Bridge Rehabilitation

The Stanly County portion of NC 24/27 will be widened to a four-lane divided facility with a 23-foot raised median from NC 740 in the City of Albemarle east to SR 1731 (Sweet Home Church Road). Between SR 1731 and the eastern terminus, NC 24/27 will be widened to a four-lane divided facility with a 46-foot depressed median. The existing Bridge No. 51 over the Pee Dee River will also be rehabilitated.

2.3. Conservation Measures

To minimize effects to the species, a plan is being developed, in coordination with the Service, to relocate all affected Schweinitz's sunflowers to a more protected site with appropriate habitat within Stanly County (a tentative relocation site has been selected but not yet finalized). All affected Schweinitz's sunflowers will be dug up and relocated prior to project let. Seeds from the plants will also be collected and transferred to a Service approved facility for storage and future restoration efforts. A NC Plant Conservation Program permit will be obtained prior to any transplant activities. A monitoring plan will be developed and reports detailing results and management activities will be supplied to the Service.

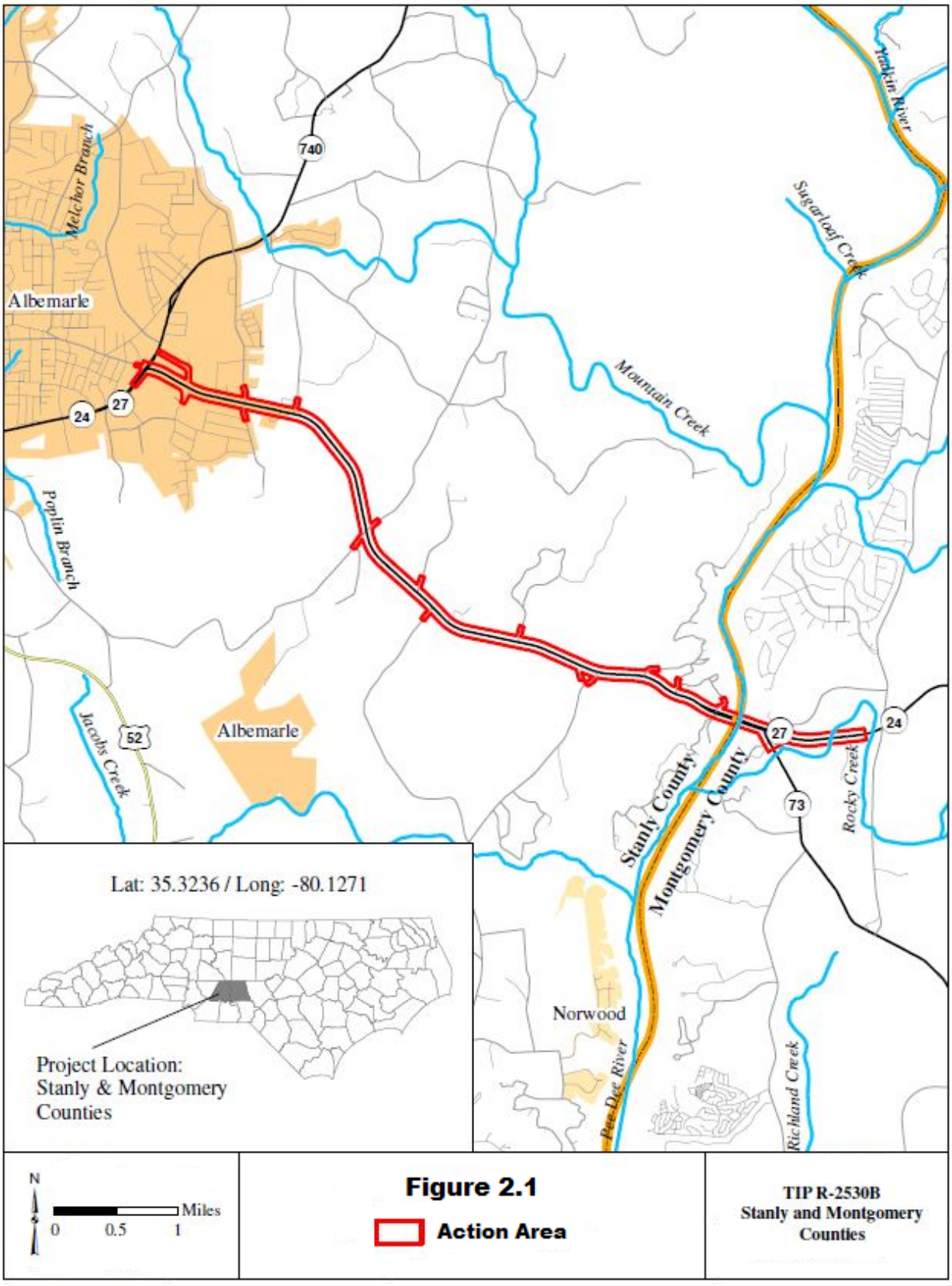
2.4. Interrelated and Interdependent Actions

A BO evaluates the effects of a proposed Federal action. For purposes of consultation under ESA §7, the effects of a Federal action on listed species or critical habitat include the direct and indirect effects of the action, plus the effects of interrelated or interdependent actions. "Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration" (50 CFR §402.02).

Utilities along NC 24/27 include telephone, power, gas, cable television, water, and sewer lines. Power, telephone, and cable television lines are suspended from utility poles, while other utility lines are buried along the road shoulder. Utilities within the construction footprint will likely be relocated prior to road construction.

3. STATUS OF SPECIES

This section summarizes best available data about the biology and current condition of Schweinitz's sunflower (*Helianthus schweinitzii*) throughout its range that are relevant to formulating an opinion about the Action. The Service published its decision to list Schweinitz's sunflower as endangered on May 7, 1991 (56 FR 21087-21091).


740
Melchor Branch
Albemarle
27
24
Poplin Branch
Jacobs Creek
52
Albemarle
Mountain Creek
Sugarloaf Creek
Tradkin River
27
24
73
Stanly County
Montgomery County
Rocky Creek
Norwood
Pee Dee River
Richland Creek
Lat: 35.3236 / Long: -80.1271
Project Location:
Stanly & Montgomery
Counties
N
Miles
0
0.5
1
Figure 2.1
Action Area
TIP R-2530B
Stanly and Montgomery
Counties

3.1. Species Description

Schweinitz's sunflower is a perennial plant that generally grows to approximately 6.5 feet tall. It has thickened roots that are used by the plant to store starch. The stem is purplish in color, and the upper third bears secondary branches at 45-degree angles. The leaves are arranged in pairs on the lower part of the stem but usually occur singly (or alternate) on the upper parts. Leaves are attached to the stem at right angles, and the tips of the leaves tend to droop. The leaves are thick and stiff with a rough upper surface. The upper leaf surfaces have broad spiny hairs that are directed toward the tip, and soft white hairs cover the underside. The plant produces small yellow flowers from late August until frost (USFWS 2017).

3.2. Life History

Schweinitz's sunflower is able to colonize through the dispersal of seeds that readily germinate without a dormant period. Presently, this species occurs in relatively open habitats such as roadsides, power line clearings, early successional fields, forest ecotone margins or forest clearings. It thrives in full sun but also grows in the light shade of open stands of oak-pine-hickory. The species is known from a variety of soil types but is generally found growing on shallow, poor, clayey and/or rocky soils, especially those derived from mafic rocks (USFWS 1994). The species also benefits from routine soil disturbance, most notably along roadsides which receive regular right-of-way (ROW) maintenance (Smith 2008).

3.3. Numbers, Reproduction, and Distribution

Schweinitz's sunflower is endemic to the Piedmont physiographic province of North Carolina and South Carolina. It is believed that the species historically occupied prairie areas and open woodlands. However, with fire suppression and increasing development, these habitats have either succeeded into oak-pine-hickory forests or have been severely degraded and fragmented (USFWS 1994).

When the species was listed in 1991, there were a total of 13 extant populations (eight in NC and five in SC) distributed across five NC counties (Cabarrus, Mecklenburg, Rowan, Stanly and Union) and one county (York) in SC (USFWS 1991). In recent years, several additional populations have been found in both NC and SC. As of 2010, there were approximately 78 geographically distinct populations of the species in NC distributed across 13 counties (the original five plus Anson, Davidson, Gaston, Montgomery, Randolph, Richmond, Stokes and Surry) (USFWS 2006, USFWS 2010). A new population in Guilford County, NC was discovered in 2018 (Dale Suiter, USFWS, personal communication). In SC, there are eight geographically distinct areas which appear to approximate populations in two counties (Lancaster and York) (Houk 2003). Therefore, the total known range consists of approximately 86 populations (USFWS 2010).

The 1991 listing rule did not state the number of plants contained within the 13 known populations extant at that time. However, supporting information from the Service's files on this species suggest that these sites were collectively and conservatively estimated to contain some 2,805 stems. Data suggests that, as of 2010, those sites with some potential to provide a role in

the species' recovery in NC contain over 40,000 stems (USFWS 2010). According to Houk (2003), all of the SC sites (regardless of their protection or recovery potential) contained some 27,740 stems in 2002. However, due to annual variability in stem counts, it is important to note that stem counts derived from single observations may provide limited value in assessing the actual abundance of the species in a given location or across its range.

3.4. Conservation Needs and Threats

Schweinitz's sunflower is endangered by the loss of historic levels of natural disturbance from fire and grazing by native herbivores, residential and industrial development, encroachment by exotic species, highway construction and improvement, and roadside and utility ROW maintenance (USFWS 1994).

While seemingly more secure due to the increase in known populations, most populations remain extremely vulnerable. A large majority of the known sites containing the species (over 90%) occur within road or utility ROW. Many of these ROW occurrences are along existing roads which are subject to widening and improvement projects which disturb the existing adjacent ROW. The NCDOT has a program designed to sign roadside rare plant populations and manage these areas with mowing and/or herbicides applied during the dormant season. Despite these efforts, some of the roadside populations have been impacted through herbicide applications or mowing during the wrong time of year. Current recovery efforts are focused upon relocating plants from vulnerable ROW habitats to more protected areas with the potential for adequate management (USFWS 2010).

Portions of 24 extant populations (distributed across eight NC counties and two SC counties) have been identified as having a potential to meet some of the recovery criteria for the species. Of the 24 extant populations with some protection potential, 22 (distributed across seven NC counties and one SC county) are in some form of ownership and management that could provide permanent protection to the species. Portions of ten of these 22 populations have written management plans with components explicit to Schweinitz's sunflower. However, implementation of these plans is a challenge at all locations due to lack of resources (i.e. funding and staff). Management plans are in draft for portions of the remaining 12 other populations whose current ownership may provide (or has indicated willingness to provide) permanent protective ownership (USFWS 2006, USFWS 2010).

As of the last 5-Year Review (USFWS 2010), the status of this species was listed as uncertain. The majority of sites are not monitored annually, or in a way that allows one to assess year-to-year fluctuations in status and trends.

4. ENVIRONMENTAL BASELINE

This section is an analysis of the effects of past and ongoing human and natural factors leading to the current status of the Schweinitz's sunflower, its habitat, and ecosystem within the Action Area. The environmental baseline is a "snapshot" of the species' health in the Action Area at the time of the consultation, and does not include the effects of the Action under review.

4.1. Action Area Numbers, Reproduction, and Distribution

The Action Area contains two NC Natural Heritage Program element occurrences (EO) for Schweinitz's sunflower – EO 14 and EO 243. No Schweinitz's sunflowers have been observed at EO 14 since 1991, with the most recent survey occurring on October 3, 2017. At EO 243, an October 3, 2017 survey revealed 212 stems with 51 being in flower. This is an increase in number from previous surveys in 2011 (55 stems) and 2012 (110 stems). The 212 Schweinitz's sunflower stems from the 2017 survey comprise 0.021 acre separated into four subpopulations stretching over approximately 0.11 mile of road right-of-way (Figure 4.1). Subpopulations A and B represent a recent increase in the boundaries of EO 243.

4.2. Action Area Conservation Needs and Threats

Like all roadside populations of Schweinitz's sunflowers, the population within the Action Area is vulnerable to future road improvements and maintenance activities. Although NCDOT has posted *Do Not Mow* signs and maintains a policy of only mowing such sites during the winter, the site is still vulnerable to mowing during the growing season by contractors who disregard the signs (as has happened at other roadside populations).

5. EFFECTS OF THE ACTION

This section analyzes the direct and indirect effects of the Action on the Schweinitz's sunflower, which includes the direct and indirect effects of interrelated and interdependent actions. Direct effects are caused by the Action and occur at the same time and place. Indirect effects are caused by the Action, but are later in time and reasonably certain to occur. Our analyses are organized according to the description of the Action in section 2 of this BO.

5.1. Effects of Road Widening and Bridge Rehabilitation

The entire Schweinitz's sunflower EO 243 lies within the construction footprint of the Action. The construction area will incur excavation, grading, and fill placement. Therefore, it is assumed that all of the current Schweinitz's sunflower habitat within this EO will either be lost or permanently modified. This will directly affect all 212 stems and their habitat, but the sunflowers will be salvaged (see Section 5.2 below). Although the current roadside habitat will be either lost or permanently modified, the clearing and soil disturbance associated with the Action will likely create new habitat within the Action Area adjacent to the affected area. Due to the persistence of seeds in the soil and the species' generally positive response to tree removal and soil disturbance, the species may recolonize the disturbed area after clearing occurs for newly established right-of-way boundaries.

Figure 4.1: EO 243

5.2. Effects of Conservation Measures

All of the known Schweinitz's sunflowers within EO 243 (212 stems as of October 2017) will be relocated to a more protected location within Stanly County (a tentative relocation site has been selected but not yet finalized). Although past efforts of transplanting the species have had mixed success, there is good potential that many of the relocated sunflowers will survive to establish a new population that will have more protection and greater opportunities for management.

5.3. Effects of Interrelated and Interdependent Actions

The existing utilities located within the construction footprint of the Action will likely be relocated prior to road construction. Although the Schweinitz's sunflowers will have been previously moved, the utility relocations will disturb the species habitat within EO 243 through excavation and clearing. The soil disturbance associated with these activities may create conditions for recolonization of the species from seeds persisting in the soil. Furthermore, the newly cleared and maintained utility rights-of-way may provide new habitat.

6. CUMULATIVE EFFECTS

For purposes of consultation under ESA §7, cumulative effects are those caused by future state, tribal, local, or private actions that are reasonably certain to occur in the Action Area. Future Federal actions that are unrelated to the proposed action are not considered, because they require separate consultation under §7 of the ESA.

There are no known cumulative effects related to this Action.

7. CONCLUSION

In this section, we summarize and interpret the findings of the previous sections (status, baseline, effects, and cumulative effects) relative to the purpose of a BO under §7(a)(2) of the ESA, which is to determine whether a Federal action is likely to:

a) jeopardize the continued existence of species listed as endangered or threatened; or
b) result in the destruction or adverse modification of designated critical habitat.

"Jeopardize the continued existence" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR §402.02).

Schweinitz's sunflower is endemic to the Piedmont physiographic province of North Carolina and South Carolina. As of 2010, there were approximately 86 populations of the species in the two states – up from 13 populations known when the species was listed in 1991. The species is endangered by the loss of historic levels of natural disturbance from fire and grazing by native herbivores, residential and industrial development, encroachment by exotic species, highway construction and improvement, and roadside and utility ROW maintenance. At least 22 populations are in some form of ownership and management that could provide permanent protection to the species.

As of October 3, 2017, approximately 212 Schweinitz's sunflower stems occupying approximately 0.021 acre were located within the Action Area. It is assumed that road construction will directly affect all 212 stems and their habitat. However, these sunflowers will be relocated to a more protected area with greater management opportunities. Assuming a significant level of survival, the relocated sunflowers will establish a new population which will compensate for the loss of habitat through the Action. Although the current roadside habitat will be either lost or permanently modified, the clearing and soil disturbance associated with the Action will likely create new habitat within the Action Area adjacent to the affected area. After the completion of the Action, it is possible that seeds persisting in the soil may recolonize the disturbed area within the new right-of-way.

After reviewing the current status of the species, the environmental baseline for the Action Area, the effects of the Action and the cumulative effects, it is the Service's biological opinion that the Action is not likely to jeopardize the continued existence of the Schweinitz's sunflower.

8. INCIDENTAL TAKE STATEMENT

ESA §9(a)(1) and regulations issued under §4(d) prohibit the take of endangered and threatened fish and wildlife species without special exemption. The term "take" in the ESA means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" (ESA §3). In regulations at 50 CFR §17.3, the Service further defines:

- "harass" as "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering;"
- "harm" as "an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering;" and
- "incidental take" as "any taking otherwise prohibited, if such taking is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity."

Under the terms of ESA §7(b)(4) and §7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered prohibited, provided that such taking is in compliance with the terms and conditions of an incidental take statement (ITS).

This BO evaluated effects of the Action on the endangered Schweinitz's sunflower. ESA §7(b)(4) and §7(o)(2), which provide the authority for issuing an ITS, do not apply to listed plant species. However, ESA §9(a)(2) prohibits certain acts with respect to endangered plant species, including:

(a) remove and reduce to possession from areas under Federal jurisdiction;
(b) maliciously damage or destroy on areas under Federal jurisdiction; and
(c) remove, cut, dig up, or damage or destroy on any other area in knowing violation of any law or regulation of any State or in the course of any violation of a State criminal trespass law.

Regulations issued under ESA §4(d) extend the prohibition under (a) above to threatened plant species (50 CFR §17.71). The damage or destruction of endangered and threatened plants that is incidental to (not the purpose of) an otherwise lawful activity is not prohibited.

9. CONSERVATION RECOMMENDATIONS

§7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by conducting conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary activities that an action agency may undertake to avoid or minimize the adverse effects of a proposed action, implement recovery plans, or develop information that is useful for the conservation of listed species. The Service offers the following recommendations that are relevant to the listed species addressed in this BO and that we believe are consistent with the authorities of the FHWA.

1. NCDOT should endeavor to keep protected roadside populations of Schweinitz's sunflower free of invasive species.
2. NCDOT should improve its roadside plant management program with more emphasis and attention to prevent roadside populations of Federally listed plant species from being treated with herbicides or mowed during the wrong time of the year.
3. NCDOT should provide the Service with a copy of any NCDOT databases used for tracking and monitoring roadside populations of Federally listed plant species. These data should be provided on an annual basis.
4. NCDOT should survey the construction site at EO 243 1-2 years after the site is stabilized to see if Schweinitz's sunflowers have recolonized the new right-of-way.

10.REINITIATION NOTICE

Formal consultation for the Action considered in this BO is concluded. Reinitiating consultation is required if the FHWA retains discretionary involvement or control over the Action (or is authorized by law) when:

a. the amount or extent of incidental take is exceeded;
b. new information reveals that the Action may affect listed species or designated critical habitat in a manner or to an extent not considered in this BO;
c. the Action is modified in a manner that causes effects to listed species or designated critical habitat not considered in this BO; or
d. a new species is listed or critical habitat designated that the Action may affect.

11.LITERATURE CITED

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Smith,T.C. 2008. Spatial analysis of *Helianthus schweinitzii* (Schweinitz's sunflower), an endangered species endemic to the Piedmont of North Carolina. Master of Arts Thesis, University of North Carolina at Greensboro, Greensboro, NC. 65 pp.

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BIOLOGICAL EVALUATION REPORT

FOR THE

NATIONAL FOREST SERVICE

NC 24/27 WIDENING – UWHARRIE NATIONAL FOREST

MONTGOMERY COUNTY, NC

TIP NO. R-2527
WBS ELEMENT 35572.1.1

APRIL 2019

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Biological Resources Reports for the Uwharrie National Forest 24/27 Widening

APPENDICES

I. INTRODUCTION

This Biological Evaluation (BE) identifies the potential effects and impacts on plant and animal resources from the N.C. Department of Transportation (NCDOT) Division 8 Project, WBS Element Number 35572.1.1, TIP R-2527, NC 24/27 Widening, including portions through the Uwharrie National Forest (UNF) (Project) in Montgomery County, NC (Figure 1). The Project occurs along NC 24/27 within sub-basin 03040103 of the Yadkin Pee-Dee River Basin. The Project would involve construction within the Uwharrie National Forest (Study Area) (see Section V.B. for description).

As described in Sections V.A. and V.B., the geographic scope of this effort comprised two areas, the Study Area and Biological Analysis Area (BAA). Project design was preliminary at the initiation of field surveys, so a conservative 500-foot corridor centered on NC24/27 was used as the Study Area. Within this 245-acre Study Area, detailed investigations were conducted on the dates and times discussed in Section IV. C. The BAA encompasses all land within two kilometers of the Study Area (see Section IV. A. for description). Each area is depicted on Figures 2 through 2.4. Within the 14,517 acres comprising the BAA, known occurrences and Significant Natural Heritage Areas (SNHA)s are considered. The anticipated disturbance area for the Project has been developed since the field surveys were completed and is used within this document for impact analysis. This "Project Area" was created using conservative (wide) estimates of the construction area incorporating:

- Existing roadway, fill slopes, and utility corridors
- Proposed roadway cut/fill lines plus an additional 25 feet
- Proposed right-of-way (ROW) plus an additional 20 feet
- Permanent and temporary easements for utility relocation and erosion control beyond the above within the UNF

The overall width of the proposed project varies between approximately 185 feet and 345 feet. These widths include the existing road, shoulders, and utilities. The Project Area comprises 130 acres within the UNF and is intended to encompass all areas to be directly disturbed by the Project.

In summary, the evaluation of the biological effects of the Project include a step-down approach of the BAA (2-kilometer radius), the Study Area (500 ft preliminary corridor used for field surveys), and Project Area (construction area used for direct impact analysis).

II. POTENTIAL IMPACTS CONSIDERED

Construction of the project would require disturbances within the UNF, some of which may be locally significant. Clearing and grubbing would be required to accommodate the project footprint and easements. Grading, including cut and fill sections, would be required throughout the Project Area. Blasting is possible as part of these efforts, depending on the results of geotechnical investigations that would follow approval of this BE. In addition to direct effects of clearing, grading, and blasting, concerns may include ground and air vibrations, flyrock, noise, fumes and dust. Construction would require the use of dozers, pans, dump trucks, excavators, and sheepsfoot rollers. The US Forest Service (USFS) also expressed concern for acid bearing rock in the Project Area, and conflicts between the new road and its ongoing prescription burning.

Hydrologic and soil impacts are also considered as part of this evaluation. The USFS expressed concerns for treatment and volume of stormwater, soil erosion, stream channel stability, stormwater contaminants (de-icing salts, road-derived contaminants), soil productivity, and impacts to hydric soils.

III. SPECIES CONSIDERED AND METHODS

Rare species considered in this report include federally Threatened and Endangered (T&E), Federal Species of Concern (FSC), and North Carolina Listed (NC Listed) species. Two amphibians, Mole Salamander (*Ambystoma talpoideum)* and Four-toed Salamander (*Hemidactylium scutatum*), in the BAA but with upland habitat overlapping the Study Area are also addressed. NC Listed species were derived from the North Carolina Natural Heritage Program (NCNHP) and expert consultations. Potential direct and indirect effects to T&E, FSC, and NC Listed species in the Study Area are analyzed.

A comprehensive list of these species, known to occur on UNF property, including the protection status for each, was provided by USFS botanists and fisheries and wildlife biologists in July 2018. These lists were provided to the team of resource specialists and served as the foundation for this investigation. A total of 101 species were identified, including 60 plants and 41 animals. The final list is provided as Appendix 1 of the attached Biological Resources Reports, and includes preferred habitat, protection status, and potential to occur in the Study Area.

Optimal survey windows for each species were determined and used to schedule detailed on-site investigations by the appropriate taxa experts. Survey windows were adjusted based on flowering status of local reference populations to capture seasonal variations of target species. The field surveys were conducted by a meander search pattern to survey all habitats in the Study Area. Attention was focused during the surveys on T&E, FSC, and NC Listed species as well as their potential habitats. The investigation documented all species encountered.

IV. EXISTING BIOLOGICAL CONDITION

A. BIOLOGICAL ANALYSIS AREA

The BAA comprises a two-kilometer buffer around the Study Area of approximately 14,517 acres (Figure 2). The BAA is located in the Piedmont Level III ecoregion, and the Carolina Slate Belt Level IV ecoregion. The BAA includes a portion of the Uwharrie Mountains, which is characterized by rolling hills with rougher terrain than much of the Piedmont region of North Carolina. Elevations vary across the BAA, but range between 400 feet above mean sea level (msl) along the floodplain of Rocky Creek in the east, Rocky Creek in the west, and Dumas and Clarks creeks in the south, up to over 780 feet above msl on Horse Trough Mountain in the west.

The Yadkin River is west of the Study Area and BAA, though numerous tributary streams flow across these areas. These streams include tributaries of Cattail Creek ((13-8-1)WS-IV), Dumas Creek (13-16-1) and its tributaries (Class C), Clarks Creek ((13-16) Class C)), (Lick Fork (13-16-4) Class C)), Rocky Creek (13-25-30-(0.5) Class C; HQW), and Smith Branch ((13-25-30-1) Class C)).

WS-IV waters are designated for drinking and food processing uses. WS-IV waters are assigned when more restrictive WS-I, WS-II, or WS-III designations are not feasible, typically due to urbanization. Class C waters are protected for fishing, wildlife, fish consumption, aquatic life including propagation, survival, and maintenance of biological integrity, agriculture, boating, and uses involving unorganized and infrequent human body contact. High Quality Waters (HQW) are supplemental designations intended to protect waters rated as excellent based on physical, biological, or chemical characteristics.

The USFS provided data on rare species and natural communities within the BAA. Their records include: approximately 15 *Stewartia ovata* (Mountain Camellia) resprouting after a 2017 fire, about 25 *Iris prismatica* (Slender Blue Iris), about 12 *Sarracenia flava* (Yellow Pitcher Plant) in a hillside seep community, three populations of *Fothergilla major* (Large Witch Alder), nine locations for a newly described species of quillwort *Isoetes uwharrie* (Tiny Quillwort), and six to eight *Lindera subcoriacea* (Bog Spicebush). Several *Isoetes uwharrie* were located within the Project Area (Figure 4.8). No published description of this species is currently available, refer to Section V. C. of this document for a discussion. The remainder of USFS records listed above occur outside the Study Area.

Significant Natural Heritage Areas

Seven Significant Natural Heritage Natural Areas (SNHAs) are mapped within the BAA (Figure 2). Appendix C includes detailed descriptions of each, taken from the Montgomery County Natural Heritage Inventory (NCNHP 2001). Lower Rocky Creek Longleaf Pine Forest (Regionally Significant) and Roberdo Bog and Longleaf Pine Forest (Nationally Significant) are mapped within the Study Area. Clarks Grove Longleaf Pine Forest (Nationally Significant), Lawrenceville Ephemeral Pools (County Significant), Railroad Mixed Pine Forest (Nationally Significant), Walker Mountain/Wood Run Natural Area, and YAD/Upper Little River Aquatic Habitat are mapped within the BAA but not in the Study Area.

Lower Rocky Creek Longleaf Pine Forest is mapped within both the Study Area and BAA and is considered Regionally Significant because of its high-quality longleaf pine forests and rare plant species. These include: *Cirsium carolinianum* (Soft Thistle), *Helianthus laevigatus* (Smooth Sunflower), and *Smilax biltmoreana* (Biltmore's Carrionflower). This SNHA occupies 352 acres in the BAA, 12 of which are within the Study Area. The Project Area includes 8.4 acres of this SNHA. The USFS is working to restore the mature longleaf pine forest that once dominated this area. The Mixed-Pine Hardwood community present in this portion of the Project Area today is a transitional condition, not reflected in either NCNHP or USFS mapping. The USFS has been managing these areas via burning for over 30 years; Initial burns occurred in the 1980s, and prescription burns began 10 to 12 years ago (USFS, email communication).

Roberdo Bog and Longleaf Pine Forest is mapped within both the Study Area and BAA. Roberdo Bog and Longleaf Pine Forest is considered Nationally Significant and includes two distinct areas: the Bog and the Longleaf Pine Forest. Similar to the Lower Rocky Creek Longleaf Pine Forest discussed above, the USFS has conducted burns in this area for over thirty years. It is transitioning back to its natural *Pinus palustrus* dominated community.

Roberdo Bog has been the focus of a number of specific concerns relating to the Project. Its

boundaries are misrepresented in two existing datasets. The NCNHP Element Occurrence dataset shows the feature entirely outside of the project Study Area. The NCNHP Managed Areas dataset shows the feature extending 200-feet into the Study Area. As part of this evaluation, North Carolina's Emergency Management QL2 LiDAR data were obtained through its Spatial Data Download portal. Based on these data, believed to most accurately reflect surface conditions, the pool occurs approximately 80 feet outside the Study Area (Figure 5.1), and approximately 150 feet from the Project Area.

Regardless of direct impact to the pool of Roberdo Bog, impacts to uplands adjacent to this feature would occur. One rare species, *Ambystoma talpoideum*, has been documented in the pool. Another, *Hemidactylium scutatum*, is know from the BAA and may also utilize the pool for breeding.

The Roberdo Bog and Longleaf Pine Forest SNHA occupies 1,007 acres inside the BAA, including 93 acres within the Study Area. The Project Area includes 51 acres of this SNHA. The impact of the Project on Roberdo Bog and Longleaf Pine Forest would be the expansion of an existing road corridor, widened between 75 and 125 feet. This SNHA is significant due to the upland pool (Roberdo Bog discussed above), and extensive *Pinus palustrus* forests managed by USFS with controlled burns. The area is also home to several rare species, including: *Ambystoma talpoideum*, *Helianthus schweinitzii* (Schweinitz's Sunflower), *Helianthus laevigatus*, and *Pseudognaphalium helleri* var. *helleri* (Heller's Rabbit Tobacco).

Clarks Grove Longleaf Pine Forest, is considered a SNHA of National Significance. It gained this ranking due to its high quality Piedmont Longleaf Pine Forest, and by being the site of several populations of the Federally Endangered *Helianthus schweinitzii*. The location of this SNHA is along NC 109, south of the Project. It occupies 263 acres of the BAA and is 5,700 feet south of the Study Area. Due to the distance from the project, no impact to this SNHA is expected to result.

Lawrenceville Ephemeral Pools is considered a SNHA of County significance. This area was designated due to the presence of two ephemeral upland pools, including one which supports *Hemidactylium scutatum*. This SNHA occurs north of NC 24/27, about a quarter mile east of Horse Trough Mountain, and occupies 116 acres of the BAA. At its closest point, Lawrenceville Ephemeral Pools SNHP is approximately 750 feet north of the Study Area. Due to the distance from the project, no impact to this SNHA or the species it supports is expected to result.

Railroad Mixed Pine Forest is considered a SNHA of National significance. This designation is due to high quality Longleaf Pine forests and numerous rare species, including: *Helianthus schweinitzii, H. laevigatus, Nestronia umbellula* (Indian Olive), and *Amorpha schwerinii* (Schwerin's False Indigo). A Uwharrie Boggy Streamhead within this SNHA provides breeding habitat for amphibians, and its 347 acres in the BAA provide contiguous forest interior bird species habitat. The Railroad Mixed Pine Forest is situated along the railroad corridor near the Project's eastern extent, 2,100 feet north of the Study Area. Due to the distance from the Project, no impact to this SNHA or the species it supports is expected to result.

Neither the **Walker Mountain/Wood Run Natural Area**, nor the **YAD/Upper Little River Aquatic Habitat** are described in the Montgomery County Natural Area Inventory. Both areas are located more than a mile from the Study Area (5,500 and 6,400 feet respectively) and due to their distances from the Project, neither is expected to be impacted.

Natural Communities

During the 2007 botanical surveys conducted by NCDOT biologists, the Study Area was grouped into four community types[1]: 1) Dry Oak-Hickory Forest, 2) Maintained/Disturbed, 3) Timbered Shrub-Scrub, and 4) Loblolly Pine Plantation. During the 2017/2018 botanical surveys conducted by the resource experts listed at the end of this document, the Study Area was also grouped into three community types: 1) Maintained/Disturbed, 2) Mixed Pine-Hardwood Forest, and 3) Seeps of First Order Tributaries.

Twelve NC NHP Natural Communities occur within the BAA (Figure 2). Resource experts performing the 2017/2018 surveys included botanists with experience in this area of the UNF. Not all Natural Communities were encountered in the Study Area, but are known to occur in the BAA. Piedmont Boggy Streamhead, Wet Piedmont Longleaf Pine Forest, and Dry Piedmont Longleaf Pine Forest are mapped within the Study Area. Dry-Mesic Oak-Hickory Forest (Piedmont Subtype), Dry Oak-Hickory Forest (Piedmont Subtype), Hillside Seepage Bog, Low Elevation Seep (Typic Subtype), Piedmont/Coastal Plain Heath Bluff, Piedmont Headwater Stream Forest (Typic Subtype), Piedmont Monadnock Forest (Typic Subtype), Upland Depression Swamp Forest, and Upland Pool (Roberdo Subtype) are mapped within the BAA but not in the Study Area. Note the Roberdo Bog discussion above regarding the location of this resource. Each of these Natural Communities are described in the Natural Communities of North Carolina, 4th Approximation (NCNHP, 2012). Excerpts from this document are provided as Appendix B.

Piedmont Boggy Streamhead (G2G3) communities include seepage areas across the landscape, though primarily occurring along smaller headwater streams. Evidence of flowing water may or may not be present. This community is not yet well defined but is considered distinct from other communities. These communities are considered rare. Piedmont Boggy Streamheads mapped by the NCNHP, including 10.15 acres in the Project Area, are illustrated on Figure 6.

Dry Piedmont Longleaf Pine Forest (G2G3) communities are dominated by *Pinus palustrus*, but also includes areas where past logging and other land uses have precluded it as a dominant landscape species. Based on USFS evaluation, a large portion of the Study Area does contain this community type as the result of extensive USFS restoration activities over more than 30 years. Some areas mapped as Dry Piedmont Longleaf Pine Forest within the Study Area today are dominated by Loblolly Pine (*Pinus taeda*). Within the BAA, larger contiguous areas of *P. palustrus* were observed within Longleaf Pine Forest mapping provided by USFS, depicted on the attached Figures 5.0 through 5.2. Dry Piedmont Longleaf Pine Forest areas mapped by NCNHP, including 33.76 acres in the Project Area, are depicted on Figure 6.

Wet Piedmont Longleaf Pine Forest (G1) include areas fed by seepage and perched woodland wetlands in which *Pinus palustris* is either dominant or codominant, which distinguishes these areas from other Piedmont wetland communities. *Pinus palustris* may be scarce in examples where past logging and fire suppression have removed it and allowed other pines and hardwoods to expand. It is distinguished from Dry Piedmont Longleaf Pine Forest by its abundant hydrophytic

1 Maintained/Disturbed areas include developed areas, roads and roadsides, and maintained rights-of-way. Timbered Shrub-Scrub areas, reported in 2007, are focused primarily in western portions of the Study Area and include early successional communities post-logging, within and immediately adjacent to the Study Area.

vegetation. Wet Longleaf Pine Forests mapped by the NCNHP, including 11.74 acres in the Project Area, are depicted on Figure 6.

Dry-Mesic Oak-Hickory Forest (Piedmont Subtype) (G4G5), and **Dry Oak-Hickory Forest (Piedmont Subtype)** (G4G5) are mature hardwood forests occurring over a dry to mesic moisture range along acidic slopes and ridges, with Dry Oak-Hickory Forest communities dominating the highest and driest landscape positions within the BAA. Both are fairly common upland hardwood communities in North Carolina.

Hillside Seepage Bog (G2) communities occur on gradual slopes adjacent, and contributing, to similar areas such as Piedmont Boggy Streamhead areas. These areas are known from the BAA, but were not observed in the Study Area. Unlike streamhead areas, seepage bog sites lack the geomorphologic evidence of flowing water. They typically contain flora tolerant of acidic soils, primarily in the Piedmont and Mountain regions of North Carolina. The Uwharrie Mountains contain examples of this community that may eventually be recognized as their own variant of this subtype. Hillside seepage bogs are historically known to contain pitcher plants and rare plant species, but as a group have been adversely impacted in recent decades. The Uwharrie variant of this community includes sites that remain vegetatively diverse, presumably due to prescribed burning. Fire may play a critical role in this community's management.

Low Elevation Seep (Typic Subtype) (G3?) communities are relatively common lower slope, seep-fed wetland areas found across North Carolina. They are acidic sites with few unique vegetative characteristics, aside from the contrast with adjacent drier communities within which they occur. These areas are known from the BAA but were not observed in the Study Area.

Piedmont/Coastal Plain Heath Bluff (G2G3) occur in cool and moist sites in the Piedmont and Coastal Plain, adjacent to steep slopes and on sites with a northern aspect. These areas are known from the BAA but were not observed in the Study Area. They are dominated in the UNF by *Kalmia latifolia* (Mountain Laurel). In this region, mountain laurel is common but Heath Bluff communities remain recognizable by landscape position.

Piedmont Headwater Stream Forest (Typic Subtype) (G3G4) communities occur in lower slope positions associated with first and second order intermittent streams. These communities are fairly common in the landscape and dominated by wetland vegetation more characteristic of lower slopes and floodplains. Upland species are not uncommon in this community. These communities are common in topographic draws above floodplains in the BAA. Several of these communities were identified within the Study Area and are depicted on Figure 3.0 through 3.9.

Piedmont Monadnock Forest (Typic Subtype) (G3G4) communities occur on rocky, acidic, bluffs and erosional uplands. However, not all these landscape positions support Piedmont Monadnock Forest. NCNHP 2012 states that Uwharrie Mountain Piedmont Monadnock Forest communities occur "on higher knobs of felsic volcanic rocks, grades into Dry or Dry-Mesic Oak-Hickory Forest downslope, but is abruptly replaced by Basic Oak-Hickory Forest on mafic volcanic rock". Tolerance to aluminum toxicity and extreme soil acidity are assumed important factors in vegetative communities on these sites. These communities occur in the BAA, but none were found within the Study Area.

Upland Depression Swamp Forest (G2G3) communities occur on concave portions of terraces and flat ridges where poor drainage enables seasonal ponding. These areas are not saturated for long enough periods to preclude tree establishment. This attribute also means a sparse layer of shade-tolerant understory is typical. Upland Depression Swamp Forests do occur in the BAA, but none were observed in the Study Area.

Upland Pool (Roberdo Subtype) (G1) community is a unique community of Upland Pool located in the UNF. Upland Pools are depression wetlands not directly associated with other surface waters. Typical examples occur across the piedmont (Piedmont Subtype – a G1 community), though there are also Mountain and Coastal Plain subtypes. Roberto Subtype, located in the BAA, is unique in that it is dominated by coastal evergreen and smilax vegetation. Please see the discussion above regarding conflicting mapping of this resource in relation to the Study Area.

B. STUDY AREA

The Study Area is the area within USFS property and includes all land within a 500-foot wide corridor centered on NC24/27. This area was established to capture all land that would be directly or indirectly disturbed by the Project based on preliminary designs. The Study Area includes two general areas of National Forest overlap (Figure 1). The first area occurs between a point 0.76 mile east of River Road and 0.74 mile west of S.R. 1134. Three portions of Study Area occur within this area. The second area occurs between Bruton Carpenter Road and 0.47 mile east of NC 109. Elevations in the Study Area range from 500 feet to 650 feet above mean msl. The Study Area encompasses approximately 245 acres.

The general community types reported from within the Study Area included: 1) Mixed Pine/Hardwood Forest, 2) Maintained Disturbed Areas, and 3) Seeps of First-Order Tributaries.

The Study Area also includes portions of two SNHAs and four Natural Communities (Figures 2 and 3). SNHAs described above that occur in the Study Area include Lower Rocky Creek Longleaf Pine Forest, and Roberdo Bog and Longleaf Pine Forest. Natural Communities located in the Study Area included Piedmont Boggy Streamhead, Piedmont Headwater Stream Forest, Dry Piedmont Longleaf Pine Forest, and Wet Piedmont Longleaf Pine Forest, all of which are described above.

Surveys conducted within the Study Area located *Fothergilla major*, *Pseudognaphalium helleri* and 17 populations of *Helianthus laevigatus*. The locations of each of these occurrences are provided on Figure 4.0 through 4.9.

C. TIMING OF FIELD SURVEYS

Field surveys were conducted in 2004, 2007, 2008, 2011, 2017, and 2018. Biologists with expertise in various fields participated in the surveys. Survey windows were adjusted based on flowering status of local reference populations to capture seasonal variations of target species. Qualifications of principle investigators from 2017 and 2018 are included in Section V of this report. The qualifications of NCDOT biologists who performed surveys in 2004, 2007, 2008, and 2011 are documented in an earlier Biological Evaluation and Biological Resource Reports for TIP# R-2527,

dated January 2014 and 2013, and provided as Appendix D through Appendix G.

Benthic Macroinvertebrates
May 21, 2007 (NCDOT Biologists)
June 27, 2007 (NCDOT Biologists)
August 16, 2007 (NCDOT Biologists)
March 7 and 8, 2018 (Dave Penrose and Jason York)

Bats
June 25-26, 2007 (NCDOT Biologists)

Birds
May 22, 2007 (NCDOT Biologists)
Surveys were conducted for presence/absence using visual and auditory surveys. Special care was given to conduct the surveys in the early morning during the breeding season (April 21-June 23).
April 26 - 28, 2018 (Logan Williams and Mike Sanderson)

Bird: Bald Eagle
September 2004, (NCDOT Biologists)
April 10, 2006 (NCDOT Biologists)
March 27, 2007 (NCDOT Biologists)
December 15, 2017 (Greg Price)

Bird: Red-cockaded Woodpecker (Greg Price, Chris Hopper)
March 8, 2006 – March 27, 2007 (NCDOT Biologists)
May 21-22, 2007 (NCDOT Biologists)
November 14, 17, and 29, 2017 (Greg Price, Chris Hopper)
December 12 and 22, 2017 (Matt Haney, Greg Price, Chris Hopper, Mike Sanderson)
January 22 – 23, 2018 (Matt Haney, Greg Price, Chris Hopper, Mike Sanderson, Rex Badgett)
March 7, 2018 (Greg Price, Chris Hopper)

Plants
May 21, 2007 (NCDOT Biologists)
June 26, 2007 (NCDOT Biologists)
October 24 - 25, 2007 (NCDOT Biologists)
November 1-2, and 7, 2007 (NCDOT Biologists)
November 16, 19, and 21, 2007 (NCDOT Biologists)
October 18 – 20, 2011 (NCDOT Biologists)
October 18 and 20, 2017 (Moni Bates and Logan Williams)
November 3 and 26, 2017 (Moni Bates and Logan Williams)
April 26 – 27, 2018 (Moni Bates and Logan Williams)
May 15, 16, and 22, 2018 (Moni Bates and Logan Williams)
October 18 – 20, 2011 (NCDOT Biologists)

Plant: Schweinitz's Sunflower
April – May, 2004 (NCDOT Biologists)

September 9 – October 18, 2006 (NCDOT Biologists)
October 24, 2007 (NCDOT Biologists)
November 1, 2, 7, 16, 19, and 21 (NCDOT Biologists)
October 18 – 20, 2011 (NCDOT Biologists)
September 26, 2017 (Chris Hopper, Greg Price)
October 18, 2017 (Chris Hopper, Greg Price)

Freshwater Fish
June 27, 2007 (NCDOT Biologists)
May 22 and 28, 2018 (John Alderman and Joe Alderman)
September 11, 2018 (John Alderman and Joe Alderman)

Freshwater Mussels
August 16, 2007 (NCDOT Biologists)
May 1, 2018 (John Alderman and Joe Alderman)

Salamanders
June 26-27, 2007 (NCDOT Biologists)
March 20, 2008 (NCDOT Biologists)
October 17, 2017(Dennis Herman and Joe Alderman)

Terrestrial Animals (Birds, Salamanders, Bats, Mammals)
May 21-22, 2007 (NCDOT Biologists)
June 25-27, 2007 (NCDOT Biologists)
August 16, 2007 (NCDOT Biologists)
March 20, 2008 (NCDOT Biologists)

Terrestrial Insects
August 16, 2007 (NCDOT Biologists)

D. THREATENED, ENDANGERED, FEDERAL SPECIES OF CONCERN, AND NORTH CAROLINA LISTED SPECIES

The team of resource specialists were tasked with surveying for 101 plant and animal species. Of these, 56 T&E, FSC, and NC Listed species are addressed in this evaluation. These include two amphibians, four birds, one crustacean, four freshwater fish, 11 freshwater bivalves, two insects, one mammal, three reptiles, and 28 vascular plants. USFS Species of Interest (SI) encountered or reported by USFS are also included below and in Section V. C., and include three birds, one macroinvertebrate, and two plants. The complete list of target species, including 45 species listed as either State Significantly Rare or identified by the USFS, is provided as Appendix 1 of the attached Biological Resources Report.

Discussed below are T&E and FSC species initially considered potentially present, followed by State Listed species observed in the Study Area. Each of these are grouped below by protection status and listed alphabetically by taxonomic group.

Threatened and Endangered Species

Bird

Picoides borealis (Red-cockaded Woodpecker) – Federally Endangered, State Endangered. *Picoides borealis* occurs in mature open pine forests, mainly in longleaf pine. Suitable habitat for *P. borealis* does occur in scattered locations within the Study Area and BAA. During their 2006/2007 surveys of the area, NCDOT Biologists did locate one inactive cavity tree approximately one mile west of the railroad and 0.4 mile north of NC 24/27. These areas were surveyed via transects in 2017 and 2018; no new activity was noted and no *P. borealis* was found. The biological conclusion for this project is 'No Effect'.

Insect

Bombus affinus (Rusty-patched Bumble Bee)—Federal Endangered. This insect is an underground nester known from temperate climates. None is known in the Study Area or BAA, and none was reported during surveys. The biological conclusion for this project is 'No Effect'.

Mussel

Lasmigona decorata (Carolina Heelsplitter) – Federally Endangered, State Endangered. *Lasmigona decorata* is known from the Catawba and Yadkin-Pee Dee drainages, and is endemic to these areas in North Carolina and South Carolina. Recent mussel surveys were performed on August 16, 2007 and May 1, 2018 and none was found. Though not found during surveys, potentially suitable habitat for this species downstream of the Project Area may be adversely impacted by this project. The erosion and sedimentation controls and hydrologic preservation mitigation measures explained in Section V.D. are expected to offset effects from the Project on this species' potentially suitable habitat. The biological conclusion for this project is 'No Effect'.

Vascular Plants

Echinacea laevigata (Smooth Coneflower) – Federally Endangered, State Endangered. *Echinacea laevigata* occurs in glades, woodlands, and open areas over mafic rock. Plant surveys occurred on October 24, November 1-2, 7, 16, 19, and 21, 2007, October 18 and 20, November 3 and 26, 2017; April 26 and 27, May 15, 16, and 22, 2018. None is known in the Study Area or BAA, and none was reported during surveys. The biological conclusion for this project is 'No Effect'.

Helianthus schweinitzii (Schweinitz's Sunflower) - Federal Endangered, State Endangered. *H. schweinitzii* populations are recorded throughout the BAA. This species favors non-forested open areas, especially roadsides and other rights-of-way. This open habitat does occur within the Study Area and was repeatedly surveyed during the course of the season. During the 2007 surveys, NCDOT biologists located *H. schweinitzii* along the railroad corridor paralleling NC 109, south of NC 24/27. During their October 2011 surveys, NCDOT Biologists documented 35 individuals within this population. In 2013, four clumps were removed by NCDOT and USFS and transplanted to another population. During a fall 2016 survey, Andy Walker, USFS Botanist, and Moni Bates conducted negative searches for remaining stems in this location. The area was visited again during the 2017 surveys and none was found. All existing populations in the BAA are distant enough from the project that they are not anticipated to be affected by the Project. Any currently

unoccupied habitat to be impacted within the Project Area would be offset by the creation of additional potentially suitable habitat. The biological conclusion for this project is 'May Affect, Not Likely to Adversely Affect'.

Rhus michauxii (Michaux's Sumac) – Federal Endangered, State Endangered. *Rhus michauxii* prefers open habitats on clayey soils derived from mafic rock. Surveys were performed during the US Fish and Wildlife Service (USFWS) recommended optimal survey window on October 24, 2007, and October 18, 2017. None is known in the Study Area or BAA, and none was reported during surveys. Any currently unoccupied habitat to be impacted within the Project Area would be offset by the creation of additional potentially suitable habitat. The biological conclusion for this project is 'No Effect'.

Federal Species of Concern

Bird

Peucaea aestivalis (Bachman's Sparrow) - Federal Species of Concern, State Special Concern. *Peucaea aestivalis* prefers open longleaf pine forests and old fields. These areas were surveyed on May 21-22, 2007, March 20, 2008, April 26, 27, and 28, 2018, and none was found. Ongoing restoration of longleaf pine forests in the BAA and Study Area will continue to improve habitat for this species. While this species was not observed during surveys for this project, its longleaf pine habitat would be impacted. NCNHP mapped Wet Piedmont Longleaf Pine Forest and Dry Piedmont Longleaf Pine Forest currently undergoing restoration within the Project Area total 45.5 acres (Figure 6). The negative findings during several surveys for this species are assumed to be evidence that any local populations are small. Vast areas of potentially suitable habitat remaining on UNF lands would be sufficient to offset any negative impact from this project. The Project is not anticipated to adversely impact this species.

Freshwater Fish

Ambloplites cavifrons (Roanoke Bass) - Federal Species of Concern, State Significantly Rare. *Ambloplites cavifrons* occurs in the Neuse and Roanoke River Basins. This species is not known to occur in the Yadkin-Pee Dee River Basin. The Project is not anticipated to adversely impact this species.

Etheostoma collis (Carolina Darter) - Federal Species of Concern, State Special Concern. Known from the Roanoke, Tar, Neuse, Cape Fear, Yadkin-Pee Dee, and Catawba drainages. Surveys were performed on May 22 and 28, 2018 and found none. Though not found during surveys, potentially suitable habitat for this species may be adversely impacted by this project. The erosion and sedimentation controls and hydrologic preservation mitigation measures explained in Section V.D. are expected to offset effects of the Project on this species' potentially suitable habitat. The Project is not anticipated to adversely impact this species.

Moxostoma sp. 3 (Carolina Redhorse) - Federal Species of Concern, State Threatened. *Moxostoma sp. 3* is known from the Cape Fear and Yadkin-Pee Dee drainages. Surveys were performed on May 22 and 28, 2018 and found none. Though not found during surveys, potentially suitable habitat for this species may be adversely impacted by this project. The erosion and sedimentation controls and hydrologic preservation mitigation measures explained in Section V.D. are expected to offset effects of the Project on this species' potentially suitable habitat. The Project is not

anticipated to adversely impact this species.

Insect

Gomphus septimal (Septima's Clubtail) - Federal Species of Concern, State Significantly Rare. *Gomphus septimal* prefers rocky rivers. None is known from the Study Area or BAA. Though not found during surveys, potentially suitable habitat for this species may be adversely impacted by this project. The erosion and sedimentation controls and hydrologic preservation mitigation measures explained in Section V.D. are expected to offset effects of the Project on this species' potentially suitable habitat. The Project is not anticipated to adversely impact this species.

Mussels

Alasmidonta undulata (Triangle Floater) - Federal Species of Concern, State Threatened. *Alasmidonta undulata* occurs in the Roanoke, Chowan, Tar, Neuse, and Cape Fear Drainages. This species is not known to occur in the Yadkin-Pee Dee River Basin. None is known from the Study Area or BAA. The Project is not anticipated to adversely impact this species.

Elliptio roanokensis (Roanoke Slabshell) - Federal Species of Concern, State Threatened. *Elliptio roanokensis* is known from the Roanoke, Tar, Neuse, White Oak, Cape Fear, Lumber, and Yadkin-Pee-Dee drainages. None is known from the Study Area or BAA. Surveys were performed on May 1, 2018 and none was found. Though not found during surveys, potentially suitable habitat for this species may be adversely impacted by this project. The erosion and sedimentation controls and hydrologic preservation mitigation measures explained in Section V.D. are expected to offset the effects of the Project on this species' potentially suitable habitat. The Project is not anticipated to adversely impact this species.

Fusconaia masoni (Atlantic Pigtoe) - Federal Species of Concern, State Endangered. *Fusconaia masoni* is known from the Roanoke, Tar Neuse, Cape Fear, and Yadkin-Pee Dee drainages. Surveys were performed on May 1, 2018 and none was found. None is known from the Study Area or BAA. Though not found during surveys, potentially suitable habitat for this species may be adversely impacted by this project. The erosion and sedimentation controls and hydrologic preservation mitigation measures explained in Section V.D. are expected to offset the effects of the Project on this species' potentially suitable habitat. The Project is not anticipated to adversely impact this species.

Lasmigona subviridis (Green Floater) - Federal Species of Concern, State Endangered. *Lasmigona subviridis* is known from the Roanoke, Tar, Neuse, Yadkin-Pee Dee, New, and Watauga drainages. Surveys were performed on May 1, 2018 and none was found. None is known from the Study Area or BAA. Though not found during surveys, potentially suitable habitat for this species may be adversely impacted by this project. The erosion and sedimentation controls and hydrologic preservation mitigation measures explained in Section V.D. are expected to offset the effects of the Project on this species' potentially suitable habitat. The Project is not anticipated to adversely impact this species.

Lampsilis cariosa (Yellow Lampmussel) - Federal Species of Concern, State Endangered. *Lampsilis cariosa* is known from the Chowan, Roanoke, Neuse, Tar, Cape Fear, Lumber, and Yadkin-Pee Dee drainages. Surveys were performed on May 1, 2018 and none was found. None

is known from the Study Area or BAA. Though not found during surveys, potentially suitable habitat for this species may be adversely impacted by this project. The erosion and sedimentation controls and hydrologic preservation mitigation measures explained in Section V.D. are expected to offset the effects of the Project on this species' potentially suitable habitat. The Project is not anticipated to adversely impact this species.

Toxolasma pullus (Savannah Lilliput) - Federal Species of Concern, State Endangered. *Toxolasma pullus* is known from the Cape Fear, Lumber, and Yadkin-Pee Dee drainages. Surveys were performed on May 1, 2018 and none was found. None is known from the Study Area or BAA. Though not found during surveys, potentially suitable habitat for this species may be adversely impacted by this project. The erosion and sedimentation controls and hydrologic preservation mitigation measures explained in Section V.D. are expected to offset the effects of the Project on this species' potentially suitable habitat. The Project is not anticipated to adversely impact this species.

Villosa vaughaniana (Carolina Creekshell) - Federal Species of Concern, State Endangered. *Villosa vaughaniana* is known from the Cape Fear, Yadkin-Pee Dee, and Catawba drainages (endemic to North Carolina and South Carolina). Surveys were performed on May 1, 2018 and none was found. None is known from the Study Area or BAA. Though not found during surveys, potentially suitable habitat for this species may be adversely impacted by this project. The erosion and sedimentation controls and hydrologic preservation mitigation measures explained in Section V.D. are expected to offset the effects of the Project on this species' potentially suitable habitat. The Project is not anticipated to adversely impact this species.

<u>Reptile</u>

Pituophis melanoleucus (Northern Pinesnake) - Federal Species of Concern, State Special Concern. *Pituophis melanoleucus* prefers dry and sandy woods, mainly in pine/oak sandhills. None is known from the Study Area or BAA. During their 2007/2008 terrestrial animal surveys, NCDOT Biologists noted that suitable habitat was not observed. Direct impacts to this species during construction are unlikely due to the negative survey results and mobility of this species. Construction equipment vibration will be localized. Blasting, if required, could be an adverse indirect impact on these animals. Snakes rely on vibration sensitivity for feeding and danger avoidance. Development of the blasting plan discussed in Section V.D. would minimize the frequency and impact extent of any unavoidable blasting. Any adverse impacts that may result are expected to be short-lived. Potentially suitable habitat for this animal would be impacted. However, the abundance of suitable habitat on adjacent UNF lands would offset any losses associated with this project. The Project is not anticipated to adversely impact this species.

<u>Vascular Plant</u>

Acmispon helleri (Carolina Birdfoot-trefoil) – Federal Species of Concern, State Special Concern – Vulnerable. This plant is found on clayey soils in open forests, woodlands, and along roadsides. Plant surveys occurred on October 18 and 20, November 3 and 26, 2017; April 26 and 27, May 15, 16, and 22, 2018. None is known in the Study Area or BAA, and none was reported during surveys. The Project is not anticipated to adversely impact this species.

Carex impressinervia (Ravine Sedge) – Federal Species of Concern, State Significantly Rare –

Throughout. *Carex impressinervia* is found in southern piedmont rich alluvial forests. Plant surveys occurred on October 18 and 20, November 3 and 26, 2017; April 26 and 27, May 15, 16, and 22, 2018. None is known in the Study Area or BAA, and none was reported during surveys. The Project is not anticipated to adversely impact this species.

Lindera subcoriacea (Bog Spicebush) – Federal Species of Concern, State Significantly Rare – Throughout. *Lindera subcoriacea* is found on hillside seepage bogs, streamhead pocosins, and white cedar swamps. Plant surveys occurred on October 18 and 20, November 3 and 26, 2017; April 26 and 27, May 15, 16, and 22, 2018. None is known in the Study Area. The USFS provided a record of *L. subcoriacea* approximately 2,400 feet north of the Study Area. Because of the distance between this occurrence and the Study Area, the Project is not anticipated to adversely impact this species.

Danthonia epilis (Bog Oat-grass) – Federal Species of Concern, State Significantly Rare – Throughout. *Danthonia epilis* is found on hillside seepage bogs and in wet, seepy powerlines. Plant surveys of suitable habitat occurred on October 18 and 20, November 3 and 26, 2017; April 26 and 27, May 15, 16, and 22, 2018. None is known in the Study Area. The USFS reported that this species is known from the BAA, but records were not available for use in this evaluation. The Project is not anticipated to adversely impact this species.

Eurybia mirabilis (Piedmont Aster) – Federal Species of Concern, State Significantly Rare – Throughout. *Eurybia mirabilis* is found on rich slopes and bottomlands, mesic mixed hardwood forest, and piedmont basic mesic forests. Plant surveys occurred on October 18 and 20, November 3 and 26, 2017; April 26 and 27, May 15, 16, and 22, 2018. None is known in the Study Area or BAA, and none was reported during surveys. The Project is not anticipated to adversely impact this species.

State Listed Species Observed

Amphibians

Ambystoma talpoideum (Mole Salamander) – State Special Concern – An *A. talpoideum* larva was located by NCDOT biologists during their June 26, 2007 terrestrial animal surveys in Roberdo Bog. This species was located in the BAA, but not the Study Area. Because uplands adjacent to Roberdo Bog do extend into the Study Area, resources utilized by this species outside its breeding season may be impacted by the Project. Section V. C. of this report includes a discussion of analyses conducted to determine the potential indirect impact to this species.

Hemidactylium scutatum (Four-toed Salamander) – State Special Concern – No *H. scutatum* were observed during either 2007/2008 or 2017/2018 surveys. However, these animals are known to occur within the BAA. Because uplands adjacent to Roberdo Bog do extend into the Study Area 2017, this species has been included for discussion. Resources utilized by this species outside its breeding season may be impacted by the Project. Section V. C. of this report includes a discussion of analyses conducted to determine the potential indirect impact to this species.

Reptile

Crotalus horridus (Timber Rattlesnake) - State Special Concern - One *C. horridus* was observed

denning in a hole on the side of the NC 24/27 embankment within the BAA, but not in the Study Area (Figure 4.3). Potentially suitable habitat for *C. horridus* occurs throughout the Study Area and BAA, but no other observation was noted. Direct impacts to this species during construction are unlikely due to the negative survey results in the Project Area and mobility of this species. Indirect impacts associated with project construction may adversely affect this species. Section V. C. of this report includes a discussion of analyses conducted to determine the potential indirect impact to this species.

Vascular Plants

Amorpha schwerinii (Piedmont Indigo Bush) – USFS SI – An occurrence of A. schwerinii was reported by NCDOT within the BAA, approximately 600 feet from NC 24/27. Suitable habitat does occur within the Study Area. However, all project related surveys have failed to locate this species. Due to its distance of the known occurrence from the Study Area, this population is not anticipated to be affected by the Project.

Cirsium carolinianum (Soft Thistle) – State Endangered - A population of *C. carolinianum*, is known within the BAA along Rocky Creek, north of NC 24/27. Due to its distance from the Study Area, this population is not anticipated to be affected by the Project. Possible habitat for *C. carolinianum* is in forests and disturbed areas, mostly on basic soils. This habitat was repeatedly surveyed during the course of the season. *C. carolinianum* was not found in the Study Area. This Project is not anticipated to adversely impact this species.

Fothergilla major (Large Witch Alder) – NC Significantly Rare - A population of *F. major* was located during the October – November 2007 surveys, two populations during the October 2011 surveys (approximately 100 individuals), and eleven individuals were located during the October 2017 surveys (Element Occurrence 20808, Figure 4.1 and 4.6). Seven stems were noted near the outflow of a culvert and in an area of approximately two square meters. Four additional short stems were noted on top of the concrete culvert structure. No plants were found north of NC 24/27. These eleven plants occur within the Project Area and would be impacted by project construction.

During an October 12, 2004 survey, Alan Weakley reported a dense clonal patch of 700 stems over an area of 70 meters. It was not clear why this population had declined so significantly. During the October/November 2007 survey performed by NCDOT Biologists, two populations of *F. major* were located. No map was provided, but the botanical conclusion was that this species may be avoided by construction because it was 100-feet from the road. Extensive searches during 2017 found none other than the eleven reported above, 65 feet from the road.

The USFS provided three additional records in the BAA, each about 1,300 feet north of the Study Area. Due to the distance between the Project and these plants, no adverse impact to these plants is expected.

Parthenium auriculatum (Glade Wild Quinine), prefers glades and openings over mafic rocks. Current records for Montgomery Co. exist. This species (less than 20 individuals) was found during NCDOT 2007/2008 surveys. Suitable habitat does occur, and was searched, within the Study Area. However, none were located during the 2017/2018 surveys. Because *P. auriculatum* wasn't located during the most recent surveys of the Study Area, no adverse impact to this species

is expected.

Pseudognaphalium helleri (Heller's Rabbit Tobacco) was located along the railroad corridor about 900 feet north of NC 24/27 (Figure 4.8, 4.9). Six stems were counted within a *Helianthus laevigatus* population (Subpopulation IV, described below). This population is located outside the Project Area and is not expected to be impacted by the project.

Helianthus laevigatus (Smooth Sunflower) – State Special Concern-Vulnerable - Possible habitats for *H. laevigatus* are open woods and roadsides. During their October 2011 surveys, NCDOT Biologists located approximately 300 individuals. Seventeen populations comprising 354 stems of *H. laevigatus* were located during the 2017/2018 surveys within the Study Area. These populations are along the NC 24/27 and railroad corridors in the Study Area and Project Area (Figure 4.1, 4.6, 4.8, 4.9). *H. laevigatus* may be affected by the project. Section V. C. of this evaluation describes each subpopulation located, including numbers of individuals reported. Section V.D. discusses mitigation measures for unavoidable impacts.

Symphyotrichum georgianum (Georgia Aster) – Federal Candidate, State Threatened - The *S. georgianum* population record is within the far western extent of the BAA along Rocky Creek. A second occurrence was documented by NCDOT Biologists along NC 24/27 in Stanly County, five to six miles from USFS lands. This species favors open woods, roadsides, and other rights-of-way. This open habitat does occur within the Study Area and was surveyed as recently as November 26, 2017. *S. georgianum* was not found in the Study Area; therefore, *S. georgianum* is not anticipated to be affected.

V. POTENTIAL DIRECT AND INDIRECT EFFECTS TO THREATENED, ENDANGERED, FEDERAL SPECIES OF CONCERN, AND STATE LISTED SPECIES

A. DIRECT EFFECTS OF PROJECT

Construction activities in the Project Area could include land clearing and grubbing, grading of the ground surface, possible blasting of subsurface rock, and temporary disturbances to vegetation and/or ground surfaces by construction equipment and temporary fill. Effects on natural resources from the proposed project would include vegetation removal and loss of forest habitat, soil disturbance, and altered hydrology of receiving streams. However, with implementation of mitigative measures, these effects are expected to be offset and confined to the Project Area (Figure 2). Impacts will occur primarily to those species and communities occurring adjacent to NC 24/27.

B. INDIRECT EFFECTS OF THE PROJECT

The USFS expressed concern for new/increased runoff including potential contaminants, the formation of new ephemeral channels, integrity of both receiving streams and adjacent lands, and loss of hydric soils. Maintaining access to UNF lands is also a concern raised by USFS.

Sediment and Erosion Control plans for road improvements will be designed to implement NCDOT Best Management Practices (BMPs) in accordance with Design Standards in HQW Watersheds to reduce the risk of sediment and nutrient runoff on downhill slopes and to the Yadkin

River. Stormwater Management Plans will be designed to treat stormwater runoff through BMPs as detailed in the most current version of NCDOT's Stormwater BMP Manual.

Recently completed and/or approved construction projects in the vicinity of this project include: 1) The construction of one mile of mountain bike trail in the Wood Run area, an extension to connect this area with the NC 24/27 trail head, 2) The maintenance of the NC 24/27 trail head and maintenance of the Uwharrie National Recreation Trail (to be done in 2019), and 3) Watershed Improvement Projects outlined by Brady Dodd for the South Roberdo Project and a future stewardship program.

C. DETERMINATION OF IMPACTS TO THREATENED, ENDANGERED, FEDERAL SPECIES OF CONCERN, AND STATE LISTED SPECIES

The Biological Conclusion for all Federally Threatened and Endangered species is 'No Effect', except for *Helianthus schweinitzii*, which is 'May Affect, Not Likely to Adversely Affect'. Informal Consultation with the USFWS will be required. A complete list of observed plant and animal species is included as Appendix 2 of the attached botanical and animal resources reports.

Plants

Within the Study Area, seventeen populations of *Helianthus laevigatus*, one *Pseudognaphalium helleri*, one *Isoetes uwharrie*, and *Fothergilla major* population are recorded. The Project Area includes eight populations of *Helianthus laevigatus*, one *Isoetes uwharrie*, and one cluster (eleven plants) of *Fothergilla major*. *Helianthus laevigatus* subpopulation IV, and a portion of subpopulation VIII are addressed below due to proximity to the Project Area but are not expected to be adversely affected. Each of these species is addressed below.

Fothergilla major (Large Witch-alder) (Significantly Rare - Throughout) - A known population of *F. major* was found within the Project Area, on the south side of NC 24/27 (Figure 4.1) on October 18, 2017. Seven stems were noted near the outflow of a culvert and in an area of approximately two square meters, and four additional stems were located on top of a concrete culvert structure. Eleven *F. major* will be affected by the project.

Helianthus laevigatus (Smooth Sunflower) – State Special Concern – Vulnerable – Eight populations of *H. Laevigatus* were located within the Project Area.

> *H. laevigatus* Subpopulation I (Figure 4.1) was located on the north side of NC 24/27. Nineteen stems were counted along a five to six-meter length between the mowed ROW and adjacent treeline.
>
> *H. laevigatus* Subpopulation II occurs across the road from Subpopulation I (Figure 4.1) and comprised 44 stems from three clumps within a three-meter length between the mowed ROW and adjacent forest.
>
> *H. laevigatus* Subpopulation III occurs along the western edge of the railroad corridor about 400 feet north of NC 24/27 (Figure 4.8). Sixteen stems were counted in a four by six-meter area, and signs of herbivory were evident.

H. laevigatus Subpopulation IV occurs in two areas along the railroad about 900 feet north of NC 24/27 (Figure 4.8). The first area is on the west side of the railroad corridor and included 138 stems growing amongst discarded railroad ties. The second area is east of the railroad and included 177 stems. This is an estimate because herbivory and dense undergrowth made counting difficult. This population is located outside the Project Area and is not expected to be directly impacted by the project but is included here due to its close proximity.

H. laevigatus Subpopulation V occurs in two areas along the railroad corridor between 130 and 180 feet north of NC 24/27 (Figure 4.8). The first included 63 stems under dense woody sprouts of loblolly pine. The second included ten stems in one clump.

H. laevigatus Subpopulation VI occurs north of NC 24/27, west of the railroad bridge. About 100 stems were noted on a steep embankment dominated by woody resprouts.

H. laevigatus Subpopulation VII occurs near the railroad bridge north of NC 24/27 (Figure 4.8). At least 100 stems were found within dense vegetation.

H. laevigatus Subpopulation VIII includes multiple clumps in small patches (Figure 4.6 and 4.8). An area of 26 stems and seven individual clumps were recorded in this area, and includes a number of individuals beyond the Project Area. This area was reported in 2011 to contain "244 stems in the woods and thousands probably present". Because the stem count for this species is dependent on the time since the previous prescribed burn, the negative observation is not assumed to be evidence the plants no long persist in this area. This subpopulation also includes 76 stems counted near the intersection of Landfill Road and NC 24/27.

H. laevigatus Subpopulation IX occurs along the northern edge of NC 24/27 west of the Landfill Road intersection (Figure 4.6). Four clumps were located in this area. Due to the proximity of the records presented in this evaluation as subpopulation VIII, it's possible these records were included in the 2011 study referenced above. Much of the forest between these subpopulations is beyond the Study Area.

In summary, a total of approximately 354 *H. laevigatus* stems counted in 2017 within eight subpopulations occur within the Project Area and are likely to be directly impacted by the Project. The number of plants these stems originate from is not known but estimated between 40 and 50.

Isoetes uwharrie (new Quillwort species) – No Status Assigned – This species was recently identified in the UNF and is in the process of being described (Figure 4.5,4.8, and 4.9). At least two small clusters, shown on Figure 4.8, occur within the Project Area. Another occurrence was recently located by USFS staff. Additional occurrences of this species outside the Project Area are also depicted on Figure 4.5 and 4.9. The USFS is in communication with the researcher and will provide information when available. NCDOT will work with the USFS to identify and relocate all *Isoetes uwharrie* prior to construction to avoid impacts to this new species.

Pseudognaphalium helleri (Heller's Rabbit Tobacco) was located along the railroad corridor about 900 feet north of NC 24/27 (Figure 4.8). Six stems were counted within a *Helianthus laevigatus* population (Subpopulation IV, described above). This population is located outside the Project Area and is not expected to be impacted by the project but is included here due to its close proximity.

Birds

During the May 22, 2007 surveys conducted by NCDOT Biologists, Eastern Wood-pewee (*Contopus virens*) USFS SI, Prairie Warbler (*Dendroica discolor*) USFS SI, and Brown-headed Nuthatch (*Sitta pusill*a) USFS SI, were observed. Eastern Wood-pewee was not noted during the 2018 surveys. However, Prairie Warbler and Brown-headed Nuthatch were recorded during the 2018 surveys. Impacts to habitats utilized by these species, as well as other observed species listed in Appendix 2 of the attached botanical and animal resources reports would occur. However, these impacts are expected to be temporary and minor relative to abundant habitats on adjacent UNF lands and mobility of these species.

Amphibians

Ambystoma talpoideum (Mole Salamander) – State Special Concern – An *A. talpoideum* larva was located by NCDOT biologists during their 2007/2008 terrestrial animal surveys in Roberdo Bog. This species was located in the BAA, but not the Study Area during the 2017/2018 surveys (see discussion of the Roberdo Bog location above). Because uplands adjacent to Roberdo Bog do extend into the Study Area, this species has been included for discussion. Little is known about the distance into uplands utilized by these salamanders, but Behr reported that adults travel farther distances to breeding pools (170 m) than juveniles (50 m).

For this evaluation, the approximate extent of the Roberdo Bog pool was digitized and buffered by 50 and 170 m to reflect potential habitat use by adult and juvenile salamanders. Based on this analysis, the total existing forest buffer around Roberdo Bog comprises nine acres of potential juvenile habitat and 35 acres of potential adult habitat. The Project Area includes 0.4 acre (four percent) of the juvenile habitat, and three acres (nine percent) of adult habitat. Uplands adjacent to Roberdo Bog that are used by these animals would be impacted by the project. However, based on the results of the two surveys (one larval individual found) used in this evaluation, the density of this salamander population is assumed to be relatively small and sufficient upland habitat to accommodate this species would remain after construction. Therefore, Mole Salamander non-breeding habitat may be affected by this project, but the impact is anticipated to be minor.

Additional areas of potential habitat occur within wetlands and Piedmont Boggy Streamhead natural areas (Figure 3). These areas were investigated for evidence of amphibian breeding and none was found. These areas are protected under the Clean Water Act and impacts have been minimized to the maximum extent practicable. Numerous similar areas occur in the UNF within close proximity to the project. Impacts to these habitats is expected to be minor.

Hemidactylium scutatum (Four-toed Salamander) – State Special Concern – No *H. scutatum* were observed during either 2007/2008 or 2017/2018 surveys. However, these animals are known to occur within the BAA. Because uplands adjacent to Roberdo Bog do extend into the Study Area,

this species has been included for discussion. The distance these salamanders travel into uplands is unknown. However, Meyer provided records from Massachusetts and Quebec, listing 72 m, 152 m, 198 m, and 201 m distances from nesting habitat.

For this evaluation, the Roberdo Bog was buffered by 201 m. resulting in 43 acres of existing forested buffer. The Project Area encompasses four acres (nine percent) of uplands adjacent to Roberdo Bog that are potentially used by these animals. However, based on the results of the two surveys (no individual found) used in this evaluation, the density of this salamander population is assumed to be small enough that sufficient upland habitat to accommodate this species would remain after construction. Therefore, Four-toed Salamander non-breeding habitat may be affected by this Project, but the impact is anticipated to be minor.

Additional areas of potential habitat occur within wetlands and Piedmont Boggy Streamhead natural areas (Figure 3). These areas were investigated for evidence of amphibian breeding, and none was found. These areas are protected under the Clean Water Act and impacts have been minimized to the maximum extent practicable. Numerous similar areas occur in the UNF within close proximity to the project. Impacts to these habitats is expected to be minor.

Reptile

Crotalus horridus (Timber Rattlesnake) - State Special Concern - One *C. horridus* was observed denning in a hole on the side of the NC 24/27 embankment (35.30331087 -80.02296081), within the BAA but outside the Study Area (Figure 4.3). Potentially suitable habitat for *C. horridus* occurs throughout the Study Area and BAA, but no other observation was noted during field surveys. Direct impacts to this species during construction are unlikely due to the negative survey results in the Project Area and the mobility of this species. Blasting, if required, could be an adverse impact on these animals. Snakes rely on vibration sensitivity for feeding and danger avoidance. Development of the blasting plan discussed in Section V.D. would minimize the frequency and impact extent of any unavoidable blasting. Any adverse impacts that may result are expected to be short-lived. Potentially suitable habitat for this animal would be impacted. However, the abundance of suitable habitat on adjacent UNF lands would offset any losses associated with this project.

D. DETERMINATION OF IMPACTS TO NATURAL COMMUNITIES

The USFS expressed concern over three globally significant natural communities occurring in the Study area that would be impacted by the project. These include the Upland Pool (Roberdo Subtype) (G1), Dry Piedmont Longleaf Pine Forest (G2G3), and Wet Piedmont Longleaf Pine Forest (G1) communities.

An Upland Pool (Roberdo Subtype) occurs within an area mapped by NCNHP as Dry Piedmont Longleaf Pine Forest. The pool would not be directly impacted by the project. This area is also a SNHA and was analyzed earlier for potential impacts to salamanders and their habitat. As described in Section IV. A., the pool occurs approximately 150 feet north of the Project Area (80 feet outside Study Area). This natural community is recognized as a G1 community because of its unique Coastal Plain vegetation. Edge effects of the project on adjacent vegetation were considered

but are expected to be relatively minor 150 feet into the forest. The USFS's ongoing prescription burning program is anticipated to control significant changes in the area's understory.

Dry Piedmont Longleaf Pine Forest mapped by NC NHP in this area of the UNF totals 1,940 acres. The project would require direct impacts to 54 acres of this natural community, or approximately three percent. However, NCNHP mapping of this community includes the existing road, its shoulders, and utility clearings, so the actual direct impact to this natural community would be a much lower percentage of the overall resource. Edge effects on this community would occur as increased wind and sunlight penetrate the new tree line. However, the current forest along NC 24/27 experiences similar edge effects today within the 54-acre impact area, and the edge effect will shift in position but be similar in magnitude.

Wet Piedmont Longleaf Pine Forests are unique and distinctive features due to their abundance of hydrophytic vegetation, including wet areas dominated by *Pinus palustris*. The NCNHP (July 2018 Tier-1 Element Occurrence Dataset) identifies only five distinct areas statewide, ranging in size from 27 to 727 acres. This dataset was used to determine worst case impacts to this and other natural communities. One of these, the Roberdo Bog and Longleaf Pine Forest Wet Piedmont Longleaf Pine Forest comprises about 403 acres, occurs on the UNF, and would be crossed by the project. However, NCNHP data is intended to establish geographies within which natural communities are known to occur. The actual area this natural community occupies on the landscape is known to be significantly less. The USFS estimates that only 85 acres of Wet Piedmont Longleaf Pine Forest occur on the entire UNF. Multiple surveys within the Study Area by resource experts between 2004 and 2018 documented no Wet Piedmont Longleaf Pine Forest. The project would impact 12 acres of NCNHP's mapped Roberdo Bog and Longleaf Pine Wet Piedmont Longleaf Pine Forest area. These 12 acres include the existing road, maintained roadsides, utility lines, etc. The project could affect as many as, but is not likely to impact more than, 12 acres of this natural area.

E. PROJECT COMMITMENTS AND MITIGATION MEASURES

Through consultation with USFS, NCDOT has agreed to the following commitments and mitigation measures to offset the direct and indirect impacts associated with TIP R-2527. Proposed commitments and mitigation measures include ensuring unimpeded access for USFS to continue prescribed burns in adjacent forest service lands, prohibit the use of herbicides or pesticides on USFS lands, investigate the likelihood of acid-bearing rock disturbance, minimize hydrologic and soil impacts, develop a plan to reduce impacts associated with the potential blasting needs, and manage non-native invasive plant species. Mitigation for loss of longleaf pine forests will be addressed as part of ongoing negotiations between NCDOT and USFS.

1. Commitments and Mitigation Measures to Minimize Direct Impacts

For selected USFS rare species of concern that may be directly impacted by the project, relocation has been determined to be appropriate mitigation for two plant species: Large Witch Alder and Quillwort. Pre-construction surveys for Quillwort will be conducted with USFS to

identify all individuals within the construction footprint. NCDOT will coordinate relocation efforts with the USFS and relocate these plants to a suitable location, to be identified in consultation with USFS.

The NCDOT will not hinder USFS' prescribed burning as recommended by the Forest's Fire Management Officer.

The removal of vegetation and grading for the initial project would follow installation of erosion and sedimentation control measures. Sediment and Tree Protection Fencing would be installed along the limits of the Project Area. These visual barriers would ensure construction equipment and contractors remain within approved disturbance limits. The NCDOT also commits to continue negotiations with the USFS to arrive at suitable mitigation for the loss of longleaf pine forest.

NCDOT does anticipate high rock lines along the project length that will require blasting. However, no reliable quantification of potential rock blasting within USFS property will be available until they are able to investigate those areas. Borings have been laid out, but SF-299 permit approval is required to continue these subsurface investigations. Approval of this document is required before that permit can be issued. If required, a blasting impact reduction plan is being developed for this project and would evolve through consultation with the USFS as information becomes available.

Potential impacts to hydric soils were investigated as part of this evaluation. All soils occurring within the Project Area are considered non-hydric according to the NRCS Web Soil Survey. However, wetland delineations have been conducted and 1.95 acres of wetland were delineated in the Study Area. The Project Area includes 0.49 acre of wetlands that may be directly affected by construction. As part of permitting unavoidable impacts to these areas, the US Army Corps of Engineers requires demonstration of avoidance and minimization of impacts. No construction would begin until USACE and NCDWR approvals are issued.

The USFS expressed concern for acid bearing rock in the Project Area. NCDOT Geotechnical engineers investigated this concern. Most acid rocks of concern are located in the western counties of North Carolina. The rock types along the NC 24/27 corridor are meta-tuffs, with minor meta-mudstone and meta-volcanic flow rocks (andesite). Iron sulfide mineral content was not indicated in weathered rock encountered in borings on nearby properties along the corridor. There are instances of volcanogenic massive sulfide deposits (source) within the Cid and Gold Hill district in Cabarrus County, and northeastern Montgomery County, but the NC 24/27 corridor does not cross through these areas.

2. Commitments and Mitigation Measures to Minimize Indirect Impacts

Erosion control measures will be designed for sensitive watershed standards in HQW Watersheds. This includes capturing runoff from larger storms and reducing the amount of exposed land and schedule for re-vegetation. Erosion Control measures (e.g., silt fence, matting, special sediment control fence, silt checks, skimmer basins, etc.) will be put in place during the clearing and grubbing, and final stages of construction to help limit erosion while

temporary and permanent seeding become established. Grassed swales, dissipator pads, and rip rap lined channels were designed to promote stability in these areas. An erosion and sedimentation control plan will be developed to reduce erosion and turbidity.

The typical road section includes grassed swales and grassed shoulders to reduce flow velocity, promote sedimentation, infiltration, and runoff attenuation. The impervious percentage will increase; however, existing drainage patterns and outfalls were maintained as much as possible to minimize increases in flow and alteration of drainage patterns. Existing concerns are mainly due to undersized pipes that create increased velocities and scour holes at existing pipe outfalls. Receiving streams were visited to identify existing geometry and condition. This information was used to choose adequate and stable system outfalls. A 10 percent impervious assumption was used to accommodate any future projects upstream of these crossings. All outfalls were supplemented with rip-rap dissipator pads to help dissipate energy at the outlet.

A Burn Management Plan was prepared by NCDOT and provided to USFS. The plan is being reviewed currently to better understand what measures can be taken to maintain USFS ability to continue their prescribed burns on both sides of the improved road. The Burn Management Plan is included with this BE as Appendix A. To mitigate potential blasting impacts, NCDOT is developing a plan to address direct and indirect impacts.

Access to the forest for maintenance, burning, and forest management is being considered during design. The road would be partial controlled access for much of its length, but NCDOT has committed to use no fencing; only concrete markers would be utilized along the entire R-2527 project (Pam Williams (NCDOT) personal communication; NCDOT Draft Right-of-Way Consultation, February 2019).

Implementation of commitments and mitigation measures agreed to between NCDOT and USFS would minimize viability concerns that could result from direct impacts. These commitments and mitigation measures would include:

- Include no fencing (except guardrails at localized areas with motorist safety concerns) and maintain access to the forest,
- 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,
- Prohibit the use of herbicides and pesticides, and
- NCDOT Division 8 forces will work with USFS staff on a periodic basis to control the presence of priority species of non-native plants along the NC 24/27 easement on UNF.
- NCDOT will also work on adjacent NCDOT ROW to prevent the encroachment of priority non-natives on to UNF. In turn, USFS will work cooperatively with NCDOT to identify and effectively control prioritized non-native invasive plant species.

In coordination with USFS, NCDOT has developed commitments and mitigation measures to

minimize the spread of non-native invasive species (NNIS) plant species on NFS lands within the UNF associated with the construction and maintenance of improvements to NC 24/27.

- To prevent the spread of non-native invasive plant species on UNF 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 UNF construction areas.
- To control the spread of NNIS plant species on UNF lands, NCDOT, in coordination with the USFS, will locate and flag areas of NNIS plant species within the Study Area. 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 UNF. If NNIS 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 UNF.
- In consultation with the USFS, seed mixes of native grasses and forbs or non-aggressive, non-natives will be used on UNF lands for erosion control and revegetation.
- NCDOT will utilize rolled matting or weed-free mulch for erosion control and revegetation on UNF lands.
- NCDOT will coordinate with the USFS on a landscaping plan for UNF lands. The plan will detail appropriate native seeding mixes for erosion control and site-specific control methods for invasive species. 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 project corridor.

With the implementation of these commitments and mitigation measures developed by NCDOT, in coordination with the USFS, the threat of spread of NNIS plants on UNF lands associated with the construction and maintenance of improvements to NC 24/27 is expected to be minimal.

Summary

Potential direct impacts to 77.6 acres of USFS forests, including Longleaf Pine forest, up to 3.0 acres of potentially occupied upland habitat around Roberdo Bog, habitat utilized by *Crotalus horridus* and several forest interior bird species, one macrobenthic species of interest, up to 50 *Helianthus laevigatus* plants (354 stems), and one newly described Quillwort were identified. Potential indirect impacts may result to adjacent terrestrial habitats and the fauna that occupy them, as well as receiving waters and their fauna. The above mitigation measures will be implemented in coordination with USFS throughout this project to offset and minimize adverse impacts.

VI. QUALIFICATIONS OF PRINCIPAL INVESTIGATORS

Investigator:	Matthew M. Haney
Education:	B.S. Natural Resources-Ecosystem Assessment, North Carolina State University, Raleigh, North Carolina
Experience:	N.C. Dept. of Transportation Oct. 1999-present N.C. Forest Service May 1998-August 1998 U.S. Forest Service, Center for Forested Wetlands Research May 1997-August 1997

Expertise: Section 7 field investigations, NEPA documentation, wetland and aquatic investigations, protected species (terrestrial/aquatic) surveys

Investigator: Michael Sanderson
Education: B.S. Fisheries and Wildlife Science, North Carolina State University
Experience: Environmental Senior Specialist, NCDOT, 2015-present.
Environmental Program Consultant, NCDOT, 2013 – 2015.
Environmental Specialist, NCDOT, April 2004 – 2013.
Wildlife Research Biologist, Down to Earth Environmental, February – June, 2003.
Wildlife Research Technician, NC Cooperative Fish and Wildlife Research Unit, 1991 – 1999.
Biological Science Technician (Wildlife), US Fish and Wildfire Service, 1995 – 1997.
Expertise: Bird surveys, behavioral analysis, habitat use/evaluation, Section 7 field investigations, protected species (terrestrial/aquatic) surveys, wetland delineation, scuba certified.

Biologist: Dennis W. Herman
Education: B.S. Biology, Western Carolina University
Experience: Retired - NCDOT, Natural Environment Section, Biological Surveys Group, June 2014; environmental Program Consultant, NCDOT, August 2004 - June 2014 coordinator of Living Collections, NC Museum of Natural Sciences, June 1996 – August 2004; assistant Curator of Herpetology, Zoo Atlanta, 1981-1996; senior Zoo Keeper of Herpetology & Mammals, Atlanta Zoological Park, 1972-1981
Expertise: Section 7 investigations, protected species (terrestrial/aquatic) surveys, bog turtle & mountain bog specialist, ecological studies, rare plant identification, and reptile and amphibian surveys; permitted to survey for the State and Federally Threatened Bog Turtle

Biologist: John M. Alderman
Education: B.A. Interdisciplinary Studies Program, Emphasis in Ecology and Taxonomy, The University of North Carolina, Chapel Hill, N.C., 1977
Experience: Retired – N.C. Wildlife Resources Commission Nongame & Endangered Wildlife Program biologist, 1984-2001; N.C. Department of Transportation Environmental Scientist, 2002-2003; President of Alderman Environmental Services, Inc. since 2003; over 30 years of experience conducting endangered and threatened species conservation activities including consultations pursuant to Section 7 of the Endangered Species Act (ESA); have lead and conducted hundreds of endangered species surveys throughout a multi-state area of the United States since 1988 (thousands of miles of creeks and rivers surveyed)
Expertise: Survey and taxonomic expert for numerous federally listed, candidate, or species of concern aquatic taxa; since 1988, member of 3 NC Wildlife Resources Commission Scientific Councils charged with state listings of Crustacea (1991-2005), fish (1989-2005), and mollusks (1988-present); federal permit to survey

for 50 federally listed species throughout the Southeast United States; state permits acquired since 1990 for surveying state and federally listed species in Illinois, Indiana, West Virginia, Virginia, South Carolina, Georgia, and Texas

Biologist: J. Logan Williams

Education: PhD, Forestry, Department of Forestry and Natural Resources, NC State University, 2008
M.S., Entomology, Department of Entomology, NC State University, 1994
B.A., Philosophy, Department of Philosophy and Religion, NC State University, 1981

Experience: Retired – N.C. Department of Transportation, environmental supervisor/biological surveys group leader, 2002-September 2012; managed all activities of Biological Surveys Group; conducted complex project studies/surveys and provided information with respect to natural resources, flora and fauna, plant communities, threatened and endangered species, benthic sampling, and aquatic surveys as required by NEPA and/or Endangered Species act; conducted surveys for freshwater mussels throughout the state; oversaw the management of T&E roadside plant populations and mitigation sites; conducted ongoing shorebird habitat/food availability assessments associated with sandbag placement and Bonner Bridge replacement on Pea Island National Wildlife Refuge; conducted and/ or supervise Submerged Aquatic Vegetation (SAV) surveys in coastal waters; conducted and coordinated surveys for US Forest Service Sensitive and Species of Concern; provided information on aquatic and terrestrial ecology and botany; assessed indirect (secondary) and cumulative impacts to protected species and their habitats

Expertise: Survey and taxonomic expert for numerous federally listed, candidate, or species of concern taxa; since 1995, member of NC Wildlife Resources Commission Scientific Council charged with state listings of mollusks; invertebrate taxonomic expert

Biologist: Joseph D. Alderman

Education: B.S., Fisheries and Wildlife Science, NC State University, 2009

Experience: Alderman Environmental Services, Inc., V.P. Field Operations/Biologist; has completed hundreds of surveys for federally listed species and species of concern throughout a multi-state area

Expertise: Survey and taxonomic expert for numerous federally listed, candidate, or species of concern taxa; federally permitted to survey for 7 listed fish and mussel species throughout a multi-state area of the Southeast; NC Wildlife Resources Commission permit to survey for all bat species, including federally listed species, throughout North Carolina; assisted bat species expert, Chris McGrath, during 2013 with the I-26 corridor bat survey (included Blue Ridge Parkway project area)

Biologist: David L. Penrose
Education: Bachelor of Science, Northern Michigan University, 1972
Master of Public Health, University of Michigan, 1975
Experience: Environmental Biologist II. North Carolina Division of Water Quality, Water Quality Section from 1976-1999. Environmental Biologist III. North Carolina Division of Water Quality. Wetlands/401 Certification Unit from 1999-2004. Faculty NSCU Water Quality Group from 2004-2008.
Expertise: Use of stream/river benthic macroinvertebrates to determine water quality. Much of this work dealt with the establishment of standardized collection methods, effective metrics for assessment and biological classification protocols. Projects include investigations of both point source problems (organics, toxics) and non-point runoff (agriculture, urban, mining, construction, silviculture). Served on Natural Area Protection Planning Committee and Outstanding Resource Water Nomination Group. Involved with the technical review of stream restoration projects in North Carolina. Assessing the successful implementation of ecological functions within restored streams. Responsibilities also included determination of intermittent versus perennial streams and administration of an EPA grant to determine the ecological function of intermittent streams. Technical review of 401 certification projects in NC.

Biologist: Jason York
Education: Bachelor of Science in Social Sciences, Unity College, Maine, 2004
Master of Science in Environmental Studies, Green Mountain College, Poultney, Vermont, 2010
Experience: Field Technician, Benthic Taxonomist Southeastern United States, (March 2013-present). Appalachian Land Stewards, Project Manager Pisgah National Forest, Western North Carolina (June 2010- present)
Expertise: Field collection of benthic samples as water quality indicators
Laboratory analysis and taxonomy. Non-native Invasive/Exotic plant management for US Forest Service on National Forest land. Timber Stand Improvement. Crown Touch Release. Habitat restoration. Hemlock treatment for Hemlock Woolly Adelgid. Private land and forest management planning.

Botanist: Moni Bates
Education: M.S. University of North Carolina at Greensboro (1996) Biology, Focus on Botanical Conservation M.A.T. University of North Carolina at Chapel Hill (1982) Science Education B.S. Iowa State University (1978) Biology
Experience: Alderman Environmental Services, Inc. - 2013 - present
North Carolina Zoological Park - 2005 to present, Guilford College - 2008 to present, North Carolina State Property Office and Local Land Trusts - 2004 to present, United States Forest Service - 1997 to present, North Carolina Natural Heritage Program - 1994 to present
Expertise: Conduct biological site surveys on private lands, write natural area management plans to guide habitat restoration, update North Carolina Natural Heritage

Program element occurrence records for rare plant populations, monitor rare plants on protected lands and search for new populations of rare species, implement habitat restoration for rare plants and natural communities.

Investigator: Chris Hopper
Education: B.S. Natural Resource Mgmt. & Engineering, 1997
Experience: Senior Scientist, Carolina Ecosystems, Inc. 2015-Present
Senior Scientist/Project Professional, Kleinfelder Southeast 2012-2015
Environmental Officer, Chatham County 2011-2012
Robert J. Goldstein & Assoc. 1998-2011
Expertise: Wetland delineation, natural communities assessment, NEPA documentation, Section 7 field investigations and consultation documentation, protected species surveys

Investigator: Greg Price, PWS
Education: M.S. Biology, 1989
Experience: NCDOT Division 6 Environmental Specialist, 2018-present
Senior Scientist, Carolina Ecosystems, Inc., 2016-2018
Natural Resources Specialist, Froehling & Robertson, 2015-2016
Environmental Specialist, NCDOT-NES, 2006-2015
Senior Biologist, Buck Engineering, 2000-2006
Water Quality Specialist, City of Durham, 1997-2000
Environmental Biologist, NCDWQ, 1991-1997
Expertise: Wetland delineation, natural communities assessment, NEPA documentation, Section 7 field investigations and consultation documentation, protected species surveys

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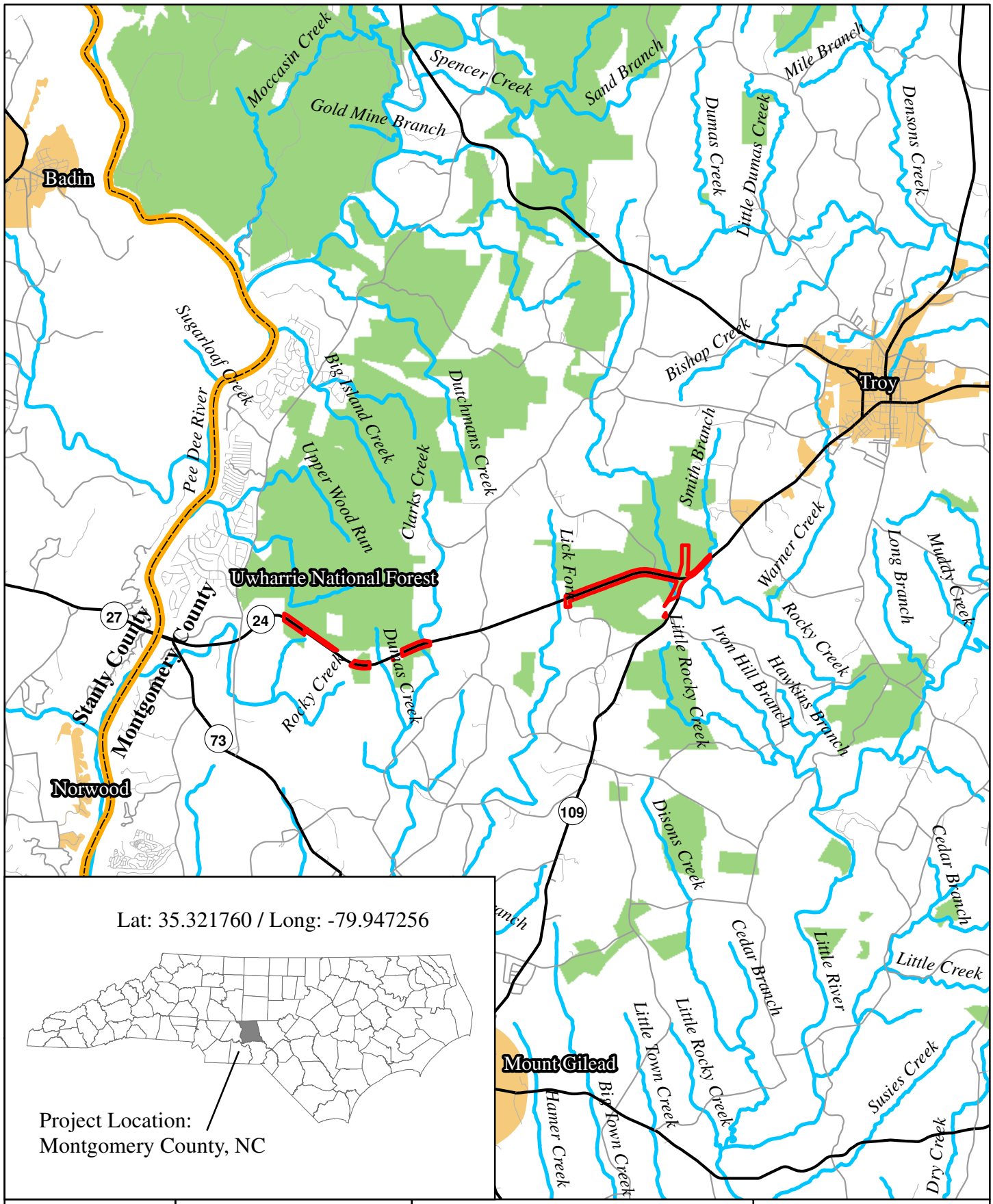
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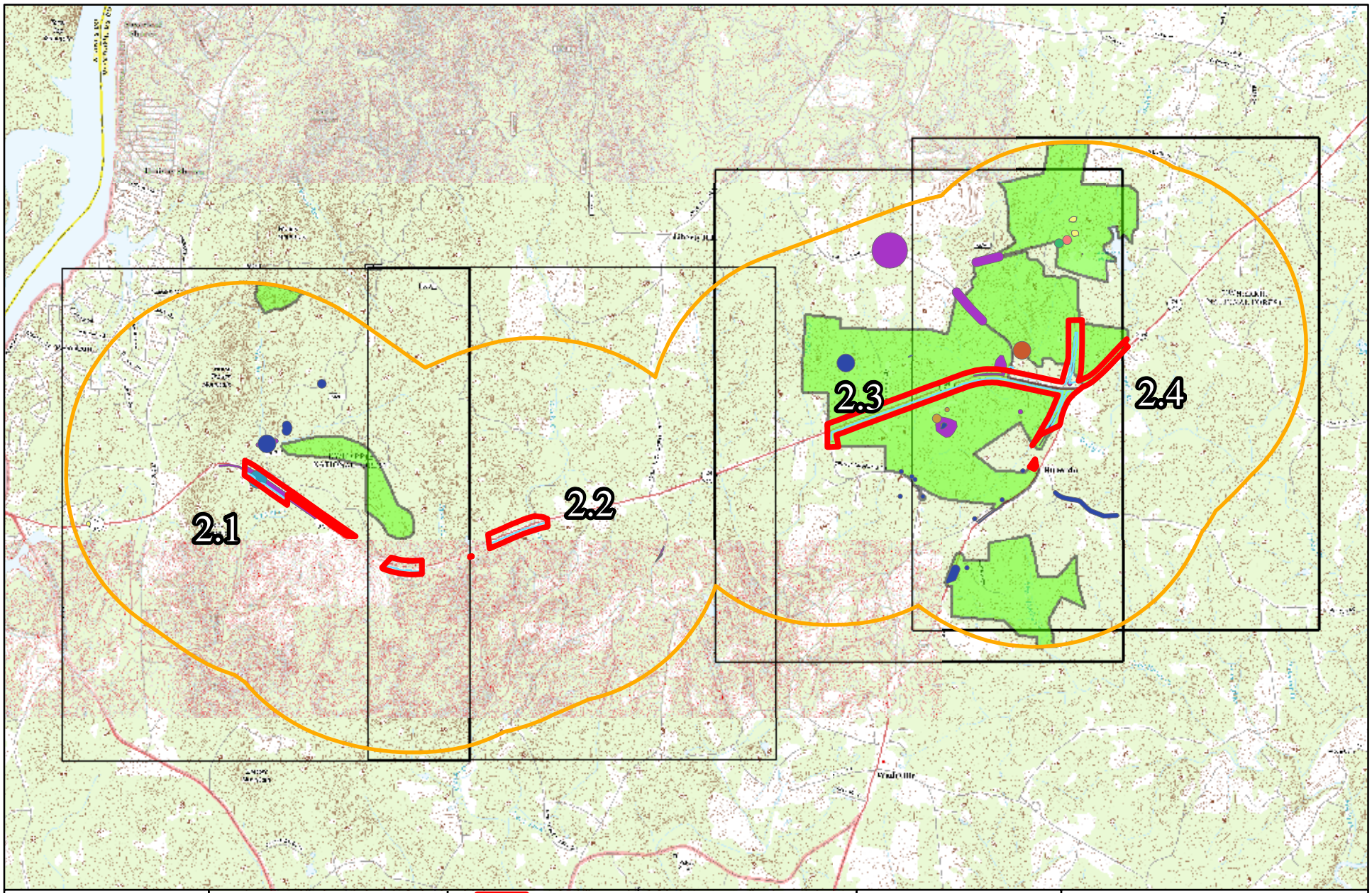
Spencer Creek
Sand Branch
Mile Branch
Densons Creek
Gold Mine Branch
Dumas Creek
Little Dumas Creek
Badin
Sugarloaf Creek
Pee Dee River
Big Island Creek
Dutchmans Creek
Bishop Creek
Troy
Upper Wood Run
Clarks Creek
Smith Branch
Lick Fork
Warner Creek
Long Branch
Muddy Creek
Uwharrie National Forest
Rocky Creek
Little Rocky Creek
Iron Hill Branch
Hawkins Branch
Stanly County
Montgomery County
27
24
73
109
Norwood
Disons Creek
Cedar Branch
Little River
Little Creek
Mount Gilead
Little Town Creek
Susies Creek
Hamer Creek
Big Town Creek
Dry Creek
Lat: 35.321760 / Long: -79.947256
Project Location:
Montgomery County, NC
N
Miles
0
0.75
1.5
Study Area
USGS Named Streams
Uwharrie National Forest
R-2527 BE
Uwharrie National Forest
Montgomery County, NC
February 2019
Figure 1: Vicinity Map



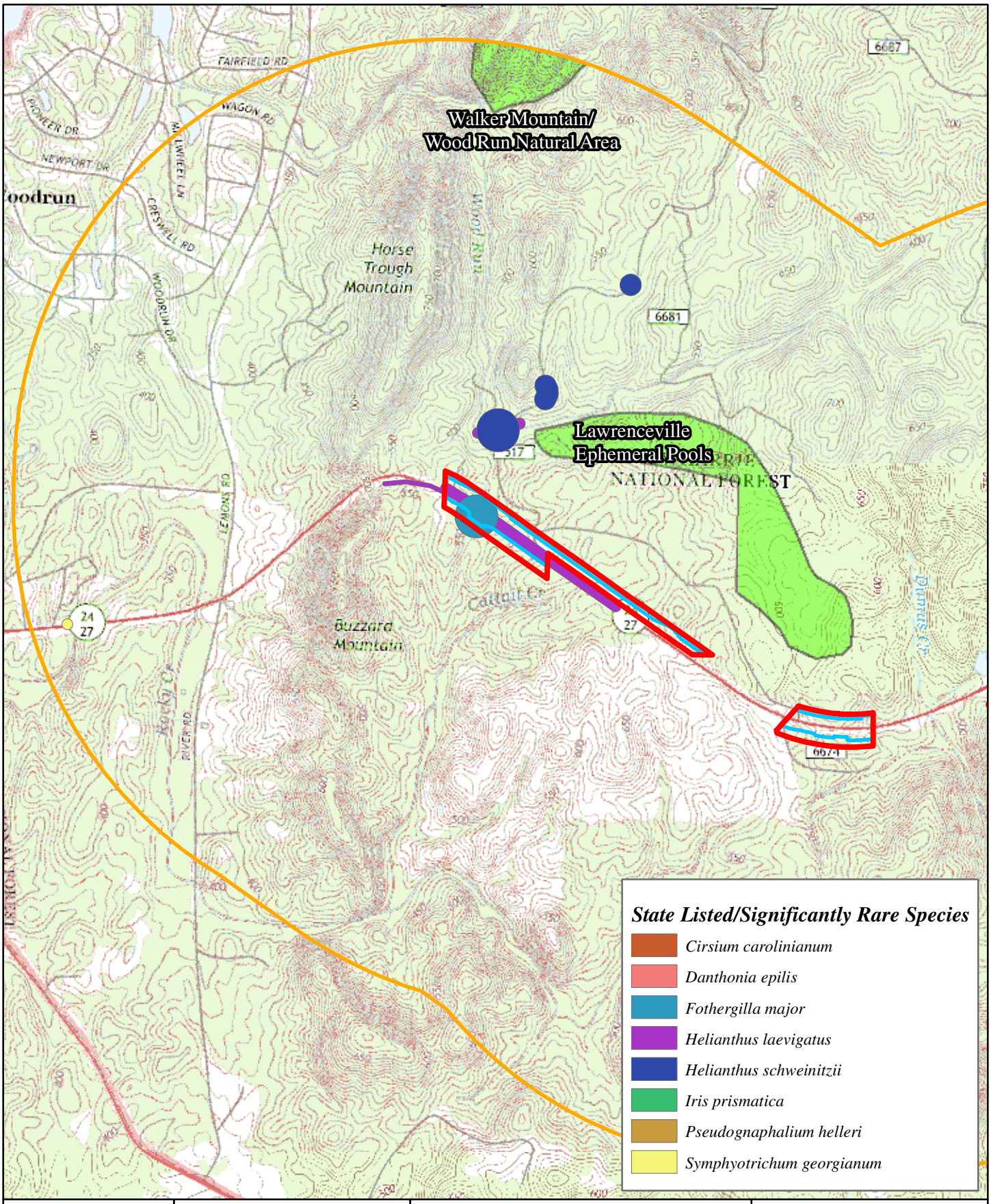
N

0 0.4 0.8 Miles

Study Area
BAA
Project Area
Sheet Limits
SNHA

Morrow Mountain (2013) and Troy (2013)
US Geological Survey 1:24,000 Quadrangle Map

Map Date: **February 2019**	**R-2527 BE** **Uwharrie National Forest** **Montgomery County, NC**
Revised:	
Revised:	**Figure 2.0: Biological Analysis Area, EO, & SNHA**
Revised:	



N

0 0.15 0.3 Miles

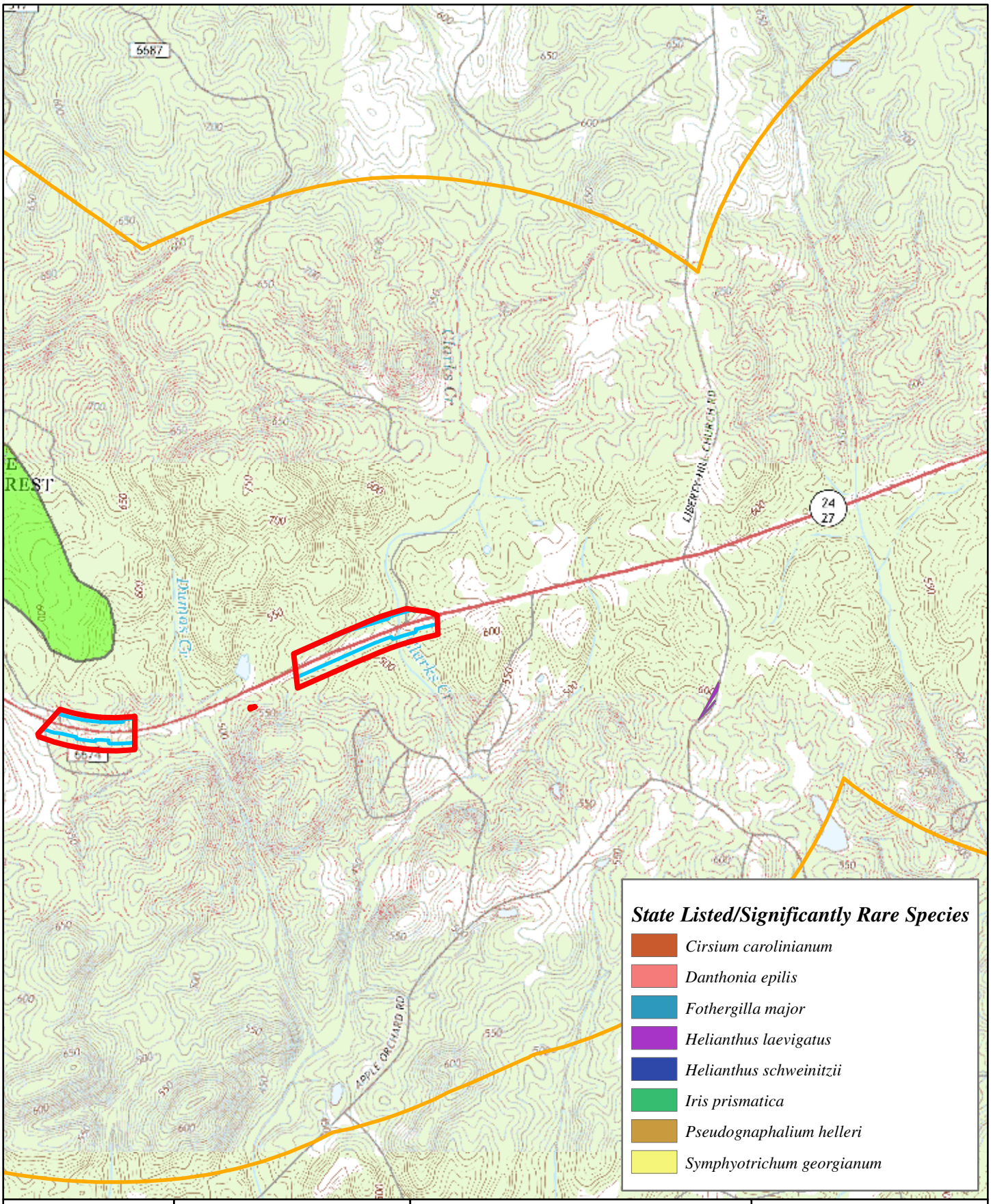
Study Area
BAA
Project Area
Significant Natural Heritage Area

Morrow Mountain (2013) and Troy (2013)
US Geological Survey 1:24,000 Quadrangle Map

February 2019

R-2527 BE
Uwharrie National Forest
Montgomery County, NC

Figure 2.1: Biological Analysis Area, EO, & SNHA



N

0 0.15 0.3 Miles

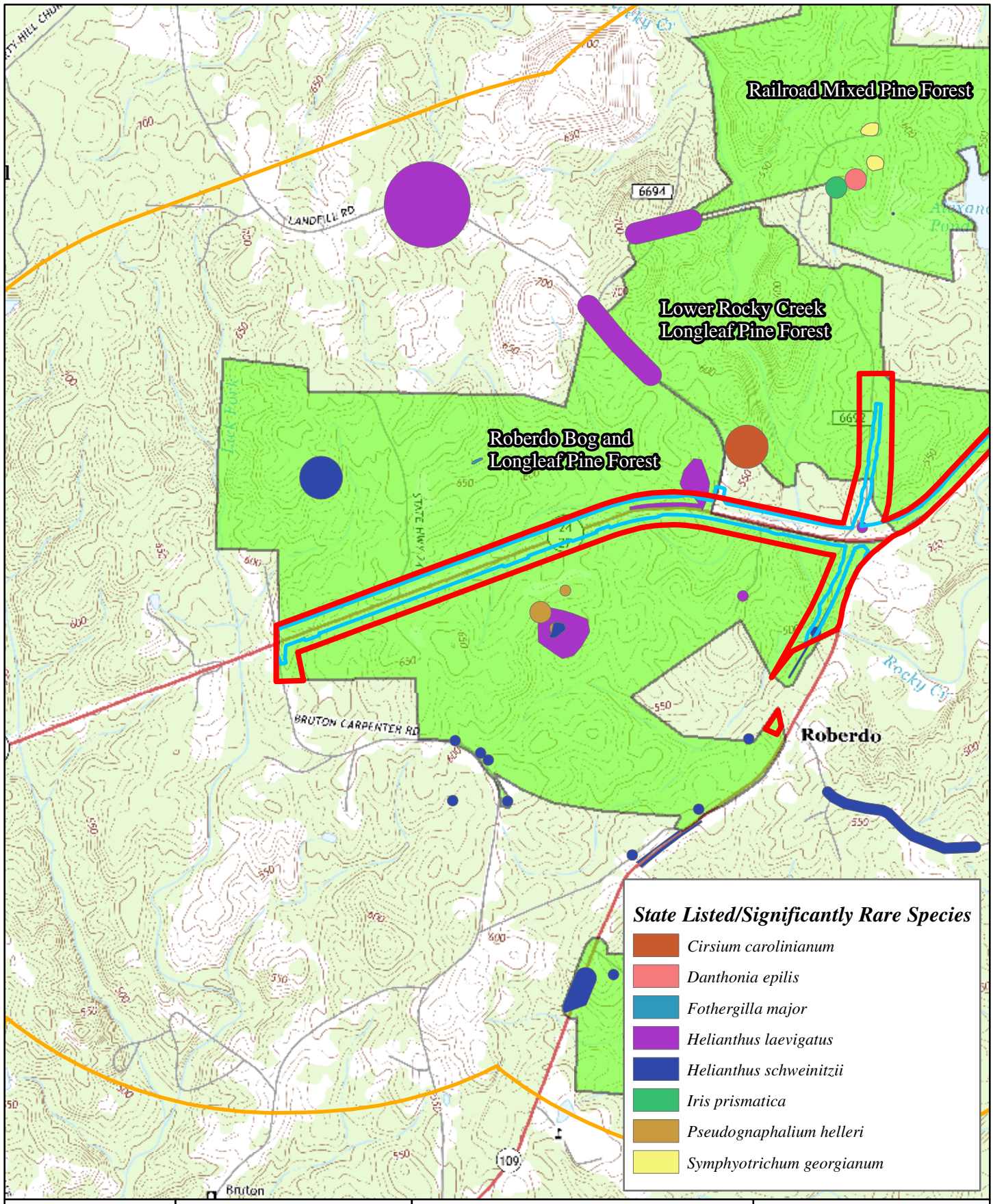
Study Area
BAA
Project Area
Significant Natural Heritage Area

Morrow Mountain (2013) and Troy (2013)
US Geological Survey 1:24,000 Quadrangle Map

February 2019

R-2527 BE
Uwharrie National Forest
Montgomery County, NC

Figure 2.2: Biological Analysis Area, EO, & SNHA



February 2019

N

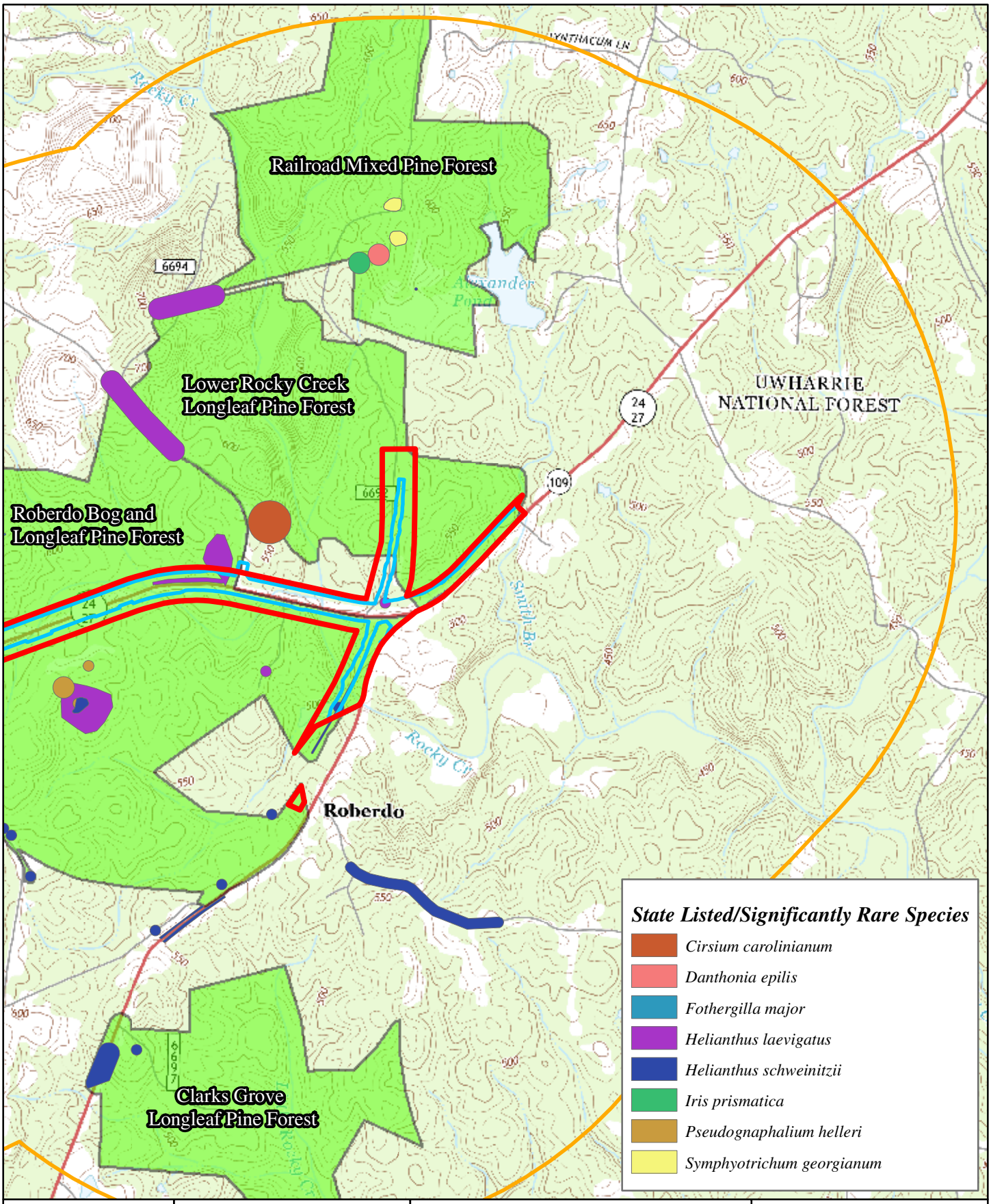
0 0.15 0.3 Miles

Study Area
BAA
Project Area
Significant Natural Heritage Area

Morrow Mountain (2013) and Troy (2013)
US Geological Survey 1:24,000 Quadrangle Map

R-2527 BE
Uwharrie National Forest
Montgomery County, NC

Figure 2.3: Biological Analysis Area, EO, & SNHA



February 2019

N

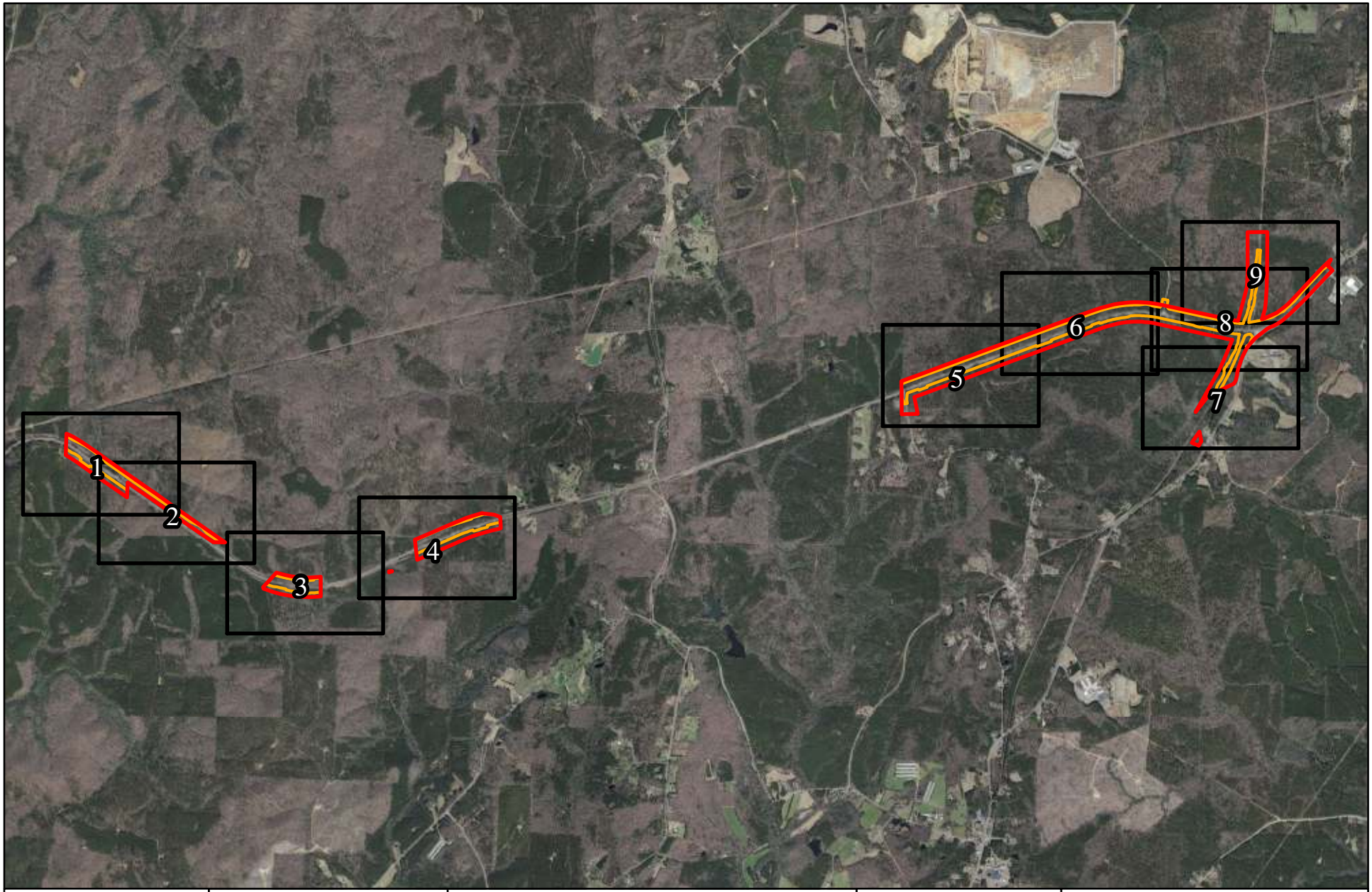
0 0.15 0.3 Miles

Study Area
BAA
Project Area
Significant Natural Heritage Area

Morrow Mountain (2013) and Troy (2013)
US Geological Survey 1:24,000 Quadrangle Map

R-2527 BE
Uwharrie National Forest
Montgomery County, NC

Figure 2.4: Biological Analysis Area, EO, & SNHA



N

0 0.25 0.5 Miles

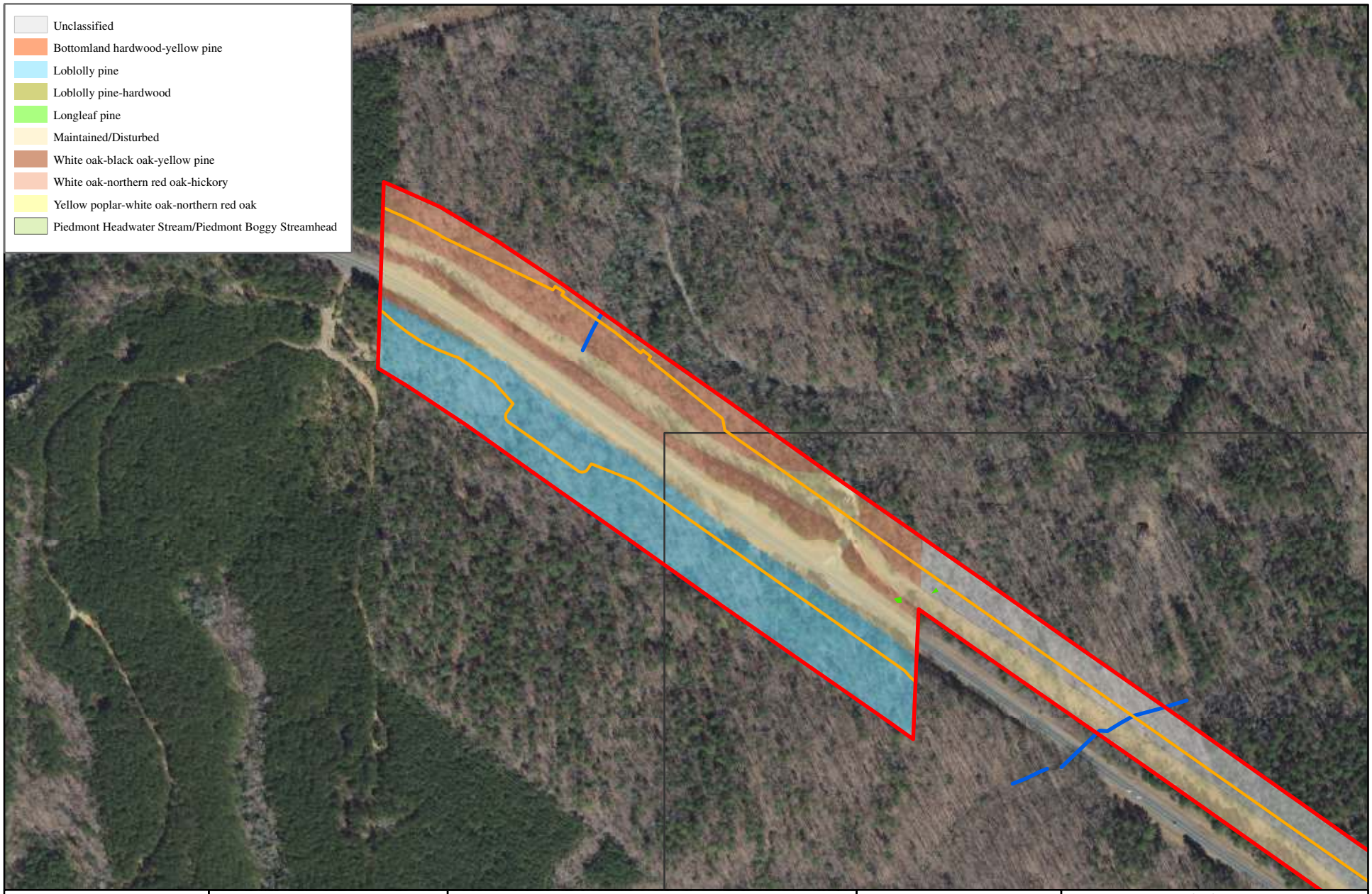
Study Area 2017

Project Area 2019

Sheet Limits

2015 NC Statewide Aerial Photographs

Map Date: **February 2019**	**R-2527 BE** **Uwharrie National Forest** **Montgomery County, NC**
Revised:	
Revised:	**Figure 3.0:** **Index Map**
Revised:	



STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

N

0 200 400 Feet

Study Area 2017

Project Area 2019

Stream

Wetland

2015 NC Statewide Aerial Photographs

Map Date: **February 2019**

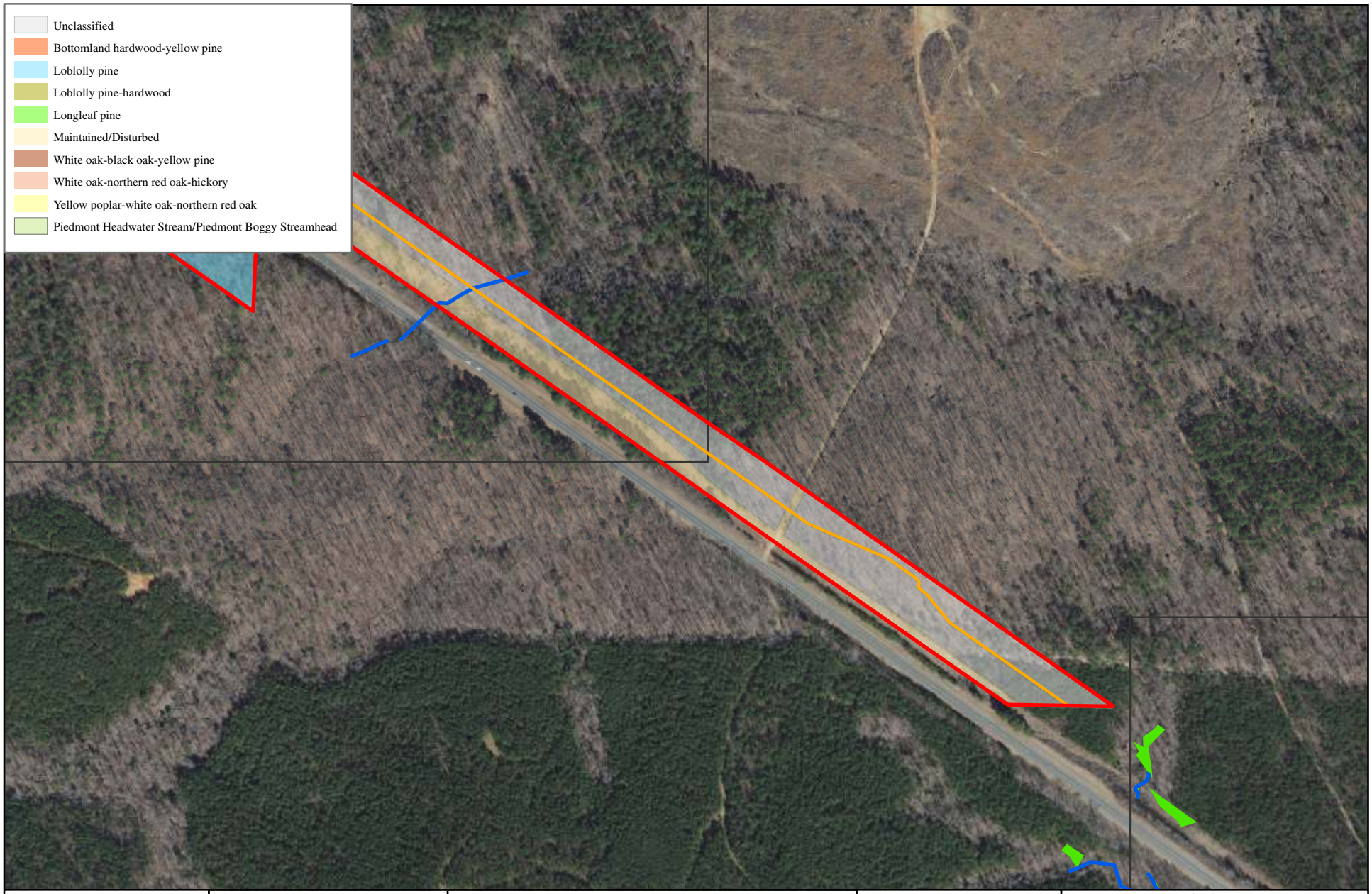
Revised:

Revised:

Revised:

R-2527 BE
Uwharrie National Forest
Montgomery County, NC

Figure 3.1:
Natural Communities



STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

N

0 200 400 Feet

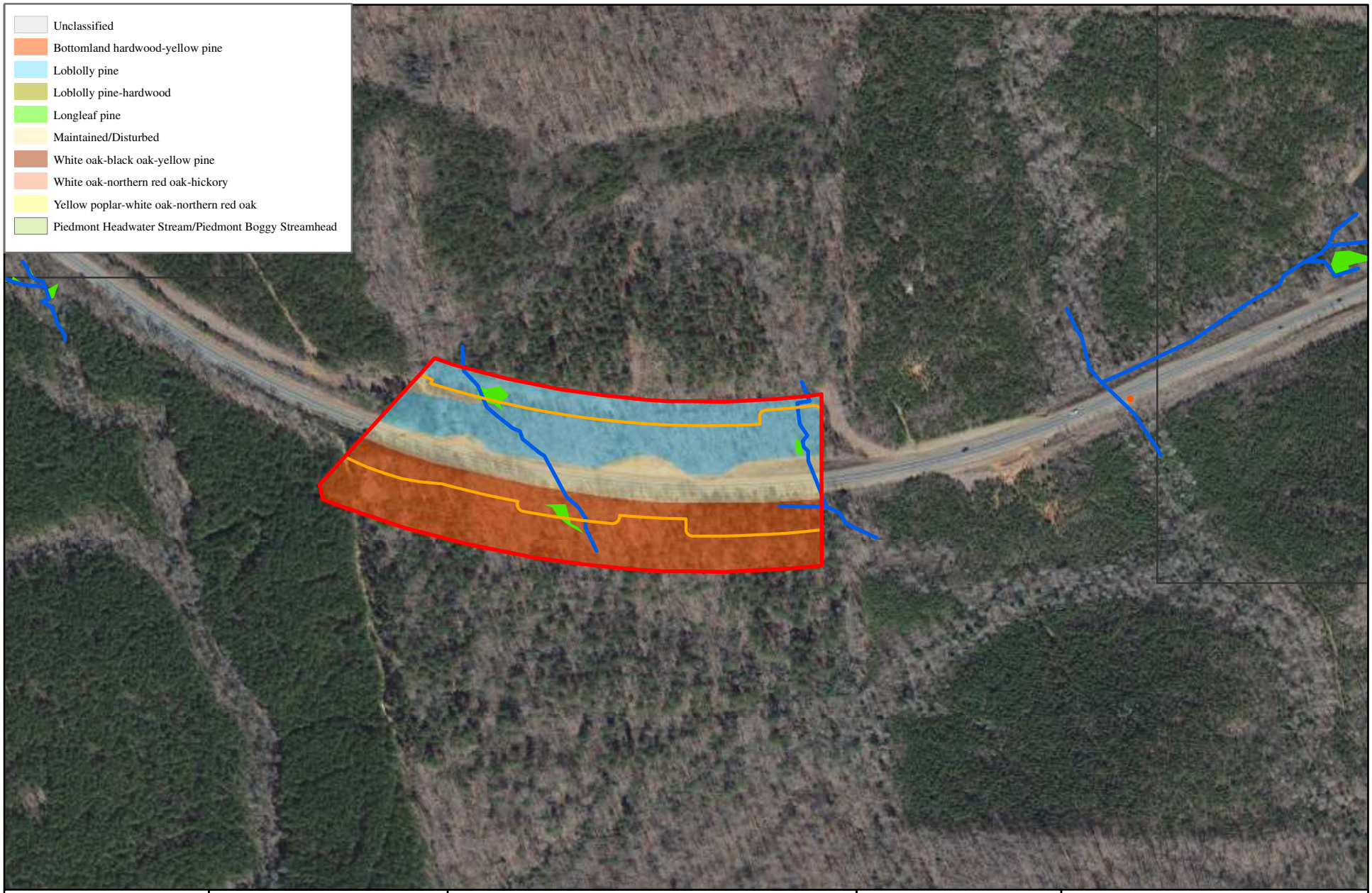
Study Area 2017
Project Area 2019
Stream
Wetland

2015 NC Statewide Aerial Photographs

Map Date: **February 2019**
Revised:
Revised:
Revised:

R-2527 BE
Uwharrie National Forest
Montgomery County, NC

Figure 3.2:
Natural Communities



STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

N

0 200 400 Feet

Study Area 2017

Project Area 2019

Stream

Wetland

2015 NC Statewide Aerial Photographs

Map Date: **February 2019**

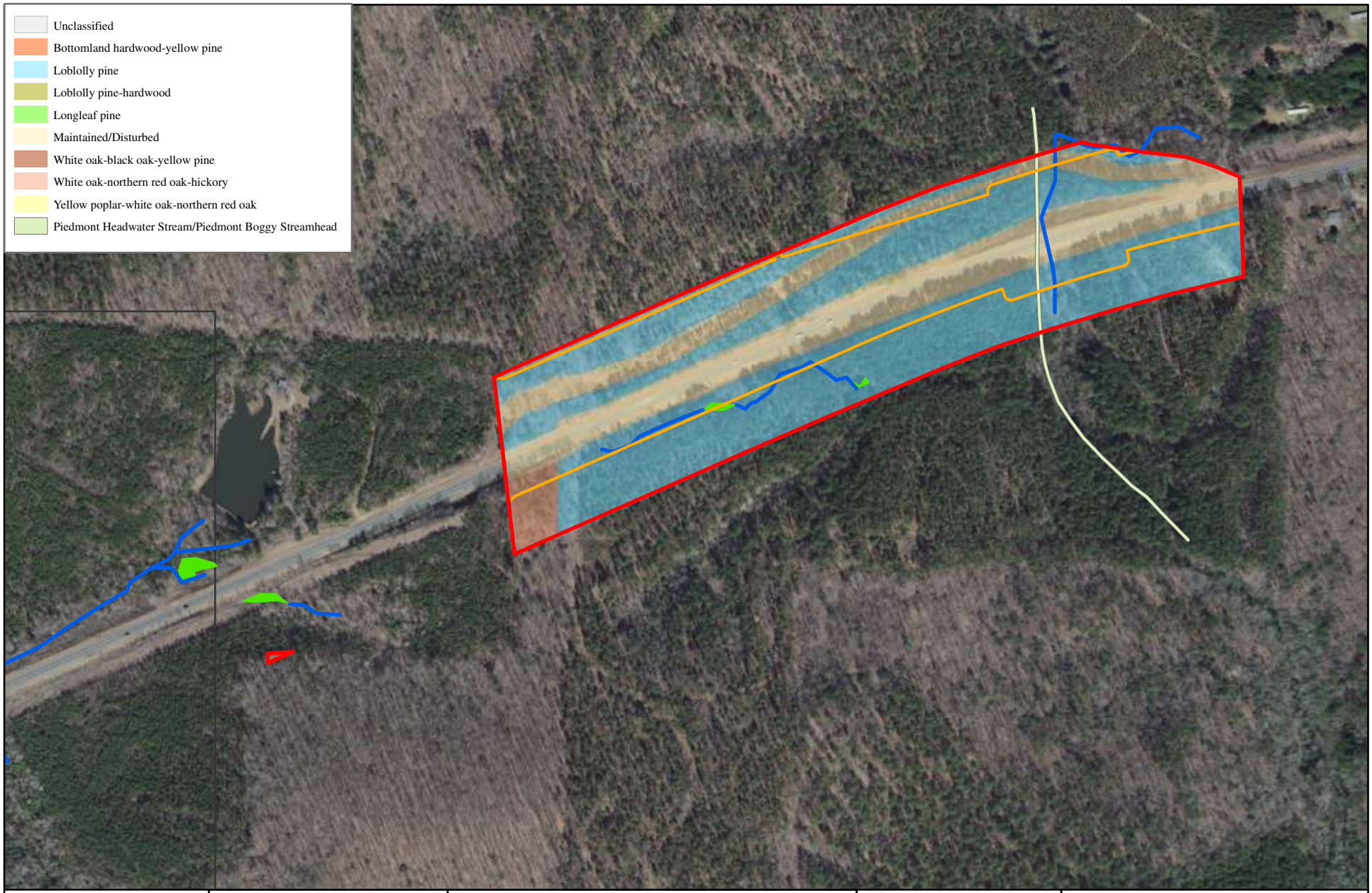
Revised:

Revised:

Revised:

R-2527 BE
Uwharrie National Forest
Montgomery County, NC

Figure 3.3:
Natural Communities



STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

N

0 200 400 Feet

Study Area 2017
Project Area 2019
Stream
Wetland

2015 NC Statewide Aerial Photographs

Map Date: **February 2019**

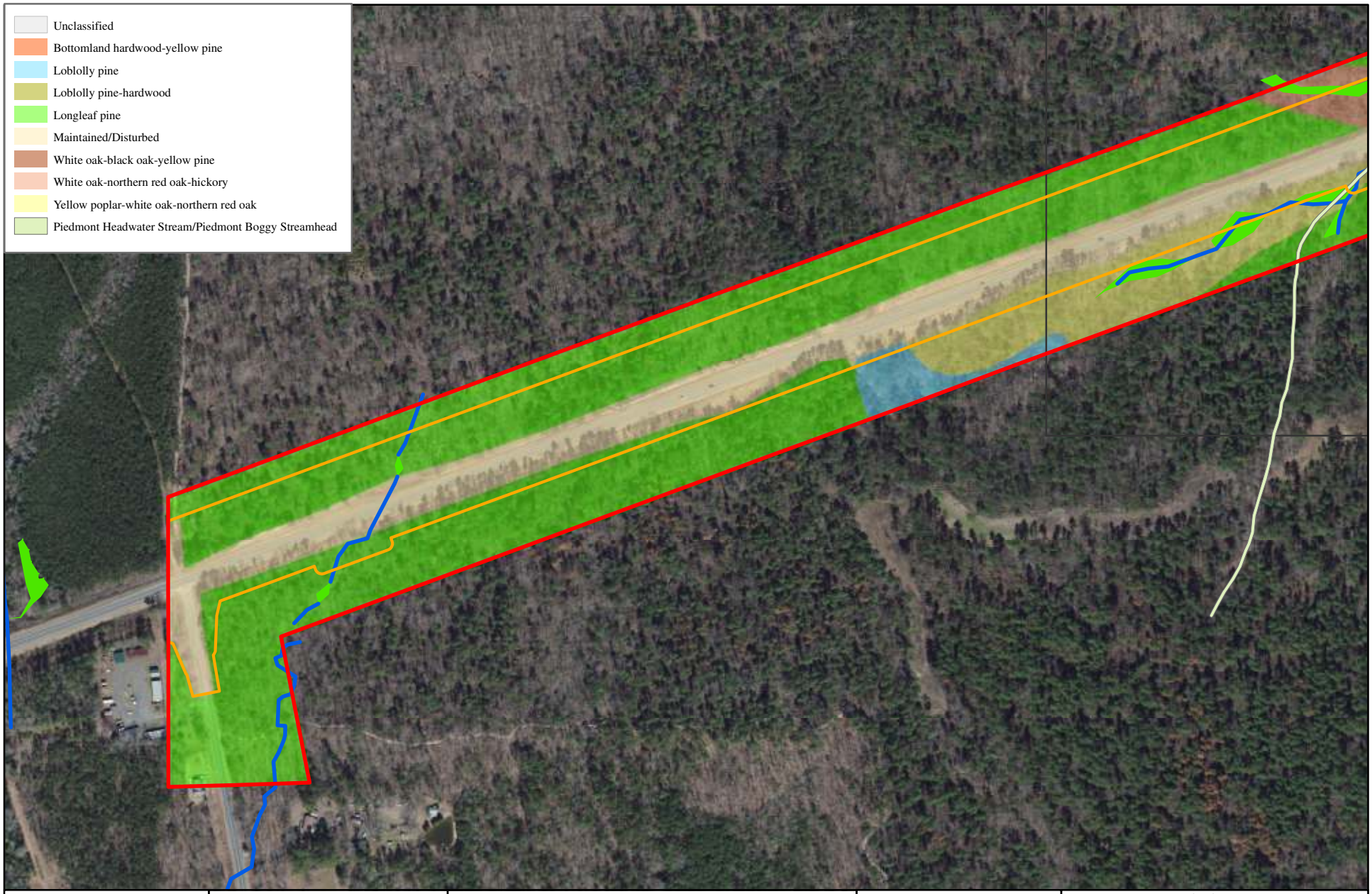
Revised:

Revised:

Revised:

R-2527 BE
Uwharrie National Forest
Montgomery County, NC

Figure 3.4:
Natural Communities



STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

N

0 200 400 Feet

Study Area 2017

Project Area 2019

Stream

Wetland

2015 NC Statewide Aerial Photographs

Map Date: **February 2019**

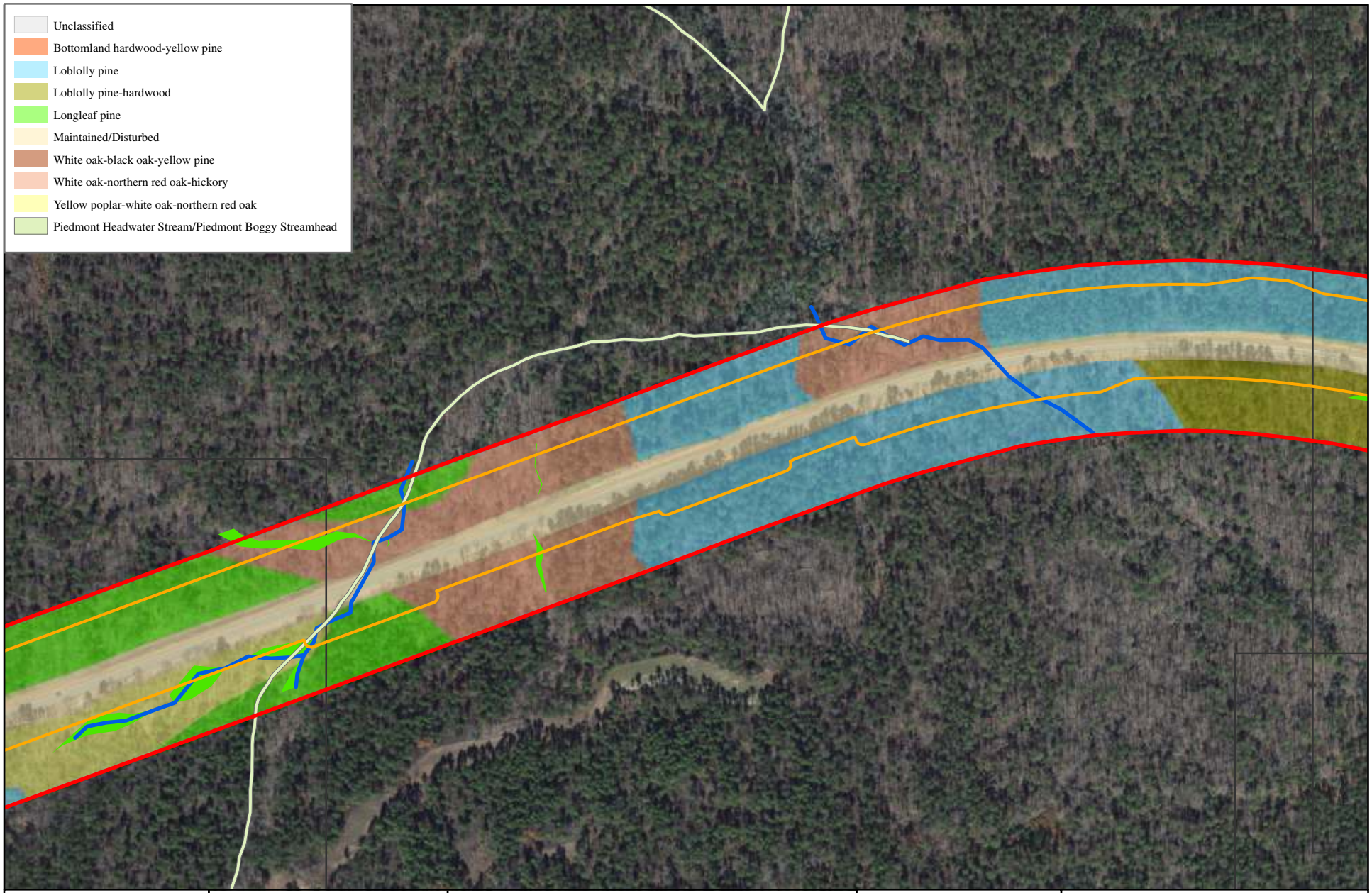
Revised:

Revised:

Revised:

R-2527 BE
Uwharrie National Forest
Montgomery County, NC

Figure 3.5:
Natural Communities



STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

N

0 200 400 Feet

Study Area 2017

Project Area 2019

Stream

Wetland

2015 NC Statewide Aerial Photographs

Map Date: **February 2019**

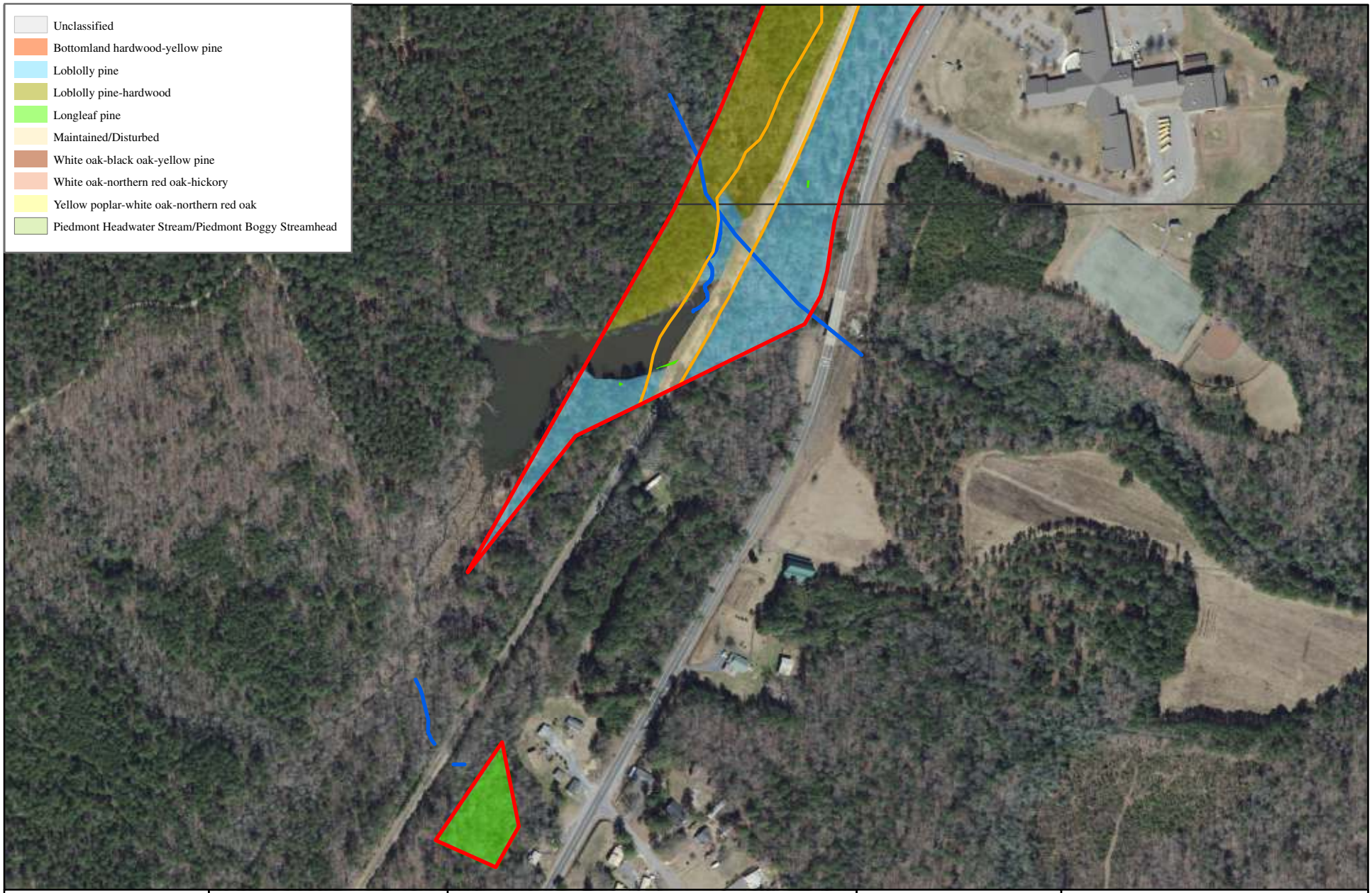
Revised:

Revised:

Revised:

R-2527 BE
Uwharrie National Forest
Montgomery County, NC

Figure 3.6:
Natural Communities



STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

N

0 200 400 Feet

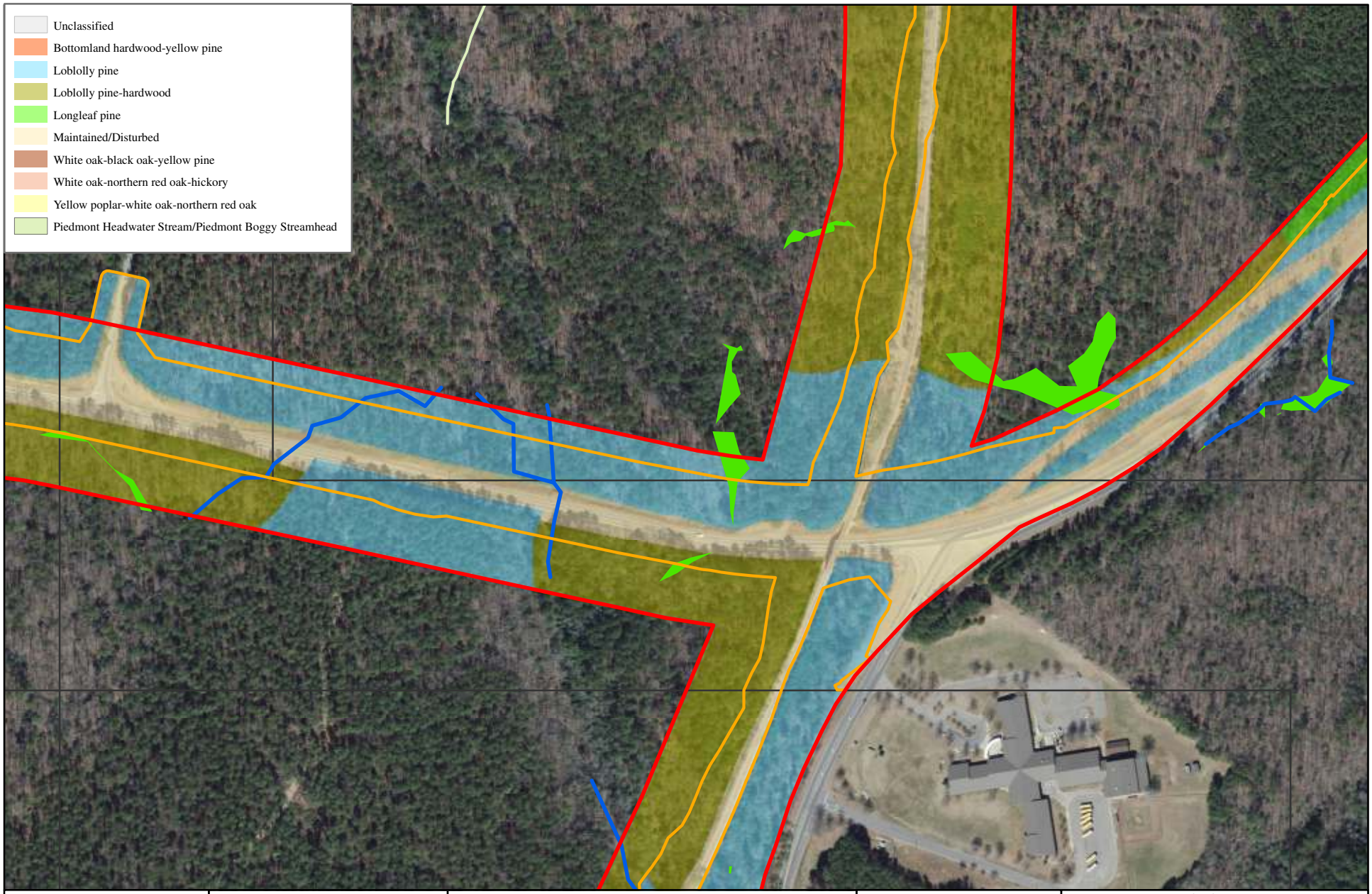
Study Area 2017
Project Area 2019
Stream
Wetland

2015 NC Statewide Aerial Photographs

Map Date: **February 2019**
Revised:
Revised:
Revised:

R-2527 BE
Uwharrie National Forest
Montgomery County, NC

Figure 3.7:
Natural Communities



STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

N

0 200 400 Feet

Study Area 2017
Project Area 2019
Stream
Wetland

2015 NC Statewide Aerial Photographs

Map Date: **February 2019**

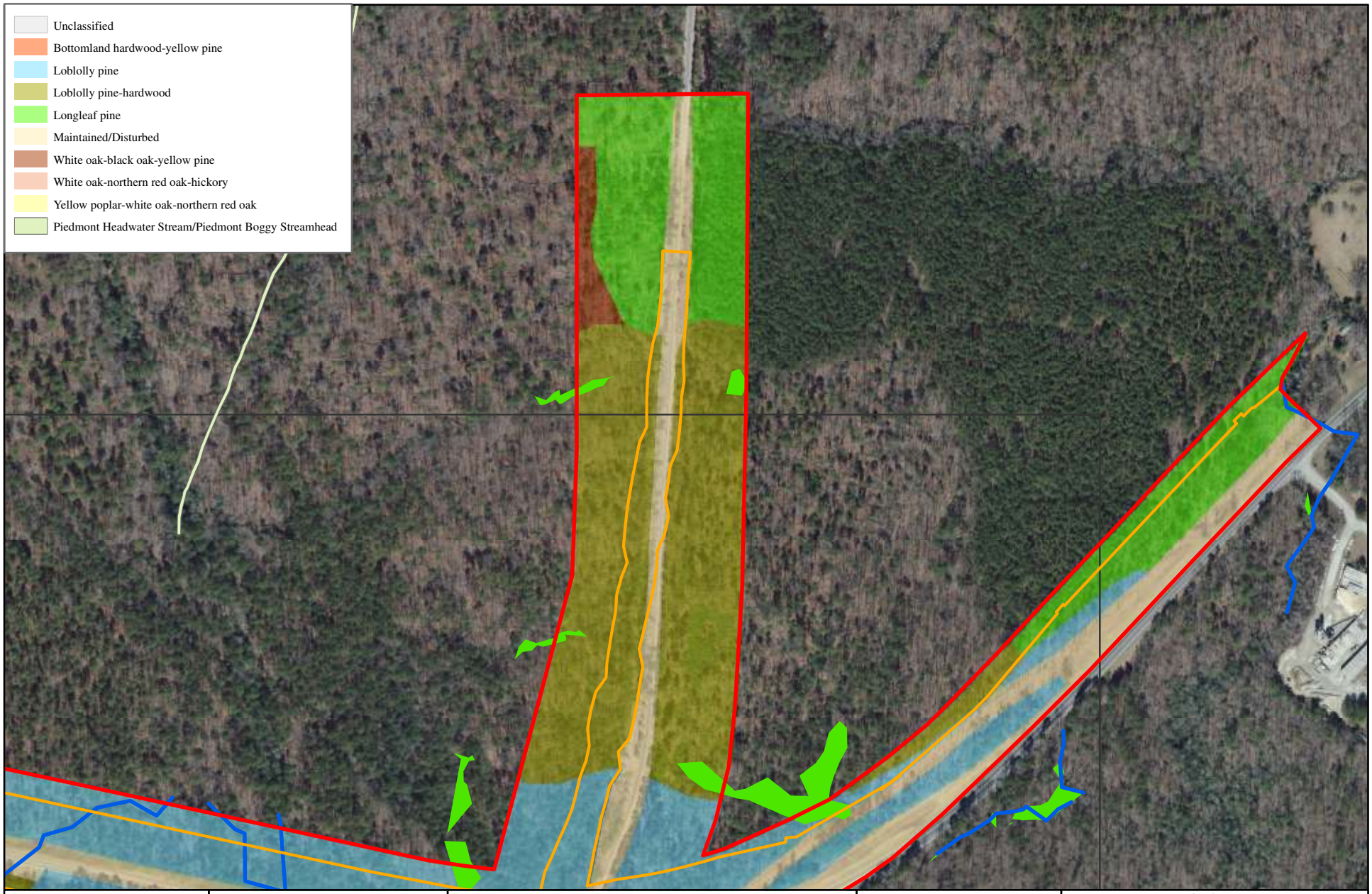
Revised:

Revised:

Revised:

R-2527 BE
Uwharrie National Forest
Montgomery County, NC

Figure 3.8:
Natural Communities



STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

N

0 200 400 Feet

Study Area 2017
Project Area 2019
Stream
Wetland

2015 NC Statewide Aerial Photographs

Map Date: **February 2019**

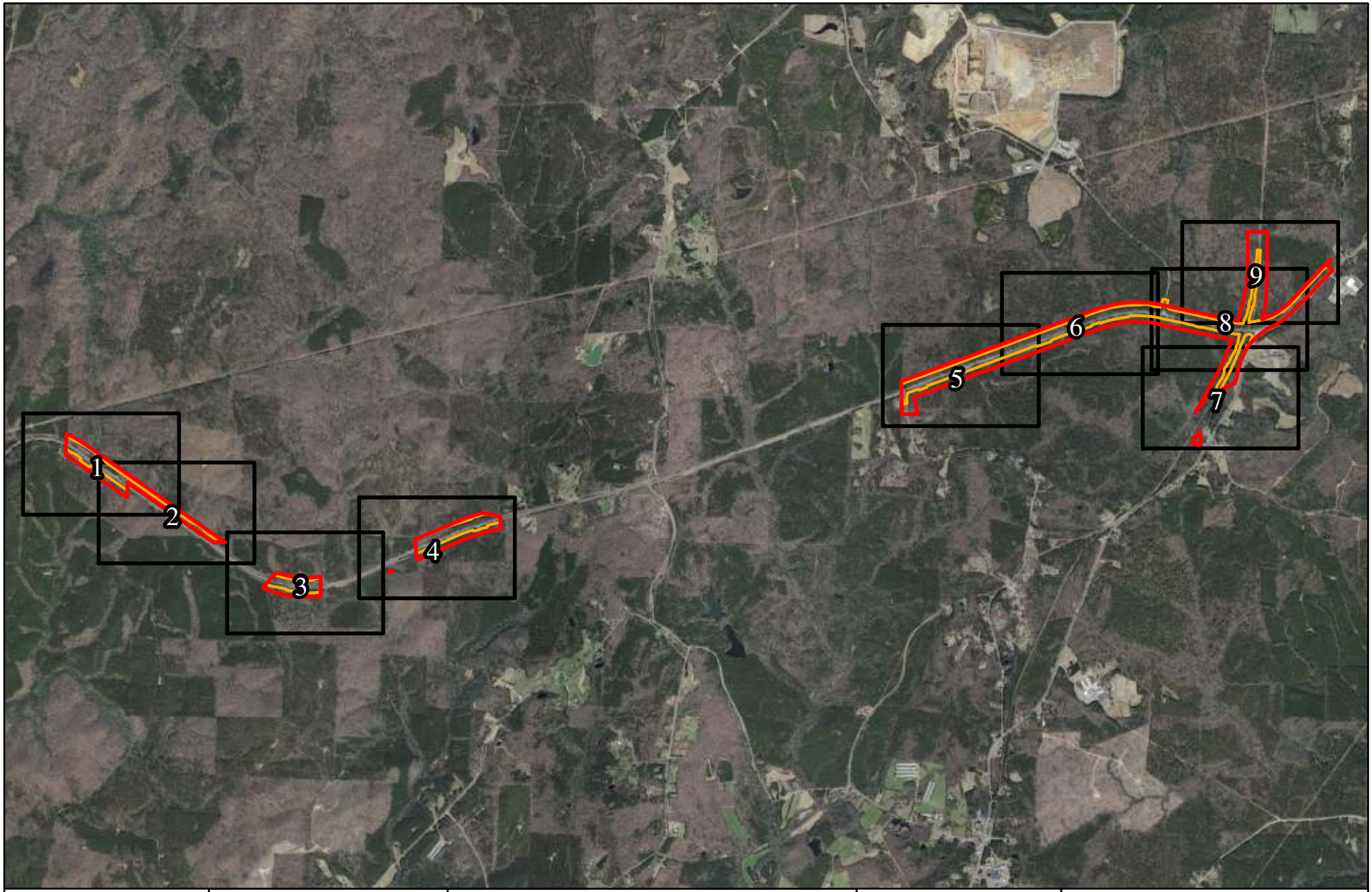
Revised:

Revised:

Revised:

R-2527 BE
Uwharrie National Forest
Montgomery County, NC

Figure 3.9:
Natural Communities



N

0 0.25 0.5 Miles

Study Area 2017

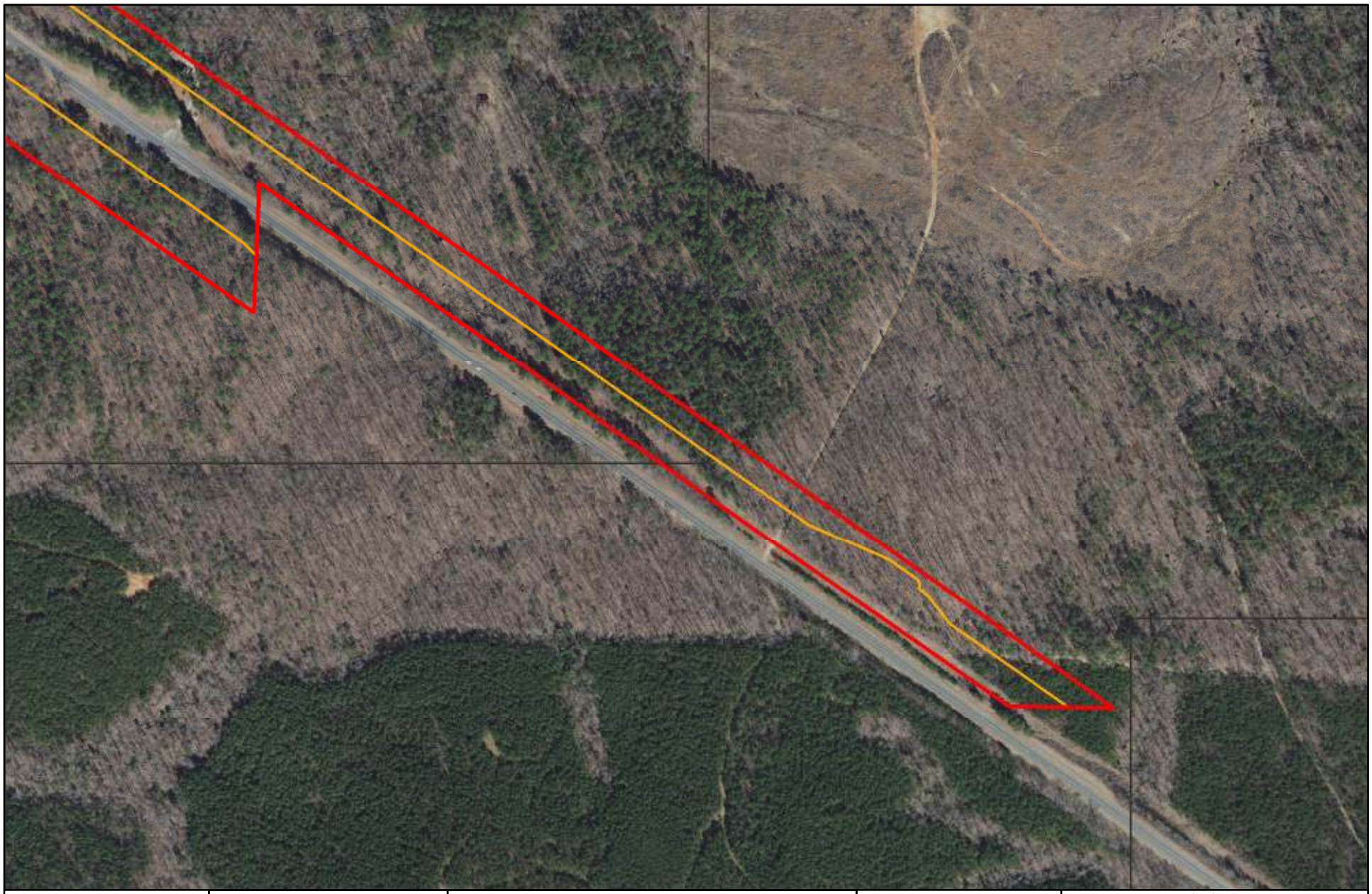
Project Area 2019

Sheet Limits

2015 NC Statewide Aerial Photographs

Map Date: **February 2019**	**R-2527 BE** **Uwharrie National Forest** **Montgomery County, NC**
Revised:	
Revised:	**Figure 4.0:** **Index Map**
Revised:	

Map Date: **February 2019**	**R-2527 BE** **Uwharrie National Forest** **Montgomery County, NC**
Revised:	
Revised:	**Figure 4.1: Observed USFS Plant and Animal Resources**
Revised:	



N

0 200 400 Feet

Study Area 2017
Project Area 2019
Smooth Sunflower
Hellers Rabbit Tobacco
Hillside Seep
Isoetes uwharrie
Large Witch Alder
Mountain Camellia
Yellow Pitcher Plant
Timber Rattlesnake

2015 NC Statewide Aerial Photographs

Map Date: **February 2019**

Revised:

Revised:

Revised:

R-2527 BE
Uwharrie National Forest
Montgomery County, NC

Figure 4.2: Observed USFS Plant and Animal Resources

	Map Date: **February 2019**	**R-2527 BE** **Uwharrie National Forest** **Montgomery County, NC**
	Revised:	
	Revised:	**Figure 4.3: Observed USFS Plant and Animal Resources**
	Revised:	

N

0 200 400 Feet

Study Area 2017
Project Area 2019
Smooth Sunflower
Hellers Rabbit Tobacco
Hillside Seep
Isoetes uwharrie
Large Witch Alder
Mountain Camellia
Yellow Pitcher Plant
Timber Rattlesnake

2015 NC Statewide Aerial Photographs

Map Date: **February 2019**

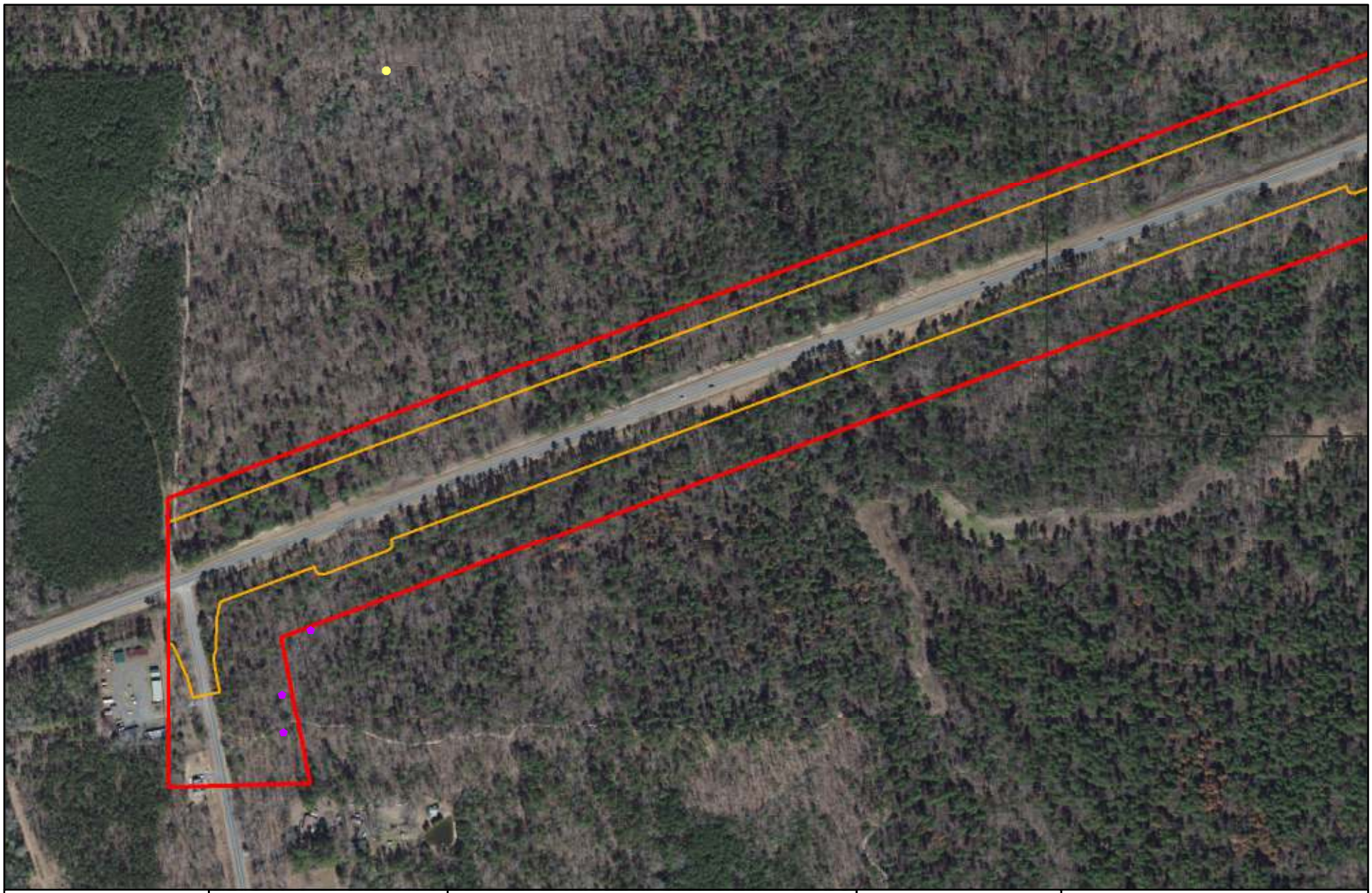
Revised:

Revised:

Revised:

R-2527 BE
Uwharrie National Forest
Montgomery County, NC

Figure 4.4: Observed USFS Plant and Animal Resources



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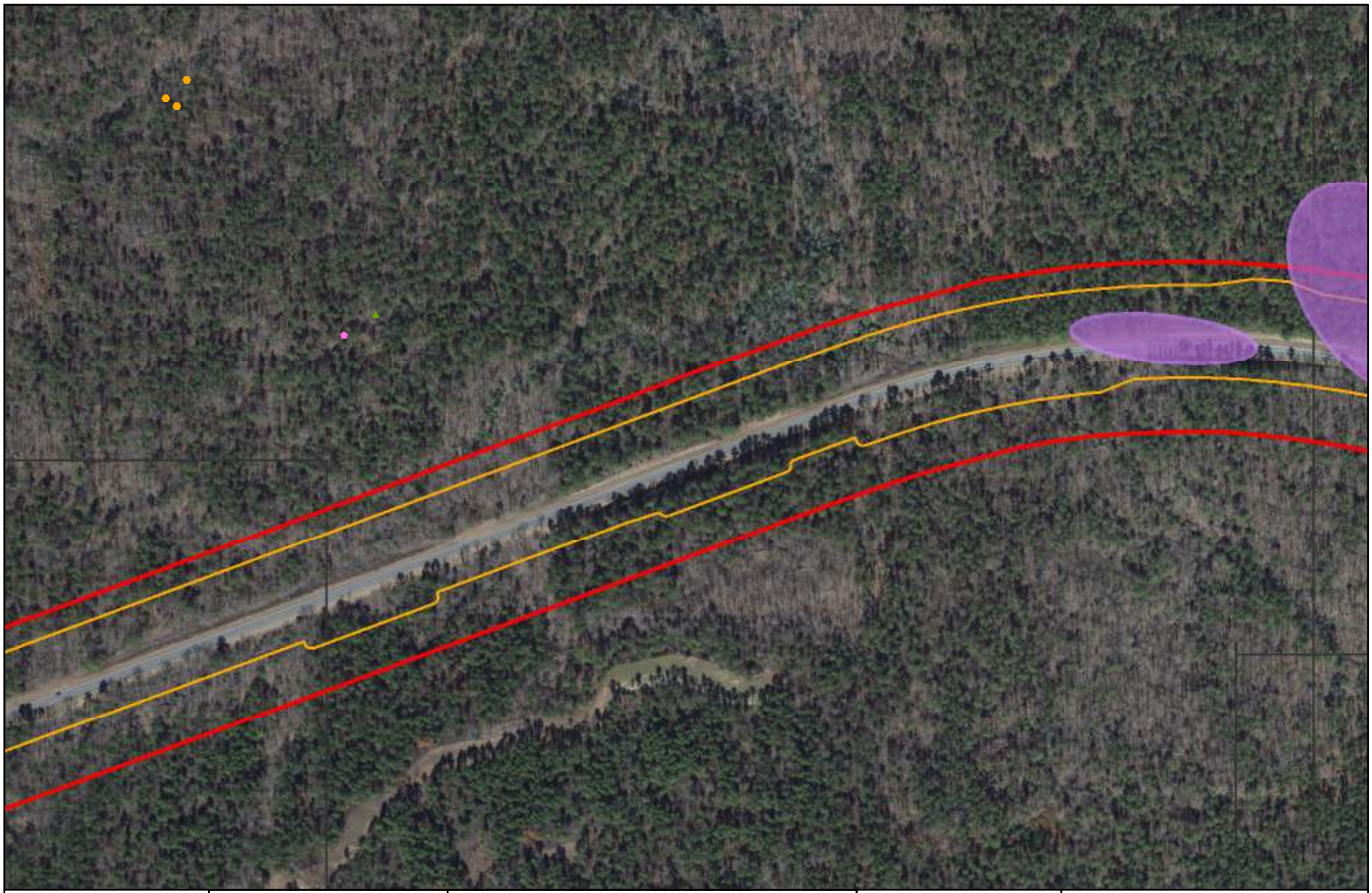
Revised:	
Revised:	**Figure 4.5: Observed USFS Plant and Animal Resources**
Revised:	



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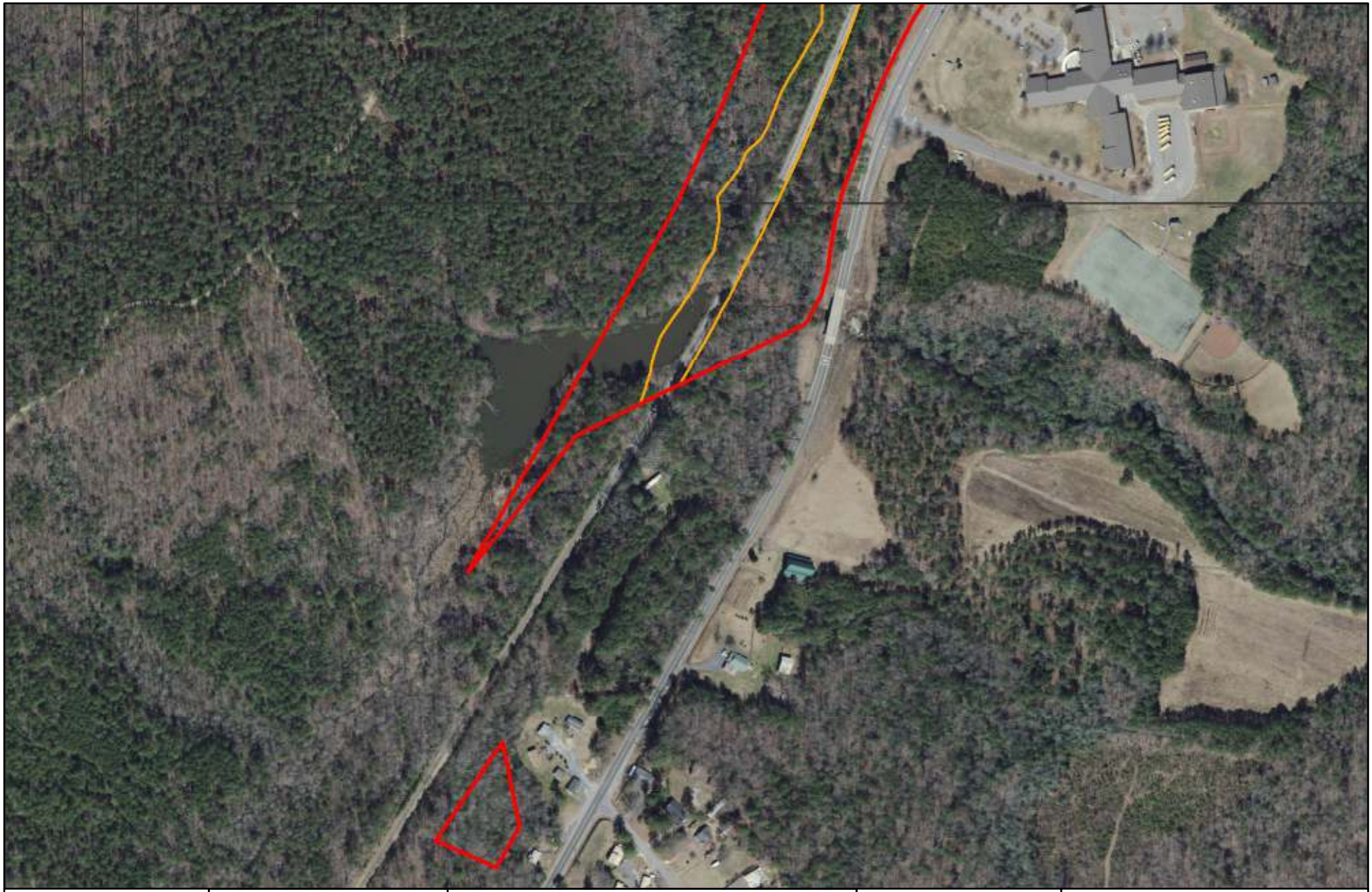
Revised:	
Revised:	**Figure 4.6: Observed USFS Plant and Animal Resources**
Revised:	



N

0 200 400 Feet

Study Area 2017
Project Area 2019
Smooth Sunflower
Hellers Rabbit Tobacco
Hillside Seep
Isoetes uwharrie
Large Witch Alder
Mountain Camellia
Yellow Pitcher Plant
Timber Rattlesnake

2015 NC Statewide Aerial Photographs

Map Date: **February 2019**

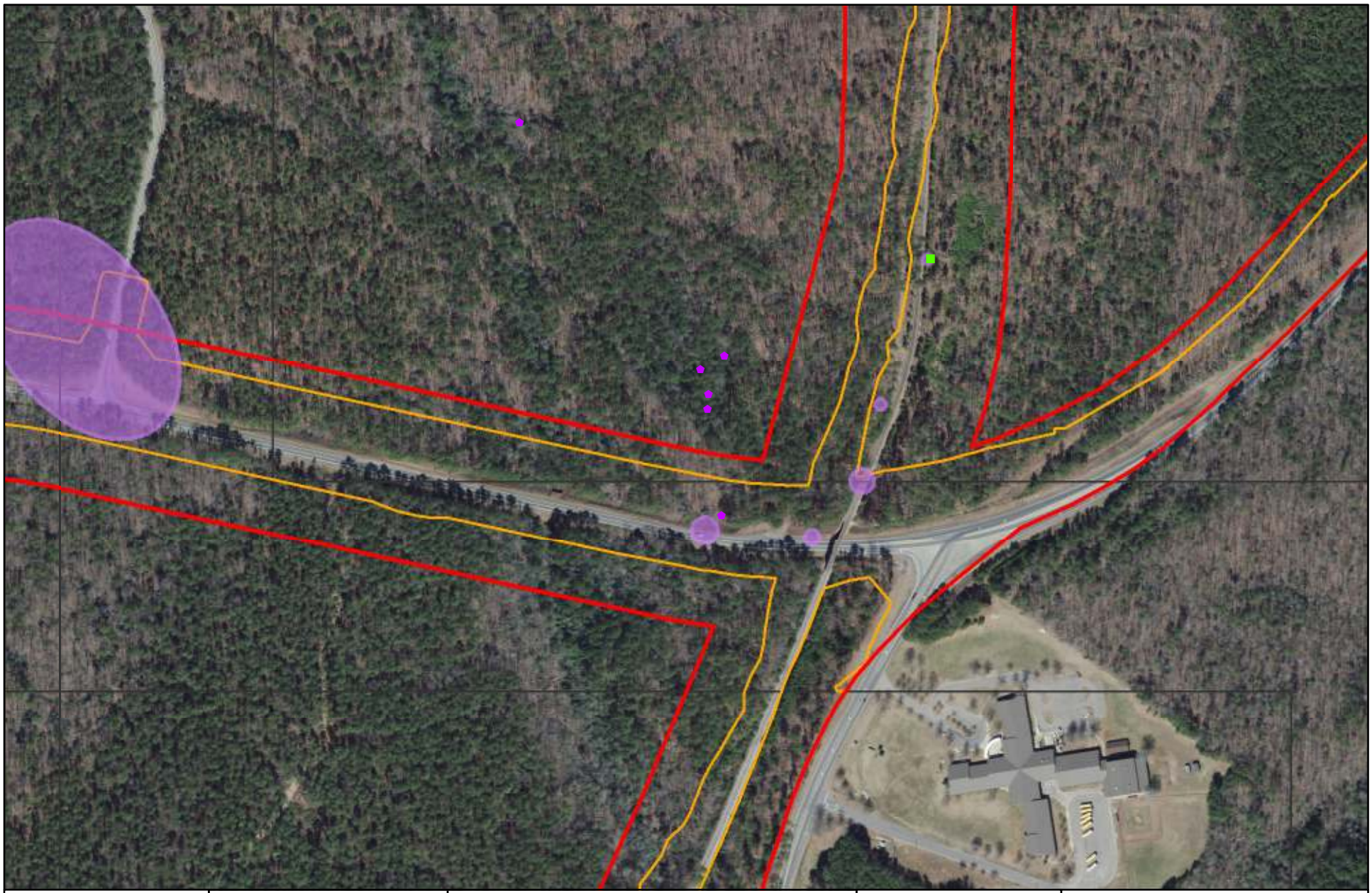
Revised:

Revised:

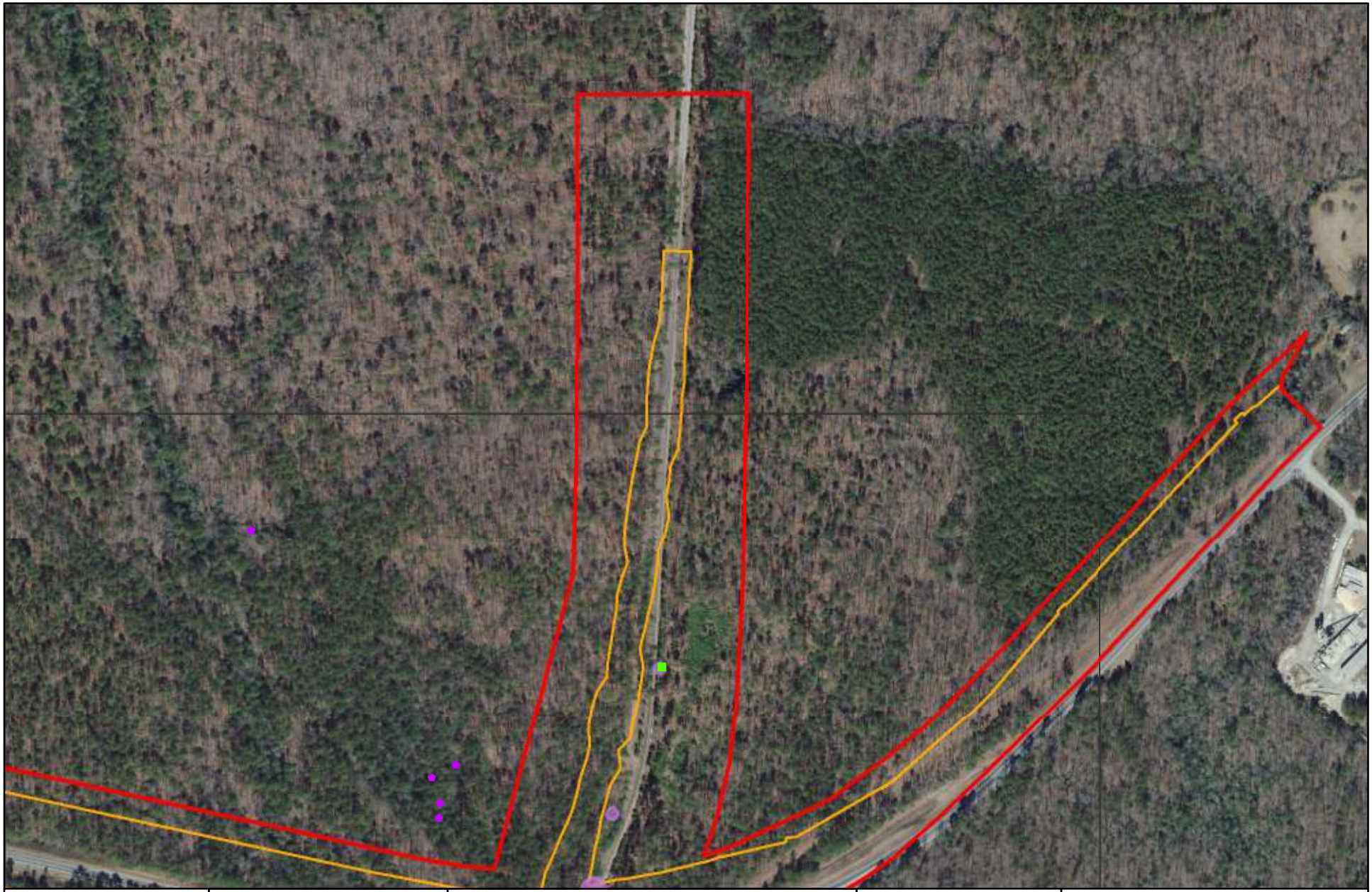
Revised:

R-2527 BE
Uwharrie National Forest
Montgomery County, NC

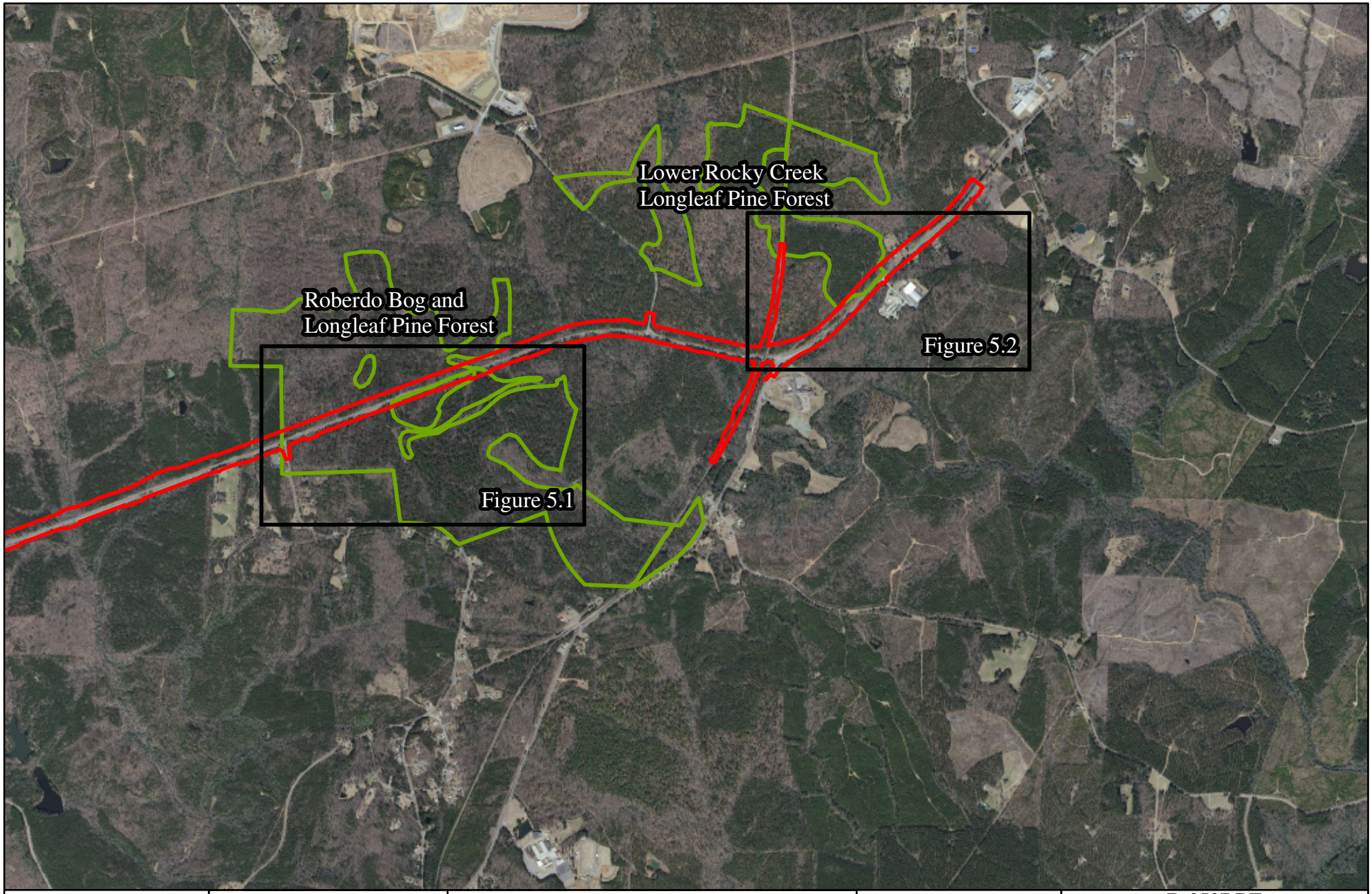
Figure 4.7: Observed USFS Plant and Animal Resources



Map Date: **February 2019**	**R-2527 BE** **Uwharrie National Forest** **Montgomery County, NC**
Revised:	
Revised:	**Figure 4.8: Observed USFS Plant and Animal Resources**
Revised:	



Map Date: **February 2019**	**R-2527 BE** **Uwharrie National Forest** **Montgomery County, NC**
Revised:	
Revised:	**Figure 4.9: Observed USFS Plant and Animal Resources**
Revised:	



N

0 0.25 0.5 Miles

Project Area

Longleaf Pine Forest

2015 NC Statewide Aerial Photographs

Map Date: **February 2019**

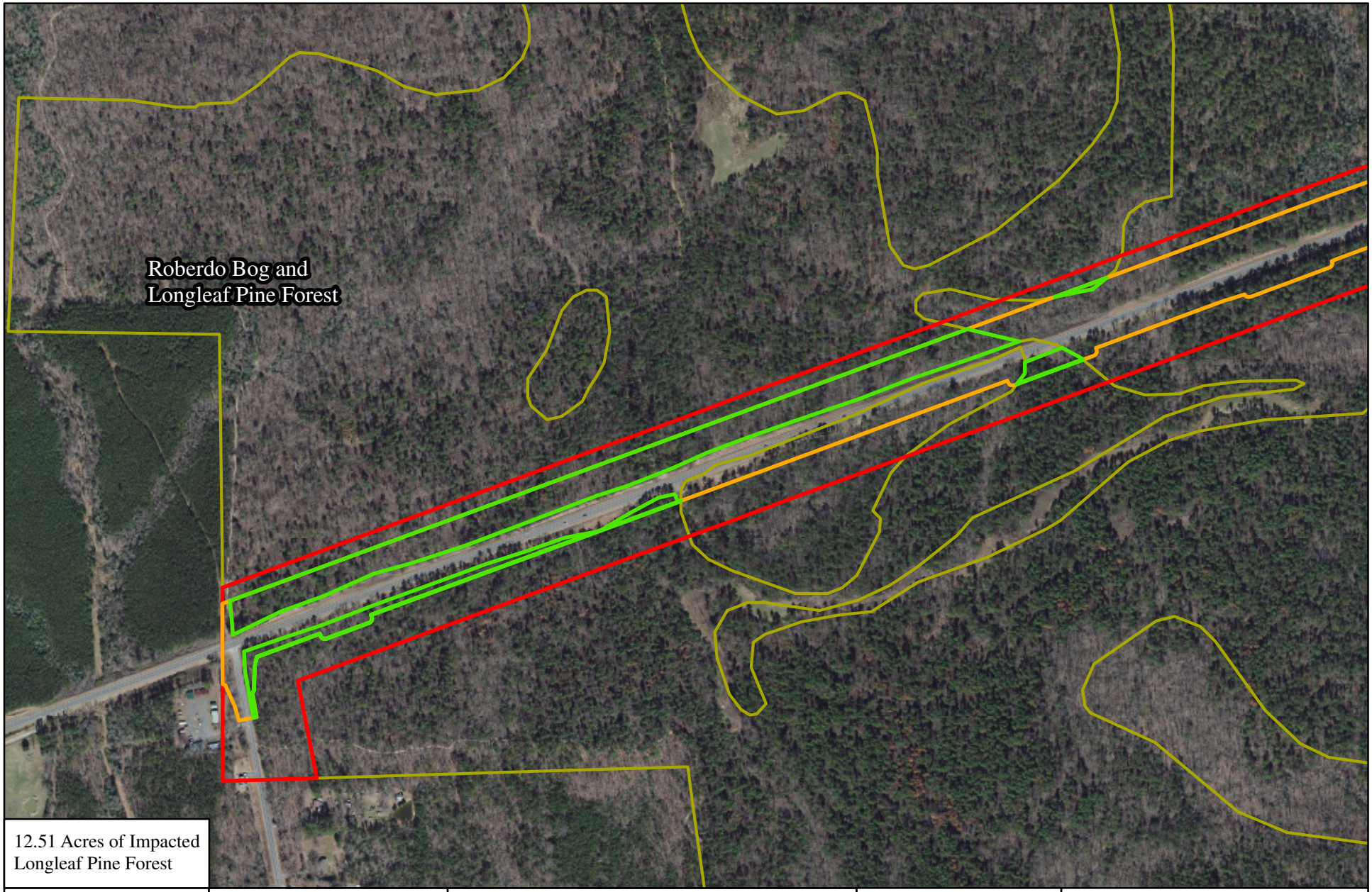
Revised:

Revised:

Revised:

R-2527 BE
Uwharrie National Forest
Montgomery County, NC

Figure 5.0: U.S. Forest Service Longleaf Pine Stand Impacts



12.51 Acres of Impacted Longleaf Pine Forest

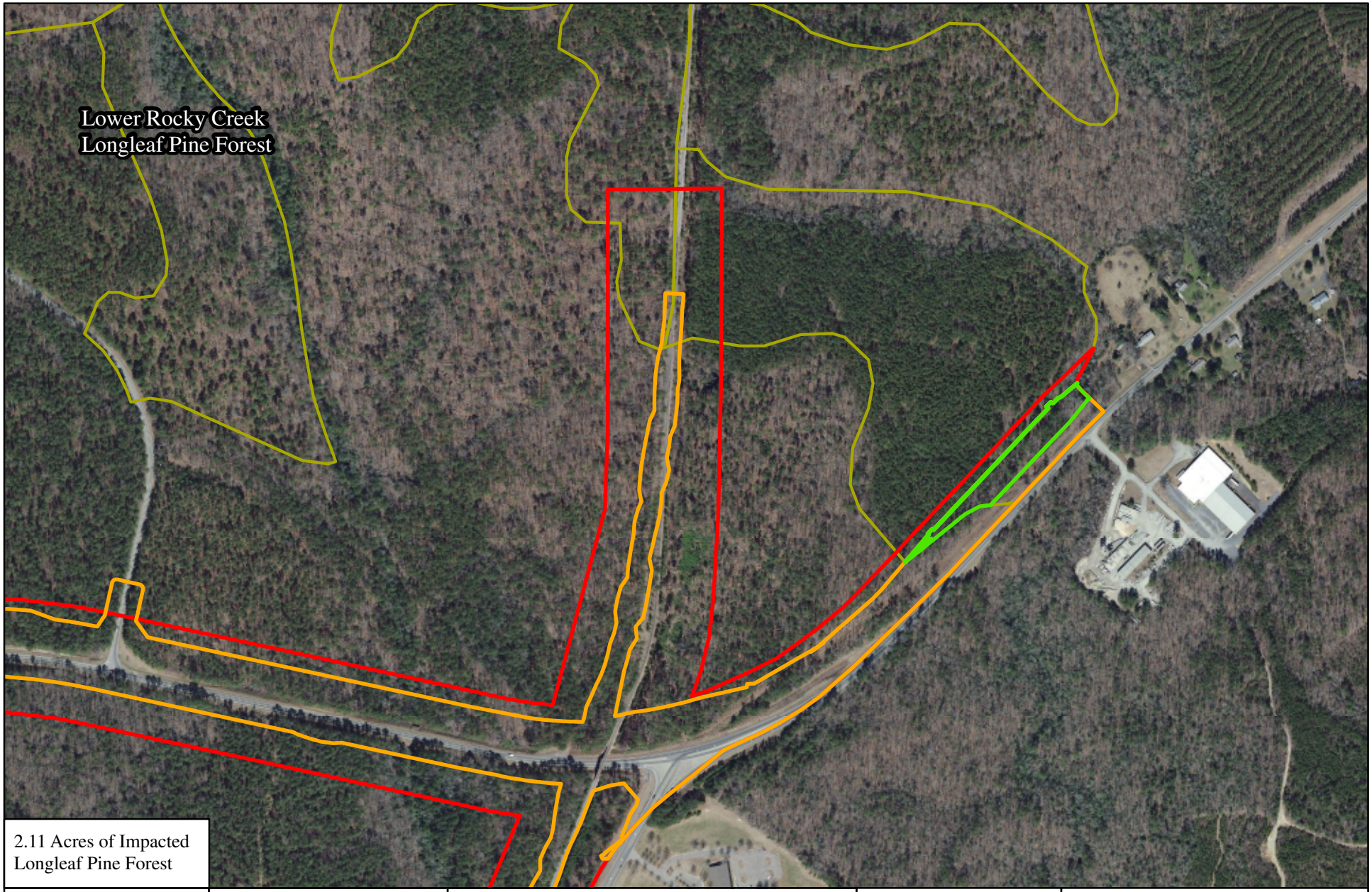
N

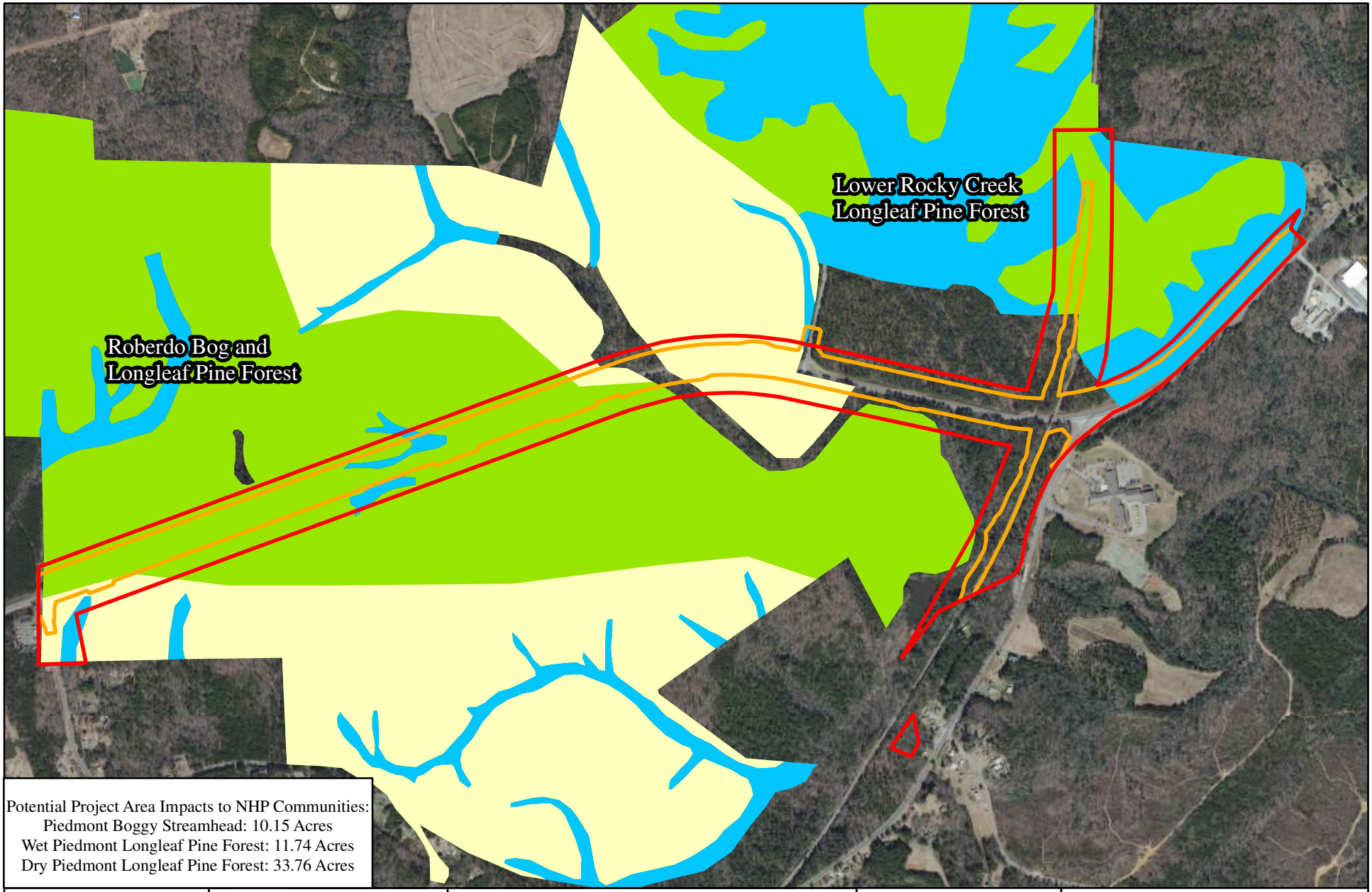
0 300 600 Feet

Study Area
Project Area
Longleaf Pine Impact Area
Longleaf Pine Forest

2015 NC Statewide Aerial Photography

Map Date: **February 2019**	**R-2527 BE** **Uwharrie National Forest** **Montgomery County, NC**
Revised:	
Revised:	**Figure 5.1: U.S. Forest Service Longleaf Pine Stand Impacts**
Revised:	


Lower Rocky Creek
Longleaf Pine Forest
2.11 Acres of Impacted
Longleaf Pine Forest
N
0
300
600
Feet
Study Area
Project Area
Longleaf Pine Impact Area
Longleaf Pine Forest
2015 NC Statewide Aerial Photography
Map Date: February 2019
Revised:
Revised:
Revised:
R-2527 BE
Uwharrie National Forest
Montgomery County, NC
Figure 5.2: U.S. Forest Service
Longleaf Pine Stand Impacts



Potential Project Area Impacts to NHP Communities:
Piedmont Boggy Streamhead: 10.15 Acres
Wet Piedmont Longleaf Pine Forest: 11.74 Acres
Dry Piedmont Longleaf Pine Forest: 33.76 Acres

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

N

0 600 1,200 Feet

Study Area
Project Area
Piedmont Boggy Streamhead
Wet Piedmont Longleaf Pine Forest
Dry Piedmont Longleaf Pine Forest

2015 NC Statewide Aerial Photography

Map Date: **March 2019**	**R-2527 BE** **Uwharrie National Forest** **Montgomery County, NC**
Revised:	
Revised:	**Figure 6.0: National Heritage Program Community Impacts**
Revised:	

BIOLOGICAL RESOURCES (BOTANICAL & ANIMAL) REPORTS

FOR THE

UWHARRIE NATIONAL FOREST

NC 24/27 WIDENING

MONTGOMERY COUNTY, NC

TIP NO. R-2527
WBS ELEMENT 35572.1.1

MARCH 2019

Contact Person:

Matt Haney
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North Carolina Department of Transportation
Natural Environment Section
Biological Surveys Group
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TABLE OF CONTENTS

BIOLOGICAL RESOURCES (BOTANICAL & ANIMAL) REPORTS
NCDOT TIP #R-2527 NC 24/27 PROJECT UWHARRIE NATIONAL FOREST

I. INTRODUCTION

This report documents Federal Threatened and Endangered (T&E), Federal Species of Concern (FSC), and State Listed (NC Listed) biological resources species (Plant and Animal) observed within US Forest Service (USFS) lands that may be impacted by construction of TIP R-2527 (Project) in western Montgomery County, North Carolina (Figure 1). The area surveyed in detail is the Study Area, a 500-foot wide corridor centered on NC 24/27. The area that may be directly impacted by road widening construction is the Project Area, but was not known at the time of surveys (See the Biological Evaluation [BE] for the project description and activities). The Biological Analysis Area (BAA) is two kilometers (2 km) beyond the Study Area (Figure 2). This two km distance best defines the limits of any potential effects to a species' population and was adopted from The Nature Conservancy (TNC) and N.C. Natural Heritage Program (NCNHP). This analysis focuses on the Study area and BAA. The potential direct and indirect effects on T&E, FSC, and NC Listed species are evaluated. Federal Candidate (C), North Carolina Significantly Rare (SR), and other species listed by the USFS are identified and minimally discussed.

II. BIOLOGICAL RESOURCES SPECIES SURVEY AND ANALYSIS METHODS

T&E, FSC, and NC Listed biological resources species were identified by:

1. Reviewing the lists of T&E, FSC, and NC Listed species and their habitat preferences provided by USFS,
2. Consulting North Carolina Natural Heritage Program element occurrence records of T&E, FSC, and NC Listed biological resources species,
3. Consulting with individuals both in the public and private sectors who are knowledgeable of the area and its flora and fauna, and
4. Conducting field surveys in areas designated for ground disturbing activities.

Survey intensity varied depending upon the extent of any likely T&E, FSC, and NC Listed biological resources species' habitat, complexity of vegetation, and/or presence of indicator species. Some areas were virtually devoid of habitat and required little intensive survey; while, other areas, such as disturbed roadside, required considerably more time to adequately survey. Although the search was focused on the possibility of occurrences of the T&E, FSC, and NC Listed biological resources species listed on Table 1 (plants) and Table 2 (animals), all T&E, FSC, and NC Listed biological resources species were searched for during the surveys.

Field surveys were conducted in 2017 and 2018. Biologists with expertise in various fields participated in the surveys. Qualifications of principle investigators are provided in the Biological Evaluation (BE) report. Survey windows were adjusted based on flowering status of local reference populations to capture seasonal variations of target species.

Benthic Macroinvertebrates
March 7 and 8, 2018 (Dave Penrose and Jason York)

Birds
April 26 - 28, 2018 (Logan Williams and Mike Sanderson)

Bird: Bald Eagle
December 15, 2017 (Greg Price)

Bird: Red-cockaded Woodpecker (Greg Price, Chris Hopper)
November 14, 17, and 29, 2017 (Greg Price, Chris Hopper)
December 12 and 22, 2017 (Matt Haney, Greg Price, Chris Hopper, Mike Sanderson)
January 22 – 23, 2018 (Matt Haney, Greg Price, Chris Hopper, Mike Sanderson, Rex Badgett)
March 7, 2018 (Greg Price, Chris Hopper)

Plants
October 18 and 20, 2017 (Moni Bates and Logan Williams)
November 3 and 26, 2017 (Moni Bates and Logan Williams)
April 26 – 27, 2018 (Moni Bates and Logan Williams)
May 15, 16, and 22, 2018 (Moni Bates and Logan Williams)

Plant: Schweinitz's Sunflower
September 26, 2017 (Chris Hopper, Greg Price)
October 18, 2017 (Chris Hopper, Greg Price)

Freshwater Fish
May 22 and 28, 2018 (John Alderman and Joe Alderman)
September 11, 2018 (John Alderman and Joe Alderman)

Freshwater Mussels
May 1, 2018 (John Alderman and Joe Alderman)

Salamanders
October 17, 2017(Dennis Herman and Joe Alderman)

The field surveys were conducted by a meander search pattern to survey all habitats in the Study Area. Attention focused on habitats that may be associated with T&E, FSC, and NC Listed biological resources species. NCDOT biologist, Mike Sanderson, conducted bird surveys alongside Logan Williams on April 26 and April 28, 2018. Surveys were conducted for presence/absence using visual and auditory surveys. Special care was given to conduct the surveys in the early morning during the breeding season (April 21-June 23). Surveys for freshwater mussels and fish species were conducted within 400 meters downstream to 100 meters upstream within Study Area streams using visual, tactile, and electroshocking (for fish taxa) techniques. Surveys were conducted so that a T&E, FSC, and NC Listed biological resources species would not be overlooked due to phenology or time of the year that the species could reasonably be detected. A list of species observed during the surveys can be found in Appendix 2.

III. CONDITION OF EXISTING PLANT AND ANIMAL SPECIES

Plant Communities and Habitats Found in the Study Area

The BAA was characterized by three different plant communities. These include mixed pine/hardwood forest, maintained/disturbed areas, and the seeps of first-order tributaries (Figures 3.1 to 3.6). These plant communities are characterized below.

Mixed Pine/Hardwood Forest: The canopy trees include Acer rubrum var. rubrum (Eastern Red Maple), Carya glabra (Pignut Hickory), Pinus echinata (Shortleaf Pine), Quercus alba (White Oak), Quercus coccinea (Scarlet Oak), Quercus montana (Chestnut Oak), and Quercus velutina (Black Oak). The shrub, vine, and herb layers varied within this community. Common subcanopy trees include Cornus florida (Flowering Dogwood), and Oxydendrum arboreum (Sourwood). Typically, the shrub and herb layers are sparse and support Muscadina rotundifolia var. rotundifolia (Muscadine), and Vaccinium spp. (Blueberry species). In other areas of mixed pine/hardwood communities, the shrub layer supports common species such as Gaylussacia frondosa (Dangleberry), Lyonia mariana (Staggerbush), Rhus copallinum var. copallinum (Winged Sumac), and Vaccinium tenellum (Southern Blueberry). The shrub layer is also dominated with dense woody resprouts of Eastern Red Maple, Liquidambar styraciflua (Sweet Gum), Sassafras albidum (Sassafras), Sourwood, and other tree species. Common grasses include Andropogon ternarius var. ternarius (Splitbeard Bluestem), Chasmanthium laxum (Slender Spike Grass), Coleataenia anceps ssp. (Beaked Panic Grass), Saccharum alopecuroides (Silver Plume Grass), Schizachyrium scoparium var. scoparium (Common Little Bluestem), Sorghastrum nutans (Yellow Indiangrass), and Tridens flavus (Purpletop Tridens). The herb layer is diverse in patches where woody resprouts are not dominant. Some of the common herb species noted include Eupatorium capillifolium (Common Dog-fennel), Eupatorium pilosum (Ragged Eupatorium), Eupatorium rotundifolium (Common Roundleaf Eupatorium), Eupatorium hyssopifolium (Hyssopleaf Eupatorium), Helianthus atrorubens (Appalachian Sunflower), Helianthus divaricatus (Spreading Sunflower), Helianthus microcephalus (Small-headed Sunflower), Liatris pilosa (A Blazing-star), Parthenium integrifolium var. integrifolium (Common Wild Quinine), Solidago odora (Licorice Goldenrod), Symphyotrichum grandiflorum (Big-headed Aster), and Tephrosia virginiana (Virginia Goat's-rue).

Maintained/Disturbed Habitats: The south /southeast side of NC Highway 24/27 was recently burned from Bruton-Carpenter Road to about 2,000 feet east. Common species noted in the highway and power line rights-of-way (ROW)s include Appalachian Sunflower, Small-headed Sunflower, Spreading Sunflower, and Symphyotrichum patens var. patens (Common Clasping Aster). The Northwest Southern Railroad uses herbicide to control vegetation along their ROW. At the transition between the herbicide treated ROW and the canopy trees on the USFS is an edge of dense woody resprouts of Eastern Red Maple, Sweet Gum, Sourwood. The adjacent canopy trees include Liriodendron tulipifera var. tulipifera (Tulip-tree), Pinus taeda (Loblolly Pine), Quercus falcata (Southern Red Oak), and other species. A few Pinus palustris (Longleaf Pine) are mixed in the canopy to the east of the railroad ROW. The vine layer is dominated with Muscadine. Common herbs along the edge habitat include Agalinis setacea (An Agalinis or Purple-foxglove), Appalachian Sunflower, Licorice Goldenrod, Pseudognaphalium obtusifolium (Fragrant Rabbit Tobacco), Silphium compositum var. compositum (A Rosinweed), Silver Plume Grass, Small-headed Sunflower, and Spreading Sunflower. Herbs noted in this habitat include

Chrysopsis mariana (Maryland Golden-aster), Common Wild Quinine, Coreopsis major var. major (Woodland Coreopsis), and Schizachyrium scoparium var. scoparium (Common Little Bluestem). In addition, also along NC Highway 24/27, there are areas that support dense stands of hardwood resprouts.

Seeps of First-Order Tributaries: The lower slopes and seeps support common species including Arundinaria gigantea (Giant or River Cane), Osmundastrum cinnamomeum (Cinnamon Fern), Osmunda spectabilis (American Royal Fern), Sphagnum moss, Viburnum nudum (Southern Wild Raisin), and Woodwardia areolata (Netted Chain Fern). A common upland fern is Pteridium aquilinum ssp. latiusculum (Eastern Bracken).

Significant Natural Heritage Areas and Natural Communities

Seven Significant Natural Heritage Areas (SNHA) are known within the BAA (Figure 2). These include Clarks Grove Longleaf Pine Forest, Lawrenceville Ephemeral Pools, Railroad Mixed Pine Forest, Walker Mountain/Wood Run Natural Area, and YAD/Upper Little River Aquatic Habitat are known within the BAA. Lower Rocky Creek Longleaf Pine Forest and Roberdo Bog and Longleaf Pine Forest are known within the BAA and Study Area.

Eleven Natural Communities occur within the BAA. These include Dry-Mesic Oak-Hickory Forest (Piedmont Subtype), Dry Oak-Hickory Forest (Piedmont Subtype), Dry Piedmont Longleaf Pine Forest, Hillside Seepage Bog, Low Elevation Seep (Typic Subtype), Piedmont Boggy Streamhead, Piedmont/Coastal Plain Heath Bluff, Piedmont Headwater Stream Forest (Typic Subtype), Piedmont Monadnock Forest (Typic Subtype), Upland Depression Swamp Forest, and Upland Pool (Roberdo Subtype).

T&E, FSC, and NC Listed Plant Species

A list of T&E, FSC, and NC Listed plant species that occur in the Uwharrie National Forest, provided by USFS, is provided in Appendix 1. Table 1 and summarizes the T&E, FSC, NC Listed, and NCNHP Significantly Rare plant species that are likely to occur, known to occur, or potentially could occur[1] in the BAA.

Site characteristics and species were observed and recorded to confirm or refute the presence of listed plant species. The Uwharrie National Forest Rare Plant List (2016 and 2018) was used to target the species search. A list of populations of rare plant species known to exist in the project area was provided by NCDOT as compiled from the NCNHP biological database. Table 1 in Appendix I provides a list of 60 plant species, sorted alphabetically per listing status, and includes occurrence status for each as: 1) Found in Study Area, 2) Found within Biological Analysis Area, but not Study Area, or 3) Possibly occurs within the Biological Analysis Area (based on broad habitat concepts)[1].

There are three known populations of rare plants in the NC NHP biological database that occur on the USFS property section of NC Highway 24/27 on the Morrow Mountain topographic map.

[1] In this document, the use of "possibly," "could occur," or "may occur," means "possible species occurrence" in the very broadest of senses. Only very general habitat preferences and species' distributions are used to determine if a species may or could occur. This does not imply their existence in an area.

These populations include Fothergilla major (Large Witch-alder), Helianthus laevigatus (Smooth Sunflower), and Pseudognaphalium helleri (Heller's Rabbit Tobacco). All three populations were noted during the survey (Figure 4). Large witch-alder has a State Rank of S3, Global Rank of G3, and is state listed as Significantly Rare-Throughout (SR-T). Smooth sunflower is ranked as State Rank of S2, Global Rank as G4, and is listed as Special Concern-Vulnerable (SC-V) by the NCNHP. Heller's Rabbit Tobacco is ranked as State Rank of S3, Global Rank as G4G5T3T4, and is listed as Significantly Rare-Peripheral (SR-P) by the NCNHP.

Botanical Survey Information

Habitats, community types, and ranges of T&E, FSC, and NC Listed plant species are derived from information in Flora of the Carolinas, Virginia, Georgia, and Surrounding Areas (Weakley 2012), Classification of the Natural Plant Communities of North Carolina: Third Approximation (Schafale and Weakley 1990), Guide to the Natural Communities of North Carolina: Fourth Approximation (Schafale 2012), Manual of the Vascular Flora of the Carolinas (Radford 1968), The Natural Heritage Program's List of Rare Plants of North Carolina (2018), Uwharrie National Forest Rare Plant List (2016), Uwharrie National Forest Rare Plant List (2018), or information obtained through other botanists.

All habitats were visited at least once during each visit. Common plant species noted during field surveys are listed in Appendix 2.

Table 1 – Potential & Known T&E, FSC, and NC Listed Plant Species in the BAA

Species	Type	Natural Community or Habitat	Local Occurrence & Effect Determination
Federally Threatened or Endangered Plant Species (T&E)			
Echinacea laevigata (Smooth Coneflower)	Vascular Plant	Glades, woodlands, and open areas over mafic rock	Not known to occur in BAA or Study Area. No Effect.
Helianthus schweinitzii (Schweinitz's Sunflower)	Vascular Plant	Open xeric forests, woodlands and roadsides	Occurs in BAA, not known to occur in Study Area. May Affect Not Likely to Adversely Affect.
Rhus michauxi (Michaux's Sumac)	Vascular Plant	Open habitats on clayey soils derived from mafic rock	Not known to occur in BAA or Study Area. No Effect.
Federal Candidate Species (C)			
Solidago plumosa (Yadkin River Goldenrod)	Vascular Plant	Open forests, woodlands and roadsides	Not known to occur in BAA or Study Area. No Effect.
Symphyotrichum georgianum (Georgia Aster)	Vascular Plant	Glades, woodlands, savannas and open areas	Occurs in BAA, not known to occur in Study Area. No Effect.
Federal Species of Concern (FSC)			
Acmispon helleri (Carolina Birdfoot-trefoil)	Vascular Plant	Open forests, woodlands and roadsides	Not known to occur in BAA or Study Area. No Effect.
Carex impressinervia (Ravine Sedge)	Vascular Plant	Southern Piedmont Alluvial Forest	Not known to occur in BAA or Study Area. No Effect.
Danthonia epilis (Bog Oat-grass)	Vascular Plant	Hillside Seepage Bog	Occurs in BAA, not known to occur in Study Area. No Effect.
Eurybia mirabilis	Vascular	Mesic Mixed Hardwood	Not known to occur in BAA or

Species	Type	Natural Community or Habitat	Local Occurrence & Effect Determination
(Piedmont Aster)	Plant	Forest, Piedmont Basic Mesic Forest	Study Area. No Effect.
Lindera subcoriacea (Bog Spicebush)	Vascular Plant	Hillside Seepage Bog	Occurs in BAA, not known to occur in Study Area. No Effect.
State Listed Species (NC Listed)			
Anemone berlandieri (Southern Anemone)	Vascular Plant	Thin circumneutral soil adjacent to rock outcrops	Not known to occur in BAA or Study Area. No Effect.
Baptisia alba var. alba (Thick-pod White Wild Indigo)	Vascular Plant	Southern Piedmont Dry Oak or Oak-Pine Forest, Roadsides	Not known to occur in BAA or Study Area. No Effect.
Baptisia australis var. aberans (Eastern Prairie Blue Wild Indigo)	Vascular Plant	Southern Piedmont Dry Oak or Oak-Pine Forest, Roadsides	Not known to occur in BAA or Study Area. No Effect.
Berberis canadensis (American Barberry)	Vascular Plant	Woodlands and glades, typically associated with mafic soils	Not known to occur in BAA or Study Area. No Effect.
Celastrus scandens (American Bittersweet)	Vascular Plant	Rich Mesic Forests	Not known to occur in BAA or Study Area. No Effect.
Cirsium carolinianum (Carolina Thistle)	Vascular Plant	Glades, woodlands, and open areas over mafic rock	Occurs in BAA, not known to occur in Study Area. No Effect.
Euphorbia mercurialina (Cumberland Spurge)	Vascular Plant	Rich slopes over gabbro	Not known to occur in BAA or Study Area. No Effect.
Gillenia stpulata (Indian Physic)	Vascular Plant	Southern Piedmont Dry Oak or Oak-Pine Forest, typically associated with mafic rock	Not known to occur in BAA or Study Area. No Effect.
Helenium brevifolium (Littleleaf Sneezeweed)	Vascular Plant	Southern Piedmont Dry Oak or Oak-Pine Forest, Roadsides	Not known to occur in BAA or Study Area. No Effect.
Helianthus laevigatus (Smooth Sunflower)	Vascular Plant	Open forests, woodlands and roadsides	Extant populations in BAA and Study Area. Likely to affect.
Liatris aspera (Rough Blazing-star)	Vascular Plant	Glades, barrens, open woods	Not known to occur in BAA or Study Area. No Effect.
Lilium canadense ssp. Editorum (Red Canada Lily)	Vascular Plant	Hillside Seepage Bog, openings in Basic Oak-Hickory Forest	Not known to occur in BAA or Study Area. No Effect.
Pellaea wrightiana (Wright's Cliff-brake)	Vascular Plant	mafic or nutrient-rich rock outcrop, bluffs with slate	Not known to occur in BAA or Study Area. No Effect.
Plantago cordata (Heart-leaf Plantain)	Vascular Plant	Slate-bottomed perennial stream beds	Not known to occur in BAA or Study Area. No Effect.
Primula meadia (Eastern Shooting Star)	Vascular Plant	Southern Piedmont Dry Oak or Oak-Pine Forest, Roadsides	Not known to occur in BAA or Study Area. No Effect.
Solidago radula (Western Rough Goldenrod)	Vascular Plant	Glades, woodlands, and open areas over mafic rock	Not known to occur in BAA or Study Area. No Effect.

Species	Type	Natural Community or Habitat	Local Occurrence & Effect Determination
Tradescantia virginiana (Virginia Spiderwort)	Vascular Plant	Basic Mesic Hardwood Forest, woodlands	Not known to occur in BAA or Study Area. No Effect.
Tridens chapmanii (Chapman's Redtop)	Vascular Plant	Xeric Pine and Oak Forests, Basic Oak-Hickory, sandy roadsides	Not known to occur in BAA or Study Area. No Effect.
Trifolium reflexum (Buffalo Clover)	Vascular Plant	Open forests, woodlands and roadsides	Not known to occur in BAA or Study Area. No Effect.
USFS Listed and Significantly Rare (NCNHP)			
Xanthoparmelia monticola (A Rock-shield Lichen)	Lichen	Glade with mafic rock	No records in the BAA or Study Area. Not Surveyed For.
Scopelophila cataractae (Agoyan Cataract Moss)	Moss	Copper rich soils	No records in the BAA or Study Area. Not Surveyed For.
Wessia sharpie (A Moss)	Moss	Calcareous rock, cedar-oak bluffs, cedar barrens.	No records in the BAA or Study Area. Not Surveyed For.
Asclepias purpurascens (Purple Milkweed)	Vascular Plant	Swamps, Bottomlands, moist wood edge	Not known to occur in BAA or Study Area. No Effect.
Boechera missouriensis (Missouri Rockcress)	Vascular Plant	Thin circumneutral soil adjacent to rock outcrops, often with Juniperus virginiana	Not known to occur in BAA or Study Area. No Effect.
Callitriche terrestris (Terrestrial Water-starwort)	Vascular Plant	areas wet from perennial or ephmeral streams, ditches, low fields, wet paths	Not known to occur in BAA or Study Area. No Effect.
Cardamine dissecta (Dissected Toothwort)	Vascular Plant	Southern Piedmont Alluvial Forest	Not known to occur in BAA or Study Area. No Effect.
Carex bushii (Bush's Sedge)	Vascular Plant	open meadows, grassy roadside ditch	Not known to occur in BAA or Study Area. No Effect.
Collinsonia tuberosa (Piedmont Horsebalm)	Vascular Plant	Thin circumneutral soil adjacent to rock outcrops	Not known to occur in BAA or Study Area. No Effect.
Desmodium fernaldii (Fernald's Tick-trefoil)	Vascular Plant	Dry to mesic Hardwood-Pine Woodland	Not known to occur in BAA or Study Area. No Effect.
Dichanthelium annulum (Ringed Witch Grass)	Vascular Plant	Southern Piedmont Dry Oak or Oak-Pine Forest, Roadsides	Not known to occur in BAA or Study Area. No Effect.
Dichanthelium bicknellii (Northern Witch Grass)	Vascular Plant	Open woods, grassy slopes	Not known to occur in BAA or Study Area. No Effect.
Echinacea purpurea (Purple Coneflower)	Vascular Plant	Open woodlands, powerlines, roads	Not known to occur in BAA or Study Area. No Effect.
Fothergilla major (Large Witch-alder)	Vascular Plant	Southern Piedmont Dry Oak or Oak-Pine Forest	Known to occur in BAA and Study Area. May Affect.
Hexalectris spicata (Crested Coralroot)	Vascular Plant	Xeric to mesic forests associated with mafic rock	Not known to occur in BAA or Study Area. No Effect.
Iris prismatica (Slender Blue Iris)	Vascular Plant	Bogs, marshes, and wet powerline clearings	Occurs in BAA, not known to occur in Study Area. No Effect.
Matelea decipiens	Vascular	Glades and woodlands, over	Not known to occur in BAA or

Species	Type	Natural Community or Habitat	Local Occurrence & Effect Determination
(Glade Milkvine)	Plant	mafic rock	Study Area. No Effect.
Parthenium auriculatum (Glade Wild Quinine)	Vascular Plant	Glades, woodlands, and open areas over mafic rock	Not known to occur in BAA or Study Area. No Effect.
Polygala senega (Seneca Snakeroot)	Vascular Plant	Open woods, openings, typically over calcareous or mafic rock	Not known to occur in BAA or Study Area. No Effect.
Pseudognaphalium helleri (Heller's Rabbit Tobacco)	Vascular Plant	Glades, woodlands, and open areas over mafic rock	Population known to occur in BAA and Study Area. May affect.
Quercus austrina (Bluff Oak)	Vascular Plant	River bluff	Not known to occur in BAA or Study Area. No Effect.
Ruellia purshiana (Pursh's Wild Petunia)	Vascular Plant	Southern Piedmont Dry Oak or Oak-Pine Forest	Not known to occur in BAA or Study Area. No Effect.
Salvia azurea (Azure Sage)	Vascular Plant	Longleaf Pine-Oak Woodland	Not known to occur in BAA or Study Area. No Effect.
Sedum glaucophyllum (Cliff Stonecrop)	Vascular Plant	rock outcrops, glades, typically over calcareous or mafic substrate	Not known to occur in BAA or Study Area. No Effect.
Silphium terebinthinaceum (Prairie Dock)	Vascular Plant	Glades, woodlands, and prairies over mafic rock	Not known to occur in BAA or Study Area. No Effect.
Smilax hugeri (Huger's Carrion-flower)	Vascular Plant	Mesic Mixed Hardwood Forest, Piedmont Basic Mesic Forest	Not known to occur in BAA or Study Area. No Effect.
Solidago rigida var. glabrata (Southeastern Bold Goldenrod)	Vascular Plant	Glades, prairies, barrens, over mafic or calcareous rock	Not known to occur in BAA or Study Area. No Effect.
Stachys matthewsii (Undescribed Hedge Nettle)	Vascular Plant	Sandy alluvium of Southern Piedmont Alluvial Forest	Not known to occur in BAA or Study Area. No Effect.
Stewartia ovata (Mountain Camellia)	Vascular Plant	Bluffs and Forests,usually with Rhododendron	Not known to occur in BAA or Study Area. No Effect.
Symphyotrichum laeve var. concinnum (Narrow-leaved Aster)	Vascular Plant	Glades, woodlands, and open areas over mafic rock	Not known to occur in BAA or Study Area. No Effect.
Viola walteri (Prostrate Blue Violet)	Vascular Plant	Mesic Hardwoods	Not known to occur in BAA or Study Area. No Effect.

T&E, FSC, and NC Listed Animal Species

Habitats, community types, and ranges of T&E, FSC, and NC Listed animal species are derived from information in Flora of the Carolinas, Virginia, Georgia, and Surrounding Areas (Weakley 2012), Classification of the Natural Plant Communities of North Carolina: Third Approximation (Schafale and Weakley 1990), Guide to the Natural Communities of North Carolina: Fourth Approximation (Schafale 2012), Manual of the Vascular Flora of the Carolinas (Radford 1968), The Natural Heritage Program's List of Rare Animals of North Carolina (2018), Uwharrie National Forest Rare Terrestrial and Aquatic Animal List (2018), or information obtained through other biologists.

Bird surveys were conducted for presence/absence using visual and auditory surveys. Special care was given to conduct the surveys in the early morning during the breeding season (April 21-June 23). Table 2 in Appendix I provides a list of 41 animal species, sorted alphabetically per listing status, and includes occurrence status for each as: 1) Found in Study Area, 2) Found within Biological Analysis Area, but not Study Area, or 3) Possibly occurs within the Biological Analysis Area (based on broad habitat concepts)[1]. Common animal species noted during field surveys are listed in Appendix 2.

Table 2 – Potential & Known T&E, FSC, and NC Listed Animal Species in the BAA

Species	Type	Natural Community or Habitat	Local Occurrence & Effect Determination
Federal Threatened or Endangered Animal Species (T&E)			
Picoides borealis (Red-cockaded Woodpecker)	Bird	mature open pine forests, mainly in longleaf pine	Not known to occur in BAA or Study Area. No Effect.
Bombus affinus (Rusty-patched Bumble Bee)	Insect	Ground nesting, temperate climates	Not known to occur in BAA or Study Area. No Effect.
Lasmigona decorata (Carolina Heelsplitter)	Mussel	Catawba and Pee Dee drainages (endemic to this area in North Carolina and adjacent South Carolina)	Not known to occur in BAA or Study Area. No Effect.
Federal Species of Concern Species (FSC)			
Peucaea aestivalis (Bachman's Sparrow)	Bird	open longleaf pine forests, old fields	Not known to occur in BAA or Study Area. No Effect.
Alasmidonta undulata (Triangle Floater)	Mussel	Roanoke, Chowan, Tar, Neuse, Cape Fear and Yadkin-Pee Dee drainages	Not known to occur in BAA or Study Area. No Effect.
Elliptio roanokensis (Roanoke Slabshell)	Mussel	Roanoke, Tar, Neuse, White Oak, Cape Fear, Lumber, and Yadkin-Pee Dee drainages	Not known to occur in BAA or Study Area. No Effect.
Fusconaia masoni (Atlantic Pigtoe)	Mussel	Roanoke, Tar, Neuse, Cape Fear, Yadkin-Pee Dee drainages	Not known to occur in BAA or Study Area. No Effect.
Lasmigona subviridis (Green Floater)	Mussel	Roanoke, Tar, Neuse and Yadkin-Pee Dee drainages; New and Watauga drainages	Not known to occur in BAA or Study Area. No Effect.
Toxolasma pullus (Savannah Lilliput)	Mussel	Cape Fear, Lumber, and Yadkin-Pee Dee drainages	Not known to occur in BAA or Study Area. No Effect.
Villosa vaughaniana (Carolina Creekshell)	Mussel	Cape Fear, Yadkin-Pee Dee, and Catawba drainages (endemic to North Carolina and adjacent South Carolina)	Not known to occur in BAA or Study Area. No Effect.
Ambloplites cavifrons (Roanoke Bass)	Fish	streams in Neuse and Tar systems; introduced to	Not known to occur in BAA or Study Area. No Effect.

Species	Type	Natural Community or Habitat	Local Occurrence & Effect Determination
		Yadkin-Pee Dee	
Etheostoma collis (Carolina Darter)	Fish	Roanoke, Tar, Neuse, Cape Fear, Yadkin-Pee Dee, and Catawba drainages	Not known to occur in BAA or Study Area. No Effect.
Moxostoma sp. 3 (Carolina Redhorse)	Fish	Cape Fear and Yadkin-Pee Dee drainages	Not known to occur in BAA or Study Area. No Effect.
Gomphus septima (Septima's Clubtail)	Insect	rocky rivers	Not known to occur in BAA or Study Area. No Effect.
Lampsilis cariosa (Yellow Lampmussel)	Mussel	Chowan, Roanoke, Tar, Neuse, Cape Fear, Yadkin-Pee Dee drainages	Not known to occur in BAA or Study Area. No Effect.
Villosa constricta (Notched Rainbow)	Mussel	Roanoke, Tar, Neuse, Yadkin-Pee Dee, and Catawba drainages	Not known to occur in BAA or Study Area. No Effect.
Pituophis melanoleucus melanoleucus (Northern Pine Snake)	Reptile	dry and sandy woods, mainly in pine/oak sandhills	Not known to occur in BAA or Study Area. No Effect.
State Listed Species (NCWRC Listed), NCNHP Significantly Rare Species, and USFS Reported			
Danaus plexipus (Monarch butterfly)	Insect	Open fields and meadows with milkweed.	No records in the BAA or Study Area. Not Surveyed For.
Erynnis martialis (Mottled Duskywing)	Insect	upland woods and wooded edges; host plant -- New Jersey Tea (Ceanothus americanus)	Not known to occur in BAA or Study Area. No Effect.
Ambystoma talpoideum (Mole Salamander)	Amphibian	Breeds in fish-free semi-permanent woodland ponds; forages in adjacent woodlands	Known to occur in BAA. Not known to occur in Study Area. May affect.
Hemidactylium scutatum (Four-toed Salamander)	Amphibian	pools, bogs, and other wetlands in hardwood forests	Known to occur in BAA. Not known to occur in Study Area. May affect.
Falco sparverius (American Kestrel)	Bird	open country, such as extensive farmland; nests in cavities	Not known to occur in BAA or Study Area. No Effect.
Haliaeetus leucocephalus (Bald Eagle)	Bird	mature forests near large bodies of water (nesting); rivers, lakes, and sounds (foraging)	Not known to occur in BAA or Study Area. No Effect.
Lanius ludovicia (Loggerhead Shrike)	Bird	fields and pastures	Not known to occur in BAA or Study Area. No Effect.
Cambarus catagius (Greensboro Burrowing Crayfish)	Crayfish	Cape Fear and Yadkin--Pee Dee drainages; Greensboro area to the Uwharries	No records in the BAA or Study Area. Not Surveyed For.
Lampetra aepyptera (Least Brook Lamprey)	Fish	Tar and Neuse drainages	Not known to occur in BAA or Study Area. No Effect.
Notropis volucellus (Mimic Shiner)	Fish	New, French Broad, Little Tennessee, Tar, and Neuse drainages	Not known to occur in BAA or Study Area. No Effect.

Species	Type	Natural Community or Habitat	Local Occurrence & Effect Determination
Megathymus cofaqui (Cofaqui Giant Skipper)	Insect	monadnocks with yucca; host plant	Not known to occur in BAA or Study Area. No Effect.
Satyrium favonius ontario (Northern Oak Hairstreak)	Insect	oak-dominated woods, usually in dry sites; host plants -- oaks (Quercus)	Not known to occur in BAA or Study Area. No Effect.
Ceraclea joannae (A Caddisfly)	Insect	Little River (Montgomery) (endemic to this area)	Not known to occur in BAA or Study Area. No Effect.
Asioplax dolani (A Mayfly)	Insect	Neuse River	Not known to occur in BAA or Study Area. No Effect.
Baetopus trishae (A Mayfly)	Insect	Panthertown Creek	Not known to occur in BAA or Study Area. No Effect.
Bleptina sangamonia (A Litter Moth)	Insect	habitats not known	Not known to occur in BAA or Study Area. No Effect.
Condylura cristata pop. 1 (Star-nosed Mole (coastal plain population))	Mammal	moist meadows, bogs, swamps, bottomlands [mountain population not of concern]	Not known to occur in BAA or Study Area. No Effect.
Alasmidonta sp. 2 (Freshwater mussel (Uwharries region))	Mussel	Pee Dee drainage streams in Uwharries region (endemic to North Carolina)	Not known to occur in BAA or Study Area. No Effect.
Lampsilis radiata (Eastern Lampmussel)	Mussel	Chowan, Roanoke, Tar, Neuse, Cape Fear, Yadkin-Pee Dee drainages	Not known to occur in BAA or Study Area. No Effect.
Strophitus undulatus (Creeper)	Mussel	Roanoke, Tar, Neuse, Cape Fear, Yadkin-Pee Dee, Catawba, Broad, and French Broad drainages	Not known to occur in BAA or Study Area. No Effect.
Villosa delumbis (Eastern Creekshell)	Mussel	Cape Fear, Lumber, Yadkin-Pee Dee, and Catawba drainages	Not known to occur in BAA or Study Area. No Effect.
Crotalus horridus (Timber Rattlesnake)	Reptile	Rocky Upland Forests	Occurs in the BAA, but not known in the Study Area. Study Area presence is assumed, May Affect.
Ophiosaurus attenuates (Slender Glass Lizard)	Reptile	Varied Habitats, Grasslands, Wooded Areas	No records in the BAA or Study Area. Not Surveyed For.
Sistrurus miliarius miliarius (Carolina Pigmy Rattlesnake)	Reptile	Pine Flatwoods, Pine/Oak Sandhills, Other Pine/Oak Forests	No records in the BAA or Study Area. Not Surveyed For.

IV. Possible Effects and Analysis of Botanical Resources (T&E, FSC, or NC Listed Plant Species)

Study Area

One NC Listed plant species, Helianthus laevigatus (SC-V), and two NCNHP Significantly Rare plant species, Fothergilla major (State SR-T) and Pseudognaphalium helleri (SR-P) were found

within the Study Area (Figures 4.0 to 4.4). There were no other T&E, FSC, or NC Listed plant species close enough to the Study Area (within the BAA) to be affected by the Project. The road widening will have an effect on one NC Listed plant species because:

1) There were several known occurrences of rare plant species in the Study Area according to the North Carolina Natural Heritage Program database. These include Fothergilla major (State SR-T), Pseudognaphalium helleri (SR-T), and Helianthus laevigatus (SC-V).
2) Thorough botanical field surveys within the Study Area were negative for all T&E, FSC, or NC Listed plant species except for H. laevigatus.
3) There was no, or very limited, marginal habitat for most other T&E, FSC, or NC Listed plant species within the Study Area (Figure 3).
4) Eleven specimens of F. major (SR-T) were observed in the Study Area October 18, 2017 (Figure 4.1).

Biological Analysis Area

Cirsium carolinianum (NC- E), Danthonia epilis (SR-T), Helianthus schweinitzii (FE), Iris prismatica (SR-T), and Symphyotrichum georgianum (C; NC-T) occur within the BAA but not within the Study Area. Known to occur in the BAA, Fothergilla major (SR-T), Helianthus laevigatus (SC-V), and Pseudognaphalium helleri (SR-T) were also found in the Study Area. Each species is discussed below:

Cirsium carolinianum, Soft thistle (State E)

A population of C. carolinianum, is known along Rocky Creek, north of NC 24/27. This population will be unaffected by the road widening due to its distance from the Project. Possible habitat for C. carolinianum is in forests and disturbed areas, mostly on basic soils. This habitat was repeatedly surveyed. C. carolinianum was not found in the Study Area; therefore, C. carolinianum will not be affected.

Danthonia epilis, Bog oatgrass (SR-T)

The D. epilis population is found north of the far western extent of the project, off an unnamed tributary to Wood Run at the end of the BAA. This population will not be affected by the road widening due to its distance from the project. There is no habitat (seepage bogs, wet seepy powerlines) for D. epilis within the Study Area. Therefore, D. epilis will not be affected.

Helianthus schweinitzii, Schweinitz's sunflower (Federal E)

The H. schweinitzii populations are recorded throughout the BAA. These populations will not be affected by the road widening due to its distance from the project. This species favors non-forested open areas, especially roadsides and other rights-of-way. This open habitat does occur within the Study Area and was repeatedly surveyed. H. schweinitzii was not found in the Study Area and will not be affected**.**

Symphyotrichum georgianum, Georgia aster (C; NC-T)

The S. georgianum population record is within the far western extent of the BAA along Rocky Creek. This species favors open woods, roadsides, and other rights-of-way. This open habitat does occur within the Study Area. This habitat was repeatedly surveyed. S. georgianum was not

found in the Study Area. Therefore, S. georgianum will not be affected.

Iris prismatica, Slender Blue iris (SR-T)
The I. prismatica population record is within the BAA, on the Northeastern extent of the BAA on a Piedmont Boggy Streamhead. This species favors bogs, marshes, and wet powerline clearings. This bog habitat does not occur within the Study Area. This habitat was repeatedly surveyed. I. prismatica was not found in the Study Area. Therefore, I. prismatica will not be affected**.**

Pseudognaphalium helleri, Heller's rabbit-tobacco (SR-P)
A population of P. helleri was discovered along the railroad corridor within the Study Area (Figure 4.8). This population may be affected by the road widening project. Suitable habitats for P. helleri are dry woodlands, openings, and glades, especially over mafic rocks. This habitat was repeatedly surveyed. One population of P. helleri (six stems) was found in the BAA, which may be affected.

Fothergilla major, Large witch-alder (SR-T)
A known population of F. major was found within the Study Area, on the south side of NC 24/27 (Figure 4.1) on October 18, 2017. Seven stems were noted near the outflow of a culvert and in an area of approximately two square meters, and four additional stems were located on top of a concrete culvert structure. During an October 12, 2004 survey, Alan Weakley reported a dense clonal patch of 700 stems over an area of 70 meters. It was not clear why this population had declined so significantly. No plants were found north of NC 24/27. Possible habitats for F. major are typically dry ridgetop or bluff forests, seepage wetlands, and Piedmont longleaf pine forests. These habitats were repeatedly surveyed, but no additional occurrence was found in the Study Area. F. major will be affected.

Helianthus laevigatus, Smooth sunflower (SC-V)
Numerous populations of H. laevigatus exist within the study area. These populations are along the northern NC 24/27 road right-of-way and the eastern extent of the Project. These populations were verified extant during a 2017 survey. These populations will be affected by the road widening project. Possible habitats for H. laevigatus are open woods and roadsides. This habitat was repeatedly surveyed during the course of the season.

V. Possible Effects and Analysis of Animal Resources (T&E, FSC, or NC Listed Animal Species)

Study Area
No T&E or FSC animal species was observed during the surveys. None would be affected by the project. One State Listed species, Timber Rattlesnake, was located in the BAA close enough to the Study Area to be presumed present and may be affected.

Biological Analysis Area
Based upon habitat information, 38 of the 41 T&E, FSC, or NC Listed animal species could potentially occur in the BAA (Table 2) but are not known to occur. The three species known to occur within the BAA but not within the Study Area or Project Area are Mole Salamander (Ambystoma talpoideum) (NC Listed Special Concern), Four-toed Salamander (Hemidactylium scutatum) (NC Listed Special Concern), and Timber Rattlesnake (Crotalus horridus) (NC Listed

Special Concern). The NCNHP provides EOs for the two amphibian species within the BAA.

VI. EFFECTS ON NORTH CAROINA STATE NATURAL AREAS

Two NCNHP Significant Natural Heritage Areas, the Roberdo Bog and Longleaf Pine Forest and the Lower Rocky Creek Longleaf Pine forest, would be impacted by the project. A discussion of these areas and likely impacts are included in the BE document.

VII. REQUIRED RECOMMENDATIONS

There are no recommendations or mitigation measures required to comply with NEPA for biological resources.

VIII. SUMMARY OF EFFECT

This proposal would not affect (directly or indirectly) any proposed or listed Federal threatened or endangered species. Consultation with the US Fish and Wildlife Service is not required. This proposal may affect two State Listed (Special Concern) species, Smooth Sunflower (Helianthus laevigatus), and Timber Rattlesnake (Crotalus horridus), and two NCNHP Significantly Rare Species: Large Witch-alder (Fothergilla major); and Heller's Rabbit Tobacco (Pseudognaphalium helleri).

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Uwharrie National Forest Rare Terrestrial and Aquatic Animal List (2018). Excel Spreadsheet, Provided via email on July 23, 2018.

APPENDIX 1

Federally Threatened or Endangered (T&E), Federal Species of Concern (FSC), and North Carolina State Listed (NC Listed) Plant and Animal Species of the Uwharrie National Forest

1 = Found in Study Area
2 = Found within Biological Analysis Area, but not Study Area
3 = Possibly occurs within the Biological Analysis Area (based on broad habitat concepts)

Uwharrie National Forest - Plants

Scientific Name	Form	Natural Communities, Habitat	Status	Occurrence
Echinacea laevigata (Smooth Coneflower)	Vascular Plant	Glades, woodlands, and open areas over mafic rock	FE	3
Helianthus schweinitzii (Schweinitz's Sunflower)	Vascular Plant	Open xeric forests, woodlands and roadsides	FE	2
Rhus michauxi (Michaux's Sumac)	Vascular Plant	Open habitats on clayey soils derived from mafic rock	FE	3
Solidago plumosa	Vascular Plant	Riverside mafic rock outcrops	C	3
Symphyotrichum georgianum (Georgia Aster)	Vascular Plant	Glades, woodlands, savannas and open areas	C	2
Acmispon helleri (Carolina Birdfoot-trefoil)	Vascular Plant	Open forests, woodlands and roadsides	FSC	3
Carex impressinervia (Ravine Sedge)	Vascular Plant	Southern Piedmont Alluvial Forest	FSC	3
Danthonia epilis (Bog Oat-grass)	Vascular Plant	Hillside Seepage Bog	FSC	2
Eurybia mirabilis (Piedmont Aster)	Vascular Plant	Mesic Mixed Hardwood Forest, Piedmont Basic Mesic Forest	FSC	3
Lindera subcoriacea (Bog Spicebush)	Vascular Plant	Hillside Seepage Bog	FSC	3
Anemone berlandieri (Southern Anemone)	Vascular Plant	Thin circumneutral soil adjacent to rock outcrops	NC LISTED	3
Baptisia alba var. alba (Thick-pod White Wild Indigo)	Vascular Plant	Southern Piedmont Dry Oak or Oak-Pine Forest, Roadsides	NC LISTED	3
Baptisia australis var. aberans (Eastern Prairie Blue Wild indigo)	Vascular Plant	Southern Piedmont Dry Oak or Oak-Pine Forest, Roadsides	NC LISTED	3
Berberis canadensis (American Barberry)	Vascular Plant	Woodlands and glades, typically associated with mafic soils	NC LISTED	3
Celastrus scandens (American Bittersweet)	Vascular Plant	Rich Mesic Forests	NC LISTED	3
Cirsium carolinianum (Carolina Thistle)	Vascular Plant	Glades, woodlands, and open areas over mafic rock	NC LISTED	2

Uwharrie National Forest - Plants

Scientific Name	Form	Natural Communities, Habitat	Status	Occurrence
Euphorbia mercurialina (Cumberland Spurge)	Vascular Plant	Rich slopes over gabbro	NC LISTED	3
Gillenia stpulata (Indian Physic)	Vascular Plant	Southern Piedmont Dry Oak or Oak-Pine Forest, typically associated with mafic rock	NC LISTED	3
Helenium brevifolium (Littleleaf Sneezeweed)	Vascular Plant	Southern Piedmont Dry Oak or Oak-Pine Forest, Roadsides	NC LISTED	3
Liatris aspera (Rough Blazing-star)	Vascular Plant	Glades, barrens, open woods	NC LISTED	3
Lilium canadense ssp. Editorum (Red Canada Lily)	Vascular Plant	Hillside Seepage Bog, openings in Basic Oak-Hickory Forest	NC LISTED	3
Pellaea wrightiana (Wright's Cliff-brake)	Vascular Plant	mafic or nutrient-rich rock outcrop, bluffs with slate	NC LISTED	3
Plantago cordata (Heart-leaf Plantain)	Vascular Plant	Slate-bottomed perennial stream beds	NC LISTED	3
Primula meadia (Eastern Shooting Star)	Vascular Plant	Southern Piedmont Dry Oak or Oak-Pine Forest, Roadsides	NC LISTED	3
Solidago radula (Western Rough Goldenrod)	Vascular Plant	Glades, woodlands, and open areas over mafic rock	NC LISTED	3
Tradescantia virginiana (Virginia Spiderwort)	Vascular Plant	Basic Mesic Hardwood Forest, woodlands	NC LISTED	3
Tridens chapmanii (Chapman's Redtop)	Vascular Plant	Xeric Pine and Oak Forests, Basic Oak-Hickory, sandy roadsides	NC LISTED	3
Xanthoparmelia monticola (A Rock-shield Lichen)	Lichen	Glade with mafic rock	NCNHP SR	3
Scopelophila cataractae (Agoyan Cataract Moss)	Moss	Copper rich soils	NCNHP SR	3
Wessia sharpie (A moss)	Moss	Calcareous rock, cedar-oak bluffs, cedar barrens	NCNHP SR	3
Asclepias purpurascens (Purple Milkweed)	Vascular Plant	Swamps, bottomlands, moist wood edge	NCNHP SR	3
Boechera missouriensis (Missouri Rockcress)	Vascular Plant	Thin circumneutral soil adjacent to rock outcrops, often with Juniperus virginiana	NCNHP SR	3
Callitriche terrestris (Terrestrial Water-starwort)	Vascular Plant	areas wet from perennial or ephmeral streams, ditches, low fields, wet paths	NCNHP SR	3
Cardamine dissecta (Dissected Toothwort)	Vascular Plant	Southern Piedmont Alluvial Forest	NCNHP SR	3
Carex bushii (Bush's Sedge)	Vascular Plant	open meadows, grassy roadside ditch	NCNHP SR	3
Collinsonia tuberosa (Piedmont Horsebalm)	Vascular Plant	Thin circumneutral soil adjacent to rock outcrops	NCNHP SR	3
Desmodium fernaldii (Fernald's Tick-trefoil)	Vascular Plant	Dry to mesic Hardwood-Pine Woodland	NCNHP SR	3

Uwharrie National Forest - Plants

Scientific Name	Form	Natural Communities, Habitat	Status	Occurrence
Dichanthelium annulum (Ringed Witch Grass)	Vascular Plant	Southern Piedmont Dry Oak or Oak-Pine Forest, Roadsides	NCNHP SR	3
Dichanthelium bicknellii (Northern Witch Grass)	Vascular Plant	Open woods, grassy slopes	NCNHP SR	3
Echinacea purpurea (Purple Coneflower)	Vascular Plant	Open woodlands, powerlines, roads	NCNHP SR	3
Fothergilla major (Large Witch Alder)	Vascular Plant	Southern Piedmont Dry Oak or Oak-Pine Forest	NCNHP SR	1
Helianthus laevigatus (Smooth Sunflower)	Vascular Plant	Open forests, woodlands and roadsides	NCNHP SR	1
Hexalectris spicata (Crested Coralroot)	Vascular Plant	Xeric to mesic forests associated with mafic rock	NCNHP SR	3
Iris prismatica (Slender Blue Iris)	Vascular Plant	Bogs, marshes, and wet powerline clearings	NCNHP SR	2
Matelea decipiens (Glade Milkvine)	Vascular Plant	Glades and woodlands, over mafic rock	NCNHP SR	3
Parthenium auriculatum (Glade Wild Quinine)	Vascular Plant	Glades, woodlands, and open areas over mafic rock	NCNHP SR	3
Polygala senega (Seneca Snakeroot)	Vascular Plant	Open woods, openings, typically over calcareous or mafic rock	NCNHP SR	3
Pseudognaphalium helleri (Heller's Rabbit Tobacco)	Vascular Plant	Glades, woodlands, and open areas over mafic rock	NCNHP SR	1
Quercus austrina (Bluff Oak)	Vascular Plant	River bluff	NCNHP SR	3
Ruellia purshiana (Pursh's Wild Petunia)	Vascular Plant	Southern Piedmont Dry Oak or Oak-Pine Forest	NCNHP SR	3
Salvia azurea (Azure Sage)	Vascular Plant	Longleaf Pine-Oak Woodland	NCNHP SR	3
Sedum glaucophyllum (Cliff Stonecrop)	Vascular Plant	rock outcrops, glades, typically over calcareous or mafic substrate	NCNHP SR	3
Silphium terebinthinaceum (Prairie Dock)	Vascular Plant	Glades, woodlands, and prairies over mafic rock	NCNHP SR	3
Smilax hugeri (Huger's Carrion-flower)	Vascular Plant	Mesic Mixed Hardwood Forest, Piedmont Basic Mesic Forest	NCNHP SR	3
Solidago rigida var. glabrata (Southeastern Bold Goldenrod)	Vascular Plant	Glades, prairies, barrens, over mafic or calcareous rock	NCNHP SR	3
Stachys matthewsii (Undescribed Hedge Nettle)	Vascular Plant	Sandy alluvium of Southern Piedmont Alluvial Forest	NCNHP SR	3
Stewartia ovata (Mountain Camellia)	Vascular Plant	Bluffs and Forests,usually with Rhododendron	NCNHP SR	3
Symphyotrichum laeve var. concinnum (Narrow-leaved Aster)	Vascular Plant	Glades, woodlands, and open areas over mafic rock	NCNHP SR	3
Viola walteri (Prostrate Blue Violet)	Vascular Plant	Mesic Hardwoods	NCNHP SR	3

Montgomery County – Animals

Scientific Name	Group	Natural Communities, Habitat	Status	Occurrence
Picoides borealis (Red-cockaded Woodpecker)	Bird	mature open pine forests, mainly in longleaf pine	FE	3
Bombus affinus (Rusty Patched Bumble Bee)	Insect	Underground nesters in temperate climate	FE	3
Lasmigona decorata (Carolina Heelsplitter)	Mussel	Catawba and Yadkin-Pee Dee drainages (endemic to this area in North Carolina and adjacent South Carolina)	FE	3
Peucaea aestivalis (Bachman's Sparrow)	Bird	open longleaf pine forests, old fields	FSC	3
Ambloplites cavifrons (Roanoke Bass)	Fish	streams in Neuse and Tar systems	FSC	3
Etheostoma collis (Carolina Darter)	Fish	Roanoke, Tar, Neuse, Cape Fear, Yadkin-Pee Dee, and Catawba drainages	FSC	3
Moxostoma sp. 3 (Carolina Redhorse)	Fish	Cape Fear and Pee Dee drainages	FSC	3
Gomphus septima (Septima's Clubtail)	Insect	rocky rivers	FSC	3
Alasmidonta undulata (Triangle Floater)	Mussel	Roanoke, Chowan, Tar, Neuse, Cape Fear drainages	FSC	3
Elliptio roanokensis (Roanoke Slabshell)	Mussel	Roanoke, Tar, Neuse, White Oak, Cape Fear, Lumber, and Yadkin-Pee Dee drainages	FSC	3
Fusconaia masoni (Atlantic Pigtoe)	Mussel	Roanoke, Tar, Neuse, Cape Fear, Yadkin-Pee Dee drainages	FSC	3
Lasmigona subviridis (Green Floater)	Mussel	Roanoke, Tar, Neuse and Yadkin-Pee Dee drainages; New and Watauga drainages	FSC	3
Lampsilis cariosa (Yellow Lampmussel)	Mussel	Chowan, Roanoke, Neuse, Tar, Cape Fear, Lumber, Yadkin-Pee Dee drainages	FSC	3
Toxolasma pullus (Savannah Lilliput)	Mussel	Cape Fear, Lumber, and Yadkin-Pee Dee drainages	FSC	3
Villosa vaughaniana (Carolina Creekshell)	Mussel	Cape Fear, Yadkin-Pee Dee, and Catawba drainages (endemic to North Carolina and adjacent South Carolina)	FSC	3
Pituophis melanoleucus melanoleucus (Northern Pinesnake)	Reptile	dry and sandy woods, mainly in pine/oak sandhills	FSC	3
Ambystoma talpoideum (Mole Salamander)	Amphibian	Breeds in fish-free semipermanent woodland ponds; forages in adjacent woodlands	NC LISTED	2
Hemidactylium scutatum (Four-toed Salamander)	Amphibian	pools, bogs, and other wetlands in hardwood forests	NC LISTED	2
Haliaeetus leucocephalus (Bald Eagle)	Bird	mature forests near large bodies of water (nesting); rivers, lakes, and sounds (foraging)	NC LISTED	3

Montgomery County – Animals

Scientific Name	Group	Natural Communities, Habitat	Status	Occurrence
Lanius ludovicia (Loggerhead Shrike)	Bird	fields and pastures	NC LISTED	3
Cambarus catagius (Greensboro Burrowing crayfish)	Crayfish	Cape Fear and Yadkin-Pee Dee drainages; Greensboro area to the Uwharries	NC LISTED	3
Lampetra aepyptera (Least Brook Lamprey)	Fish	Tar and Neuse drainages	NC LISTED	3
Condylura cristata pop. 1 (Star-nosed Mole - Coastal Plain population)	Mammal	moist meadows, bogs, swamps, bottomlands [mountain population not of concern]	NC LISTED	3
Lampsilis radiata (Eastern Lampmussel)	Mussel	Chowan, Roanoke, Tar, Neuse, Cape Fear, Yadkin--Pee Dee drainages	NC LISTED	3
Strophitus undulatus (Creeper)	Mussel	Roanoke, Tar, Neuse, Cape Fear, Yadkin-Pee Dee, Catawba, Broad, and French Broad drainages	NC LISTED	3
Villosa constricta (Notched Rainbow)	Mussel	Roanoke, Tar, Neuse, Yadkin-Pee Dee, and Catawba drainages	NC LISTED	3
Crotalus horridus (Timber Rattlesnake)	Reptile	wetland forests in the Coastal Plain; rocky, upland forests elsewhere	NC LISTED	2
Sistrurus miliarius miliarius (Carolina Pigmy Rattlesnake)_	Reptile	pine flatwoods, pine/oak sandhills, other pine/oak forests	NC LISTED	3
Falco sparverius (American Kestrel)	Bird	open country, such as extensive farmland; nests in cavities	NCNHP SR	3
Asioplax dolani (A Mayfly)	Insect	Neuse River	NCNHP SR	3
Baetopus trishae (A Mayfly)	Insect	Panthertown Creek	NCNHP SR	3
Bleptina sangamonia (A Litter Moth)	Insect	habitats not known	NCNHP SR	3
Ceraclea joannae (Lenat's Ceraclea)	Insect	Little River (Montgomery) (endemic to this area)	NCNHP SR	3
Erynnis martialis (Mottled Duskywing)	Insect	upland woods and wooded edges; host plant -- New Jersey tea (Ceanothus americanus)	NCNHP SR	3
Megathymus cofaqui (Cofaqui Giant-skipper)	Insect	monadnocks with yucca; host plant	NCNHP SR	3
Satyrium favonius Ontario (Northern Oak Hairstreak)	Insect	oak-dominated woods, usually in dry sites; host plants - oaks (Quercus)	NCNHP SR	3
Alasmidonta sp. 2	Mussel	Yadkin-Pee Dee drainage streams in Uwharries region (endemic to North Carolina)	NCNHP SR	3
Villosa delumbis (Eastern Creekshell)	Mussel	Cape Fear, Lumber, Yadkin-Pee Dee, and Catawba drainages	NCNHP SR	3
Ophiosaurus attenuates (Slender Glass Lizard)	Reptile	Reported by USFS	NCNHP SR	3

APPENDIX 2

Vascular Plant Species Noted during 2018 Botanical Surveys or Specimens from Other Botanical Surveys of the NC 24/27 Study Area.
(This may not be a complete list of the species within the BAA or Study Area.)

Acer rubrum var. rubrum	Eastern Red Maple
Agalinis setacea	An Agalinis or Purple-foxglove
Andropogon ternarius var. ternarius	Splitbeard Bluestem
Arundinaria gigantea	Giant or River Cane
Carya glabra	Pignut Hickory
Chasmanthium laxum	Slender Spike Grass
Coleataenia anceps ssp. anceps	Beaked Panic Grass
Cornus florida	Flowering Dogwood
Coreopsis major var. major	Woodland Coreopsis
Coreopsis mariana	Maryland Golden-aster
Eupatorium capillifolium	Common Dog-fennel
Eupatorium hyssopifolium	Hyssopleaf Eupatorium
Eupatorium pilosum	Ragged Eupatorium
Eupatorium rotundifolium	Common Roundleaf Eupatorium
Fothergilla major	Large Witch Alder
Gaylussacia frondosa	Dangleberry
Helianthus atrorubens	Appalachian Sunflower
Helianthus divaricatus	Spreading Sunflower
Helianthus laevigatus	Smooth Sunflower
Helianthus microcephalus	Small-Headed Sunflower
Liatris Pilosa	A Blazing-star
Liquidambar styraciflua	Sweetgum
Liriodendron tulipifera var. tulipifera	Tulip-tree
Lyonia mariana	Staggerbush
Muscadina rotundifolia var. rotundifolia	Muscadine
Osmunda spectabilis	American Royal Fern
Osmundastrum cinnamomeum	Cinnamon Fern
Oxydendrum arboreum	Sourwood
Parthenium integrifolium var. integrifolium	Common Wild Quinine
Pinus echinata	Shortleaf Pine
Pinus palustris	Longleaf Pine
Pinus taeda	Loblolly Pine

Pseudognaphalium helleri	Heller's Rabbit Tobacco
Pseudognaphalium obtusifolium	Fragrant Rabbit Tobacco
Pteridium aquilinum ssp. latiusculum	Eastern Bracken
Quercus alba	White Oak
Quercus coccinea	Scarlet Oak
Quercus falcata	Southern Red Oak
Quercus montana	Chestnut Oak
Quercus velutina	Black Oak
Rhus copallinum var. copallinum	Winged Sumac
Saccharum alopecuroides	Silver Plume Grass
Sassafras albidium	Sassafras
Schizachyrinum scoparium var. scoparium	Common Little Bluestem
Silphium compositum var. compositum	A Rosinweed
Solidago odorata	Licorice Goldenrod
Sorghastrum nutans	Yellow Indiangrass
Symphotrichum grandiflorum	Big-headed Aster
Symphotrichum patens var. patens	Common Clasping Aster
Tephrosia virginiana	Virginia Goat's-rue
Tridens flavus	Purpletop Tridens
Vaccinium spp.	Blueberry Species
Vaccinium tenellum	Southern Blueberry
Viburnum nudum	Southern Wild Rasin
Woodwardia areolata	Netted Chain Fern

Animal Species Observed, Heard, or Identified during Field Surveys in the Study Area, NC 24/27 Project, Montgomery Co., North Carolina
(This may not be a complete list of the species within the BAA or Study Area.)

Birds

Agelaius phoeniceus	Red-winged Blackbird
Archilochus colubris	Ruby-throated Hummingbird
Ardea herodias	Great Blue Heron
Baeolophus bicolor	Tufted Titmouse
Branta canadensis	Canada Goose
Carduelis tristis	American Goldfinch
Cathartes aura	Turkey Vulture
Carpodacus mexicanus	House Finch
Ceryle alcyon	Belted Kingfisher

Charadrius vociferus	Killdeer
Corvus brachyrhynchos	American Crow
Corvus ossifragus	Fish Crow
Cyanocitta cristata	Blue Jay
Dendroica coronata	Yellow Rumped Warbler
Dendroica discolor	Prairie Warbler
Dendroica dominica	Yellow-throated Warbler
Dendroica petechia	Yellow Warbler
Dendroica pinus	Pine Warbler
Dendroica vire	Black-throated Green Warbler
Dryocopus pileatus	Pileated Woodpecker
Dumetella carolinensis	Gray Catbird
Empidonax virescens	Acadian Flycatcher
Geothlypis trichas	Common Yellowthroat
Helmitheros vermivora	Worm Eating Warbler
Hirundo rustica	Barn Swallow
Hylocichla mustelina	Wood Thrush
Icteria virens	Yellow-breasted Chat
Meleagris gallopavo	Wild Turkey
Melanerpes carolinus	Red-bellied Woodpecker
Mimus polyglottos	Northern Mockingbird
Mniotilta varia	Black and White Warbler
Myiarchus crinitus	Great Crested Flycatcher
Molothrus ater	Brown-headed Cowbird
Pandion haliaetus	Osprey
Parula americana	Northern Parula
Passerina cyanea	Indigo Bunting
Petrochelidon pyrrhonota	Cliff Swallow
Pheucticus ludovicianus	Rose-breasted Grosbeak
Picoides pubescens	Downy Woodpecker
Picoides villosus	Hairy Woodpecker
Pipilo erythrophthalmus	Eastern Towhee
Piranga olivacea	Scarlet Tanager
Poecile carolinensis	Carolina Chickadee
Polioptila caerulea	Blue-grey Gnatcatcher
Prothonotaria citrea	Prothonotary Warbler
Quiscalus quiscula	Common Grackle
Regulus calendula	Ruby-crowned Kinglet
Seiurus aurocapillus	Ovenbird
Setophaga ruticilla	American Redstart
Sialis sialis	Eastern Bluebird
Sitta carolinensis	White-breasted Nuthatch
Sitta pusilla	Brown-headed Nuthatch
Sphyrapicus varius	Yellow-bellied Sapsucker
Spizella passerine	Chipping Sparrow
Stelgidopteryx serripennis	Northern Rough-winged Swallow

Strix varia	Barred Owl
Sturnus vulgaris	European Starling
Thryothorus ludovicianus	Carolina Wren
Troglodytes aedon	House Wren
Toxostoma rufum	Brown Thrasher
Turdus migratorius	American Robin
Tyrannus tyrannus	Eastern Kingbird
Vireo flavifrons	Blue-headed Vireo
Vireo griseus	White-eyed Vireo
Vireo olivaceus	Red-eyed Vireo
Wilsonia citrina	Hooded Warbler
Zenaida macroura	Mourning Dove
Zonotrichia albicollis	White-throated Sparrow

Freshwater Fish

Ameiurus nebulosus	Brown Bullhead
Aphredoderus sayanus	Pirate Perch
Clinostomus funduloides	Rosyside Dace
Erimyzon oblongus	Creek Chubsucker
Esox niger	Chain Pickerel
Etheostoma olmstedi	Tessellated Darter
Lepomis aurutus	Redbreast
Lepomis macrochirus	Bluegill
Micropterus salmoides	Largemouth Bass
Nocomis leptocephalus	Bluehead Chub
Notropis altipinnis	Highfin Shiner
Semotilus atromaculatus	Creek Chub

Reptile

Crotalus horridus	Timber Rattlesnake

Mollusks - Freshwater Mussels

Elliptio complanata	Eastern Elliptio

Insects – Butterflies

Celastrina ladon neglecta	Summer Azure
Epargyreus clarus	Silver-spotted Skipper
Everes comyntas	Eastern Tailed-blue
Hermeuptychia sosybius	Carolina Satyr
Papilio glaucus	Eastern Tiger Swallowtail
Papilio troilus	Spicebush Swallowtail
Phyciodes tharos	Pearl Crescent
Polygonia interrogationis	Question Mark

Vanessa atalanta	Red Admiral
Vanessa virginiensis	American Lady

Insects – Benthic Macroinvertebrates

Ablabesmyia spp	Midge#
Acentrella spp	Small Minnow Mayfly#
Acroneuria spp	Stonefly#
Allocapnia spp	Stonefly#
Amphinemura spp	Stonefly#
Anopheles spp	Mosquito#
Baetis alachua	Blue Winged Olive Mayfly#
Caecidotea spp	Aquatic Sowbug#
Caenis spp.	Mayfly#
Crangonyx spp	Amphipod#
Cricotopus vieriensis	Midge#
Clioperla clio	Clio Stripetail
Cordulegaster spp	Dragonfly#
Cyrnellus fraternus	Caddisfly#
Helichus spp	Aquatic Beetle#
Heterotrissocladius spp	Nematoceran Fly#
Hexatoma spp	Cranefly#
Hydatophylax argus	Giant Cream Pattern-wing Sedge
Isoperla kirchneri	Stripetail#
Larsia spp	Midge#
Lepidostoma spp	Caddisfly#
Leuctra spp	Stonefly#
Maccaffertium modestum	White Eyed Mayfly
Maccaffertium vicarium	Flatheaded Mayfly
Neophylax consimilis	Autumn Mottled Sedge#
Neoporus spp	Aquatic Beetle#
Nigronia fasciatus	Hellgrammite#
Parachaetocladius spp	Midge#
Parametriocnemus lunbecki	Midge#
Prosimulium spp	Blackfly#
Prostoia spp	Stonefly#
Psectrocladius spp	Midge#
Psephenus herricki	Water Penny Beetle#
Psilotreta spp	Caddisfly#

Vanessa atalanta	Red Admiral
Vanessa virginiensis	American Lady

Insects – Benthic Macroinvertebrates

Ablabesmyia spp	Midge#
Acentrella spp	Small Minnow Mayfly#
Acroneuria spp	Stonefly#
Allocapnia spp	Stonefly#
Amphinemura spp	Stonefly#
Anopheles spp	Mosquito#
Baetis alachua	Blue Winged Olive Mayfly#
Caecidotea spp	Aquatic Sowbug#
Caenis spp.	Mayfly#
Crangonyx spp	Amphipod#
Cricotopus vieriensis	Midge#
Clioperla clio	Clio Stripetail
Cordulegaster spp	Dragonfly#
Cyrnellus fraternus	Caddisfly#
Helichus spp	Aquatic Beetle#
Heterotrissocladius spp	Nematoceran Fly#
Hexatoma spp	Cranefly#
Hydatophylax argus	Giant Cream Pattern-wing Sedge
Isoperla kirchneri	Stripetail#
Larsia spp	Midge#
Lepidostoma spp	Caddisfly#
Leuctra spp	Stonefly#
Maccaffertium modestum	White Eyed Mayfly
Maccaffertium vicarium	Flatheaded Mayfly
Neophylax consimilis	Autumn Mottled Sedge#
Neoporus spp	Aquatic Beetle#
Nigronia fasciatus	Hellgrammite#
Parachaetocladius spp	Midge#
Parametriocnemus lunbecki	Midge#
Prosimulium spp	Blackfly#
Prostoia spp	Stonefly#
Psectrocladius spp	Midge#
Psephenus herricki	Water Penny Beetle#
Psilotreta spp	Caddisfly#

Pycnopsyche lepida	Great Autumn Brown Sedge
Rhyacophilia torva	Green Sedge
Similum spp	Blackfly#
Somatochlora spp	Dragonfly#
Stenelmis spp	Aquatic Beetle#
Stenonema femoratum	Cream Cahill
Strophopteryx spp	Caddisfly#
Suwallia marginata	York Sallfly
Taeniopteryx spp	Willowfly#
Tipula spp	Cranefly#
Tvetenia bavarica group	Midge#
Wormaldia spp	Caddisfly#

Insects – Dragonflies

Calopteryx maculata
Cordulegaster spp
Gomphus (Gomphus) lividus
Plethemis lydia
Somatochlora spp

Salamanders

Ambystoma talpoideum	Mole Salamander
Desmognathus fuscus	Northern Dusky Salamander

APPENDICES

A - Prescribed Burning Analysis for TIP# R-2527
B - Natural Communities of North Carolina occurring on Uwharrie National Forest
C - NCNHP Significant Natural Heritage Areas occurring on Uwharrie National Forest
D - Biological Evaluation for the Proposed Widening of NC 24/27, January 2014
E - Aquatic Resources Report for the Proposed Widening of NC 24/27, January 2014
F - Botanical Resources Report for the Proposed Widening of NC 24/27, January 2014
G - Terrestrial Animal Resources Report for the Proposed Widening of NC 24/27, January 2013

Appendix A

Prescribed Burning Analysis for TIP# R-2527

Prescribed Burning Analysis for TIP# R-2527, NC 24/27 Improvements, Uwharrie National Forest, Montgomery Co., N.C.

March 31, 2014

Prepared by

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Prescribed Burning Analysis for TIP# R-2527 Project, Uwharrie Ranger District, Uwharrie National Forest, Montgomery Co., North Carolina

Introduction

This prescribed burning analysis identifies the potential effects on the current and future U.S. Forest Service's prescribed burning program by the proposed road widening of NC 24/27 (TIP # R-2527) from east of the Yadkin-Pee Dee River to west of SR 1134 (Wadeville Road). This proposed project would affect U.S. Forest Service (USFS) property along the existing and proposed right-of-way.

Four portions of the proposed NC 24/27 highway project falls within the Uwharrie Ranger District, Uwharrie National Forest, Montgomery Co., N.C. Approximately 50 acres of USFS land falls within the 500 foot project study corridor (project area) for a distance of 3.28 miles.

Since Longleaf Pine ecosystem restoration is a major driver of the new forest plan for the Uwharrie National Forest (Uwharrie NF), the Uwharrie Ranger District (Uwharrie RD) foresees continuing and expanding its growing season burn program. In addition to the Longleaf Pine (*Pinus palustris*), the federally protected Schweinitz's Sunflower (*Helianthus schweinitzii*) and other Forest Service sensitive and locally rare species occur in several areas along NC Highway 24/27 (TIP# R-2527).

Restoring the Uwharrie NF to a more natural ecological condition encompasses the biological and physical natural resources of vegetation, wildlife, soil, water and fisheries (USDA Forest Service 2012). Although all of these are important to the overall restoration of the forest, this prescribed burning analysis will focus only on the Longleaf Pine and Schweinitz's Sunflower restoration management areas along and adjacent to NC 24/27. These management areas currently undergo a prescribed burning regime and may be affected by the proposed highway project that will increase the width of the transportation corridor.

The Uwharrie NF Management Plan (USDA 2012) lists vegetation-related goals and conditions, three of which pertain to this prescribed burning analysis:

- Longleaf Pine and oak-hickory woodlands that provide habitat for federally listed, sensitive, and locally rare species in canopy openings.

- Plant communities such as longleaf pine woodlands, shortleaf pine woodlands, and oak hickory forests.

- Schweinitz's Sunflowers (federally listed as endangered since 1991), that historically occurred across the Piedmont of North Carolina, and are being restored on appropriate sites across the forest.

Ecological systems are defined by groups of plant associations occurring in regions of similar physical conditions and biological potential. The desired composition, structure and process for each system listed in the vegetation-related goals above, including fire return intervals for each (USDA 2012) include Southern Interior Longleaf Pine Woodland, Dry Oak-Hickory Forest, Southern Piedmont Mafic Hardpan Woodland, and Xeric Oak Forest.

The desired fire return intervals for the above ecological systems of the Uwharrie NF are:

Southern Interior Longleaf Pine Woodland	3 - 5 years
Dry Oak-Hickory Forest	7 - 20 years
Southern Piedmont Mafic Hardpan Woodland	3 - 5 years
Xeric Oak Forest	7 - 20 years

The objectives of prescribed burns are to improve wildlife habitat, to reduce dangerous fuel buildup, and to improve overall ecosystem health. Prescribed fire can do this by stimulating lush and abundant re-growth after the fire that is more desirable for wildlife forage. Prescribed fires can also reduce wildfire threat by consuming fuels that naturally accumulate in the absence of fire, and prescribed fire can improve overall ecosystem health in terms of the forest structure, reduced tree density, better species diversity, as well as maintain or restore fire dependent species.

Creating more open conditions by reestablishing or maintaining a more appropriate fire return interval will help with the restoration and maintenance of certain rare plant communities as well as support habitat for Schweinitz's sunflower, and habitat for sensitive species. It will be important to emphasize opportunities for Longleaf Pine restoration and Schweinitz's Sunflower restoration when prioritizing work, such as when deciding what part of the national forest to prescribed burn from year to year. Most fuels treatments will occur in the wildland – urban interface. Burns in the pine forest types would also improve the fire regime condition class (USDA 2012).

The Uwharrie NF has a set of fire management standards and guidelines that are followed (USDA 2012). These standards and guidelines will pertain to the NC 24/27 proposed highway project:

- Existing barriers, e.g., streams, lakes, wetlands, roads, and trails, shall be used whenever possible to reduce the need for fire line construction and to minimize resource impacts.

- All prescribed burning shall comply with the state's smoke management plan (http://www.ncforestservice.gov/fire_control/fc_smoke_management_guidelines.htm).

- When prescribe burning, at least every third burn on a site should be a growing season burn. It is permissible to burn the same acreage in two sequential years and to apply only growing season fire to the same acreage for three or more sequential burning cycles.

- When prescribe burning, the fire should be allowed to burn in a mosaic pattern resulting from differential influence of topography, fuel loading and moisture, and vegetation type.

When prescribed burning, state management guidelines as detailed in FSM 5140, the North Carolina Prescribed Burning Act 113-60.43, and the North Carolina open burning Rule 15A-NCAC 02D-1900 should be followed.

Management Areas (MAs) are areas in the Uwharrie NF that are similar in some respect. They have similar features or uses, or contain special attributes that must be taken into account when considering management activities. The two management areas in Uwharrie NF that pertain directly to TIP # R-2527, NC 24/27 widening project are:

Longleaf Pine Restoration MA (15,094 acres) [**Maps 1 & 2**]: This MA occurs in sections of the Uwharrie NF where Longleaf Pine restoration would be focused. It contains most of the existing longleaf as well as areas having the characteristics of potential longleaf communities. It encompasses most of the southeastern part of the Forest in the vicinity of the NC 24/27 project area. Within this MA, management actions would retain, restore, or enhance the longleaf pine community when the following conditions are encountered:

- Presence of existing remnant longleaf,
- Presence of Piedmont longleaf associated forbs and grasses such as Little Bluestem (Schizachyrium scoparium) and Indiangrass (Sorghastrum nutans).
- Dry ridges or south facing slopes.

Schweinitz's Sunflower Habitat MA (2,307 acres) [**Maps 1 & 2**]: These are areas of the Uwharrie NF that have ecological attributes that are conducive to restoring Schweinitz's Sunflower. The desired condition within Schweinitz's Sunflower's management areas is for open conditions within drier portions of the landscape, specifically in Xeric Oak Forest, Dry Oak-Hickory Forest, Dry-Mesic Oak-Hickory Forest, and Piedmont Longleaf Woodlands. The desirable fire frequency once these habitats are restored would be on a 3-5 year cycle.

Uwharrie NF Prescribed Burning History

The Uwharrie NF currently has approximately 4,000 acres of longleaf (or longleaf/mix) forest, with at least 10,000 more acres suitable for establishing longleaf. Most of these acres have historically been managed with dormant season fire.

Each year an average of 3,000 to 6,000 acres in the Uwharrie NF undergo prescribed burns to create open canopy conditions, reduce midcanopy, and move toward ecological conditions described in the ecological systems above. Public and firefighter safety will be the first priority in fire management activities (USDA 2012).

Historically, dormant season burns have encouraged regrowth of unwanted hardwoods. However, growing season burns are reported to significantly reduce hardwood stem numbers and the amount of regrowth. In 2007 the Uwharrie Ranger District conducted a growing season

burn. Little to no damage to existing longleaf saplings and grass formation in the understory, resulting in a more "classic" longleaf stand appearance was observed after this burn (USDOI/USDA 2007).

Several areas of Uwharrie NF property occur on either one or both sides of NC 24/27 in the proposed highway project area. Roberdo, the largest area, occurs from Smith Creek westward to SR 1136 (Bruton Carpenter Rd.) and spans approximately 12,050 ft (2.26 mi) along the proposed highway project area. The easternmost section of the Roberdo area is located on the north side of the highway from Smith Creek to the intersection of NC 24/27 and NC 109 for a distance of approximately 2,416 ft (0.46 mi). The remainder, and largest section, of the Roberdo area (NC 24/27 - NC 109 intersection to SR 1136) on the west side of NC 109 spans a distance of approximately 9,634 ft (1.8 mi) along NC 24/27. (**See Map 3**)

Three smaller sections (western, central, and eastern) of Uwharrie NF are located along NC 24/27, starting approximately 0.75 mi east of River Rd. (SR 1150) on both sides of NC 24/27 [**Map 4**]. The western section is associated with the national forest's Wood Run/Lawrenceville area and spans approximately 1,860 ft (0.35 mi) highway frontage along NC 24/27. This section is the only one of the three that is currently in the forest burn rotation. The central section spans 1,317 ft (0.25 mi) highway frontage and the eastern section spans 2,241 ft (0.42 mi) along the highway. Neither of these sections is currently in the forest burn rotation. There are no immediate plans to burn either of the two remaining tracts because they are currently a low priority for burns.

Prescribed burns during the dormant season have been conducted on the Roberdo and Wood Run/Lawrenceville areas adjacent to NC 24/27 for many years. One of the first growing season burns took place in 2007, and these areas have become part of the burn rotation since. These areas are burned at least every 3 years, but if the opportunity (and funding) arises, Uwharrie NF will burn portions of these areas every other year. National Forest botanists suggest that the ecosystem is improved more by burning more frequently for a few burn cycles. There is no set schedule for if the burn will be dormant season or growing season, but a rule of thumb is that at least every other burn will be a growing season burn. The various areas or specific tracts in the forest compartments below are not generally burned on the same day or the same year. The different tract or area names presented below are names used by Uwharrie NF personnel for internal identification purposes and record keeping (Kelly Cagle, pers. comm.).

1. The Roberdo area has the most Longleaf Pine and Schweinitz's Sunflowers in the highway project vicinity. The entire area is a Longleaf Pine Restoration MA that includes three Schweinitz's Sunflower Habitat MAs (**Map 1**). Prescribed burns in the Roberdo area occur as described in the two compartments below (**See Map 3**):

   Compartment 37 (north of NC 24/27)
   - Railroad Tracks East/N Boon Chesson, east of the RR tracks.
   - Roberdo West (or Landfill Road burn unit), west of the RR tracks. The current burn regime for the southern portion of this area will produce some effects from smoke along NC 24/27.

Compartment 36 (south of NC 24/27)

- Roberdo South. The current burn regime for the northern part of this area will produce some effects from smoke along NC 24/27 and, possibily, NC 109 east of the RR tracks.

2. The Wood Run/Lawrenceville area (**Map 4**) makes up parts of Compartments 34 and 35, and is located north of NC 24/27. This area is almost entirely within a Longleaf Pine Restoration MA, and includes the Wood Run Schweinitz's Sunflower Habitat MA (**Map 2**). Only the small westernmost section currently being burned is located adjacent to the highway project area, but the current burn regime for the southern portion of the Wood Run/Lawrenceville area will produce some effects from smoke along NC 24/27.

Prescribed Burn Analysis for the NC 24/27 Improvement Project

The proposed NC 24/27 highway project will have negligible effects on the ability of Uwharrie NF to conduct prescribed burns. The 2010 Annual Average Daily Traffic (AADT) along NC 24/27 within the Uwharrie NF is estimated between 7,200 - 10,100 AADT and the 2035 estimate is 10,500 – 14,800 AADT (NCDOT 2010a; 2010b). The predicted increase in traffic volume on NC 24/27 after the project will not be enough to affect frequency, duration, or timing of prescribed burns.

The following information was provided by Kelly Cagle, prescribed burn supervisor, Uwharrie National Forest:

Each management area is currently burned at least every three years, but may be burned every other year (no more frequently than that) on some type of alternating schedule between growing and dormant season fires. These prescribed burns may be executed at any time of the year, with some occurring during the dormant season as well as the growing season. For instance the Roberdo and Wood Run/Lawrenceville areas could be burned during the same season but will not be burned at the same time or on the same day.

The USFS does not typically close NC 24/27 or NC 109, but when they are burning, they may flag traffic and stop it for brief periods (5 minutes or until heavy smoke clears). Most of the time the USFS place signs along the highway in numerous locations and then have some sort of law enforcement presence to slow traffic down to a safe speed. This may happen 2 to 4 times per year, and in some years it does not occur at all. Burns have been postponed when the weather was likely to carry smoke onto the roadways and the FS could not mitigate that with signs or flagmen; the USFS usually waits until favorable conditions occur to initiate a burn.

The NCDOT Division 8 district office has not played a major role with the prescribed burns along NC 24/27 in the past. The USFS usually relies on Forest law enforcement staff or the Montgomery County sheriff's office to provide help in maintaining slow traffic during the burns.

Notice can be given to NCDOT, Montgomery sheriff's department, and local residents **no** earlier than the afternoon or evening prior to the prescribed burn because FS cannot get a

reasonably accurate weather forecast any sooner than that. USFS can make plans a few days earlier than that, but the actual 'go or no go' could not occur until the day prior. Sometimes this changes even as late as the morning of a scheduled burn, if winds or humidities change at the last minute.

All of the tracts along NC 24/27 are considered Urban Interface because every management area has private land adjacent to them and most have private structures somewhere in the vicinity. The residents are usually notified the afternoon prior to the prescribed burn.

Traffic is fairly consistent and steady on NC 24/27 and NC 109 on weekdays. It seems to be less on weekends. Weekdays are when the majority of burns occur, but FS occasionally schedules a burn on weekends (2 or 3 times a year). Holidays are rarely scheduled for prescribed burn, but it has occurred a few times in past years. Burns are usually started by mid-morning (10:00 a.m. or so) and last most of the day, usually ending between 3:00 – 6:00 p.m. depending on acreage and amount of help on a burn day.

Currently, NC 24/27 acts as a fire break or fire line, and will continue to do so post construction. USFS has had good success in limiting smoke on the highways, but most of the time a roadway will have at least some smoke. Traffic flowing along a highway actually makes a "vortex" type of effect along the edge of the road, and that tends to suck smoke out into the roadway as traffic passes by. There are times when winds have blown smoke directly into the highway, and during these times FS ramps up the law enforcement presence and signage. Smoke impacts will usually be worse immediately at the onset of ignition operations, and then decrease as FS work their way away from the road edge and the smoke has time to rise a bit before it crosses the road.

Only sections adjacent to the actual burn area will be affected and the need to detour traffic rarely occurs. Minor traffic control to reduce speed is the best way to manage in the event that smoke crosses the highway.

The NCDOT, Division 8, proposes to take the following actions to assist the Uwharrie NF during prescribed burns along the NC 24/27 portion within the forest. In the event of smoke on the roadway, road closures, or detours, NCDOT can:

- Provide personnel and assistance to the Uwharrie NF and the Montgomery Co. sheriff's department.
- Provide signs or cones.
- Provide guide vehicles and/or flagmen.

References

Cagle, Kelly (Uwharrie National Forest). 2013. Personal Communication.

Fire Weather Reports- Raleigh Zone
http://www.ncforestservice.gov/fire_control/fire_weather_reports.htm

N. C. Division of Forest Resources Smoke Management Guidelines
http://www.ncforestservice.gov/fire_control/fc_smoke_management_guidelines.htm

NCDOT. 2010a. 2010 Annual Average Daily Traffic – No Build. Sheet 1-1. NC 24-27 Improvements, TIP:R-2527, B-4974, WBS: 35572.1. November 9, 2010.

NCDOT. 2010b. 2035 Annual Average Daily Traffic – Build / No Build. Sheet 1-1. NC 24-27 Improvements, TIP:R-2527, B-4974, WBS: 35572.1. November 9, 2010.

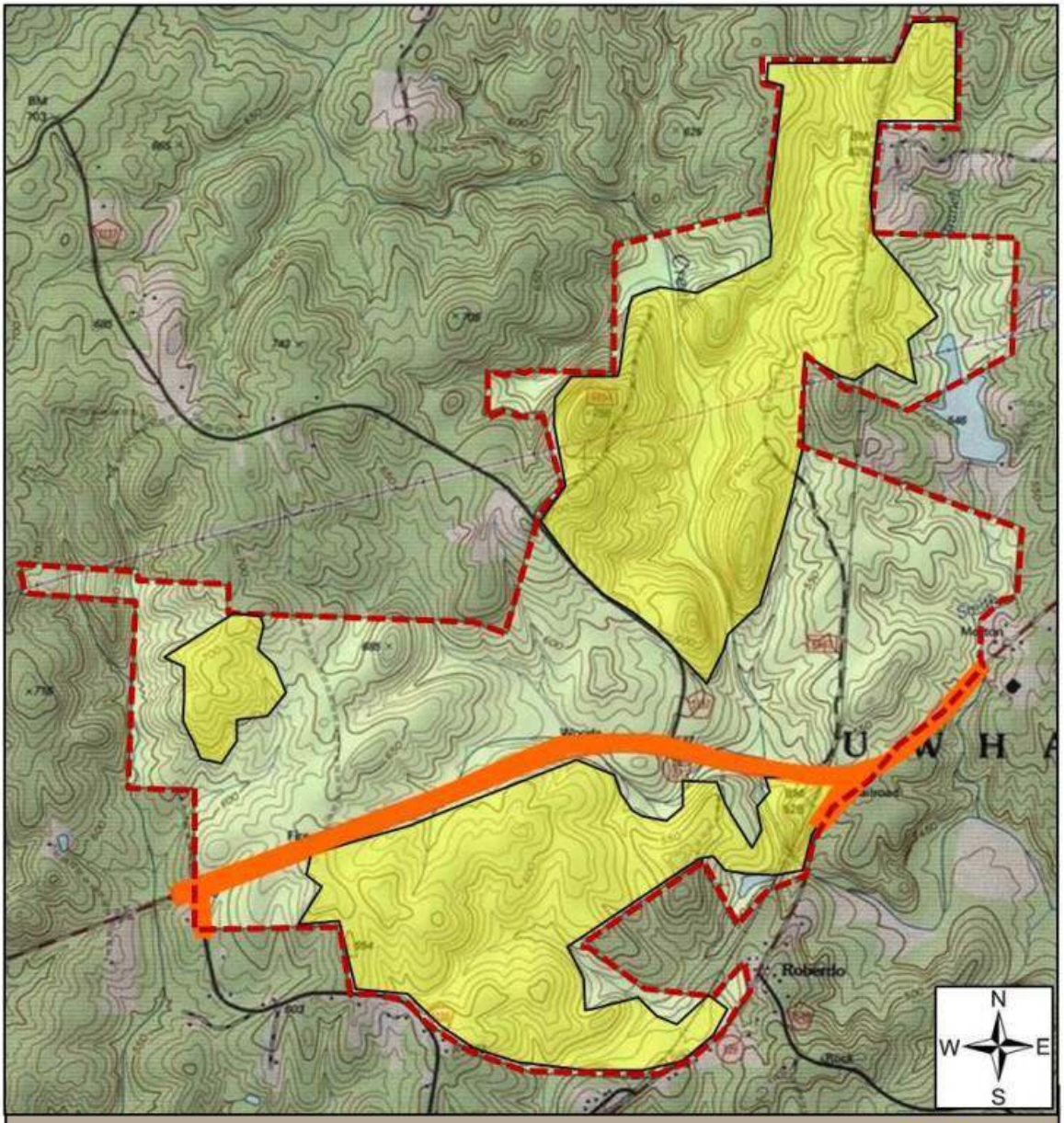
N.C. Prescribed Burning Act,
http://www.cals.ncsu.edu/wq/lpn/statutes/nc/prescribedburning.htm

USDA/FS. 2012. Uwharrie National Forest Land and Resource Management Plan. R8-MB 140A. U.S.D.A. Forest Service, Southern Region. 129 pp.

USDA/FS. 2011. Letter to Friends of the Uwharrie National Forest regarding prescribed fire. Troy, NC. November 8, 2011.

USDOI/USDA. 2007. National Fire Plan Success Story; Growing Season Prescribed Burning. Uwharrie National Forest, 2007. National Fire Plan. USDOI/USDA Forests and Rangelands Cooperative.
http://www.forestsandrangelands.gov/success/stories/2007/nfp_2007_nc_fs_uwnf_growseasonburn_fuelsreduction.shtml

Map 1: Management Areas, TIP # R-2527, Uwharrie National Forest, Montgomery Co., N.C.

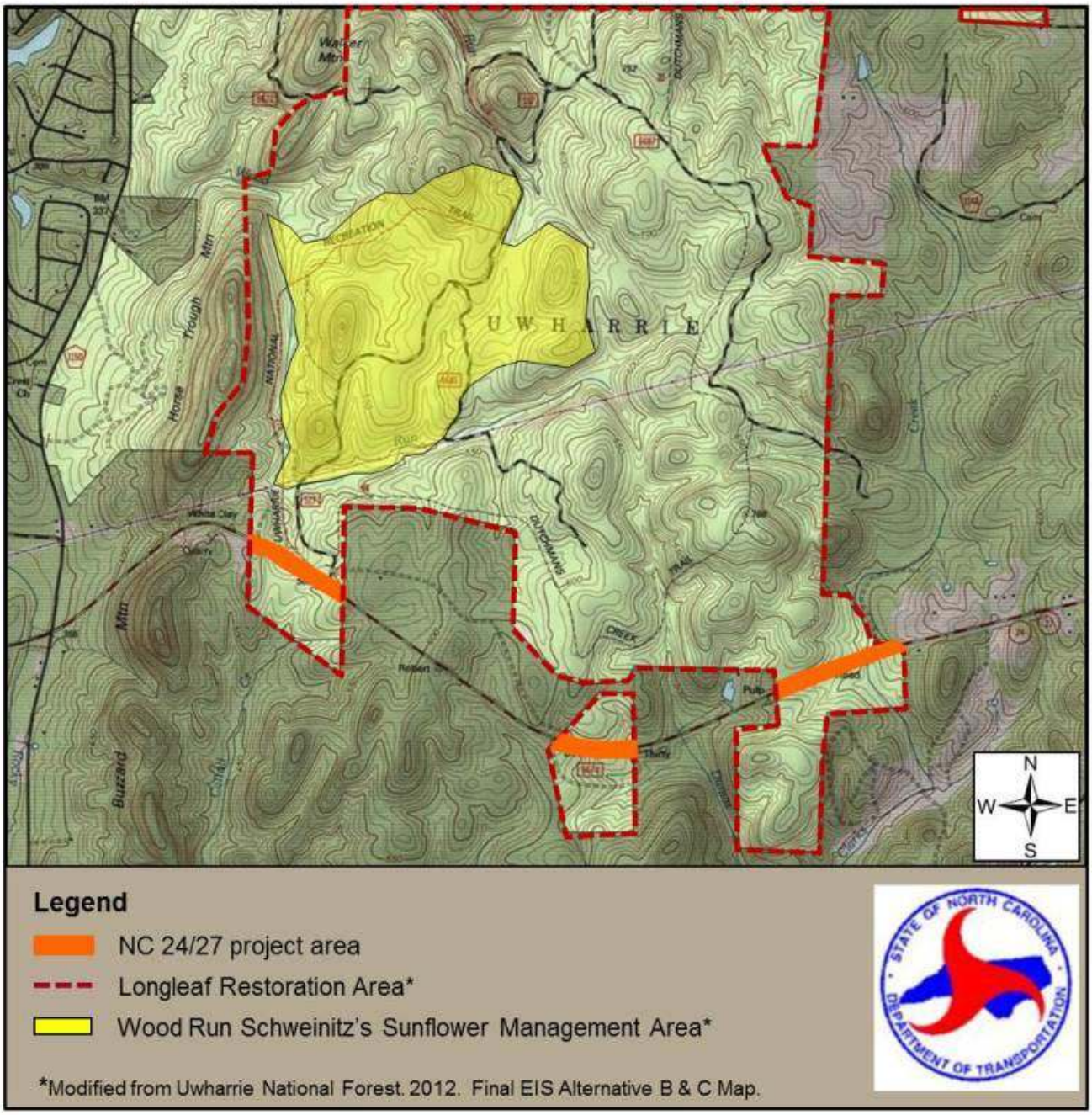


Legend

- NC 24/27 project area
- Longleaf Restoration Area*
- Roberdo Schweinitz's Sunflower Management Area*

*Modified from Uwharrie National Forest. 2012. Final EIS Alternative B & C Map.

Map 2: Management Areas, Tip# R-2527, Uwharrie National Forest Montgomery Co., N.C.



Legend

- NC 24/27 project area
- Longleaf Restoration Area*
- Wood Run Schweinitz's Sunflower Management Area*

*Modified from Uwharrie National Forest. 2012. Final EIS Alternative B & C Map.

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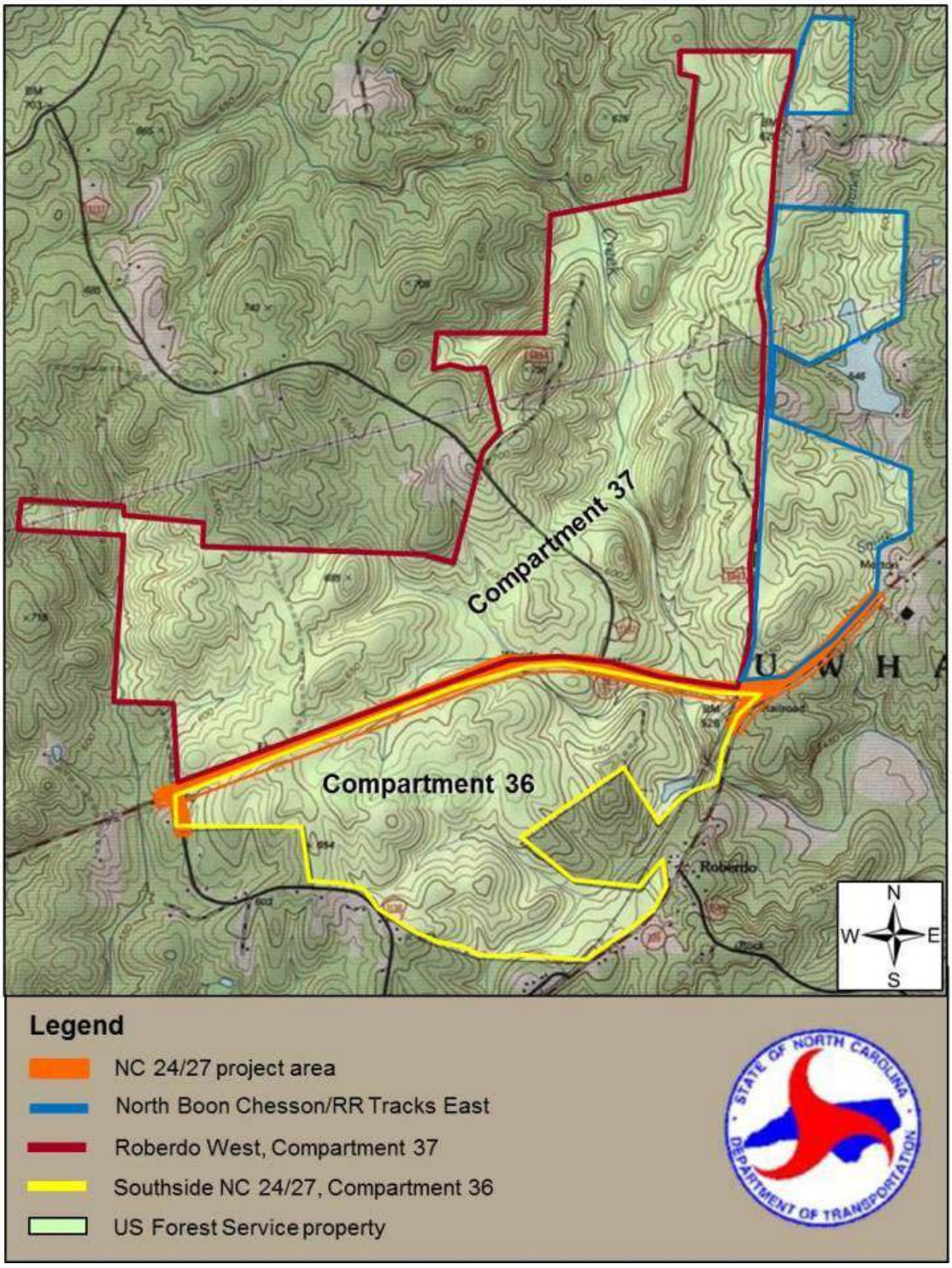
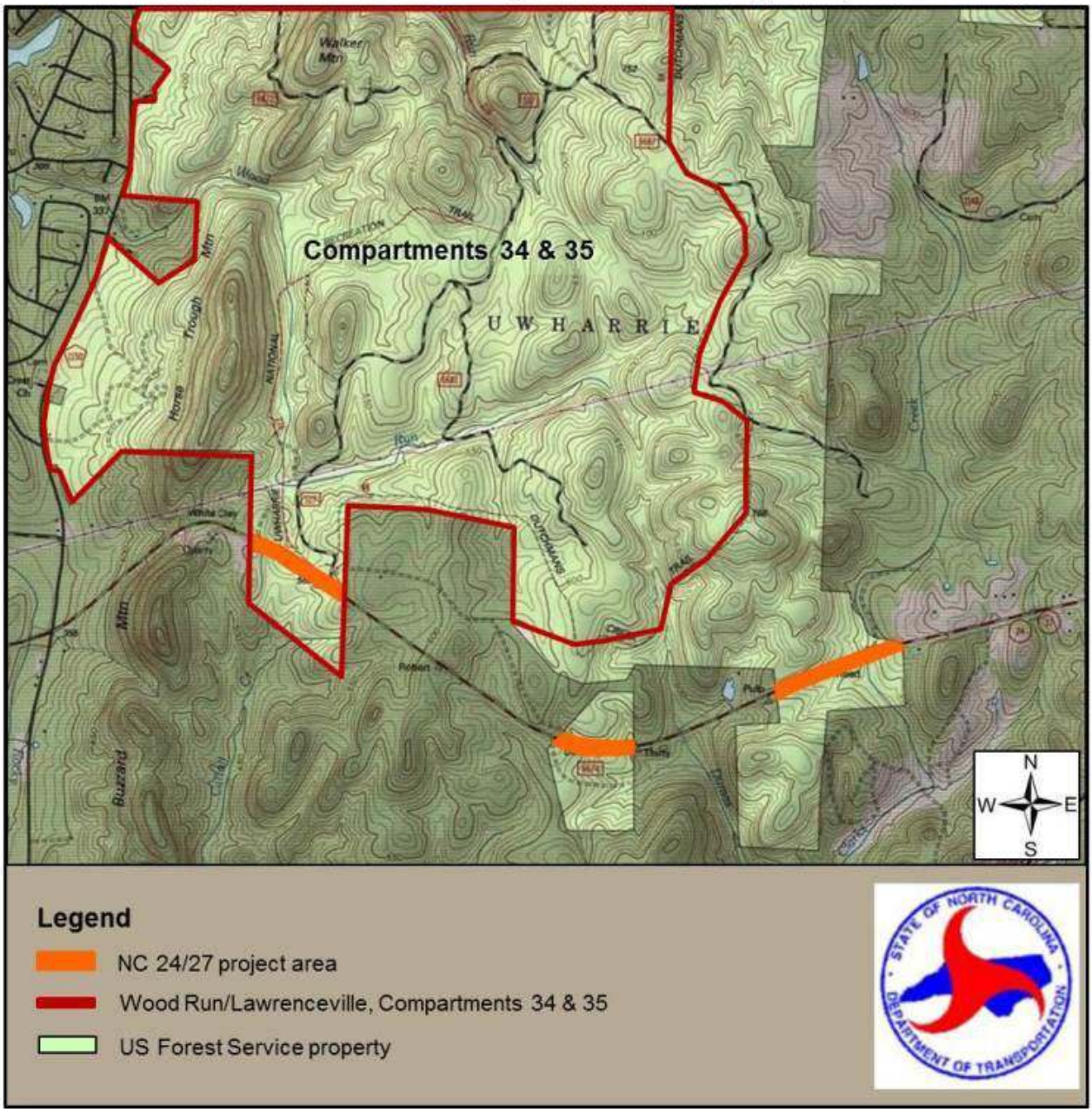
Map 3: Prescribed Burn Areas in the Roberdo Area, TIP # R-2527, Uwharrie National Forest, Montgomery Co., N.C.



Map 4: Prescribed Burn Areas in the Lawrenceville Area, Uwharrie National Forest, Tip# R-2527, Montgomery Co., N.C.



Appendix B

Natural Communities of North Carolina occurring on Uwharrie National Forest

Natural Communities of North Carolina - March 2012
Michael P. Schafale
North Carolina Natural Heritage Program
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NC 24/27 WIDENING – UWHARRIE NATIONAL FOREST

Piedmont Boggy Streamhead (G2G3) is described in Schafale (2012).

Synonyms: Acer rubrum var. trilobum - Liriodendron tulipifera / Ilex opaca var. opaca / Osmunda cinnamomea Forest (CEGL004551). Streamhead Seep (Seymour 2011).
Ecological Systems: Piedmont Seepage Wetland (CES202.298).

Concept: Type covers seepage areas along small headwater streams (generally intermittent or 1st to 2nd order), and occasional other seepage wetlands far from lower slopes or larger streams, which lack the characteristics of Hillside Seepage Bogs. Known examples are all in the eastern and central Piedmont, geographically separated from the Upper Piedmont Springhead Subtype. Vegetation is a mix of widely tolerant acidic seepage species and of species shared with Piedmont Headwater Stream Forests and uplands, often with some characteristic Coastal Plain species.

Distinguishing Features: This type is distinguished from other seepage wetland communities by occurring in upland or headwater settings while lacking the characteristic species of Hillside Seepage Bogs, such as Sarracenia flava and Sarracenia purpurea. Wetlands that have been known once to have had more distinctive open bog herbs typical of the Hillside Seepage Bog type, such as Sarracenia flava, Sarracenia purpurea, and Helenium brevifolium, should be treated as degraded Hillside Seepage Bogs rather than as this type.

Piedmont Boggy Streamhead is distinguished from Low Elevation Seep by a more upland setting and by floristic differences. Species characteristic of this type but scarce or absent in Low Elevation Seeps include Osmunda regalis, Eubotrys racemosa, Vaccinium fuscatum, Vaccinium formosum, Cyrilla racemiflora, and Smilax laurifolia. More species are shared with the Piedmont/Mountain Springhead Subtype of Low Elevation Seep than with the other subtypes (e.g., Vaccinium spp., Viburnum nudum, Ilex opaca, Smilax laurifolia, Woodwardia areolata). However, Piedmont/Mountain Springheads tend to lack other characteristic species such as Liquidambar styraciflua, Eubotrys racemosa, Osmunda regalis, Morella caroliniensis (= Myrica heterophylla), Cyrilla racemiflora, Gaylussacia frondosa, Pinus taeda, and Chasmanthium laxum. They tend to have species such as Alnus serrulata, Ilex verticillata, Decumaria barbara, and Carex allegheniensis that are absent in Piedmont Boggy Streamheads. There is also a geographic separation. No Piedmont Boggy Streamheads (as defined here) are known from the western Piedmont or Mountains. (Some communities in the western Piedmont were previously called Piedmont Boggy Streamheads). Other subtypes of Low Elevation Seep have greater floristic differences, including a number of additional species such as Saururus cernuus, Boehmeria cylindrica, Arisaema triphyllum, Leersia spp., Glyceria striata, Acer negundo, Fraxinus pennsylvanica, Celtis laevigata, Peltandra virginica, Sagittaria spp., and Cephalanthus occidentalis).

Piedmont Boggy Streamheads occur along headwater streams, and can show some evidence of flowing water. They are distinguished from Piedmont Headwater Stream Forest by a greater proportion of seepage wetland species and a scarcity of upland species. Many of the species are shared, including Osmundastrum (Osmunda) cinnamomeum and Viburnum nudum, but are minor components in Piedmont Headwater Stream Forest.

Comments: The Piedmont Boggy Streamhead was not recognized in the 3rd Approximation, but was recognized and tracked shortly thereafter. Definition of the conceptual boundary with Hillside Seepage Bog has always been difficult because of the loss of herbaceous flora in many Hillside Seepage Bogs. Some examples may remain ambiguous. However, analysis by Seymour (2011) found this to be a distinct group of communities, and its retention as a type seems appropriate. These communities are rare.

Dry Piedmont Longleaf Pine Forest (G2G3) is described in Schafale (2012)
Synonyms: Pinus palustris - Pinus echinata - (Pinus virginiana) / Quercus marilandica - (Quercus prinus) / Vaccinium pallidum Woodland (CEGL008437).
Ecological Systems: Southeastern Interior Longleaf Pine Woodland (CES202.319).

Concept: Type covers woodlands or forests of the eastern Piedmont (primarily the Uwharries and areas adjacent to the Sandhills) in which Pinus palustris naturally dominates or codominates. Pinus palustris may be scarce in examples where past logging and fire suppression have removed it and allowed other pines or hardwoods to dominate.

Distinguishing Features: Dry Piedmont Longleaf Pine Forest is distinguished from all other Piedmont dry communities by having Pinus palustris dominant or codominant, or by having evidence that it once dominated. In degraded examples the canopy may resemble Dry Oak–Hickory Forest or Piedmont Monadnock Forest, or may be dominated by Pinus taeda and Pinus echinata, with only scattered Pinus palustris. It is distinguished from Wet Piedmont Longleaf Pine Forest by its overall dry to dry-mesic vegetation, lacking any appreciable amount of wetland species or even mesic species such as Panicum virgatum or Chasmanthium laxum. It is distinguished from most longleaf pine communities of the adjacent Coastal Plain by lacking Aristida stricta, Quercus laevis, Quercus incana, and Quercus margarettiae, as well as by its Piedmont location. The Northern Subtype of Pine/Scrub Oak Sandhill also lacks Aristida stricta, but contains the Coastal Plain scrub oaks.

Comments: This type covers a broader range of moisture and topographic positions than Piedmont hardwood forests. It may be that additional subtypes should be recognized, but their distinction is hidden by the universal alteration by past fire suppression in all remaining examples. Pinus palustris – Quercus marilandica - Quercus prinus / Symplocos tinctoria Woodland (CEGL004554), formerly considered distinct in the NVC, was merged with this type. It represents a single example in the Uwharrie Mountains, on a steep south slope.

Wet Piedmont Longleaf Pint Forest (G1)
Synonyms: Pinus palustris - Pinus taeda - Pinus serotina / Chasmanthium laxum - Panicum virgatum Piedmont Woodland (CEGL003663).

Ecological Systems: Southeastern Interior Longleaf Pine Woodland (CES202.319).

Concept: Type covers seepage fed or perched wetland woodlands or forests of the eastern Piedmont (primarily the Uwharries and areas adjacent to the Sandhills) in which Pinus palustris naturally dominates or codominates. Pinus palustris may be scarce in examples where past logging and fire suppression have removed it and allowed other pines and hardwoods to expand.

Distinguishing Features: Wet Piedmont Longleaf Pine Forest is distinguished from all other Piedmont wetland communities by having a component of Pinus palustris or evidence that it once dominated. In degraded examples the canopy may be dominated by Pinus taeda and Pinus serotina with only scattered Pinus palustris. It is distinguished from Dry Piedmont Longleaf Pine Forest by its overall mesic to wet flora, with appreciable amounts of facultative wetland species such as Panicum virgatum or Chasmanthium laxum, and often some more exclusively wetland species such as Osmunda (Osmundastrum) cinnamomeum. It is distinguished from most longleaf pine communities of the adjacent Coastal Plain by lacking Aristida stricta, as well as by its Piedmont location. Northern Wet Pine Savanna also lacks Aristida stricta, but has a more depauperate and northern flora that still contains a number of Coastal Plain species absent in the Piedmont.

Comments: Hillside Seepage Bogs are often associated with Dry Piedmont Longleaf Pine Forest. It is possible that Pinus palustris once occurred in them, potentially blurring the distinction between them and Wet Piedmont Longleaf Pine Forest. However, Hillside Seepage Bogs contain a more specialized wetland flora.

Dry-Mesic Oak-Hickory Forest (Piedmont Subtype) (G4G5) is described in Schafale (2012).
Synonyms: Quercus alba - Quercus rubra - Carya alba / Cornus florida / Vaccinium stamineum / Desmodium nudiflorum Piedmont Forest (CEGL008475).
Ecological Systems: Southern Piedmont Dry Oak-(Pine) Forest (CES202.339).

Concept: Type covers dry-mesic forests of acidic upland slopes and somewhat sheltered ridges in the Piedmont and Coastal Plain, dominated by combinations of Quercus alba, Quercus rubra, Quercus velutina, Carya tomentosa, Carya glabra, along with varying amounts of pine, maple, and poplar. Basic soil plants are absent or scarce, and acid tolerant species such as Oxydendrum arboreum and Vaccinium spp. are common. These forests cover the moisture range between that where Fagus becomes a significant component and that where Quercus falcata, Quercus stellata, Quercus marilandica, or Quercus montana become significant components. Subtype covers Piedmont examples, which lack characteristic Coastal Plain species.

Distinguishing Features: Dry-Mesic Oak–Hickory Forest is distinguished from Dry Oak–Hickory Forest by a flora of more mesic composition, most clearly in the canopy. Quercus stellata, Quercus falcata, Quercus marilandica, and Quercus montana are scarce or absent. It is distinguished from Mesic Mixed Hardwood Forest by the absence of more mesic species, particularly Fagus grandifolia. It is distinguished from Montane Oak–Hickory Forest by the absence of characteristically montane flora, such as Castanea dentata, Magnolia fraseri, Acer pensylvanicum, Rhododendron calendulaceum, and Rhododendron maximum. Additionally, some species are widespread in Montane Oak–Hickory Forests but are restricted to more mesic

communities than this in the Piedmont and Coastal Plain. These include Kalmia latifolia, Hamamelis virginiana, and Polygonatum biflorum.

The Dry-Mesic Oak–Hickory Forest type is distinguished from Dry-Mesic Basic Oak–Hickory Forest by the absence or scarcity of a suite of basic indicators, such as Symphoricarpos orbiculatus, Frangula caroliniana, Celtis spp., Fraxinus americana, Cercis canadensis, Brachyelytrum erectum, and Dichanthelium boscii. Basic indicators also include a set of species that are characteristic of more mesic or floodplain communities but that occur in dry sites that are less acidic. These include Acer floridanum, Carya ovata, Elymus hystrix, Elymus virginicus, Phryma leptostachya, and Phegopteris hexagonoptera. Characteristic species of acidic soils, such as Oxydendrum arboreum, Vaccinium stamineum, Vaccinium pallidum, Vaccinium tenellum, Gaylussacia frondosa, and Chimaphila maculata may be present in basic communities, but don't predominate as they do in Dry Mesic Oak–Hickory Forest.
The Piedmont Subtype is distinguished from the Coastal Plain Subtype by floristic differences. Quercus rubra is largely restricted to the Piedmont Subtype. Quercus nigra, Gaylussacia frondosa, Morella cerifera, and Arundinaria tecta are largely restricted to the Coastal Plain Subtype. The Coastal Plain Subtype also tends to have at some least some plants more typical of wetter habitats, such as Ilex glabra, Osmunda cinnamomea, and Woodwardia areolata, presumably associated with very small seepage patches.

Comments: This association is perhaps the most common one in the Piedmont. It is also common in Virginia, where Quercus coccinea becomes more common than Quercus rubra as a component. It extends across the Coastal Plain in northern Virginia.

Dry Oak-Hickory Forest (Piedmont Subtype) (G4G5) is described in Schafale (2012).
Synonyms: Quercus falcata - Quercus alba - Carya alba / Oxydendrum arboreum / Vaccinium stamineum Forest (CEGL007244).
Ecological Systems: Southern Piedmont Dry Oak-(Pine) Forest (CES202.339).

Concept: Type covers upland hardwood forests of acidic soils in the driest typical topographic positions, on south slopes and ridge tops; where Quercus alba, Q. stellata, and Q. falcata predominate in the canopy. They are less xeric in composition than the Quercus stellata - Q. marilandica forests that occur in specialized edaphic conditions such clay hardpans, shallow rock, or very sandy soils. They contain acid-tolerant flora such as Oxydendrum arboreum, Nyssa sylvatica, Vaccinium stamineum, Vaccinium pallidum, and Vaccinium arboreum, and lack more base-loving plants. Subtype covers typical examples of the Piedmont, which lack significant Coastal Plain flora.

Distinguishing Features: Dry Oak–Hickory Forests are distinguished from Dry-Mesic Oak–Hickory Forests by canopy composition, which has Quercus stellata, Q. falcata, and other trees more drought tolerant than Quercus alba predominating over Quercus rubra and other trees less drought-tolerant than Quercus alba. They are distinguished from Xeric Hardpan Forests by a canopy which contains significant Quercus alba and other trees that are less xerophytic than Quercus stellata.

Dry Oak–Hickory Forests are distinguished from Dry Basic Oak–Hickory Forests by having acid tolerant plants predominating and by lacking more base-loving plants. This is most apparent in the lower strata, but the number of distinguishing species is less than in more mesic communities because of the limited number of species present. Oxydendrum arboreum, Vaccinium pallidum, Vaccinium tenellum, and Chimaphila maculata are generally abundant in Dry Oak–Hickory Forest but absent or scarce in Dry Basic Oak–Hickory Forest. Cercis canadensis, Fraxinus americana, Acer leucoderme, and Viburnum spp. are generally abundant in Dry Basic Oak–Hickory Forest and scarce in Dry Oak–Hickory Forest, and stronger basic indicators such as Frangula caroliniana, Symphoricarpos orbiculatus, or Rhus aromatica are often present. As in Dry-Mesic Basic Oak–Hickory Forest, species otherwise typical of floodplains or of more mesic communities may be present, though less commonly.

The Piedmont Subtype is distinguished from the Coastal Plain Subtype by floristic differences. The Coastal Plain Subtype generally has a number of species that are absent in the Piedmont, though they may not be the dominant species in the community. Species shared with drier communities, such as Quercus margarettiae, Quercus incana, Cnidoscolus stimulosus, or Gaylussacia dumosa are often present in the Coastal Plain Subtype, as are species of wetter communities, such as Quercus nigra, Gaylussacia frondosa, Morella cerifera, and Arundinaria tecta.

Comments: As currently defined in the NVC, this association is very broad and not precisely defined, extending to Mississippi and Kentucky. It apparently excludes the Atlantic Coastal Plain. It apparently does not occur in Virginia, where drier sites are occupied by an oak/heath forest of more northerly affinities. This concept is almost certainly inappropriately broad.

Pinus echinata - Quercus alba / Vaccinium pallidum / Hexastylis arifolia - Chimaphila maculata Forest (CEGL008427) and Pinus taeda - Quercus (alba, falcata, stellata) Successional Coastal Plain Forest (CEGL004766) are widespread associations that appear to overlap this. While pines of several species may be present in natural examples in North Carolina, codominant or dominant pines suggests a successional version of this community type. Pinus taeda - Quercus falcata / Vaccinium pallidum / Hexastylis arifolia Forest (CEGL006033) has been defined in Virginia and not attributed to North Carolina. It is unclear how it relates to this.

A Slate Slope Variant of Dry Oak–Hickory Forest may be recognized for steep slopes on slate or other rocks that break into small fragments. The accumulation of rock fragments makes these slopes better drained and somewhat unstable, and it has been suggested the vegetation is distinctive. They tend to have more Pinus virginiana or Pinus echinata in them, perhaps reflecting more frequent natural disturbance. They may have some unusual species, such as Rhus aromatica, along with more typical acid-tolerant species. These do not appear to be distinct enough to recognize as a subtype.

Hillside Seepage Bog (G2) is described in Schafale (2012).
Synonyms: Acer rubrum var. trilobum / Morella caroliniensis - Gaylussacia frondosa / Andropogon glomeratus - (Sarracenia flava) Woodland (CEGL004781). Headwater Boggy Seep (Seymour 2011).
Ecological Systems: Piedmont Seepage Wetland (CES202.298).

Concept: Covers gently sloping wetlands of the Piedmont that have a distinctive acid-loving flora that generally includes Sarracenia flava or Sarracenia purpurea, along with other herbaceous species of Coastal Plain affinities.

Distinguishing Features: Hillside Seepage Bogs share many plants with Piedmont Boggy Streamheads, including Sphagnum, Smilax laurifolia, Osmundastrum (= Osmunda) cinnamomeum, or Osmunda regalis. They are distinguished from Piedmont Boggy Streamheads as well as from Low Elevation Seep by occurring in more isolated upland locations, having more seepage but less influence by flowing water, and by having a more boggy, acid-tolerant, herbaceous flora. Sarracenia flava or Sarracenia purpurea are good indicators of this type, but are not always present. When examples are burned, a variety of other distinctive herbaceous species are present, including Symphyotrichum dumosum (=Aster dumosus), Rhexia mariana, Danthonia sericea, Eupatorium leucolepis, and Drosera brevifolia. Piedmont Boggy Streamheads lack most of these species, though they share many woody wetland species, including many of Coastal Plain affinities. They also contain a few more widespread floodplain species such as Lindera benzoin and Xanthorhiza simplicissima, as well as upland species such as Quercus alba and Liriodendron tulipifera.

Low Elevation Seep (Piedmont/Mountain Springhead Subtype) shares many woody species of Coastal Plain affinities with this type, such as Viburnum nudum and Smilax laurifolia, but lacks the distinctive herbaceous species. It is known only from the upper Piedmont and Mountains, while Hillside Seepage Bogs are known only from the middle and lower Piedmont. When Hillside Seepage Bogs have been degraded by woody encroachment related to lack of fire and to hydrologic alteration, they may come to resemble the Piedmont/Mountain Springhead Subtype or Piedmont Boggy Streamhead. However, sites that are known to have once harbored the more distinctive herbaceous species should be regarded as degraded Hillside Seepage Bogs rather than as one of the other kinds of communities.

Other subtypes of Low Elevation Seep share some wetland species with Hillside Seepage Bogs, but are less similar. Species such as Arisaema triphyllum ssp. triphyllum, Glyceria striata, Boehmeria cylindrica, and Saururus cernuus are Low Elevation Seep species not characteristic of this type. Low Mountain Seepage Bogs share a similar topographic and hydrologic setting with Hillside Seepage Bogs, along with sharing some species, but their location in the western Mountains leads to a substantially different flora.

Comments: Hillside Seepage Bogs occur in two clusters, one in Iredell County and the other in the Uwharrie Mountains area (Montgomery and Randolph County). These are recognized as variants, and may warrant eventual recognition as subtypes.

Seymour (2011), in her study of Piedmont seep vegetation, recognized a Headwater Boggy Seep type that corresponded to Hillside Seepage Bogs. It was more narrowly defined, encompassing only two of the sites that have been recognized as Hillside Seepage Bogs grouped in it. This appears to be because these bogs had been burned, promoting a more diverse herbaceous flora that stood out, while the loss of distinctive flora in the degraded examples made them indistinguishable in analysis from Low Elevation Seeps. Nevertheless, for Natural Heritage

purposes, sites that are known to have once had pitcher plants or other distinctive bog plants should be regarded as degraded Hillside Seepage Bogs. Seymour (2011) found this to be the most acidic and infertile of her five groups of Piedmont seep communities, but with soils high in clay.

These communities have suffered tremendous degradation and loss over recent decades. A number of sites that were known as bogs with pitcher plants and rare plant species have become densely forested and have lost their distinctive herbaceous flora. In many bogs of the Iredell County variant, this appears to have accompanied entrenchment or headward erosion of adjacent streams, which has altered hydrology. But in the Uwharrie variant, increase of woody vegetation appears to have occurred without hydrologic alteration. The few bogs that remain diverse communities with abundant herbaceous vegetation in the Uwharries are those that have had prescribed burning. It appears that fire is needed to maintain Hillside Seepage Bogs, at least in the Uwharrie variant.

Low Elevation Seep (Typic Subtype) (G3?) is described in Schafale (2012).
Synonyms: Acer rubrum var. trilobum / Viburnum nudum var. nudum / Osmunda cinnamomea - Saururus cernuus - Impatiens capensis Forest (CEGL004426). Rich Foot-slope Seeps (Seymour 2011).
Ecological Systems: Piedmont Seepage Wetland (CES202.298).

Concept: Type covers seepage-fed wetlands that lack the distinctive species composition and other characteristics of Hillside Seepage Bog, High Elevation Seep, Rich Montane Seep, or Sandhill Seep. They may occur in any region of the state. Sites include small hollows on slopes, slope breaks, toe slopes, or edges of floodplains. They can be quite small, but have wetland vegetation which contrasts sharply with adjacent communities. Subtype covers examples of the Piedmont and Coastal Plain which occur on lower slopes or edges of bottomlands but not on well-developed floodplains. These are the most typical examples, lacking the distinctive physical and floristic features of the other subtypes. They are fairly common, though they are small and many examples are overlooked.

Distinguishing Features: Low Elevation Seeps are distinguished by abundant wetland vegetation, without the characteristic composition and setting of other seepage wetlands. Sphagnum is not generally abundant but may be present in limited amounts. Many species may be shared with Southern Appalachian Bogs and other mountain bog communities, including Viburnum nudum, Viburnum cassinoides, Impatiens capensis, Osmundastrum (Osmunda) cinnamomeum, Osmunda regalis, Woodwardia areolata, and Carex spp. However, other species indicative of less nutrient-poor conditions, such as Saururus cernuus, Lycopus virginicus, and Lindera benzoin, are also present. Rich Montane Seeps share some species but have a number of species not found in this type, such as Laportea canadensis, Diphylleia cymosa, Rudbeckia laciniata, Micranthes micranthidifolia (= Saxifraga micranthidifolia), Lilium superbum, and Lilium grayi.

The Typic Subtype may be distinguished from the Floodplain Subtype by occurring in uplands or at the heads of small streams, rather than on the edge of larger floodplains. It consequently lacks the admixture of floodplain and alluvial species found in the Floodplain Subtype, such as Acer

negundo, Fraxinus pennsylvanica, and Celtis laevigata, as well as species of wetter areas such as Peltandra virginica, Sagittaria spp., and Cephalanthus occidentalis.

Comments: This subtype corresponds to the group Seymour (2011) called Rich Foot-slope Seeps, but also includes examples in the Coastal Plain which may be a bit different. Soil analysis and flora indicate that it is more fertile than any other except the Floodplain Subtype, but it too is an acidic wetland that has few or no species characteristic of rich sites.

The NVC association linked to this subtype does not describe the range of vegetation of this type well. In addition, it can be difficult to characterize the vegetation structure of these communities. Examples usually have a tree canopy above them, but often are small enough that most canopy cover comes from upland trees rooted outside of the community. Hence wetland canopy trees are absent. Some other communities with similar vegetation structure are treated as herbaceous vegetation associations rather than forests.

Acer rubrum - Nyssa sylvatica - Magnolia virginiana / Viburnum nudum var. nudum / Osmunda cinnamomea - Woodwardia areolata Forest (CEGL006238) is a seepage swamp of states to the north, primarily in the Coastal Plain. It may be related.

Piedmont/Coastal Plain Heath Bluff (G2G3) is described in Schafale (2012).
Synonyms: Fagus grandifolia - Quercus alba / Kalmia latifolia - (Symplocos tinctoria, Rhododendron catawbiense) / Galax urceolata Forest (CEGL004539).
Ecological Systems: Southern Piedmont Mesic Forest (CES202.342).

Concept: Type covers communities of cool microsites in the Piedmont and Coastal Plain, generally north-facing bluffs, with dense shrub layers dominated by Kalmia latifolia, Rhododendron catawbiense, or occasionally Symplocos tinctoria, under a variable, usually open, canopy.

Distinguishing Features: Piedmont/Coastal Plain Heath Bluff is distinguished from Mesic Mixed Hardwood Forest by having a dense shrub layer dominated by Kalmia latifolia, Rhododendron sp., or Symplocos tinctoria. The species diversity is generally very low. These communities may grade conceptually into Acidic Cove Forests in the upper Piedmont, with Rhododendron maximum becoming a more prominent component and more montane flora being present. Substantial presence of Tsuga canadensis, Betula lenta, Halesia tetraptera, or Liriodendron tulipifera, predominating over Quercus montana, Quercus alba, or Fagus grandifolia, indicates Acidic Cove Forest. This type grades into the Heath Subtype of Piedmont Monadnock Forest on higher, more exposed rocky slopes, at least in the Uwharrie Mountains.

Comments: At least three variants can be recognized. A Catawba Rhododendron Variant, dominated by Rhododendron catawbiense, is confined to Orange and Durham counties. The Mountain Laurel Variant, dominated by Kalmia latifolia is the most widespread. The Horse Sugar Variant has Symplocos tinctorial dominant or codominant, with or without abundant Kalmia latifolia, and encompasses some of the Coastal Plain examples.

Fagus grandifolia - (Liquidambar styraciflua) / Oxydendrum arboreum / Kalmia latifolia Forest

(CEGL004636) is a nonstandard entity in the NVC, based on Rice and Peet's (1997) Roanoke River study. It is not clear that Roanoke River examples or most Coastal Plain examples are distinct from those in the Piedmont. However, some Coastal Plain examples contain a larger component of characteristic Coastal Plain species, usually including some wetland that apparently are associated with seepage from the steep bluffs.

Pinus echinata - Pinus virginiana / Rhododendron minus - Kalmia latifolia Woodland (CEGL003563) was named as a slate slope community, based on a single site for which there is no community documentation. There is not enough evidence to support recognition of slate slopes as a distinctive type or subtype. This association, or the site on which it was based, may be best classified as a Heath Bluff.

This community type barely ranges into Virginia. In much of the Virginia Piedmont, Kalmia latifolia is widespread in the oak-heath forests, and is not confined to cool microsites. The Heath Bluff communities therefore grade into more widespread oak-heath forests, recognized in the NVC as Quercus prinus - (Quercus coccinea, Quercus rubra) / Kalmia latifolia / Vaccinium pallidum Forest (CEGL006299) and Quercus alba - Quercus (coccinea, velutina, prinus) / Gaylussacia baccata Forest (CEGL008521). A similar but less drastic blurring occurs in the Uwharrie Mountains, where Kalmia is more widespread in the landscape and occurs in other community types, but distinct occurrences of Piedmont/Coastal Plain Heath Bluff are still recognizable there. In the rest of the North Carolina Piedmont and Coastal Plain, Kalmia latifolia is scarce and is largely confined to this community type.

Piedmont Headwater Stream Forest (Typic Subtype) (G3G4) is described in Schafale (2012).
Synonyms: Liriodendron tulipifera - Quercus alba - (Liquidambar styraciflua) / Ilex opaca / Polystichum acrostichoides Piedmont Small Stream Forest (CEGL004900). Piedmont/Low Mountain Alluvial Forest (3rd Approximation).
Ecological Systems: Southern Piedmont Small Floodplain and Riparian Forest (CES202.323).

Concept: Type covers forests of floodplains of the smallest Piedmont streams, generally intermittent to 1st or 2nd order, where flooding and alluvial processes have some, but limited, influence on vegetation and most characteristic alluvial species are absent or scarce. They have vegetation that consists largely of species of broad ecological tolerance and of upland species, but occur on distinct floodplains, have vegetation in combinations not usually found in upland community types, and have a few floodplain species. The Typic Subtype covers most examples of typical small streams, excluding only those with the specialized characteristics of the Hardpan Subtype.

Distinguishing Features: Piedmont Headwater Stream Forests are distinguished from other floodplain communities by the absence of alluvial species such as Platanus occidentalis, Betula nigra, and Celtis laevigata, though other riparian species such as Xanthorhiza simplicissima or wetland species such as Osmundastrum(Osmunda) cinnamomeum, Osmunda regalis, or Viburnum nudum may be present. Widely tolerant species such as Liriodendron tulipifera and Liquidambar styraciflua, and upland species such as Quercus alba, Quercus rubra, and Fagus grandifolia are generally present in both this type and in Piedmont Alluvial Forest. However, upland species are more abundant and diverse in this type. Piedmont Headwater Stream Forests

are distinguished from Mesic Mixed Hardwood Forest, with which they may share many species, by the presence of riparian and/or wetland species as well as by evidence of flooding.

The Typic Subtype is distinguished from the Hardpan Subtype by not occurring in broad, gently sloped bottoms with dense clay hardpan substrates. Generally, the soil in the Typic Subtype is coarse-textured. Quercus phellos and Carya carolinae-septentrionalis are both largely absent from the Typic Subtype.

Comments: Fagus grandifolia - Quercus spp. / Kalmia latifolia - Hamamelis virginiana / Galax urceolata Forest [Provisional] (CEGL004549) was initially described as a mesic forest of the Uwharrie area, but further examination of the plot attributed to it shows it to be a floodplain forest closely related enough to this type to be questionably distinct.

Piedmont Monadnock Forest (Typic Subtype) (G3G4) is described in Schafale (2012).
Synonyms: Quercus prinus - Quercus alba / Oxydendrum arboreum / Vitis rotundifolia Forest (CEGL006281).
Ecological Systems: Southern Piedmont Dry Oak-(Pine) Forest (CES202.339).

Concept: Type covers forests of rocky, acidic, central and eastern Piedmont sites dominated by Quercus montana, occasionally codominated by Quercus coccinea, but lacking characteristic montane species typical of Chestnut Oak Forests. These typically occur on isolated erosional remnant hills (monadnocks or inselbergs), but occasionally occur on bluffs.

Subtype covers most examples, those not having the distinctive characteristics of the other subtypes.

Distinguishing Features: Piedmont Monadnock Forests may be distinguished from Chestnut Oak Forests by a more limited flora that lacks many characteristic montane species, such as Castanea dentata, Rhododendron calendulaceum, Pyrularia pubera, Gaylussacia ursina, Magnolia fraseri, Carex pensylvanica, and Maianthemum racemosum. Piedmont species such as Quercus falcata and Quercus stellata are often present. It is distinguished from all other community types by the dominance of Quercus montana. Some Dry Oak–Hickory Forests that are transitional to this type may have abundant Quercus montana.

The Typic Subtype is distinguished by the absence of a significant admixture of pines, more xerophytic oaks, or Kalmia latifolia.

Comments: This community was tentatively treated as a subtype of Chestnut Oak Forest in earlier versions of the 4th Approximation guide. The recognition of several subtypes within it suggests it would be better treated as a distinct type. While floristically depauperate, it appears to be as distinct from montane Chestnut Oak Forest as Montane Oak–Hickory Forest is from Piedmont oak-hickory forests. Some examples have well-developed shrub layers of Vaccinium pallidum, or on Occoneechee Mountain, Gaylussacia baccata, but some have Vitis rotundifolia dominating the ground cover with little shrub or herb component. With a more natural fire regime, they might be more grassy.

Not all isolated hills support this community type. The abundance of rock may be an important factor in determining its occurrence, as may soil chemistry. Extreme soil acidity, accompanied by aluminum toxicity, has been suggested as important. Most examples are on hard rhyolite flows or quartzite. In the Uwharrie Mountains, the Piedmont Monadnock Forest type occurs on higher knobs of felsic volcanic rocks, grades to Dry or Dry-Mesic Oak–Hickory Forest downslope, but is abruptly replaced by Basic Oak–Hickory Forest on mafic volcanic rocks. In the largest monadnock expanses in the Uwharrie Mountains, there is a distinct landscape pattern of the Typic Subtype occurring on knobs and ridge tops, the Pine Subtype on east and west side slopes, the Xeric Subtype on south slopes, and the Heath Subtype on north slopes. On most smaller monadnocks elsewhere in the Piedmont, only the Typic Subtype is present. A few examples elsewhere occur on mafic or intermediate igneous rocks. These may represent a distinct variant.

Upland Depression Swamp Forest (G2G3) is described in Schafale (2012).
Synonyms: Quercus phellos / Carex (albolutescens, intumescens, joorii) / Climacium americanum Forest (CEGL007403).
Ecological Systems: Piedmont Upland Depression Swamp (CES202.336).

Concept: Type covers forested isolated wetlands in depressions on upland ridges and flats with impeded soil drainage, where water stands for part of the year but wetness is not great enough to prevent a closed tree canopy from developing. They occur on unusually flat areas with hardpan soils derived from mafic rocks or slates, or in small topographic basins on ridgetops of volcanic rock. The forests are usually dominated by Quercus phellos, sometimes codominant with or replaced by Quercus lyrata, Quercus bicolor, Quercus michauxii, or Liquidambar styraciflua. Successional examples may be dominated by Acer rubrum or Liquidambar styraciflua.

Distinguishing Features: The Upland Depression Swamp Forest type is distinguished from Upland Pool by having (or potentially having, if recently disturbed) a closed canopy across the basin, and therefore lacking shade-intolerant shrubs and herbs. Upland Pools may have trees on the edge but lack them in the center and have a much less diverse flora because of the long hydroperiod.

Upland Depression Swamp Forests are distinguished from floodplain forests of various kinds by their isolated upland location and lack of channel flow or overbank flooding, which is indicated by the lack of most characteristic bottomland trees, the usual predominance of Quercus phellos, and the usual presence of Sphagnum lescurii and Climacium americanum. Ambiguous and transitional examples are possible where small streams originate in upland flats. Piedmont Headwater Stream Forest (Hardpan Subtype) occurrences may be dominated by Quercus phellos, and have sometimes been called Upland Depression Swamp Forests in the past, but have a visible channel and have a more diverse flora that includes floodplain species.

Comments: Liquidambar styraciflua - Acer rubrum / Carex spp. - Sphagnum spp. Forest (CEGL007388) was a problematic association that was attributed to a single Upland Depression Swamp in North Carolina as well as depressional wetlands elsewhere. Further examination of the North Carolina example found it not to be a natural Upland Depression Swamp, and the association was removed from North Carolina. Liquidambar styraciflua is often present in

Upland Depression Swamp Forests, and sometimes comes to dominate or codominate after major disturbances such as logging. These are better viewed as degraded examples of this association than as a different community type.

Seymour (2011) identified four different groups of Upland Depression Swamp communities, divided by wetness and by rock substrate: wet felsic, dry felsic, wet mafic, and dry mafic. The strongest vegetational differences were between drier and wetter swamp communities. However, these differences consisted largely of the presence of a few upland species, such as Danthonia spicata and Quercus alba, that may be ecotonal, confined to drier microsites, or short-lived. Differences between felsic and mafic substrates were slightly less but may be more worthy of recognition for our purposes. Mafic depressions had some species that are associated with other mafic-substrate communities, such as Fraxinus sp., Ulmus americana, Ulmus alata, and Trachelospermum difforme. Felsic depressions had a few species that are recognizable as acid-tolerant, such as Sphagnum sp. and Vaccinium spp., but differences in other distinguishing species such as Liquidambar styraciflua and Acer rubrum are probably coincidental. Plot samples and soil analysis in comparable communities in Virginia found that even mafic depressions are strongly acidic. Seymour (2011) also found this, but found differences in soil texture, cation exchange capacity, calcium, magnesium, and other cations. These four types may be recognized as variants, but at present do not appear marked enough to warrant defining as subtypes.

Additional variation occurs in canopy dominance. Examples dominated by Quercus lyrata or by Quercus bicolor may be recognized as additional variants divided from the wet mafic variant, and the one example dominated by Quercus michauxii may be recognized as a variant divided from the dry mafic variant. It appears that all examples with different canopy dominants occur on mafic substrate. While Quercus phellos is usually present in them, it generally is distinctly subordinate.

Upland Pool (Roberdo Subtype) (G1?) is described in Schafale (2012). NOTE: Upland Pool (Typic Piedmont Subtype) added below for complete summary.
Synonyms: Leucothoe racemosa - Vaccinium fuscatum - Smilax walteri Shrubland (CEGL004533).
Ecological Systems: Piedmont Upland Depression Swamp (CES202.336).

Concept: Subtype covers the distinctive example with a more “pocosin-like” character, with a substantial component of evergreen Coastal Plain shrubs and greenbriers.

Distinguishing Features: The Roberdo Subtype is distinguished by the substantial presence of evergreen shrubs such as Cyrilla racemiflora, and of Smilax.

Upland Pool (Typic Piedmont Subtype) (G1) is described in Schafale (2012).
Synonyms: Cephalanthus occidentalis - (Leucothoe racemosa) / Carex joorii Shrubland (CEGL004075). Carex joorii Pools (Seymour 2011).
Ecological Systems: Piedmont Upland Depression Swamp (CES202.336).

Concept: Type covers depression wetlands not associated with rivers or streams, holding water long enough through the growing season to present development of a substantial tree canopy. Trees are limited to the edge of the basin. Subtype covers the most typical and widespread Piedmont examples, which lack the distinctive Coastal Plain flora of the Pleasant Grove and Roberdo subtypes.

Distinguishing Features: Upland Pools are distinguished from Upland Depression Swamp Forests by the lack of a well-developed tree canopy. Some trees may be present, scattered in the pool or forming an edge zone within the wetland. The pool may also be partly shaded by trees from adjacent forests, but should have sufficient light to allow shade-intolerant plants to survive.

The Typic Piedmont Subtype is distinguished from the Pleasant Grove and Roberdo subtypes by the absence of the characteristic Coastal Plain species that distinguish them - Nyssa biflora, Cyrilla racemiflora, and Smilax walteri. It is distinguished from the Mountain Subtype by the absence of the characteristic Blue Ridge components of the flora, as well as occurrence in the eastern or central Piedmont.

Comments: Seymour (2011) noted that, while Carex joorii usually strongly dominated the herb layer, the absence of other species was more characteristic than the presence of Carex joorii. She found this to be the most distinctive of the five Piedmont depression wetland types she identified; however the single plots for the Pleasant Grove and Roberdo subtypes were removed as outliers.

Appendix C

NCNHP Significant Natural Heritage Areas occurring on Uwharrie National Forest

Montgomery County Natural Heritage Inventory Site Report

Clarks Grove Longleaf Pine Forest

Site Significance: National
Size: 536 acres
Quadrangle: Troy
Ownership: U.S.F.S. - Uwharrie National Forest
Protection Status: No special designation

Significant Factors:

1. Clarks Grove Longleaf Pine Forest supports a high quality Piedmont Longleaf Pine Forest and numerous rare plant populations.

2. Several occurrences of a rare sunflower, Helianthus schweinitzii, which has a North Carolina and Federal Status of Endangered, occur within road and powerline right-of-ways and longleaf pine forests in the Clarks Grove area.

3. The upland habitat on this site supports numerous large populations of a rare shrub, Nestronia umbellula, which is on the North Carolina Watch List.

Landscape Relationships:

Clarks Grove Longleaf Pine Forest is a large block of U.S.F.S. - Uwharrie National Forest property that is southwest of Troy. Other large blocks of forest in this vicinity include Railroad Mixed Pine Forest, Lower Rocky Creek Longleaf Pine Forest, and Roberdo Bog and Longleaf Pine Forest. The Rocky Creek and its tributaries flow through all of these sites.

Description of Natural Communities and Rare Plant Populations:

The quality of the forests in the Clarks Grove area varies. The canopy of the Piedmont Longleaf Pine Forest is dominated with Pinus palustris (Long-leaf pine) and a mix of Pinus echinata (Short-leaf pine), Pinus taeda (Loblolly pine), Quercus falcata (Spanish oak), Quercus marilandica (Blackjack oak), and Carya tomentosa (Mockernut). The subcanopy supports saplings of hardwood trees such as Liriodendron tulipifera (Tuliptree), Acer rubrum (Red maple), Carya glabra (Pignut hickory), Quercus alba (White oak), Liquidambar styracifula (Sweet gum), and Quercus phellos (Willow oak). The shrub layer includes Gaylussacia frondosa var. frondosa (Dangleberry), Lyonia mariana (Stagger-bush), and Rhus copallina (Winged sumac). The herb layer is sparse in areas where shrubs dominate, but herb diversity increases near seeps and south facing slopes. The herb layer includes species such as Stylosanthes biflora (Pencil flower), Aster paternus, Pteridium aquilinum (Bracken fern), Chasmathium laxum, Solidago odora (A goldenrod), Euphorbia corollata (Flowering spurge), Eupatorium rotundifolia var. ovatum (A Thoroughwort), Erianthus contortus

(Beard grass), Elephantopus tomentosus (Elephant's-foot), Erygnium yuccifolium (Rattlesnake master), Polystichum acrostichoides (Christmas fern), Vernonia acaulis (An ironweed), Coreopsis major var. stellata (Greater coreopsis), Parthenium integrifolium var. integrifolium (Wild quinine), Rhexia mariana (A meadow-beauty), Panicum anceps, and Helianthus microcephalus (A sunflower). Three new populations of the federally endangered sunflower, Helianthus schweinitzii (Schweinitz's sunflower), were found during the botanical survey: one site occurs along a roadside, one within the Piedmont Longleaf Pine Forest, and one under a powerline right-of-way.

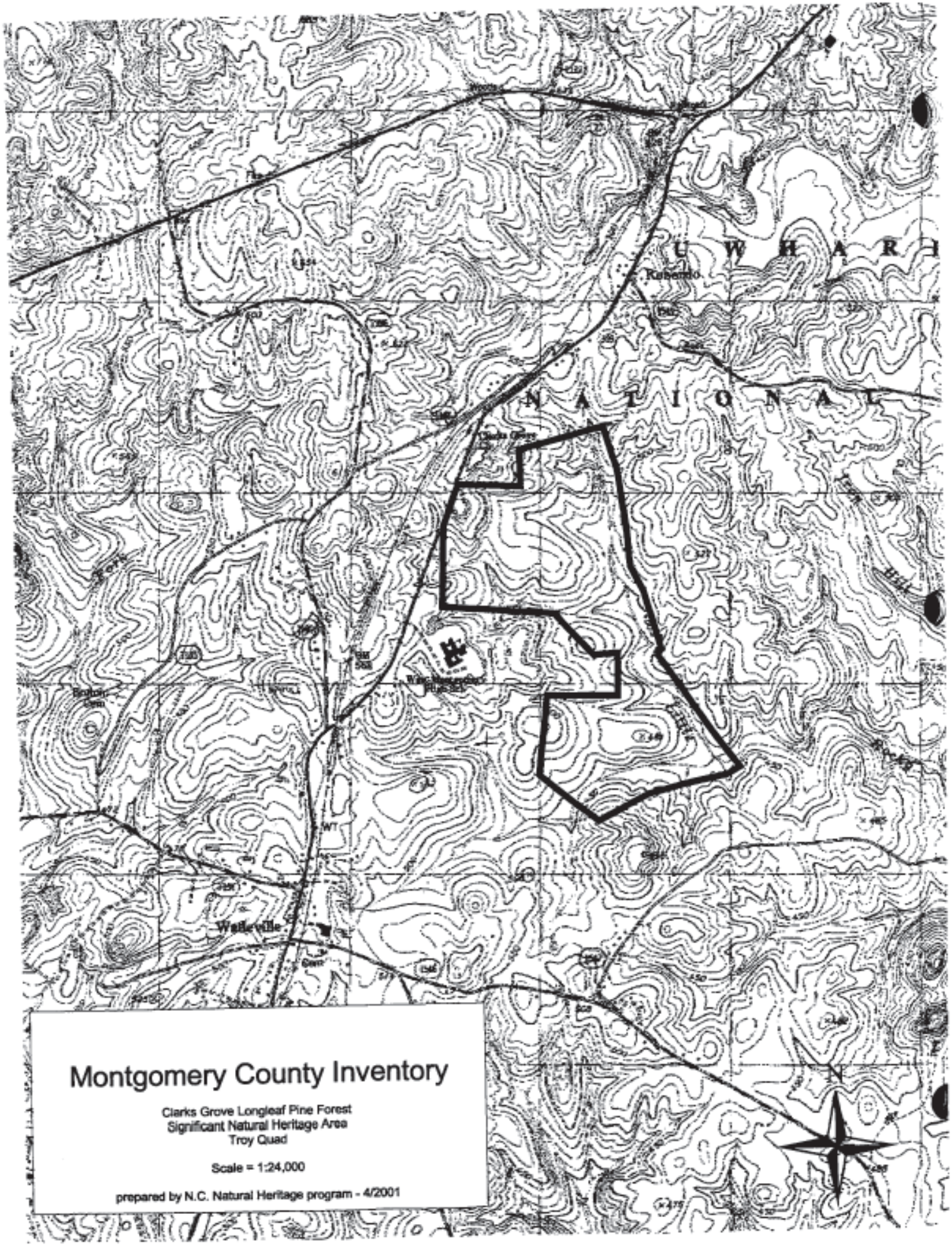
The area east of Little Rocky Creek consists of a dense canopy and subcanopy. Large Pinus taeda (Loblolly pine) individuals are common in the canopy and immature hardwoods form a dense stand in the understory. Liquidambar styracifula (Sweet gum) is the dominant understory trees. In another area, the canopy consists of a hardwood and pine mix. A few mature Pinus palustris (Long-leaf pine) individuals occur in the canopy and fire-suppressed saplings in the understory. The herb and shrub diversity is low due to the shade created by the thick understory. Gaylussacia frondosa var. frondosa (Dangleberry) is the dominant shrub. There are numerous windfall canopy gaps in this stand.

Description of Faunal Communities and Rare Animal Populations:

No animal survey was conducted on this site. Two forest interior animals were noted during the botanical survey: Dryocopus pileatus (Pileated woodpecker) and Terrapene carolina (Eastern box turtle).

Management/Protection Recommendations:

Clarks Grove Longleaf Pine Forest has a national rank because of the high integrity of the Piedmont Longleaf Pine Forest and occurrence of several Helianthus schweinitzii (Schweinitz's sunflower) populations. Restoration and protection measures are currently under consideration by the U.S.F.S. - Uwharrie National Forest, U.S. Fish and Wildlife, and the North Carolina Plant Conservation Program.



Montgomery County Inventory

Clarks Grove Longleaf Pine Forest
Significant Natural Heritage Area
Troy Quad

Scale = 1:24,000

prepared by N.C. Natural Heritage program - 4/2001

Montgomery County Natural Heritage Inventory Site Report

Lawrenceville Ephemeral Pools

Site Significance: County
Size: 116 acres
Quadrangle: Morrow Mountain
Ownership: U.S.F.S. - Uwharrie National Forest
Protection Status: no special designation

Significant Factors:

1. Lawrenceville Ephemeral Pools supports two pools in upland habitat.

2. One of the ephemeral pools on this site supports Hemidactylium scutatum (Four-toed salamander), which has a North Carolina status of Special Concern.

Landscape Relationships:

The Lawrenceville Ephemeral Pools tract occurs is the southern most portion of a large block of U.S.F.S. - Uwharrie National Forest property. The site is one quarter to one half mile north of US Highway 24/27, no secondary roads occur near the site. The Dutchmans Creek Trail which is a hiking trail runs through the site. To the south is the Historic Lawrenceville/Cochran Estate tract that is protected through the LandTrust for Central North Carolina.

Description of Natural Communities and Rare Plant Populations:

The Lawrenceville Ephemeral Pools site supports two ephemeral pools surrounded by Upland Depression Swamp Forests. A canopy covers a large portion of the ephemeral pools and the dominant canopy trees are Quercus phellos (Willow oak) and Acer rubrum (Red maple). Other canopy trees include Liquidambar styracifula (Sweet gum) and Liriodendron tulipifera (Tuliptree). The surrounding upland habitat includes a mix of pine and hardwoods. The dominant pine species is Pinus taeda (Loblolly pine). The hardwood trees include Quercus alba (White oak), Quercus stellata (Post oak), Quercus montana (Chestnut oak), Quercus nigra (Water oak), Quercus falcata (Spanish oak), Quercus marilandica (Blackjack oak), and Carya spp.(Hickories). The understory supports Cornus florida (Flowering dogwood), Ilex opaca (American holly), Juniperus virginiana (Virginia red-cedar), and Oxydendrum arboreum (Sourwood). The shrub layer is dominated with Vaccinium spp. (Blueberry) and the herb layer is sparse. The site varies in quality of natural communities. The upland habitat probably once supported a Dry-Mesic Oak-Hickory Forest. However, the occurrence of scattered loblolly pines diminishes the integrity of the natural community.

Description of Faunal Communities and Rare Animal Populations:

This site supports three ephemeral pools in unfragmented, upland habitat. The northern most ephemeral pools are about 1/4 to 1/3 acre in size. These pools support Ambystoma maculatum (Spotted salamander) and Ambystoma opacum (Marbled salamander), but lacks the habitat necessary for the rare species, Hemidactylium scutatum (Four-toed salamander).

The third ephemeral pool occurs to the southeast of the other pools and on the border of U.S.F.S. - Uwharrie National Forest and private property. This pool is 1/4 to 1/3 acre in size. In addition to the common spotted and marbled salamanders, this pool supports Hemidactylium scutatum (Four-toed salamander). The extensive moss mats provide habitat for the four-toed salamander's eggs. The four-toed salamander has a North Carolina Status of Special Concern. The ephemeral pool is surrounded by a mature hardwood/pine forest on U.S.F.S. - Uwharrie National Forest property. U.S. Highway 24/27 occurs about 1/4 to 1/2 mile to the south. However, no secondary roads occur near the ephemeral pool.

Management/Protection Recommendations:

Upland buffers around the ephemeral pools provide non-breeding habitat for salamanders. Protecting the private property to the south would enhance the buffer. On U.S.F.S. - Uwharrie National Forest property, timber practices that reduce impact to the buffer would help protect the rare salamander habitat.

Montgomery County Inventory

Lawrenceville Ephemeral Pools
Significant Natural Heritage Area
Morrow Mountain Quad

Scale = 1:24,000

prepared by N.C. Natural Heritage program - 4/2001

Montgomery County Natural Heritage Inventory Site Report

Lower Rocky Creek Longleaf Pine Forest

Site Significance: Regional
Size: 246 acres
Quadrangle: Troy
Ownership: U.S.F.S. - Uwharrie National Forest
Protection Status: none

Significant Factors:

1. A high quality Piedmont Longleaf Pine Forest occurs on this site and supports numerous rare plant species.

2. There are occurrence of three rare plant species, as follows:
   Cirsium carolinianum (Carolina thistle), North Carolina Status of Candidate
   Helianthus laevigatus (Smooth sunflower), North Carolina Status of Significantly Rare
   Smilax biltmoreana (Biltmore carrion-flower), North Carolina Status of Candidate

3. Large example of a Uwharrie Boggy Streamhead with potential habitat for breeding amphibians.

Landscape Relationships:

The Lower Rocky Creek Longleaf Pine Forest is a large block of U.S.F.S. - Uwharrie National Forest property that is southwest of Troy. Other large blocks of forest in this vicinity include Railroad Mixed Pine Forest, Roberdo Bog and Longleaf Pine Forest, and Clarks Grove Longleaf Pine Forest. Rocky Creek and its tributaries flow through all of these sites.

Description of Natural Communities and Rare Plant Populations:

The Lower Rocky Creek Longleaf Pine Forest site supports three important natural areas. A Piedmont Longleaf Pine Forest occurs on the west side and supports numerous rare plants. The dominant canopy tree is Pinus palustris (Long-leaf pine). Recent controlled burns by the U.S.F.S. - Uwharrie National Forest opened the understory and a high diversity herb layer is replacing the woody, hardwood saplings. The herb layer includes three rare plants: Cirsium carolinianum (Carolina thistle), Smilax biltmoreana (Biltmore carrion-flower), and Helianthus laevigatus (Smooth sunflower). The dominant herb is Erygnium yuccifolium (Rattlesnake master). Due to fire suppression, this species is uncommon. Large numbers of Rattlesnake master were in full bloom during the botanical survey. The shrub layer supports Gaylussacia frondosa var. frondosa

(Dangleberry) and Vaccinium tenellum (A blueberry). This exemplary Piedmont Longleaf Pine Forest will continue to improve in quality through controlled burns conducted by the U.S.F.S.

A hardwood buffer occurs along Rocky Creek. On the west side of Rocky Creek is a Piedmont Longleaf Pine Forest on the uplands and the buffer supports a mature hardwood forest. The canopy includes xeric species such as Quercus montana (Chestnut oak), Quercus alba (White oak), Quercus stellata (Post oak), and Quercus velutina (Black oak). The steep slopes support a Piedmont Health Bluff that is dominated with Kalmia latifolia (Mountain laurel) in the shrub layer and Galax aphylla in the herb layer. Orontium aquaticum (Golden club) occurs in the stream channel of Rocky Creek.

A small ephemeral pool occurs to the east of the Forest Service Road and railroad track. This area is less than a quarter of an acre and lacks an herb layer and sphagnum moss. Liquidambar styracifula (Sweet gum) and Acer rubrum (Red maple) are rooted along the edges and a couple individuals in the center of the pool. Ilex verticillata (Common winterberry) is found in the shrub layer. The surrounding forest is of low quality and supports mature pines and immature hardwoods. Mature Pinus taeda (Loblolly pine) is common in the canopy and a few scattered Pinus palustris (Long-leaf pine) are mixed with the loblolly pine. The understory is dense with immature hardwoods.

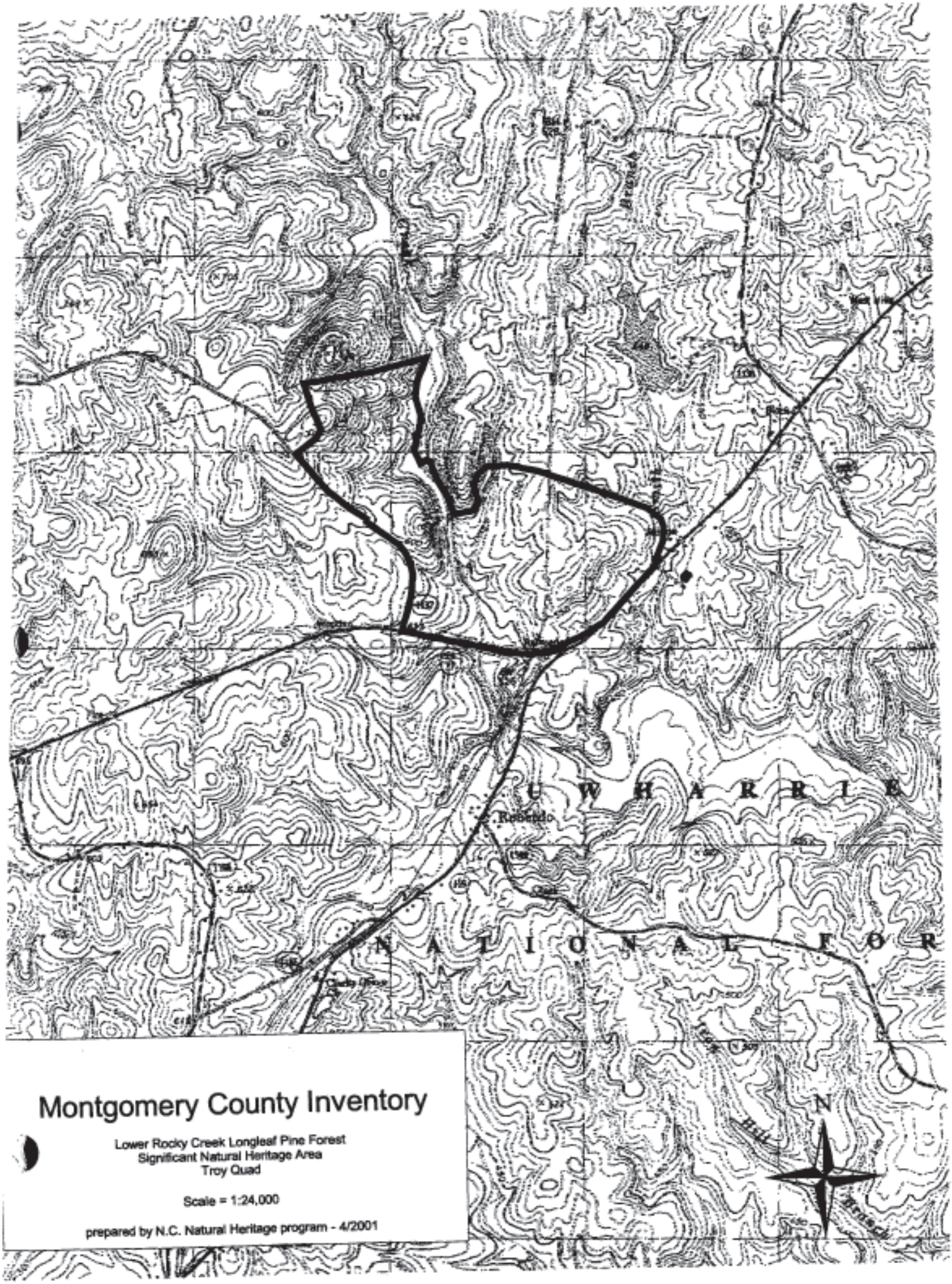
Uwharrie Boggy Streamheads are scattered throughout this site. This natural community supports herbs and shrubs that are characteristic of moist soil conditions. The herb layer is dominated by Osmunda cinnamomea (Cinnamon fern) and Osmunda regalis var. spectabilis (Royal fern). Athyrium asplenioides (Lady fern) is dominant along the dry edges. Viburnun nudum (Southern wild raisin) is the dominant shrub. Other important shrubs includes coastal plain species such as Myrica heterophylla (Bayberry), Lyonia ligustrina (Maleberry), Ilex verticillata (Common winterberry), and Magnolia virginiana. Sphagnum sp. is dominant in the herb layer and forms large mats.

Description of Faunal Communities and Rare Animal Populations:

Several forest interior and neotropical migratory birds were noted during the botanical survey. These species include Polioptila caerulea (Blue-gray gnatcatcher), Wilsonia citrina (Hooded warbler), Vireo olivaceus (Red-eyed vireo), and Coccyzus americanus (Yellow-billed cuckoo). The Uwharrie Boggy Streamhead and ephemeral pool provides potential breeding habitat for amphibians and reptiles.

Management/Protection Recommendations:

The Lower Rocky Creek Longleaf Pine Forest is managed by the U.S.F.S. - Uwharrie National Forest. The Forest Service conducts regular burns in the Piedmont Longleaf Pine Forest, which enhances the habitat for rare plant species.



Montgomery County Inventory

Lower Rocky Creek Longleaf Pine Forest
Significant Natural Heritage Area
Troy Quad

Scale = 1:24,000

prepared by N.C. Natural Heritage program - 4/2001

Montgomery County Natural Heritage Inventory Site Report

Railroad Mixed Pine Forest

Site Significance: National
Size: 329 acres
Quadrangle: Troy
Ownership: Private and U.S.F.S. - Uwharrie National Forest
Protection Status: none

Significant Factors:

1. A high quality Piedmont Longleaf Pine Forest that supports numerous rare plant species occurs in the Railroad Mixed Pine Forest.

2. There is an occurrence of a rare sunflower, Helianthus schweinitzii, which has a North Carolina and Federal Status of Endangered.

3. There is an occurrence of a rare plant species, Helianthus laevigatus (Smooth sunflower), which has a North Carolina Status of Significantly Rare.

4. The upland habitat for the Piedmont Longleaf Pine Forest supports numerous large populations of a rare shrub, Nestronia umbellula, which is on the North Carolina Watch List.

5. The Piedmont Longleaf Pine Forest that occurs on the Uwharrie National Forest property supports a large population of a rare shrub called Amorpha schwerinii (Piedmont indigo-bush). This shrub has a restricted distribution and a North Carolina Status of Significantly Rare.

6. The site also supports a Uwharrie Boggy Streamhead with habitat for breeding amphibians.

7. Railroad Mixed Pine Forest provides unfragmented habitat for forest interior bird species.

Landscape Relationships:

Railroad Mixed Pine Forest is a large block of U.S.F.S. - Uwharrie National Forest and private property that is southwest of Troy. Other large blocks of forest in this vicinity include Lower Rocky Creek Longleaf Pine Forest, Roberdo Bog and Longleaf Pine Forest, and Clarks Grove Longleaf Pine Forest. Rocky Creek and its tributaries flow through all of these sites.

Description of Natural Communities and Rare Plant Populations:

The vegetation varies across this site due to past silviculture practices. The area east of the railroad tracks and north of an abandoned pond is dominated with Pinus taeda (Loblolly pine) and Pinus echinata (Short-leaf pine). The subcanopy is sparse and supports Cornus florida (Flowering dogwood) and Oxydendrum arboreum (Sourwood). Acer rubrum (Red maple) is also dominant in the subcanopy and canopy. The herb layer is sparse and the dominant herb is Vitis rotundifolia (Muscadine). This area is of low biological integrity.

The area to the west of the railroad track and north of the powerline supports a mix of Pinus taeda (Loblolly pine), Pinus palustris (Long-leaf pine), and hardwoods. Pinus taeda (Loblolly pine) is the dominant canopy tree throughout most of the area. The subcanopy and shrub layer is quite dense in some areas and includes Gaylussacia frondosa var. frondosa (Dangleberry), Gaylussacia dumosa (Dwarf huckleberry), Diospyros virginiana (Persimmon), Sassafras albidum (Sassafras), Oxydendrum arboreum (Sourwood), Castanea pumila var. pumila (Chinquapin), Symplocos tinctoria (Horse sugar), Asimina parviflora (Dwarf pawpaw), and other trees and shrubs. Two rare shrub species occur in this area, Nestronia umbellula and Amorpha schwerinii (Piedmont indigo-bush). The herb layer in the uplands includes species such as Amianthium muscaetoxicum (Fly-poison), Pitysopsis graminifolia, Helianthus microcephalus (A sunflower), Euphorbia corollata (Flowering spurge), and Crotalaria purshii. A steep slope near a stream supports Kalmia latifolia (Mountain laurel) as the dominant shrub.

The areas with intermittent streams and draws support Uwharrie Boggy Streamheads, which have a higher diversity of herbs than the upland habitat. Mesic subcanopy trees and shrubs such Magnolia virginica, Xanthorhiza simplicissima (Yellowroot), Cephalanthus occidentalis (Buttonbush), Cornus amomum (Silky dogwood), Myrica heterophylla (Bayberry), Viburnun nudum (Southern wild raisin), and Ilex verticillata (Common winterberry) occur along the streams. The herb layer is diverse in the Uwharrie Boggy Streamhead and includes species such as Carex crinita (Fringed sedge), Carex intumescens (sedge), Amsonia tabernaemontana (Blue star), Osmunda regalis var. spectabilis (Royal fern), Osmunda cinnamomea (Cinnamon fern), Selaginella apoda (Meadow spikemoss), Lycopus virginicus (A water-horehound), and Medeola virginiana (Indian cucumber-root). Sphagnum sp. is common in some of the seepage areas. Orontium aquaticum (Golden club) occurs in the stream channel.

The northern portion of the Railroad Mixed Pine Forest site is dominated by Pinus palustris (Long-leaf pine). This area supports a federally endangered sunflower, Helianthus schweinitzii. Currently the sunflower grows mainly on Uwharrie National Forest property that parallels the railroad tracks. Helianthus laevigatus (Smooth sunflower), another rare sunflower, occurs to the west and along a powerline on U.S.F.S. - Uwharrie National Forest property. Both of these sunflower species require an open canopy for their survival. For this reason, they have survived along the railroad track and powerline. However, maintenance of these utilities is not always conducive to the survival of the rare plants (refer to Management and Protection Recommendations).

The area under the powerline where Helianthus laevigatus (Smooth sunflower) occurs supports numerous plants that require an open canopy. These species include Liatris squarrosa (A blazing star), Liatris graminifolia (A blazing star), Silphium compositum var. compositum, Marshallia obovatum, Andropogon gerardii (Big blue stem), Erygnium yuccifolium (Rattlesnake master), and Helianthus angustifolius (A sunflower).

Description of Faunal Communities and Rare Animal Populations:

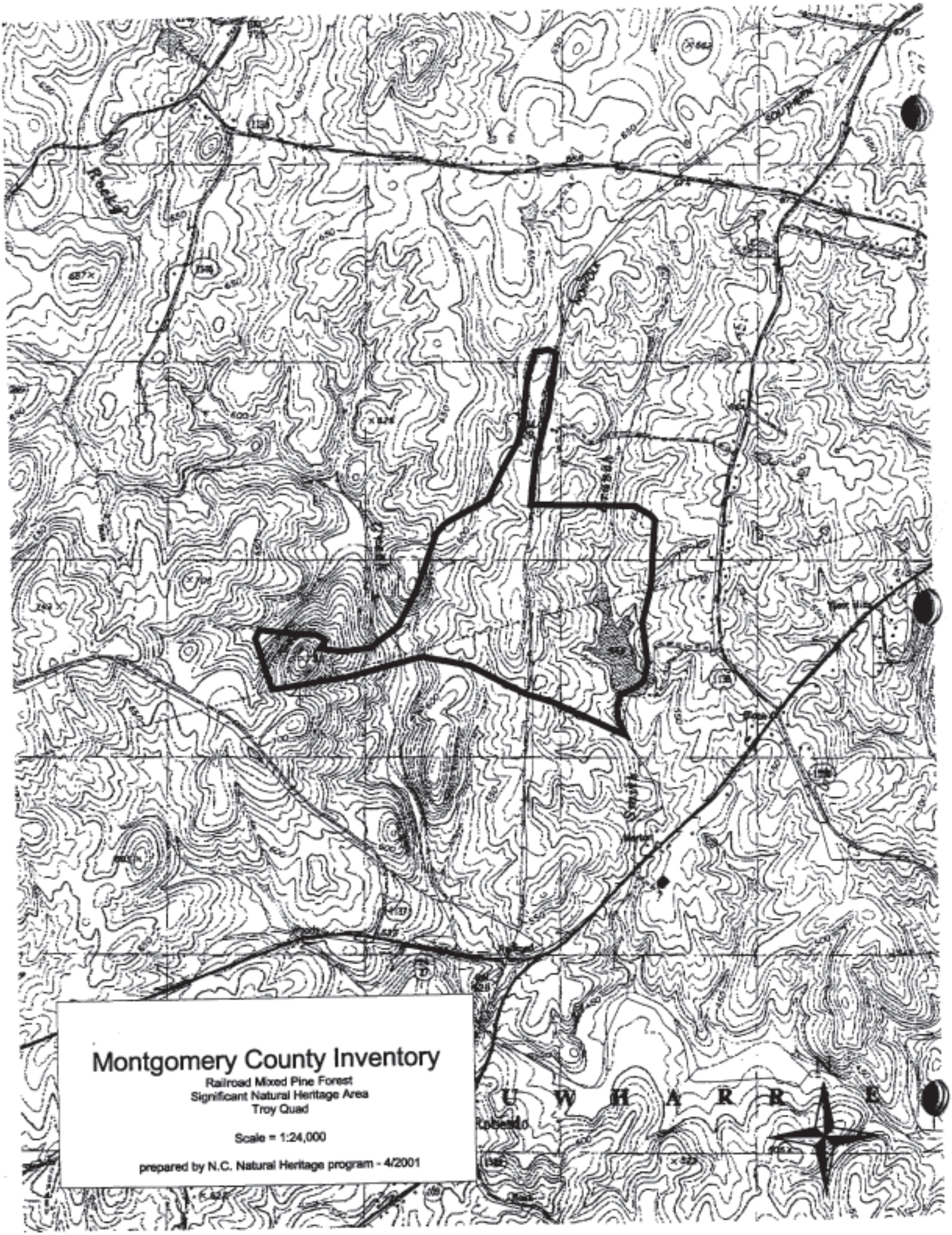
The private property portion of the Railroad Mixed Pine Forest supports numerous species of Lespedeza which attracts Colinus virginianus (Bobwhite quail) to the property. Meleagris gallopavo (Wild turkey) are also present on the site. Several forest interior and neotropical migratory bird species were noted during the botanical survey, these species include Polioptila caerulea (Blue-gray gnatcatcher), Wilsonia citrina (Hooded warbler), Vireo olivaceus (Red-eyed vireo), and Coccyzus americanus (Yellow-billed cuckoo). The Uwharrie Boggy Streamhead provides breeding habitat for amphibians.

Management/Protection Recommendations:

The Railroad Mixed Pine Forest includes U.S.F.S. - Uwharrie National Forest property and private property. Both the Forest Service and private landowner conduct regular burns in the Piedmont Longleaf Pine Forest. With regular burning the Railroad Pine Forest will mature into a high quality natural community and improve habitat for rare plants. The surrounding landscape on U.S.F.S. - Uwharrie National Forest property is also in conversion from hardwoods to longleaf pine forests.

In the past, the Helianthus schweinitzii populations along the railroad tracks have been sprayed with herbicide and some populations are now extirpated. The land management practices conducted on the private and Uwharrie National Forest property is appropriate for sustaining Helianthus schweinitzii populations, however, railroad right-of-way maintenance threatens this federally endangered sunflower. The Railroad Mixed Pine Forest site provides an opportunity for establishing viable populations of Helianthus schweinitzii in natural habitat where it is not vulnerable to right-of-way maintenance.

The current landowner of the private property is conservation minded and uses a Forestry Stewardship plan for timber management. A conservation easement with a local land trust in conjunction with the Forestry Stewardship plan would help protect this portion of the site.


Montgomery County Inventory
Railroad Mixed Pine Forest
Significant Natural Heritage Area
Troy Quad
Scale = 1:24,000
prepared by N.C. Natural Heritage program - 4/2001
U W H A R R E

Montgomery County Natural Heritage Inventory Site Report

Roberdo Bog and Longleaf Pine Forest

Site Significance: National
Size: 997 acres
Quadrangle: Troy
Ownership: U.S.F.S. - Uwharrie National Forest
Protection Status: Portions of the site are Registered Natural Heritage Areas

Significant Factors:

1. Roberdo Bog and Longleaf Pine Forest supports two high quality natural communities that include a Piedmont Longleaf Pine Forest and an Upland Pool. The extensive Piedmont Longleaf Pine Forest is managed by the U.S.F.S. - Uwharrie National Forest with controlled burns.

2. There is an occurrence of Ambystoma talpoideum (Mole salamander), with a North Carolina Status of Special Concern.

3. Several populations of Helianthus schweinitzii (Schweinitz's sunflower), a Federally Endangered sunflower, occur on this site. One population is highly significant because it is one of fewer than ten known populations that occur in natural communities. Most known populations occur along road, powerline, or railroad right-of-ways and are vulnerable to maintenance procedures such as herbicide spraying and mowing conducted during the growing season.

4. Roberdo Bog and Longleaf Pine Forest supports a rare plant species, Helianthus laevigatus (Smooth sunflower), which has a North Carolina Status of Significantly Rare.

5. Records show that two subpopulations of Gnaphalium helleri var. helleri (Heller's rabbit tobacco), with a North Carolina Status of Significantly Rare, occur along old logging road clearings on this site. However, these records were not confirmed during the botanical survey for this report.

Landscape Relationships:

Roberdo Bog and Longleaf Pine Forest is a large block of U.S.F.S. - Uwharrie National Forest property that is southwest of Troy. Other large blocks of forest in this vicinity include Railroad Mixed Pine Forest, Lower Rocky Creek Longleaf Pine Forest, and Clarks Grove Longleaf Pine Forest. Rocky Creek and its tributaries flow through all of these sites.

Description of Natural Communities and Rare Plant Populations:

Two significant natural communities occur on this site, Upland Pool and Piedmont Longleaf Pine Forest. Upland pools are depressions that occur in upland habitat or ridges. Upland Pools are rare and quite variable. The water level may range from three feet deep to completely dry, depending on rainfall. The Roberdo Bog Upland Pool is surrounded by a dense shrub zone of Leucothoe racemosa (Fetter-bush), Viburnun nudum (Southern wild raisin), Cyrilla racemiflora (Titi), and a thick mat of Smilax rotundifolia (Horsebrier) and Smilax laurifolia. Canopy trees that occur on the outer zone include Acer rubrum (Red maple), Quercus phellos (Willow oak), Nyssa sylvatica (Black gum), and Pinus taeda (Loblolly pine). Common wetland herbs grow in areas of low shrub density, Oxypolis rigidior, Carex crinita (Fringed sedge), Eleocharis tuberculosa, Scirpus atrovirens, Dulichium arundinaceum, and Osmunda cinnamomea (Cinnamon fern).

The Piedmont Longleaf Pine Forest is significant because few examples of high quality longleaf pine forest still occur in the piedmont. This site supports a Piedmont Longleaf Pine Forest due to management efforts by the U.S.F.S. - Uwharrie National Forest. The quality of the longleaf pine forest varies across the site. In some areas, 90%of the canopy is Pinus palustris (Long-leaf pine). In other areas, the canopy is dominated by hardwoods. The dominant canopy trees in the Piedmont Longleaf Pine Forest are Pinus palustris (Long-leaf pine), Pinus taeda (Loblolly pine), and Pinus echinata (Short-leaf pine). Canopy hardwood trees found on the site include Quercus falcata (Spanish oak), Quercus velutina (Black oak), Quercus coccinea (Scarlet oak), Quercus montana (Chestnut oak), Liriodendron tulipifera (Tuliptree), Quercus alba (White oak), and Carya glabra (Pignut hickory). The understory supports hardwood trees such as Cornus florida (Flowering dogwood), Oxydendrum arboreum (Sourwood), Acer rubrum (Red maple), Carya tomentosa (Mockernut), Sassafras albidum (Sassafras), Quercus alba (White oak), and other oaks and hickories. The shrub and herb layer is dominated with Gaylussacia frondosa var. frondosa (Dangleberry) and Pteridium aquilinum (Bracken fern). The herb layer varies in composition depending on the soil moisture. Seepage areas support species such as Osmunda cinnamomea (Cinnamon fern), Osmunda regalis var. spectabilis (Royal fern), Woodwardia areolata (Netted chainfern), and Carex spp. (Sedges).

Three rare plant species occur on the Roberdo Bog and Longleaf Pine Forest site. All three species occur within or adjacent to abandoned logging roads or fire breaks where sunlight penetrates to the forest floor. These species include Helianthus schweinitzii (Schweinitz's sunflower), Helianthus laevigatus (Smooth sunflower), and Gnaphalium helleri var. helleri (Heller's rabbit tobacco). This site is especially significant because most known occurrences of the Helianthus species are found along road, powerlines, and railroad right-of-ways where they are threatened by mowing and herbicide spraying. Helianthus schweinitzii (Schweinitz's sunflower) is a Federally Endangered sunflower. Helianthus laevigatus (Smooth sunflower) has a North Carolina Status of Significantly Rare. Future forestry management by the U.S.F.S. - Uwharrie National Forest may improve the habitat for these species. Gnaphalium helleri var. helleri (Heller's rabbit tobacco) has a North Carolina Status of Significantly Rare and occurs along old logging road clearings.

Description of Faunal Communities and Rare Animal Populations:

Roberdo Bog and Longleaf Pine Forest is a large, square site that is bisected by N.C. Highway 24-27. Roberdo Bog occurs on the west side of the highway and is surrounded by a Piedmont Longleaf Pine Forest. There is a known occurrence of the rare salamander, Ambystoma talpoideum (Mole salamander) from Roberdo Bog. This is one of only three known breeding sites for mole salamanders in Montgomery County. Mole salamanders occur in the mountains and piedmont of North Carolina. They breed in fish-free semipermanent woodland ponds and forage in adjacent woodlands. Roberdo Bog is also the only known breeding pool for Acris gryllus (Southern cricket frog), a species abundant in the Coastal Plain but very rare in the Piedmont. Another rare salamander that occurs on this site is Hemidatylium scutatum (Four-toed salamander) which has a North Carolina Status of Special Concern. Roberdo Bog is the only site in the county that harbors two state-listed amphibians. The common Ambystoma maculatum (Spotted salamander) are also known to breed in Roberdo Bog.

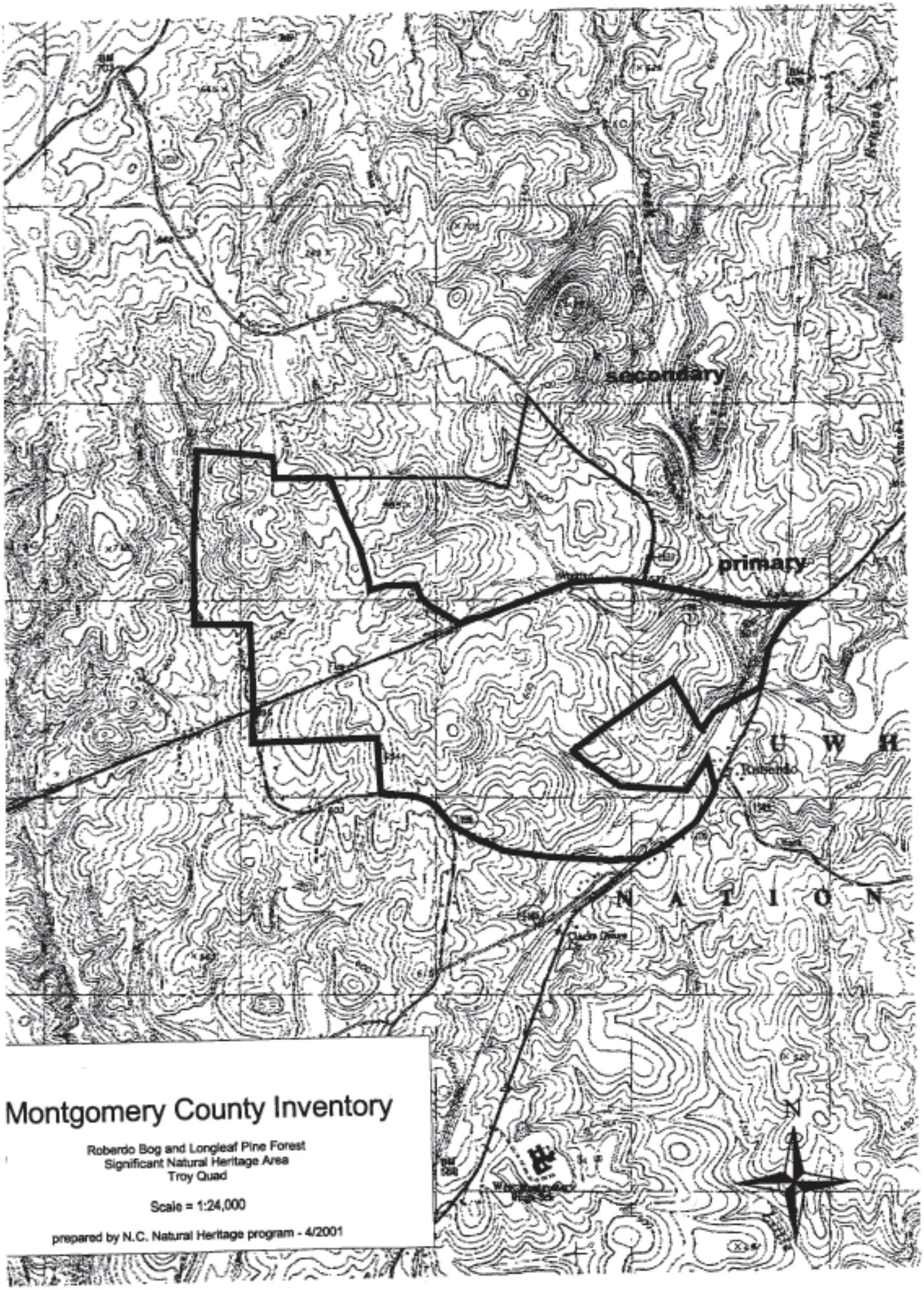
Sciurus niger (Eastern fox squirrel) has been noted in the longleaf pine forest on this site. This squirrel is disjunct from the coastal plain and sandhills. It is known to occur on only one other site in Montgomery County on the Pleasant Grove Bog and Pine Savanna site.

A few forest interior and migratory neotropical birds were noted during the botanical survey. These species include Piranga olivacea (Scarlet tanager), Coccyzus americanus (Yellow-billed cuckoo), Picoides villosus (Hairy woodpecker), and Dryocopus pileatus (Pileated woodpecker).

In addition to birds, this site provides potential habitat for Crotalus horridus (Timber rattlesnake), Lampropeltis triangulum elapsoides (Scarlet kingsnake), and possibly Sistrurus m. miliarius (Pygmy rattlesnake).

Management/Protection Recommendations:

The U.S. Forest Service manages the Roberdo Bog and Longleaf Pine Forest. Thinning is used to convert the forest from a hardwood to longleaf pine canopy. Controlled burns are used to reduce the woody sapling understory, reduce fuel buildup, and regenerate the longleaf pines. Amphibians and reptile use the upland buffer to burrow up to six inches into the ground during their nonbreeding life cycle. Therefore, it is necessary to protect the buffer from soil compaction. Portions of the site are included as a Registered Natural Area through the North Carolina Natural Heritage Program.



Montgomery County Inventory

Roberdo Bog and Longleaf Pine Forest
Significant Natural Heritage Area
Troy Quad

Scale = 1:24,000

prepared by N.C. Natural Heritage program - 4/2001

Appendix D

Biological Evaluation for the Proposed Widening of NC 24/27, January 2014

BIOLOGICAL EVALUATION

FOR THE

PROPOSED WIDENING OF NC 24/27 FROM

EAST OF THE PEE DEE RIVER TO WEST OF

SR 1134 (WADEVILLE ROAD)

UWHARRIE NATIONAL FOREST

MONTGOMERY COUNTY

NORTH CAROLINA

TIP # R-2527

WBS ELEMENT 35572.1.1

January 14, 2014

Contact Person:
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I. INTRODUCTION

The North Carolina Department of Transportation proposes to widen NC 24/27 to a four-lane divided facility in Montgomery County, North Carolina. The proposed project, TIP No. R-2527, will widen NC 24/27 from east of the Pee Dee River to west of SR 1134 (Wadeville Road) (approximately 9 miles). Portions of this project are in the Uwharrie National Forest. The proposed project would affect U.S. Forest Service (USFS) property along the existing and proposed right-of-way.

Approximately 50 acres of USFS land falls within the 500 ft project study corridor. As design is finalized, the acreage will decrease.

II. SPECIES CONSIDERED AND METHODS

The potential effects on Sensitive (S) species are evaluated. The S species list is maintained by the Uwharrie National Forest Service, Asheville, N.C. Potential direct and indirect effects to S species were analyzed in areas where road widening is proposed. This area is referred to as the activity area.

Potentially affected rare species were identified by:

(1) Reviewing the list of S species of the Uwharrie National Forest in Montgomery Co. and streamlining this list to include only species that exist within the natural communities found at the project site.

(2) Consulting the element occurrence records of rare species as maintained by the North Carolina Natural Heritage Program (NCNHP 2012).

(3) Consulting with NCNHP, USFS, and NC Wildlife Resource Commission (NCWRC) personnel who are knowledgeable of the area and its fauna.

(4) Conducting field surveys in the activity area.

Surveys were conducted within the Forest Service property that may be impacted by the proposed road improvements. While the inventory assessed all plants and animals encountered, particular focus was directed for species listed with Threatened (T), Endangered (E) or S status.

III. EXISTING BIOLOGICAL CONDITION

A. T&E and FOREST SENSITIVE SPECIES

The Forest Service's rare species resource lists for Montgomery Co. includes three T&E species (2 Terrestrial and 1 Botanical) and 22 S species (7 Aquatic, 4 Terrestrial, and 11 Botanical).

Many of these species were ruled out due to a lack of suitable habitat in the activity area or the species has a well-known distribution that does not include the activity area. Below is a list of the T&E and S species with the reason for its elimination from the list or whether it could potentially occur in the vicinity of the activity area (bold font). Most botanical, terrestrial, and aquatic species that could potentially occur were ruled out either during the surveys or because they were "historic or extirpated" or "obscure records." The number of species on this list was substantially reduced and summarized for the following reasons:

1. Lack of suitable habitat for the species in the activity area.

2. The species has a well-known distribution that does not include the activity area.

3. Conclusions were also based on personal communication with experts in the field of study.

Threatened and Endangered Species

Birds

1. Picoides borealis (red-cockaded woodpecker), federally endangered, prefers mature open pine forests, mainly in longleaf pine (breeding evidence only). NCNHP has a 1994 record for a cavity tree approximately 2.4 mi south of the study corridor. Survey were conducted for this species from March 8, 2006-March 27, 2007. The surveyed areas within 0.5 mile of the project did contain pine-dominated forests. The pines within the surveyed areas were composed of young pines (between 20 to 30 years old) that would not provide suitable nesting habitat. Two areas contained older long-leaf pines (between 30 to 60 years old). The first area, located approximately 1.0 mile west of the railroad and 0.4 mile north NC 24-27, is small with scattered mature pines. An inactive cavity tree was observed within this stand. The second area is located approximately 0.3 mile north of the Additional Study Area associated with the railroad. This area provides the best potential nesting habitat, however, the older trees are scattered throughout the stand which are dominated by younger pines between 20 to 30 years old. The area within 0.5 mile of these stands is fragmented due to clear cutting. No RCWs were observed during surveys. This species is not further analyzed.

Mammals

1. Puma concolor cougar (eastern cougar), federally endangered, prefers extensive forests in remote areas. This species is believed to be extirpated in North Carolina. This species is not further analyzed.

Vascular Plants

1. **Helianthus schweinitzii (Schweinitz's sunflower), federally endangered, prefers open woods and roadsides. This species was found during surveys.**

Sensitive Species

Mollusks

1. Elliptio roanokensis (Roanoke slabshell), occurs in most Atlantic drainages. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
2. Fusconaia masoni (Atlantic pigtoe), occurs in most Atlantic drainages in the lower Piedmont. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
3. Lasmigona subviridis (green floater), occurs in the Yadkin/Pee Dee River basin. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
4. Toxolasma pullus (Savannah lilliput), occurs in a number of Atlantic drainages. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
5. Villosa vaughaniana (Carolina creekshell), occurs in the Pee Dee River basin. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.

Fish

1. Etheostoma collis (Carolina darter), occurs in streams in the Piedmont. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
2. Etheostoma mariae (pinewoods darter), possibly occurs in the Pee Dee River basin. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.

Terrestrial Insects

1. Cicindela patruela (Northern barrens tiger beetle), occurs in sandy soil in open pine or pine-oak woods. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.

Amphibians

1. **Ambystoma talpoideum (mole salamander), breeds in fish-free semipermanent woodland ponds and forages in adjacent woodlands. Suitable habitat was observed in the activity area. This species was observed outside of the 500 ft wide project study corridor (approximately 300 ft from NC 24/27), but on Forest Service property. No impacts to this species are anticipated since it was found outside of the project corridor. This species is not further analyzed.**

Birds

1. Haliaeetus leucocephalus (bald eagle), prefers mature forests near large bodies of water for nesting, and lakes and sounds for nesting sites and regular non-breeding sites. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
2. **Lanius ludovicia (loggerhead shrike), prefers fields and pastures during the breeding season only. Suitable habitat was observed in the activity area. This species was not observed during surveys. No impacts to this species are anticipated. This species is not further analyzed.**

Nonvascular Plants

1. Scopelophila cataractae (Agoyan cataract moss), prefers copper-rich soils. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
2. Xanthoparmelia monticola (a rock-shield lichen), prefers high elevation rocky summits and mafic glades. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.

Vascular Plants

1. **Amorpha schwerinii (Piedmont indigo bush), prefers dry forests. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was not found during surveys. There is an occurrence of this species outside of the 500 ft wide project study corridor (approximately 600 ft from NC 24/27). This species is not further analyzed.**
2. Berberis canadensis (American barberry), prefers open forests and glades on basic soils. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
3. Carex impressinervia (ravine sedge), prefers rich alluvial forests. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
4. Danthonia epilis (bog oatgrass), occurs in seepage bogs and wet seepy power lines. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
5. Eurybia mirabilis (Piedmont aster), prefers rich slopes and bottomlands. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
6. **Fothergilla major (large witch-alder), occurs on dry ridge tops, in bluff forests, seepage wetlands, and Piedmont longleaf pine forests. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was found during surveys.**
7. Lindera subcoriacea (bog spicebush), prefers streamhead pocosins, white cedar swamps, and seepage slopes. Current records for Montgomery Co. exist. Suitable habitat was not

observed in the activity area, therefore there are no impacts. This species is not further analyzed.

8. Solidago plumosa (Yadkin River goldenrod), prefers riverside rocks. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
9. **Symphyotrichum georgianum (Georgia aster), prefers open woods and roadsides. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was not found during surveys within National Forest land. This species has been found along NC 24/27 on private land in Stanly County approximately 5-6 miles away from USFS property. This species is not further analyzed.**

B. RARE SPECIES SURVEYS

Multiple surveys were conducted in the activity area to ensure that seasonal variability in species numbers and optimal survey windows for flowering plants were taken into account. Because the S and LR lists contain a broad spectrum of plants and animals, it was necessary to bring in expertise from a wide spectrum of biologists. Qualifications of principle investigators are included at the end of this document.

Survey Dates: 4/04-5/04 (Schweinitz's sunflower), 9/04 (bald eagle), 3/8/06-3/27/07 (Red-cockaded woodpeckers), 4/10/06 (bald eagle), 9/9/06-10/18/06 (Schweinitz's sunflower, smooth coneflower), 3/27/07 (bald eagle), 5/21/07 (plants), 5/22/07 (birds), 6/25/07 (bats), 6/26/07 (salamander, plants, bats), 6/27/07 (salamanders), 8/16/07 (mussels, terrestrial insects), 10/24/07 (plants), 10/25/07, 11/1/07 (plants), 11/2/07 (plants), 11/7/07 (plants), 11/16/07 (plants), 11/19/07 (plants), 11/21/07 (plants)

C. COMMUNITIES

Four common community types were found in the proposed activity areas: Dry Oak-Hickory Forest, Maintained/Disturbed, Timbered Scrub/Shrub and Loblolly Pine Plantation. The Dry Oak-Hickory Forest is described in detail by Schafale and Weakley (1990). The Maintained/Disturbed Community included a power line right-of-way dominated by grasses and forbes, and ruderal roadside edge. Most of the herbaceous diversity was associated with the Dry Oak-Hickory Forest Community. There were no significant rock outcrops or seeps.

These communities and their associated plant species are described in detail in the Natural Resources Technical Report (NRTR). The Mixed Pine/Hardwood Forest and Mixed Hardwood Forest communities described in the NRTR are similar to the Dry Oak-Hickory Forest described by Schafale and Weakley (1990).

IV. RESULTS AND POTENTIAL EFFECTS TO T, E and FOREST SERVICE S SPECIES

The proposed road widening project may affect or impact botanical and aquatic resources of the Uwharrie National Forest due to occurrence of E and Forest Service S plants or aquatic animals in the vicinity of the project area.

A larva of the S terrestrial animal species mole salamander (Ambystoma talpoideum) was found in an upland pool in the activity area. Mole salamanders occupy underground burrows in pine savannas, hardwood forests, and swamps and breed in fish-free semi-permanent woodland ponds and forage in adjacent woodlands. This species is found in Alleghany, Buncombe, Cherokee, Guilford, Henderson, Macon, Montgomery, Person, Polk, Richmond, Rockingham, Rowan, Surry, and Union Counties. The mole salamander is considered a species of special concern by the North Carolina Natural Heritage Program (NCNHP). This species can be avoided, as it is located approximately 300 feet from the existing alignment.

Approximately 100 individuals of the S plant species large witch alder (Fothergilla major) were found in forested areas in the activity area. Large witch alder is found on dry ridgetops or bluff forests, seepage wetlands, and Piedmont longleaf pine forests. This species is found in Burke, Chatham, Harnett, McDowell, Montgomery, Orange, Person, Rutherford, Stanly, Stokes, Transylvania, and Wake Counties. Large witch alder is considered a significantly rare species throughout its range by NCNHP. This species can be avoided, as it is located approximately 100 feet from the existing alignment.

Approximately 35 individuals of the federally endangered plant species Schweinitz's sunflower (Helianthus schweinitzii) were found adjacent to the railroad in the activity area. Schweinitz's sunflower is found in open woods and roadsides. This species is found in Anson, Cabarrus, Davidson, Gaston, Mecklenberg, Montgomery, Randolph, Rowan, Stanly, Stokes, Surry, and Union Counties. Schweinitz's sunflower is considered an endangered species by the United States Fish and Wildlife Service (USFWS). This population of Schweinitz's sunflower could be affected by the proposed project. If it is determined that this population will be affected, the plants will be transplanted to adjacent USFS land and formal consultation with the USFWS will be initiated.

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QUALIFICATIONS OF PRINCIPLE INVESTIGATORS:

Investigator: Kathy Herring, Environmental Supervisor, NCDOT
Education: B.S. Biology, University of South Carolina.
Experience: Environmental Specialist/Supervisor, NCDOT, August 2004 – present.
Environmental Biologist, NC Division of Water Quality, Biological Assessment Unit, December 1992 – July 2004.
Environmental Biologist Supervisor, Normandeau Associates, Aiken, SC. April 1988 to November 1992 and February 1982 to August 1985.
Aquatic Biologist Chadwick and Associates, Inc. Denver, CO, November 1986 to March 1988.
Project Manager - The Potential Effects of Flow Fluctuations on Establishing a Balanced Biological Community in Discharge Streams at the Savannah River Plant, Aiken, SC.
Academy of Natural Sciences of Philadelphia**,** September 1985 to September 1986
Expertise: Freshwater fish and benthic macroinvertebrate collection and identification; aquatic habitat evaluations and function; biocriteria and biotic indices evaluations; Endangered species (terrestrial/aquatic) surveys; data analysis/report writing. SCUBA diving certified.

Investigator: Karen M. Lynch, Environmental Supervisor, NCDOT
Education: B.S. Wildlife Biology and Fisheries, North Carolina State University.
Experience: Environmental Supervisor, NCDOT July 2003- present.
Environmental Specialist, NCDOT, November 1998 – July 2003.
Environmental Biologist, NC Division of Water Quality, November 1984-October 1998.
Expertise: Section 7 field investigations; NEPA documentation, protected species (terrestrial/aquatic) surveys, benthic macroinvertebrate collection, water quality analyses, aquatic plant surveys. Permitted to survey for State and Federal Threatened and Endangered mussels. SCUBA certified.

Investigator: Jason Mays, Environmental Specialist
Education: B.S. Biological Sciences, UNC Chapel Hill.
Experience: NCWRC Field Biologist May 2002-October 2003.
Environmental Specialist, NCDOT, March 2003- Present.
Expertise: Section 7 field investigations, protected species (terrestrial/aquatic) surveys, 404/401 permitting, wetland delineation/ determination, GIS studies.

Investigator: Michael Sanderson
Education: B.S. Fisheries and Wildlife Science, North Carolina State University.
Experience: Environmental Specialist, NCDOT April 2004- present.
Wildlife Research Biologist, Down to Earth Environmental, February – June,

2003.
Wildlife Research Technician, NC Cooperative Fish and Wildlife Research unit, 1991- 1999.
Biological Science Technician (Wildlife), US Fish and Wildlife Service, 1995-1997.

Expertise: Bird surveys, behavioral analysis, habitat use/evaluation, Section 7 field investigations, protected species (terrestrial/aquatic) surveys, wetland delineation, SCUBA certified.

Investigator: Logan Williams
Education: B.A. Philosophy, North Carolina State University, December 1981.
M.S. Entomology, North Carolina State University, May 1994.
Experience: Environmental Supervisor, NCDOT, 2002-present.
Entomologist, NC Dept. of Agriculture, 2001-2002.
Natural Systems Specialist, NCDOT, 1995-2000.
Supervisor of Apiary Inspection, NC Dept of Agriculture, 1988-1995.
Expertise: Coordinate and conduct Section 7 investigations (aquatic and terrestrial). Identification of aquatic benthic macroinvertebrates. Wetland Mitigation. Ecological studies, NEPA documentation. SCUBA certified.

Investigator: Dennis W. Herman
Education: B.S. Biology, Western Carolina University.
Experience: Environmental Program Consultant, NCDOT, August 2004-present.
Coordinator of Living Collections, NC Museum of Natural Sciences, June 1996-August 2004.
Assistant Curator of Herpetology, Zoo Atlanta, 1981-1996.
Senior Zoo Keeper of Herpetology & Mammals, Atlanta Zoological Park, 1972-1981.
Expertise: Section 7 investigations, protected species (terrestrial/aquatic) surveys, bog turtle & mountain bog specialist, ecological studies, rare plant identification, benthic macroinvertebrate collection, reptile and amphibian surveys.

Investigator: Matthew M. Haney
Education: B.S. Natural Resources-Ecosystem Assessment, North Carolina State University, Raleigh, North Carolina.
Experience: N.C. Dept. of Transportation Oct. 1999-present.
N.C. Forest Service May 1998-August 1998.
U.S. Forest Service, Center for Forested Wetlands Research May 1997-August 1997.
Expertise: Section 7 field investigations, NEPA documentation, wetland and aquatic investigations, protected species (terrestrial/aquatic) surveys.

Investigator:	Neil Medlin
Education:	M.A. Biology, Appalachian State University. B.S. Biology, Appalachian State University.
Experience:	Environmental Specialist/Supervisor, NCDOT, January 2002-present. Environmental Biologist, NC Division of Water Quality, June 1990-January 2002. Environmental Biologist, FL Department of Environmental Protection (formerly Department of Environmental Regulation), August 1986-June 1990.
Expertise:	Freshwater fish and benthic macroinvertebrate collection and identification; aquatic habitat evaluations and function; biocriteria and biotic indices evaluations; Endangered species (terrestrial/aquatic) surveys and assessments; permitted to survey for State and Federal Threatened and Endangered mussels and fish.

Investigator:	Mary E. Frazer
Education:	B.S. Zoology, University of Wisconsin. M.E.M. (Master of Environmental Management), Resource Ecology, Duke University.
Experience:	Natural Systems Specialist, NCDOT, August 2000-present. Water Regulation Specialist, Wisconsin Department of Natural Resources, 1998-2000. Wisconsin Coastal Management Program, 1994-1998. Biologist, Soil and Environmental Consultants, 1992-1994.
Expertise:	Section 7 field investigations; NEPA documentation, wetland and aquatic investigations.

Investigator:	Melissa Miller
Education:	B.S. Fisheries and Wildlife Sciences, North Carolina State University.
Experience:	Environmental Biologist, NCDOT, February 2005-present. Assistant Wildlife Biologist, Howell Woods Environmental Learning Center, Four Oaks, NC, January1999-February 2005.
Expertise:	Section 7 field investigations, protected species (terrestrial/aquatic) surveys.

Investigator:	Anne Burroughs
Education:	B.S. Biological Sciences, Minor in Environmental Science, North Carolina State University 1992.
Experience:	Biological Control Technician – NC Dept of Agriculture May 2001-April 2003. Environmental Specialist – NC Dept. of Transportation, May 2003-August 2003, January 2004-present.
Expertise:	Endangered species (terrestrial/aquatic) surveys; benthic macroinvertebrate collection.

Investigator:	Lance P. Fontaine, Ph.D.
Education:	Ph.D., Wildlife and Fisheries Sciences, Texas A&M University, 2008. M.S. Wildlife and Fisheries Sciences, Texas A&M University, 2002. B.S. Ecological & Evolutionary Biology, Tulane University, 1999.
Experience:	Environmental Specialist, NCDOT, Raleigh, NC, October 2006 – Present. Lecturer, University of California at Irvine, January 2006 – September 2006. Research Assistant, Wildlife and Fisheries Sciences, Texas A&M University, College Station, TX, August 2000 – December 2005. Pond Technician/Technical Consultant, Integrated Lakes Management, Gurnee, IL September 1999 – August 2000.
Expertise:	Endangered species (terrestrial/aquatic) surveys; section 7 field investigation; biological assessment preparation; water quality analysis; aquatic and wetland ecology studies; freshwater and marine fish ecology and ecophysiology studies; invasive and exotic species (terrestrial/aquatic) issues; statistical analysis; benthic macroinvertebrate collection; GIS studies; prescribed burns.

Investigator:	Cheryl Gregory
Education:	B.S. Natural Resource Management & Ecology, Colorado State University.
Experience:	Environmental Specialist, NCDOT, Raleigh, NC, December 2003 to present. Field Tech, GeoSonics, Inc., Raleigh, NC September to December 2003.
Expertise:	Biotic community mapping and assessment, Section 404/401 permitting, Section 7 field surveys, wetland delineation, GIS mapping, and technical report writing.

Investigator:	Heather Renninger
Education:	B.S. Ecology/Environmental Biology, Appalachian State University.
Experience:	Environmental Specialist, NCDOT, February 2007- present. Environmental Biologist, H.W. Lochner, Inc., 2003-2007. Biologist, Earth Tech, Inc., 2000-2003.
Expertise:	Section 7 field investigations and documentation, benthic macroinvertebrate collection, 401/404 permitting, protected species (terrestrial/aquatic) surveys, NEPA documentation, wetland delineation, stream restoration, invasive species, avian ecology and behavior.

Appendix E

Aquatic Resources Report for the Proposed Widening of NC 24/27, January 2014

AQUATIC RESOURCES REPORT

FOR THE

PROPOSED WIDENING OF NC 24/27

FROM EAST OF THE PEE DEE RIVER

TO WEST OF SR 1134 (WADEVILLE ROAD)

UWHARRIE NATIONAL FOREST

MONTGOMERY COUNTY

NORTH CAROLINA

TIP # R-2527

WBS ELEMENT 35572.1.1

January 14, 2014

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I. INTRODUCTION

This report identifies the potential effects and impacts on aquatic resources of the proposed widening of NC 24/27 from east of the Pee Dee River to west of SR 1134 (Wadeville Road). The proposed project would affect U.S. Forest Service (USFS) property along the existing and proposed right-of-way. The project area is in the Uwharrie Ranger District, Uwharrie National Forest, Montgomery County, North Carolina.

Approximately 50 acres of USFS land falls within the 500 ft project study corridor. As design is finalized, the acreage will decrease.

This project affects Clarks Creek, Rocky Creek, unnamed tributaries to Rocky Creek, and Smith Branch along NC 24/27. These streams are located in the Piedmont III ecoregion, and the Carolina Slate Belt level IV ecoregion (Griffith et al. 2002). The Carolina Slate Belt has some of the lowest water-yielding geology in the state resulting in the tendency of streams to dry up in summer. Mount Gilead Town Wastewater Treatment Plant discharges into Clarks Creek. Clarks Creek was rated Fair in 2011 for benthic bioclassification by North Carolina Department of Environment and Natural Resources' Division of Water Quality (NCDWQ). Rocky Creek was rated Good-Fair in 1996 for benthic bioclassification by NCDWQ. Clarks Creek was rated Excellent 2004 for fish bioclassification by NCDWQ. Rocky Creek was rated Good in 2010 for fish bioclassification by NCDWQ.

Water quality ratings for fish and benthic macroinvertebrates are not always in agreement due to habitat differences. Furthermore, benthic macroinvertebrates are more sensitive to slight changes in water quality.

During the twentieth century these streams suffered numerous detrimental effects on the aquatic fauna. Logging in the Uwharrie National Forest, construction of the railroad and NC 24/27 through the National Forest, and residential development and agriculture have all contributed to periods of habitat degradation.

II. SPECIES CONSIDERED AND METHODS

The potential effects on Sensitive (S) and Locally Rare (LR) aquatic species are evaluated. The S and LR species lists are maintained by the Uwharrie National Forest Service, Asheville, N.C. Potential direct and indirect effects to S and LR aquatic species were analyzed in the Clarks Creek, Rocky Creek, and Smith Branch areas where road widening is proposed. This area is referred to as the activity area, and is shown in the attached project map (See Figure 1).

Potentially affected aquatic species were identified by:

(1) Reviewing the list of S and LR aquatic species of the Uwharrie National Forest in Montgomery Co. (Appendix 1) and streamlining this list to include only aquatic species that exist

within the natural communities found at the project site.

(2) Consulting the element occurrence records of aquatic species as maintained by the North Carolina Natural Heritage Program (NCNHP 2012).

(3) Consulting with NCNHP, USFS, and NC Wildlife Resource Commission (NCWRC) personnel who are knowledgeable of the area and its fauna.

(4) Conducting field surveys in areas designated for stream disturbing activities.

Surveys were conducted within the Forest Service property that may be impacted by the proposed road improvements. While the aquatic inventory assessed all animals encountered, particular focus was directed for species listed with Threatened (T), Endangered (E), S or LR status.

III. AQUATIC RESOURCES

A. T&E, SENSITIVE, AND LOCALLY RARE SPECIES

The 2011 revised rare aquatic species list for Montgomery County (Appendix 1) includes twenty-two T&E, S, and LR species: eighteen invertebrates (5 S and 13 LR), one amphibian (1 S), and five fish (2 S and 3 LR). The number of species on this list was substantially reduced and summarized for the following reasons:

1. Lack of suitable habitat for the species in the activity area.

2. The species has a well-known distribution that does not include the activity area.

3. Conclusions were also based on personal communication with experts in the field of study.

4. Any aquatic species that had marginal to suitable habitat in the vicinity of the area and could potentially occur were ruled out either during the surveys or because they were "historic or extirpated" or listed as "obscure records."

Endangered and Threatened Species

A detailed discussion of the T&E aquatic species was included in the accompanying Biological Evaluation along with the botanical and terrestrial species and will not be included in this report. The S and LR aquatic species are discussed below.

Sensitive Species

Eight Forest Service S aquatic species are listed for the Uwharrie National Forest in Montgomery Co. All eight species were ruled out due to not being found during surveys or outside of the project study corridor.

Mollusks

1. Elliptio roanokensis (Roanoke slabshell), occurs in most Atlantic drainages. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
2. Fusconaia masoni (Atlantic pigtoe), occurs in most Atlantic drainages in the lower Piedmont. The preferred habitat for the Atlantic pigtoe is a yielding substrate composed of coarse sands and gravel at the downstream edge of riffle areas. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
3. Lasmigona subviridis (green floater), occurs in the Yadkin/Pee Dee River basin. This species prefers pools or eddies with gravelly and sandy bottoms. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
4. Toxolasma pullus (Savannah lilliput), occurs in a number of Atlantic drainages. This species lives in still shallow water near the banks of streams and ponds in mud or sand. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
5. Villosa vaughaniana (Carolina creekshell), occurs in the Pee Dee River basin. This species is found near the bank in shaded pools of small streams. This species prefers muddy or silty gravel in shallow water. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.

Fish

1. Etheostoma collis (Carolina darter), occurs in streams in the Piedmont. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
2. Etheostoma mariae (pinewoods darter), possibly occurs in the Pee Dee River basin. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.

Locally Rare Species

Sixteen Forest Service LR aquatic species are listed for the Uwharrie National Forest in Montgomery Co. All sixteen species were ruled out due to not being found during surveys.

Mollusks

1. Alasmidonta sp. 2 (a bivalve), occurs in streams in the Uwharrie Mountains region. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
2. Alasmidonta undulata (triangle floater), occurs in most river systems in the Piedmont. This species is common in smaller rivers and streams, going well into the headwaters, found mainly in quiet waters with some current, avoiding riffles, living in coarser gravel and sand. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.

3. Anodonta implicata (alewife floater), occurs in the Pee Dee River. This species is found living in ponds, overbank pools, streams and rivers in a variety of substrates including silt, sand and gravel. This species is listed as obscure in Montgomery Co. This species was not found during surveys. This species is not further analyzed.
4. Lampsilis cariosa (yellow lampmussel), occurs in a number of river systems. This species is found in medium to larger rivers often in sand in bedrock cracks, but also is found in silt, sand, gravel, and cobble substrates. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
5. Lampsilis radiata (eastern lampmussel), occurs in a number of river systems. This species has been found in creeks, lakes and rivers with fast current in gravel substrate and in a sandy substrate in lake like portions of rivers. This species has also been found in sand substrate with good current. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
6. Strophitus undulatus (creeper), occurs in most river basins in the Piedmont. This species appears adaptable to a variety of aquatic habitats, from high-gradient small streams to main channels of rivers in finer sediments to large gravel, usually deeply buried. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.

Crustaceans

1. Cambarus catagius (Greensboro burrowing crayfish), occurs in the Uwharrie Mountains. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
2. Cambarus hystriocosus (Sandhills spiny crayfish), occurs in streams in the Sandhills. Current records for Montgomery Co. possibly exist. This species was not found during surveys. This species is not further analyzed.

Aquatic Insects

1. Beraea gorteba (a caddisfly), has no locality data. Current records for Montgomery Co. possibly exist. This species was not found during surveys. This species is not further analyzed.
2. Ceraclea joannae (a caddisfly), occurs in the Little River. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
3. Baetpous trishae (a mayfly), has no locality data. Current records for Montgomery Co. possibly exist. This species was not found during surveys. This species is not further analyzed.
4. Plauditus cestus (a mayfly), has no locality data. Current records for Montgomery Co. possibly exist. This species was not found during surveys. This species is not further analyzed.
5. Pteronarcy comstocki (spiny salmonfly), has no locality data. Current records for Montgomery Co. possibly exist. This species was not found during surveys. This species is not further analyzed.

Fish

1. Carpiodes sp. cf. cyprinus (a carpsucker), occurs in the Yadkin/Pee Dee drainage. Current records for Montgomery Co. possibly exist. This species was not found during surveys. This species is not further analyzed.
2. Moxostoma sp. 3 (Carolina redhorse), occurs in the Pee Dee drainage. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
3. Notropis volucellus (mimic shiner), occurs in scattered drainages near the Fall Line. Current records for Montgomery Co. possibly exist. This species was not found during surveys. This species is not further analyzed.

B. AQUATIC SPECIES SURVEYS

Benthic Macroinvertebrates

NCDOT biologists conducted multiple surveys in Rocky Creek, Clarks Creek, and Smith Branch within the Uwharrie National Forest for benthic macroinvertebrates, and samples were collected during each survey. For details on collection methods, please refer to the NCDENR DWQ Biological Assessment website: (http://www.esb.enr.state.nc.us/BAU.html). Appendix 2 lists macroinvertebrate species actually collected by NCDOT biologists on 5/21/2007, 6/27/2007, and 8/16/2007. A vicinity map can be found in this report, before the appendices. **None of the invertebrate species on the Forest Service S or LR lists were found during any of the surveys.**

Freshwater Mussels

Mussel surveys were conducted on 8/16/2007 by NCDOT biologists in Clarks Creek and Rocky Creek for the presence of live mussels and mussel shells. The only mussel species that was observed during surveys was Elliptio complanata. Clarks Creek and Rocky Creek had very little water during mussel surveys. **None of the freshwater mussel species on the Forest Service S or LR lists were found during any of the surveys.**

Fish

Fish surveys were conducted on 6/27/2007 by NCDOT biologists in Rocky Creek and Clarks Creek. Appendix 3 lists the fish species that were collected during the survey. **None of the fish species on the Forest Service S or LR lists were found during any of the surveys.**

Qualifications of principle investigators are included in the Biological Evaluation report.

C. COMMUNITIES

Stream characteristics were recorded during the fish surveys on 6/27/2007.

Clarks Creek had a water depth of approximately 3 inches. The stream channel was approximately 9 feet wide. The substrate was primarily cobble and gravel, but also consisted of sand and boulder. The bank height was approximately 3 feet.

Rocky Creek had a water depth of 3-6 inches. The stream channel was approximately 12 feet wide. The substrate was primarily cobble and boulder, but also consisted of bedrock and gravel. The bank height was approximately 3 feet.

IV. POTENTIAL EFFECTS TO SENSITIVE AND LOCALLY RARE AQUATIC SPECIES

There will be no effects or impacts (direct, indirect or cumulative) to any listed aquatic species if this proposal were implemented. This conclusion is supported by the following:

1) S or LR aquatic species are not known to occur in or near the activity area.

2) Site specific aquatic surveys did reveal the absence of S or LR species.

V. MITIGATION AND RATIONALE

Since there are no effects or impacts to any T & E, S and LR aquatic species, there is no recommended mitigation.

VI. SUMMARY OF EFFECT

The proposed improvements to R-2527 will not impact any S or LR aquatic species on the USDA Forest Service S and LR list for Montgomery County due to nonoccurrence in the vicinity of the activity area. No mitigation is recommended. **The proposed project will not affect any Federally listed or proposed listed aquatic species. Formal consultation with the U.S. Fish and Wildlife Service is not required.**

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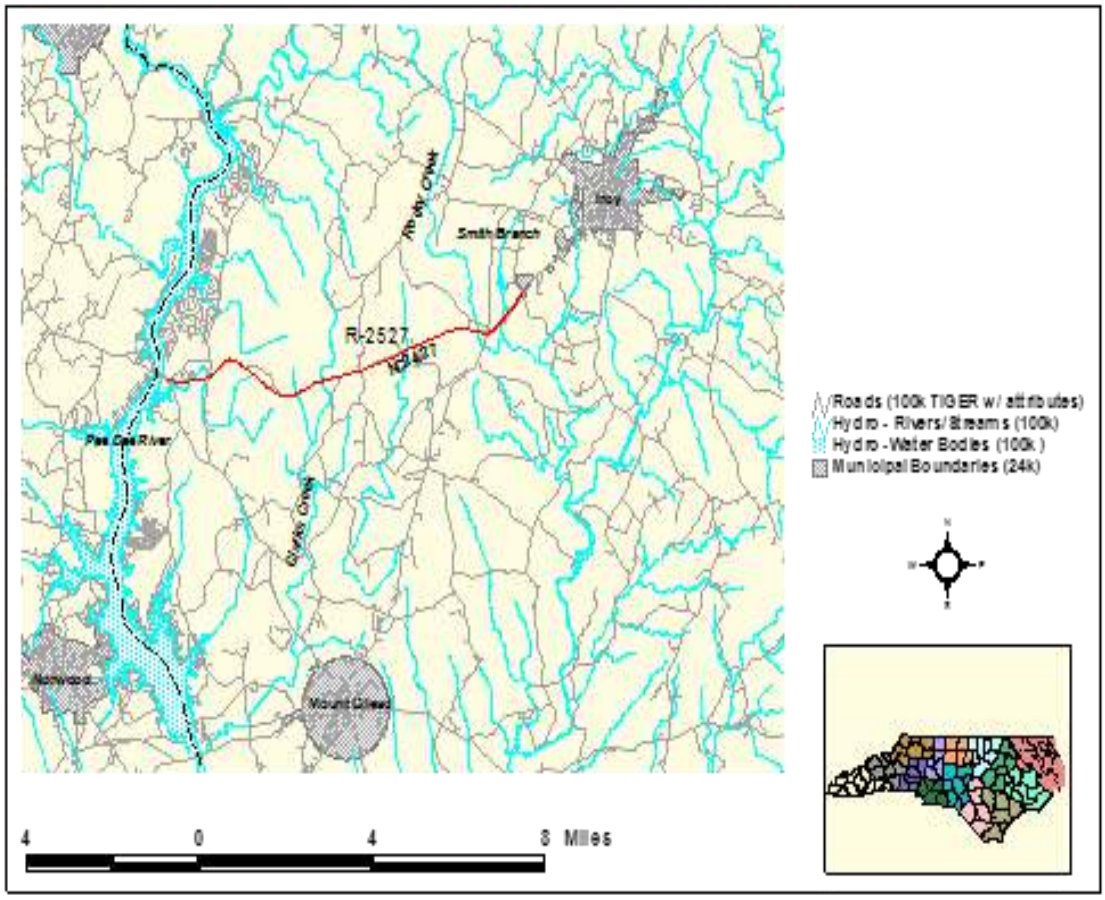
Figure 1. R-2527 Vicinity Map



Appendix 1. List of Forest Service Sensitive and Locally Rare Aquatic Species for Montgomery County (October 2012).

SCIENTIFIC NAME	COMMON NAME	STATUS	NHP-LISTED COMMUNITY OR HABITAT AND RECORDS	LIKELIHOOD OF OCCURRENCE AND CONCLUSION
Fish				
Carpiodes sp. cf. cyprinus	A carpsucker	LR	Occurs in the Yadkin/Pee Dee drainage	Species was not collected during surveys.
Etheostoma collis	Carolina darter	S	Occurs in streams in the Piedmont	Current records are known in Montgomery Co. This species was not collected during surveys.
Etheostoma mariae	Pinewoods darter	S	Possibly occurs in the Pee Dee drainage	Current records are known in Montgomery Co. This species was not collected during surveys.
Moxostoma sp. 3	Carolina redhorse	LR	Occurs in the Pee Dee drainage	Current records are known in Montgomery Co. This species was not collected during surveys.
Notropis volucellus	Mimic shiner	LR	Occurs in scattered drainages near Fall Line	Species was not collected during surveys.
Mussels				
Alasmidonta sp. 2	A bivalve	LR	Occurs in streams in the Uwharrie Mountains region	Current records are known in Montgomery Co. This species was not collected during surveys.
Alasmidonta undulata	Triangle floater	LR	Occurs in most river systems in Piedmont	Current records are known in Montgomery Co. This species was not collected during surveys.
Anodonta implicata	Alewife floater	LR	Occurs in the Pee Dee River	Listed as obscure in Montgomery Co. This species was not collected during surveys.

Elliptio roanokensis	Roanoke slabshell	S	Occurs in most Atlantic drainages	Current records are known in Montgomery Co. This species was not collected during surveys.
Fusconaia masoni	Atlantic pigtoe	S	Occurs in most Atlantic drainages, in the lower Piedmont	Current records are known in Montgomery Co. This species was not collected during surveys.
Lampsilis cariosa	Yellow lampmussel	LR	Occurs in a number of river systems; mainly near the Fall Line	Current records are known in Montgomery Co. This species was not collected during surveys.
Lampsilis radiata	Eastern lampmussel	LR	Occurs in a number of river systems	Current records are known in Montgomery Co. This species was not collected during surveys.
Lasmigona subviridis	green floater	S	Occurs in the Yadkin/Pee Dee system downstate	Current records are known in Montgomery Co. This species was not collected during surveys.
Strophitus undulatus	creeper	LR	Occurs in most river basins in the Piedmont	Current records are known in Montgomery Co. This species was not collected during surveys.
Toxolasma pullus	Savannah lilliput	S	Occurs in a number of Atlantic drainages	Current records are known in Montgomery Co. This species was not collected during surveys.
Villosa vaughaniana	Carolina creekshell	S	Occurs in the Pee Dee system	Current records are known in Montgomery Co. This species was not collected during surveys.
Crayfish				
Cambarus catagius	Greensboro burrowing crayfish	LR	Occurs in the Greensboro area, south to the Uwharrie Mountains	Current records are known in Montgomery Co. This species was not collected during surveys.
Cambarus hystriocosus	Sandhills spiny crayfish	LR	Occurs in streams in the Sandhills	This species was not collected during surveys.
Insects				
Beraea gorteba	A caddisfly	LR	No locality data	This species was not

				collected during surveys.
Ceraclea joannae	A caddisfly	LR	Occurs in the Little River	Current records are known in Montgomery Co. Endemic to this area. This species was not collected during surveys.
Baetpous trishae	A mayfly	LR	No locality data	This species was not collected during surveys.
Plauditus cestus	A mayfly	LR	No locality data	This species was not collected during surveys.
Pteronarcy comstocki	Spiny salmonfly	LR	No locality data	This species was not collected during surveys.

Forest Service Status (FS) is designated by the U.S. Forest Service. Sensitive and locally rare species are protected under provisions of the National Forest Management Act and directions set forth in FS manual 2670.

STATUS CODE	STATUS	DESCRIPTION
E	Endangered	A taxon which is in danger of extinction throughout all or a significant portion of its range
T	Threatened	A taxon which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range
S	Sensitive	Species at risk of extinction in a portion of their range as evidenced by downward trends in population numbers or density, or downward trends in habitat capability.
FC	Forest Concern	Species not at risk of extinction, even in a portion of their range, and not showing a downward population trend over their range as a whole within North Carolina.

Appendix 2. Taxa list with indication of relative abundance. A = Abundant (≥10), C=Common (3-9), and R = Rare (1-2). Uwharrie National Forest, Montgomery County, May 21, 2007. (Macroinvertebrate species found during NCDOT field surveys on May 21, 2007)

Stream	**Rocky Cr**	**Rocky Cr**	**Clark Cr**	**Clark Cr**	**Smith Br**	**Smith Br**
Site (relative to NC 24/27)	**Upstream**	**Downstream**	**Upstream**	**Downstream**	**Upstream**	**Downstream**
Date	**5/21/07**	**5/21/07**	**5/21/07**	**5/21/07**	**5/21/07**	**5/21/07**
	Abundance	**Abundance**	**Abundance**	**Abundance**	**Abundance**	**Abundance**
Ephemeroptera						
Acerpenna pygmaea	R		R	R	R	R
Baetis flavistriga	R	R	R	C		
Baetis pluto	R	C	R	C		
Baetis propinquis			R		C	R
Caenis			A	C		
Centroptilum					C	C
Habrophlediodes sp.	A	A	A	A	A	A
Heptagenia	R		R		C	
Isonychia sp.	A	A	A	C	A	A
Eurylophella	C	A	A	A		
Ephemerella dorothea	R	C				
Leucrocuta	A	A	C	C	C	A
Plauditus dubius grp.		R	R	R	C	A
Pseudocloeon frondalis			C		R	
Stenacron interpunctatum	C	C	A	C	R	R
Stenonema modestum		R	C	C	C	C
Odonata						
Argia sp.			C			
Boyeria vinosa	R	R	R	R	R	R
Calopteryx sp.		R	R	R		R
Cordulegaster						R
Lanthus	C			R	R	
Somatochlora		R				R
Plecoptera						
Alloperla	R					
Acroneuria abnormis	A	A				
Amphinemura sp.					R	
Ecoptura xanthenes				R		
Neoperla	C	C				
Isoperla holochlora	R		C	R	R	
Perlesta placida	A	A	A	A	A	A
Leuctra	C					
Megaloptera						
Corydalus cornutus		C	R	R		
Nigronia serricornis			R	R		
Sialis			R			R
Trichoptera						
Chimarra	A	A	A	C		
Hydropsychye betteni		R				
Cheumatopsyche sp.	A	A	A	A	C	
Ceraclea ancylus	C		C			
Diplectrona modesta				R	C	
Neophylax oligius		R				C
Polycentropus	R	R				
Pteronarcys		R				

Pycnopshyche				R		
Ryacophila carolina				C		
Coleoptera						
Ancyronyx variegatus			R	C		
Dineutus			R			
Dytiscidae			A	A		
Gyrinus			R			
Helichus		C	A	C	R	
Macronychus glabratus			R	R		
Neoporus sp.						C
Stenelmis sp.			R			R
Psephenus herricki	R	C	R	C		
Diptera						
Antocha			R		C	R
Dicranota			C	R		
Simulium	C	A	A	A	R	
Hexatoma		C	C	C	R	
Tipula		C		R	R	
Palpomyia			R	R		
Other						
Erpobdella/Moreeobdella		C				

Appendix 3. Fish species collected during surveys for R-2527

Chain pickerel	Esox niger
Rosyside dace	Clinostomus funduloides
Highback chub	Hybopsis hypsinotus
Bluehead chub	Nocomis leptocephalus
Redlip shiner	Notropis chiliticus
Highfin shiner	Notropis altipinnis
Creek chub	Semotilus atromaculatus
Creek chubsucker	Erimyzon oblongus
Flat bullhead	Ameiurus platycephalus
Yellow bullhead	Ameiurus natalis
Margined madtom	Notorus insignis
Pirate perch	Aphredoderus sayanus
Green sunfish	Lepomis cyanellus
Redbreast	Lepomis auritus
Pumpkinseed	Lepomis gibbosus
Warmouth	Lepomis gulosus
Tessellated darter	Etheostoma olmstedi
Fantail darter	Etheostoma flabellare

Appendix F

Botanical Resources Report for the Proposed Widening of NC 24/27, January 2014

BOTANICAL RESOURCES REPORT

FOR THE

PROPOSED WIDENING OF NC 24/27

FROM EAST OF THE YADKIN-PEE DEE RIVER TO

WEST OF SR 1134 (WADEVILLE ROAD)

UWHARRIE NATIONAL FOREST

MONTGOMERY COUNTY

NORTH CAROLINA

TIP # R-2527

WBS ELEMENT 35572.1.1

January 14, 2014

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I. INTRODUCTION

This report identifies the potential effects on botanical resources of a proposed road widening of NC 24/27 from east of the Yadkin-Pee Dee River to west of SR 1134 (Wadeville Road). The proposed project would affect U.S. Forest Service (USFS) property along the existing and proposed right-of-way. The project area is in the Uwharrie Ranger District, Uwharrie National Forest, Montgomery Co., North Carolina.

Approximately 50 acres of USFS land falls within the 500 ft wide project study corridor. As design is finalized, the acreage will decrease.

II. SPECIES CONSIDERED AND METHODS

The potential effects on USFS Sensitive (S) and Locally Rare (LR) plant species are evaluated. Threatened (T) and Endangered (E) plant species are discussed in the Biological Evaluation report. Potential direct and indirect effects to S and LR plant species were analyzed in the areas where road widening is proposed. This area is referred to as the activity area, and is shown in the attached project map (Figure 1 of Biological Evaluation).

Potentially affected plant species were identified by:

1) Reviewing the list of S and LR plant species of the Uwharrie National Forest in Montgomery Co. (Appendix 1) and streamlining this list to include only plants that could potentially exist within the natural communities found at the project site. The streamlined list is shown below in Table 1.

2) Consulting element occurrence records of plants as maintained by the North Carolina Natural Heritage Program (NCNHP 2012).

3) Consulting with NCNHP and US Forest Service personnel who are knowledgeable of the area and its flora.

4) Conducting field surveys in areas designated for ground disturbing activities.

Surveys were conducted within the Forest Service property that will be impacted by the proposed road widening. While the floral survey assessed all plants encountered, particular focus was directed for plants listed as Threatened (T), Endangered (E), S or LR Status.

III. BOTANICAL RESOURCES

A. T&E, SENSITIVE AND LOCALLY RARE SPECIES:

The 2011 revised rare botanical species list for Montgomery Co. (Appendix 1) includes thirty-nine T&E, S, and LR species: two nonvascular species (2 S) and thirty-seven vascular species (1 E, 9 S and 27 LR).

All but fourteen species were dropped from the list for further consideration and discussion for one of the two following reasons: 1) lack of suitable habitat for the species in the project area, 2) the species has a well-known distribution that does not include the project area.

Habitats, community types and ranges of plant Threatened (T) and Endangered (E), S and LR species are derived from information in "Classification of the Natural Plant Communities of North Carolina (1990)," the Natural Heritage Program's "List of Rare Plant Species of North Carolina" (http://portal.ncdenr.org/c/document_library/get_file?uuid=b0c4aa96-6cdf-4c19-8885-88c4c0dc18c7&groupId=61587) or personal communication with other botanists.

Endangered and Threatened Species

A detailed discussion of the T&E botanical species was included in the accompanying Biological Evaluation along with the botanical and terrestrial species and will not be included in this report. The S and LR botanical species are discussed below.

Sensitive Species

Eleven Forest Service S botanical species are listed for the Uwharrie National Forest in Montgomery Co. All but three species were ruled out due to lack of suitable habitat.

Nonvascular

1. Scopelophila cataractae (Agoyan cataract moss), prefers copper-rich soils. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
2. Xanthoparmelia monticola (a rock-shield lichen), prefers high elevation rocky summits and mafic glades. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.

Vascular

1. Amorpha schwerinii (Piedmont indigo bush), prefers dry forests. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was not found during surveys. There is an occurrence of this species outside of the 500 ft wide project study corridor (approximately 600 ft from NC 24/27). This species is not further analyzed.
2. Berberis canadensis (American barberry), prefers open forests and glades on basic soils. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
3. Carex impressinervia (ravine sedge), prefers rich alluvial forests. Current records for

Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.

4. Danthonia epilis (bog oatgrass), occurs in seepage bogs and wet seepy power lines. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
5. Eurybia mirabilis (Piedmont aster), prefers rich slopes and bottomlands. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
6. Fothergilla major (large witch-alder), occurs on dry ridge tops, in bluff forests, seepage wetlands, and Piedmont longleaf pine forests. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was found during surveys.
7. Lindera subcoriacea (bog spicebush), prefers streamhead pocosins, white cedar swamps, and seepage slopes. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
8. Solidago plumosa (Yadkin River goldenrod), prefers riverside rocks. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
9. Symphyotrichum georgianum (Georgia aster), prefers open woods and roadsides. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was not found during surveys within National Forest land. This species has been found along NC 24/27 on private land in Stanly County approximately 5-6 miles away from USFS property. This species is not further analyzed.

Locally Rare Species

Twenty-seven Forest Service LR botanical species are listed for the Uwharrie National Forest in Montgomery Co. All but eleven species were ruled out due to lack of suitable habitat.

<u>Vascular</u>

1. Anemone berlandieri (southern anemone), prefers thin circumneutral soil adjacent to rock outcrops. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
2. Baptisia alba var. alba (thick-pod white wild indigo), prefers open woodlands and clearings. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was not found during surveys. This species is not further analyzed.
3. Baptisia australis var. aberrans (eastern prairie blue wild indigo), prefers glades and open forests on basic soils. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
4. Cardamine dissecta (dissected toothwort), prefers rich woods, cove forests, and

bottomlands. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.

5. Cirsium carolinianum (Carolina thistle), occurs in forests and disturbed areas, mostly on basic soils. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was not found during surveys. This species is not further analyzed.
6. Collinsonia tuberosa (Piedmont horsebalm), prefers thin circumneutral soil adjacent to rock outcrops. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
7. Desmodium fernaldii (Fernald's tick-trefoil), prefers dry to mesic hardwood-pine woodlands. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was not found during surveys. This species is not further analyzed.
8. Dichanthelium boreale (northern witch grass), prefers open woods. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was added to the USFS list since the last surveys were done. Surveys will be done for this species closer to the let date for this project.
9. Gillenia stipulata (Indian physic), prefers forests and open woods, mainly over mafic rocks. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
10. Helenium brevifolium (littleleaf sneezeweed), prefers bogs, seeps, riverbanks, and other wet sites. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was not found during surveys. This species is not further analyzed.
11. Helianthus laevigatus (smooth sunflower), prefers shaly open woods and roadsides. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was found during surveys.
12. Matelea decipiens (glade milkvine), prefers thin woodlands over mafic or calcareous rocks. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
13. Parthenium auriculatum (glade wild quinine), prefers glades and openings over mafic rocks. Current records for Montgomery Co. exist. This species was found during surveys.
14. Primula meadia (eastern shooting star), prefers mafic cliffs, dry coniferous woodlands, and associated nutrient-rich alluvial forests. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area. This species is not further analyzed.
15. Pseudognaphalium helleri (Heller's rabbit tobacco), prefers dry woodlands, openings, and glades, especially over mafic rocks. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was not found during

surveys. This species is not further analyzed. There is a population of this species south of NC 24/27 within the National Forest, approximately 800 feet from the road.

16. Quercus austrina (bluff oak), prefers bluff and bottomland forests over circumneutral soil. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
17. Ruellia purshiana (Pursh's wild petunia), prefers glades and woodlands, mostly over mafic or calcareous rocks. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
18. Salvia azurea (azure sage), occurs in sandhills. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
19. Sedum glaucophyllum (cliff stonecrop), prefers rock outcrops, mainly calcareous or mafic. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
20. Smilax hugeri (Huger's carrion-flower), prefers deciduous forests. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was not found during surveys. This species is not further analyzed.
21. Solidago radula (western rough goldenrod), prefers dry woodlands over mafic rocks. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
22. Stachys sp. 1 (undescribed hedge nettle), prefers sandy edges of forested floodplains. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
23. Stewartia ovata (mountain camellia), occurs on bluffs and in forests, usually with rhododendrons. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
24. Tradescantia virginiana (Virginia spiderwort), prefers rich woods on circumneutral soils. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
25. Tridens chapmanii (Chapman's redtop), prefers dry pine and oak woods, and sandy roadsides. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was not found during surveys. This species is not further analyzed.
26. Trifolium reflexum (buffalo clover), prefers open woods and clearings. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was not found during surveys. This species is not further analyzed.
27. Viola walteri (prostrate blue violet), prefers rich cove forests and other rich forests. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.

B. BOTANICAL SURVEYS:

The activity area was surveyed by multiple NCDOT biologists on May 21, 2007, June 26, 2007, October 24, 2007, November 1, 2007, November 2, 2007, November 7, 2007, November 16, 2007, November 19, 2007, and November 21, 2007. Surveys for Schweinitz's sunflower were conducted on October 18-20, 2011. **One population of Endangered (Schweinitz's sunflower, Helianthus schweinitzii), two populations of S (large witch alder, Fothergilla major) one population of LR (glade wild quinine, Parthenium auriculatum) and several populations of LR (smooth sunflower, Helianthus laevigatus) species were detected during the site visits**. An additional population of Schweinitz's sunflower, as well as a population of Georgia aster, were found during the October 2011 survey dates, but these populations are not on USFS property.

C. COMMUNITIES

Four common community types were found in the proposed activity areas: Dry Oak-Hickory Forest, Maintained/Disturbed, Timbered Scrub/Shrub and Loblolly Pine Plantation. The Dry Oak-Hickory Forest is described in detail by Schafale and Weakley (1990). The Maintained/Disturbed Community included a power line right-of-way dominated by grasses and forbes, and ruderal roadside edge. Most of the herbaceous diversity was associated with the Dry Oak-Hickory Forest Community. There were no significant rock outcrops or seeps.

These communities and their associated plant species are described in detail in the Natural Resources Technical Report (NRTR). The Mixed Pine/Hardwood Forest and Mixed Hardwood Forest communities described in the NRTR are similar to the Dry Oak-Hickory Forest described by Schafale and Weakley (1990).

IV. POTENTIAL BOTANICAL EFFECTS TO T and E, S and LR plants.

There are approximately 450 individuals of T and E, S or LR plant species within the 500 ft wide project study corridor. Approximately 100 individuals of the S plant species large witch alder (Fothergilla major), 300 individuals of the LR plant species smooth sunflower (Helianthus laevigatus), 35 individuals of the E plant species Schweinitz's sunflower (Helianthus schweinitzii) and several (less than 20) individuals of the LR plant species glade wild quinine (Parthenium auriculatum) were found in the activity area. It is not anticipated that all of these individuals will be affected or impacted (direct, indirect or cumulative) since construction will not occur throughout the entire 500 ft wide project study corridor. As design is finalized, NCDOT will have a more accurate estimation of how many individuals will be affected. This conclusion is supported by the following:

1) Site specific botanical surveys did reveal the presence of T and E, S or LR species, or habitat that is specific to T and E, S and LR species.

2) Dry Oak-Hickory Forest, Maintained/Disturbed, Timbered Scrub/Shrub, and Loblolly Pine Plantation communities are common community types within the Uwharrie National Forest. The habitats and natural communities found within the activity area have potential for T and E, S and LR plant species occurrence.

Direct effects to the aforementioned species include any effect related to the actual construction of the project. These effects would include: clearing vegetation, placing fill material on top of plants, cut slopes (digging up plants). These direct effects would result in the death of all the individuals of the species in the construction corridor.

Indirect effects include effects that occur after project construction. These effects would include: additional stormwater flowing to where these species occur, additional drainage and the possibility of invasive species increasing in areas that are cleared. Indirect effects may result in the eventual death of individuals of the four species.

V. MITIGATION AND RATIONALE

Since there are known effects to T and E, S and LR plant species, some form of mitigation is recommended. Mitigation options include: transplanting, avoidance (flagging or fencing), using native plantings for erosion control, and habitat enhancement. NCDOT will discuss these options with USFS.

The large witch alder plants can possibly be avoided since they are located approximately 100 ft from the existing road. Smooth sunflower seeds were harvested from the impact area for potential mitigation needs in 2007 and were subsequently transferred to USFS. Seeds from the Schweinitz's sunflower population that may be affected (EO 028) were collected in 2011 and 2012 and stored for potential mitigation.

VI. SUMMARY OF EFFECT

The proposed project will potentially impact E, S and LR plant species. The Biological Conclusion for Schweinitz's sunflower is May Affect, Likely to Adversely Affect. Therefore, formal consultation with the U.S. Fish and Wildlife Service is required.

This project may impact individuals of the three S and LR species (smooth sunflower, large witch alder and glade wild quinine), but will not affect the viability of any of the three species across the forest. Discussions will occur with the USFS to determine avoidance and minimization options.

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Appendix 1. Forest Service Endangered (E), Sensitive (S) and Locally Rare (LR) list of plant species on the Uwharrie National Forest, North Carolina (October 2012).

SCIENTIFIC NAME	FOREST SERVICE STATUS (E, S, LR)	COMMON NAME	NATURAL HABITAT IN WHICH SPECIES OCCUR	LIKELIHOOD OF OCCURRENCE AND CONCLUSION
NONVASCULAR				
Scopelophila cataractae	S	Agoyan cataract moss	Prefers copper-rich soils	Habitat not present
Xanthoparmelia monticola	S	A rock-shield lichen	Prefers high elevation rocky summits and mafic glades	Habitat not present
VASCULAR				
Helianthus schweinitzii	**E**	**Schweinitz's sunflower**	**Open forests, woodlands and roadsides**	**Found during surveys**
Amorpha schwerinii	S	Piedmont indigo bush	Southern Piedmont Dry Oak or Oak-Pine Forest	Habitat present, but not found during surveys
Berberis canadensis	S	American barberry	Woodlands & Glades, typically associated with mafic soils	Habitat not present
Carex impressinervia	S	Ravine sedge	Southern Piedmont Alluvial Forest	Habitat not present
Danthonia epilis	S	Bog oat-grass	Seeps around rock outcrops, granitic domes	Habitat not present
Eurybia mirabilis	S	Piedmont aster	Mesic Mixed Hardwood Forest, Piedmont Basic Mesic Forest	Habitat not present
Fothergilla major	**S**	**Large witch alder**	**Southern Piedmont Dry Oak or Oak-Pine Forest**	**Found during surveys**
Lindera subcoriacea	S	Bog spicebush	Hillside Seepage Bog	Habitat not present
Solidago plumosa	S	Yadkin River goldenrod	Riverside mafic rock outcrops	Habitat not present
Symphyotrichum georgianum	S	Georgia aster	Glades, woodlands, savannas and open areas	Habitat present, but not found during surveys
Anemone berlandieri	LR	Southern anemone	Thin circumneutral soil adjacent to rock outcrops	Habitat not present
Baptisia alba var. alba	LR	Thick-pod white wild indigo	Southern Piedmont Dry Oak or Oak-Pine Forest, Roadsides	Habitat present, but not found during surveys
Baptisia australis var. aberrans	LR	Eastern prairie blue wild indigo	Southern Piedmont Dry Oak or Oak-Pine Forest, Roadsides. This species has been found over limestone of mafic rock	Habitat not present

			influenced plant communities.	
Cardamine dissecta	LR	Dissected toothwort	Southern Piedmont Alluvial Forest	Habitat not present
Cirsium carolinianum	LR	Carolina thistle	Glades, woodlands, and open areas over mafic rock	Habitat present, but not found during surveys
Collinsonia tuberosa	LR	Piedmont horsebalm	Thin circumneutral soil adjacent to rock outcrops	Habitat not present
Desmodium fernaldii	LR	Fernald's tick-trefoil	Dry to mesic hardwood-pine woodland	Habitat present, but not found during surveys
Dichanthelium boreale	LR	Northern witch grass	Open woods	Habitat present. Surveys for this species will be done in 2013.
Gillenia stipulata	LR	Indian physic	Southern Piedmont Dry Oak or Oak-Pine Forest, typically associated with mafic rock	Habitat not present
Helenium brevifolium	LR	Littleleaf sneezeweed	Southern Piedmont Dry Oak or Oak-Pine Forest, Roadsides	Habitat present, but not found during surveys
Helianthus laevigatus	**LR**	**Smooth sunflower**	**Open forests, woodlands and roadsides**	**Found during surveys**
Matelea decipiens	LR	Glade milkvine	Glades and woodlands, over mafic rock	Habitat not present
Parthenium auriculatum	**LR**	**Glade wild quinine**	**Glades, woodlands, and open areas over mafic rock**	**Found during surveys**
Primula meadia	LR	Eastern shooting star	Southern Piedmont Dry Oak or Oak-Pine Forest, Roadsides over mafic substrates	Habitat not present
Pseudognaphalium helleri	LR	Heller's rabbit tobacco	Glades, woodlands, and open areas over mafic rock	Habitat present, but not found during surveys
Quercus austrina	LR	Bluff oak	River bluff	Habitat not present
Ruellia purshiana	LR	Pursh's wild petunia	Southern Piedmont Dry Oak or Oak-Pine Forest over mafic rock substrates	Habitat not present
Salvia azurea	LR	Azure sage	Longleaf pine-oak woodland	Habitat present, but not found during surveys
Sedum glaucophyllum	LR	Cliff stonecrop	Rock outcrops, glades, typically over calcareous or mafic substrate	Habitat not present
Smilax hugeri	LR	Huger's carrion-flower	Mesic mixed hardwood forest, piedmont basic mesic forest	Habitat present, but not found during surveys
Solidago radula	LR	Western Rough Goldenrod	Glades, woodlands, and open areas over	Habitat not present

			mafic rock	
Stachys sp. 1	LR	Undescribed hedge nettle	Sandy alluvium of Southern Piedmont Alluvial Forest	Habitat not present
Stewartia ovata	LR	Mountain Camellia	Bluffs and Forests,usually with Rhododendron	Habitat not present
Tradescantia virginiana	LR	Virginia spiderwort	Basic Mesic Hardwood Forest, woodlands	Habitat present, but not found during surveys
Tridens chapmanii	LR	Chapman's Redtop	Xeric Pine and Oak Forests, sandy roadsides	Habitat present, but not found during surveys
Trifolium reflexum	LR	Buffalo clover	Open forests, woodlands and roadsides	Habitat present, but not found during surveys
Viola walteri	LR	Prostrate Blue Violet	Mesic Hardwoods	Habitat not present

Appendix G

Terrestrial Animal Resources Report for the Proposed Widening of NC 24/27, January 2013

TERRESTRIAL ANIMAL RESOURCES REPORT

FOR THE

PROPOSED WIDENING OF NC 24/27 FROM EAST

OF THE YADKIN-PEE DEE RIVER TO WEST OF SR 1134 (WADEVILLE ROAD)

UWHARRIE NATIONAL FOREST

MONTGOMERY COUNTY

NORTH CAROLINA

TIP # R-2527

WBS ELEMENT 35572.1.1

January 7, 2013

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I. INTRODUCTION

This report identifies the potential effects on terrestrial animal resources of a proposed road widening of NC 24/27 from east of the Yadkin-Pee Dee River to west of SR 1134 (Wadeville Road). The proposed project would affect U.S. Forest Service (USFS) property along the existing and proposed right-of-way. The project area is in the Uwharrie Ranger District, Uwharrie National Forest, Montgomery Co., North Carolina. This project is located in the Piedmont III ecoregion, and the Carolina Slate Belt level IV ecoregion (Griffith et al. 2002). Habitat types found in the proposed activity areas include Mixed Pine-Hardwood Forest, Maintained/Disturbed, Timbered Scrub Shrub, and Pine Plantation. The natural communities are described in detail by Schafale and Weakley (1990). The elevation of the study area is approximately 300 to 600 feet above mean sea level.

Approximately 50 acres of USFS land falls within the 500 ft project study corridor. As design is finalized, this acreage will decrease.

II. SPECIES CONSIDERED AND METHODS

The potential effects on USFS Sensitive (S) and Locally Rare (LR) terrestrial animal species are evaluated. Threatened (T) and Endangered (E) terrestrial animal species are evaluated in the Biological Evaluation report. LR species are usually peripheral or disjunct. Potential direct and indirect effects to S and LR animal species were analyzed in the areas where road widening is proposed. This area is referred to as the activity area and is shown in the attached project map (Figure 1 of Biological Evaluation).

Potentially affected terrestrial animal species were identified by:

1) Reviewing the list of S and LR animal species of the Uwharrie National Forest in Montgomery Co. (Appendix 1) and streamlining this list to include only the species that exist within the habitats found at the project site.

2) Consulting element occurrence records of animals as maintained by the North Carolina Natural Heritage Program (NCNHP) using the most up-to-date information in their database (http://nhpweb.enr.state.nc.us/nhis/public/gmap75_main.phtml)(August 10, 2012).

3) Consulting with NCNHP, NC Wildlife Resources Commission, US Fish and Wildlife Service and USFS personnel who are knowledgeable of the area and its flora.

4) Conducting field surveys in areas designated for ground disturbing activities. Surveys were conducted within the Forest Service property that will be impacted by the proposed road widening.

III. TERRESTRIAL ANIMAL RESOURCES:

A. T&E, SENSITIVE, AND LOCALLY RARE SPECIES

The 2011 revised rare terrestrial species list for Montgomery Co. (Appendix 1) includes nine T&E, S, and LR species: two invertebrates (1 S and 1 LR), one amphibian (1 S), one reptile (2 LR), three birds (2 S and 1 E), and one mammal (1 E). This list of animals that could potentially be impacted by the project was substantially reduced and summarized for the following reasons:

1) Lack of suitable habitat for the species in the project area. This may include elevation and/or forest type.
2) The species has a well-known distribution that does not include the project area or has never been recorded in Montgomery Co.
3) Based on field surveys of potential habitat, no habitat was observed in the activity area.
4) Conclusions were also based on personal communication with experts in the field.

Endangered and Threatened Species

A detailed discussion of the T&E terrestrial species is included in the accompanying Biological Evaluation along with the botanical and aquatic species and will not be included in this report. The S and LR terrestrial species are discussed below.

Sensitive Species

Four Forest Service S terrestrial species are listed for the Uwharrie National Forest in Montgomery Co. All four species were ruled out due to lack of suitable habitat, not being observed during surveys, or occurring outside of the project study corridor.

<u>Insects</u>

1. Cicindela patruela (Northern barrens tiger beetle), occurs in sandy soil in open pine or pine-oak woods. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.

<u>Amphibians</u>

1. Ambystoma talpoideum (mole salamander), breeds in fish-free semipermanent woodland ponds and forages in adjacent woodlands. Suitable habitat was observed in the activity area. This species was observed outside of the 500 ft wide project study corridor (approximately 300 ft from NC 24/27). No impacts to this species are anticipated. This species is not further analyzed.

<u>Birds</u>

1. Haliaeetus leucocephalus (bald eagle), prefers mature forests near large bodies of water for nesting, and lakes and sounds for nesting sites and regular non-breeding sites. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
2. Lanius ludovicia (loggerhead shrike), prefers fields and pastures during the breeding season only. Suitable habitat was observed in the activity area. This species was not observed during surveys. No impacts to this species are anticipated. This species is not further analyzed.

Locally Rare Species
Three Forest Service LR terrestrial species are listed for the Uwharrie National Forest in Montgomery Co. All three species were ruled out due to lack of suitable habitat or not being observed during surveys.

Insects

1. Erynnis martialis (mottled duskywing), occurs in upland woods and wooded edges. The host plant for this species is New Jersey tea (Ceanothus americanus). Suitable habitat was observed in the activity area. This species was not observed during surveys. No impacts to this species are anticipated. This species is not further analyzed.

Reptiles

1. Ophiosaurus attenuatus (slender glass lizard), prefers old fields, wooded edges, and open woods. Suitable habitat was observed in the activity area. This species was not observed during surveys. No impacts to this species are anticipated. This species is not further analyzed.
2. Pituophis melanoleucus melanoleucus (Northern pine snake), prefers dry and sandy woods, mainly in pine/oak sandhills. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.

B. TERRESTRIAL SPECIES SURVEYS
Multiple surveys were conducted for Forest Service S and LR species in the activity area in suitable habitat by NCDOT biologists with varying expertise with invertebrates, amphibians, reptiles, birds, and mammals. Qualifications of principle investigators are included in Biological Evaluation report.

Surveys Dates: 5/21/2007-5/22/2007, 6/25/2007-6/27/2007, 8/16/2007, and 3/20/2008.

A list of all terrestrial species detected can be found in Appendix 2. One S species (mole salamander) was found during the site visits. However, this occurrence is outside of the 500 ft wide project study corridor (approximately 300 ft from NC 24/27).

C. COMMUNITIES
Four common community types were found in the proposed activity areas: Dry Oak-Hickory Forest, Maintained/Disturbed, Timbered Scrub/Shrub and Loblolly Pine Plantation. The Dry Oak-Hickory Forest is described in detail by Schafale and Weakley (1990). Of these communities, the Dry Oak-Hickory Forest Community dominates. This community encompasses the Mixed Pine/Hardwood Forest and Mixed Hardwood Forest communities that are described in the Natural Resources Technical Report (NRTR). Plant species found in this community can be found in the NRTR.

IV. POTENTIAL EFFECTS TO ANIMAL SPECIES OF CONCERN AND SPECIES OF INTEREST

There are no known effects or impacts (direct, indirect or cumulative) to any S or LR animal species. This conclusion is supported by the following:

1) Literature review, North Carolina Natural Heritage Program files, site specific surveys and consultation with experts in the field did not reveal the presence of any S or LR species or habitat that is specific to S and LR species.

2) The community types found at the project site are common community types within the Uwharrie National Forest and the habitats found within this proposal have a low potential for S and LR animal species to occur.

V. MITIGATION AND RATIONALE

Since there are no effects to any T & E, S and LR aquatic species, there is no recommended mitigation.

VI. SUMMARY OF EFFECT

The proposed improvements to R-2527 are not likely to adversely affect any S or FC terrestrial species on the USDA Forest Service S and LR list for Montgomery County due to nonoccurrence in the vicinity of the activity area. No mitigation is recommended. The proposed project will not affect any Federally listed or proposed listed aquatic species. Formal consultation with the U.S. Fish and Wildlife Service is not required.

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WORLD WIDE WEB REFERENCES:

North Carolina Natural Heritage Program: http://www.ncnhp.org/

US Fish and Wildlife Service in NC: http://www.fws.gov/nc-es/es/countyfr.html

OTHER SOURCES:

Bat Blitz data from Southeastern Bat Diversity Network (SBDN), 2004

Appendix 1. List of Forest Service Endangered, S, and LR Terrestrial Animal Species for the Uwharrie National Forest (October 2012). *Species that were detected are listed in bold.

SCIENTIFIC NAME	COMMON NAME	STATUS	NHP-LISTED COMMUNITY OR HABITAT AND RECORDS	LIKELIHOOD OF OCCURRENCE AND CONCLUSION
Mammals				
Puma concolor cougar	Eastern cougar	E	Extensive forests and remote areas	This species is extirpated in N.C. and across most of its range.
Birds				
Picoides borealis	Red-cockaded Woodpecker (RCW)	E	Open Pine woods	NHP has a 1994 record for a cavity tree approximately 2.4 mi south of the study corridor. An inactive cavity tree was observed during surveys from March 8, 2006-March 27, 2007. No RCWs were observed during surveys.
Haliaeetus leucocephalus	Bald Eagle	S	Mature forests near large bodies of water	A known bald eagle nest is located approximately 7000 ft southwest of the

			for nesting	project's west terminus. This nest is located outside the boundaries of the Uwharrie National Forest.
Lanius ludovicianus	Loggerhead Shrike	S	fields and pastures	This species has been observed recently in Montgomery County, but was not detected during surveys on May 22, 2007.
Insects				
Cicindela patruela	Northern barrens tiger beetle	S	Occurs in sandy soil in open pine or pine-oak woods	Suitable habitat was not observed for this species.
Erynnis martialis	Mottled duskywing	LR	Occurs in upland woods and wooded edges; host plant-New Jersey tea (Ceanothus americanus)	This species has been observed recently in Montgomery County, but was not detected during surveys.
Amphibians				
Ambystoma talpoideum	**Mole salamander**	**S**	**Breeds in fish-free semipermanent woodland ponds and forages in adjacent woodlands**	**This species was observed during surveys, but this occurrence is outside of the 500 ft project study corridor.**
Reptiles				
Ophiosaurus attentuatus	Slender glass lizard	LR	Prefers old fields, wooded edges, and open woods	This species was not observed during surveys.
Pituophis melanoleucus melanoleucus	Northern pine snake	LR	Prefers dry and sandy woods, mainly in pine/oak sandhills	This species has been observed recently in Montgomery County, but suitable habitat was not observed for this species.

Forest Service Status (FS) is designated by the U.S. Forest Service. Sensitive and locally rare species are protected under provisions of the National Forest Management Act and directions set forth in FS manual 2670.

STATUS CODE	STATUS	DESCRIPTION
E	Endangered	A taxon which is in danger of extinction throughout all or a significant portion of its range
T	Threatened	A taxon which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range
S	Sensitive	Species at risk of extinction in a portion of their range as evidenced by downward trends in population numbers or density, or downward trends in habitat capability.
FC	Forest Concern	Species not at risk of extinction, even in a portion of their range, and not showing a downward population trend over their range as a whole within North Carolina.

Appendix 2: Terrestrial Animal Detections for R-2527

This list represents animal detections during surveys in the activity area and areas immediately adjacent. It is not exhaustive. Other species may exist in the project area.

Insects:

Fawn darner	Boyeria vinosa
Ebony jewelwing	Calopteryx maculata
Painted lady	Vanessa cardui
Summer azure	Celastrina neglecta
Eastern tiger swallowtail	Papillio glaucus

Birds:

Black vulture	Coragyps atratus
Turkey vulture	Cathartes aura
Red-shouldered hawk	Buteo lineatus
Red-tailed hawk	Buteo jamaicensis
Rock pigeon	Columba livia
Mourning dove	Zenaida macroura
Yellow-billed cuckoo	Coccyzus americanus
Great horned owl	Bubo virginianus
Whip-poor-will	Caprimulgus vociferus
Chimney swift	Chaetura pelagica
Ruby-throated hummingbird	Archilochus colubris
Red-bellied woodpecker	Melanerpes carolinus
Downy woodpecker	Picoides pubescens
Pileated woodpecker	Dryocopus pileatus
Eastern wood-pewee	Contopus virens
Acadian flycatcher	Empidonax virescens
Eastern phoebe	Sayornis phoebe
Great crested flycatcher	Myiarchus crinitus
White-eyed vireo	Vireo griseus
Yellow-throated vireo	Vireo flavifrons
Red-eyed vireo	Vireo olivaceus
Blue jay	Cyanocitta cristata
American crow	Corvus brachyrhynchos
Fish crow	Corvus ossifragus
Carolina chickadee	Poecile carolinensis
Tufted titmouse	Baeolophus bicolor
White-breasted nuthatch	Sitta carolinensis
Brown-headed nuthatch	Sitta pusilla
Carolina wren	Thryothorus ludovicianus
Blue-gray gnatcatcher	Polioptila caerulea

Eastern bluebird	Sialia sialis
Wood thrush	Hylocichla mustelina
American robin	Turdus migratorius
Brown thrasher	Toxostoma rufum
European starling	Sturnus vulgaris
Northern parula	Parula americana
Yellow-throated warbler	Dendroica dominica
Pine warbler	Dendroica pinus
Prairie warbler	Dendroica discolor
Black-and-white warbler	Mniotilta varia
Ovenbird	Seiurus aurocapilla
Northern waterthrush	Seiurus noveboracensis
Common yellowthroat	Geothlypis trichas
Hooded warbler	Wilsonia citrina
Yellow-breasted chat	Icteria virens
Summer tanager	Piranga rubra
Scarlet tanager	Piranga olivacea
Eastern towhee	Pipilo erythrophthalmus
Field sparrow	Spizella pusilla
Song sparrow	Melospiza melodia
Northern cardinal	Cardinalis cardinalis
Indigo bunting	Passerina cyanea
Common grackle	Quiscalus quiscula
Brown-headed cowbird	Molothrus ater
American goldfinch	Carduelis tristis

Mammals:

Big brown bat	Eptesicus fuscus
Red bat	Lasiurus borealis
Evening bat	Nycticeius humeralis
Eastern pipistrelle	Pipistrellus subflavus
White-tailed deer	Odocoileus virginianus

Amphibians and Reptiles:

Upland chorus frog	Pseudacris feriarum
Gray treefrog	Hyla chrysoscelis
Eastern narrowmouth toad	Gastrophryne carolinensis
Three-lined salamander	Eurycea guttolineata
Mole salamander	Ambystoma talpoideum
Northern dusky salamander	Desmognathus fuscus
Eastern box turtle	Terrapene carolina

Black rat snake	Elaphe obsoleta
Black racer	Coluber constrictor

Appendix 2: Terrestrial Animal Detections for R-2527

This list represents animal detections during surveys in the activity area and areas immediately adjacent. It is not exhaustive. Other species may exist in the project area.

Insects:

Fawn darner Boyeria vinosa

Ebony jewelwing	Calopteryx maculata
Painted lady	Vanessa cardui
Summer azure	Celastrina neglecta
Eastern tiger swallowtail	Papillio glaucus

Birds:

Black vulture	Coragyps atratus
Turkey vulture	Cathartes aura
Red-shouldered hawk	Buteo lineatus
Red-tailed hawk	Buteo jamaicensis
Rock pigeon	Columba livia
Mourning dove	Zenaida macroura
Yellow-billed cuckoo	Coccyzus americanus
Great horned owl	Bubo virginianus
Whip-poor-will	Caprimulgus vociferus
Chimney swift	Chaetura pelagica
Ruby-throated hummingbird	Archilochus colubris
Red-bellied woodpecker	Melanerpes carolinus
Downy woodpecker	Picoides pubescens
Pileated woodpecker	Dryocopus pileatus
Eastern wood-pewee	Contopus virens
Acadian flycatcher	Empidonax virescens
Eastern phoebe	Sayornis phoebe
Great crested flycatcher	Myiarchus crinitus
White-eyed vireo	Vireo griseus
Yellow-throated vireo	Vireo flavifrons
Red-eyed vireo	Vireo olivaceus
Blue jay	Cyanocitta cristata
American crow	Corvus brachyrhynchos
Fish crow	Corvus ossifragus
Carolina chickadee	Poecile carolinensis
Tufted titmouse	Baeolophus bicolor
White-breasted nuthatch	Sitta carolinensis
Brown-headed nuthatch	Sitta pusilla
Carolina wren	Thryothorus ludovicianus
Blue-gray gnatcatcher	Polioptila caerulea
Eastern bluebird	Sialia sialis
Wood thrush	Hylocichla mustelina
American robin	Turdus migratorius
Brown thrasher	Toxostoma rufum
European starling	Sturnus vulgaris
Northern parula	Parula americana
Yellow-throated warbler	Dendroica dominica

Pine warbler	Dendroica pinus
Prairie warbler	Dendroica discolor
Black-and-white warbler	Mniotilta varia
Ovenbird	Seiurus aurocapilla
Northern waterthrush	Seiurus noveboracensis
Common yellowthroat	Geothlypis trichas
Hooded warbler	Wilsonia citrina
Yellow-breasted chat	Icteria virens
Summer tanager	Piranga rubra
Scarlet tanager	Piranga olivacea
Eastern towhee	Pipilo erythrophthalmus
Field sparrow	Spizella pusilla
Song sparrow	Melospiza melodia
Northern cardinal	Cardinalis cardinalis
Indigo bunting	Passerina cyanea
Common grackle	Quiscalus quiscula
Brown-headed cowbird	Molothrus ater
American goldfinch	Carduelis tristis

Mammals:

Big brown bat	Eptesicus fuscus
Red bat	Lasiurus borealis
Evening bat	Nycticeius humeralis
Eastern pipistrelle	Pipistrellus subflavus
White-tailed deer	Odocoileus virginianus

Amphibians and Reptiles:

Upland chorus frog	Pseudacris feriarum
Gray treefrog	Hyla chrysoscelis
Eastern narrowmouth toad	Gastrophryne carolinensis
Three-lined salamander	Eurycea guttolineata
Mole salamander	Ambystoma talpoideum
Northern dusky salamander	Desmognathus fuscus
Eastern box turtle	Terrapene carolina
Black rat snake	Elaphe obsoleta
Black racer	Coluber constrictor

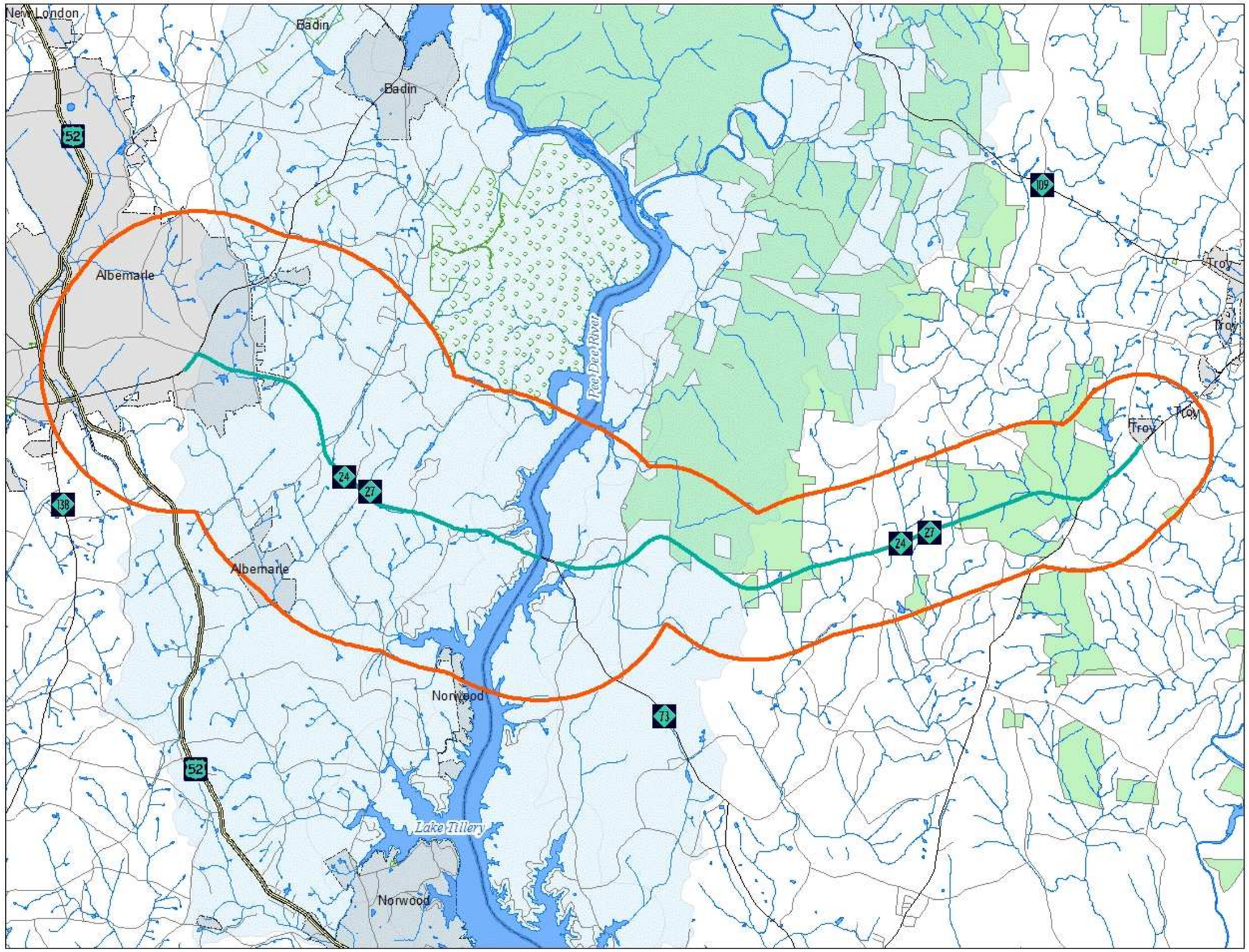


Figure 1
R-2527 & R-2530B
Future Land Use Study Area
August 2018

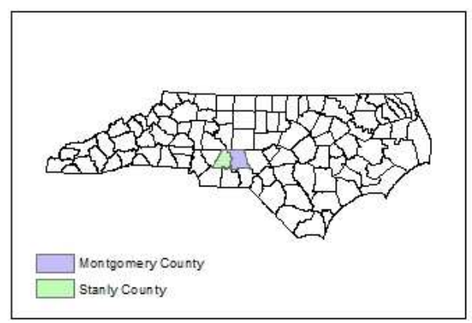
Legend

- R-2527 & R-2530
- FLUSA
- US Route
- NC Route
- Secondary Route
- Water Supply Watershed
- Water Bodies
- Morrow Mountain State Park
- Uwharrie NationalForest
- Municipal Boundaries
- County Boundaries

0 0.5 1 2 Miles

N

MAP SOURCE: NORTH CAROLINA DEPARTMENT OF TRANSPORTATION



North Carolina Department of Natural and Cultural Resources

State Historic Preservation Office

Ramona M. Bartos, Administrator

Governor Roy Cooper
Secretary Susi H. Hamilton

Office of Archives and History
Deputy Secretary Kevin Cherry

December 20, 2018

MEMORANDUM

TO: Matt Wilkerson
Office of Human Environment
NCDOT Division of Highways

FROM: Ramona M. Bartos RMB for Ramona M. Bartos

SUBJECT: Memorandum of Agreement for R-2530, B-4974, and R-2527,
Stanly and Montgomery Counties, ER 04-0086, CH07-0295 & ER 02-7546

Thank you for your December 13, 2018, letter transmitting the Memorandum of Agreement for the above-referenced undertaking(s) that will adversely affect six archaeological sites that have been determined eligible for listing in the National Register of Historic Places. Dr. Kevin Cherry, State Historic Preservation Officer, has signed the agreement, which we return for execution and filing with the Advisory Council on Historic Preservation. We look forward to receipt of a fully executed copy for our records and to implementation of the mitigation measured outline in the agreement.

The above comments are made pursuant to Section 106 and 110 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Thank you for your cooperation and consideration. If you have questions concerning the above comment, contact Renee Gledhill-Earley, environmental review coordinator, at 919-814-6579 or environmental.review@ncdcr.gov. In all future communication concerning this project, please cite the above referenced tracking number.

Attached: MOA

cc: Felix Davila, FHWA, Felix.Davila@dot.gov

MEMORANDUM OF AGREEMENT
AMONG THE
FEDERAL HIGHWAY ADMINISTRATION,
THE UNITED STATES FOREST SERVICE,
THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION,
THE CATAWBA INDIAN NATION,
AND
NORTH CAROLINA STATE HISTORIC PRESERVATION OFFICER
FOR THE
IMPROVEMENTS TO NC 24/NC 27 FROM NC 740 IN ALBEMARLE TO THE PROPOSED TROY BYPASS,
STANLY & MONTGOMERY COUNTIES, NORTH CAROLINA,
TIP NOS. R-2530B, B-4974, & R-2527,
FEDERAL AID NO. STBG-0024(083) R-2530B

WHEREAS, the Federal Highway Administration (FHWA) has determined that the proposed improvements to NC 24/27 from NC 740 in Albemarle to the proposed Troy Bypass (the Undertaking) will have an adverse effect upon archaeological sites 31MG1806, 31MG1629, 31MG321, and the archaeological district composed of sites 31ST195, 31ST196, and 31ST204/204** which have been determined eligible for the National Register of Historic Places (NRHP) under Criterion D; and

WHEREAS, the FHWA has consulted with the North Carolina State Historic Preservation Officer (SHPO), pursuant to 36 CFR 800, regulations implementing Section 106 of the National Historic Preservation Act (16 U.S.C. 470f); and

WHEREAS, the FHWA has notified the Advisory Council on Historic Preservation (Council) of the adverse effect to archaeological sites 31MG1806, 31MG1629, 31MG321, and the archaeological district composed of sites 31ST195, 31ST196, and 31ST204/204** and it has declined to comment or participate in the consultation; and

WHEREAS, the North Carolina Department of Transportation (NCDOT)has participated in the consultation and has been invited by the FHWA to be a signatory to this Memorandum of Agreement (MOA); and

Whereas the Catawba Indian Nation and the United States Forest Service (USFS) have been notified of the adverse effects and invited to participate in the consultation and concur in this MOA; and

WHEREAS, the consulting parties agree that the recovery of significant information from archaeological sites 31MG1806, 31MG1629, 31MG321, and the archaeological district composed of sites 31ST195, 31ST196, and 31ST204/204** may be done in accordance with the published guidance; and

WHEREAS, the consulting parties agree that it is in the public interest to expend funds for the recovery of significant information from archaeological sites 31MG1806, 31MG1629, 31MG321, and the archaeological district composed of sites 31ST195, 31ST196, and 31ST204/204** to mitigate the adverse effects of the project; and

WHEREAS, to the best of our knowledge and belief, no human remains, associated or unassociated funerary objects or sacred objects, or objects of cultural patrimony as defined in the Native American Graves Protection and Repatriation Act (25 U.S.C. 3001), are expected to be encountered in the archaeological work;

NOW, THEREFORE, the FHWA, NCDOT, and the SHPO agree that the Undertaking shall be implemented in accordance with the following stipulations in compliance with the National Historic Preservation Act of 1966, as amended (16 U.S.C. 470).

I. Stipulations

1. The NCDOT, in consultation with the SHPO, USFS, and the Catawba Indian Nation, will develop Data Recovery Plans (DRPs) for archaeological sites 31MG1806, 31MG1629, 31MG321, and the archaeological district composed of sites 31ST195, 31ST196, and 31ST204/204** which will be affected by the subject project.
2. The NCDOT will ensure that the DRPs will be implemented after Right-of-Way is acquired and prior to construction activities within the site location as shown in the DRPs.
3. Upon completion of the Data Recovery efforts, the NCDOT will prepare and forward a Management Summary to the SHPO, USFS, and the Catawba Indian Nation detailing the results of the Data Recovery field investigations. The Management Summary will contain sufficient information to demonstrate that the field investigation portion of the DRP has been implemented.
4. Upon receipt of the Management Summary, the SHPO, USFS, and the Catawba Indian Nation will respond within ten (10) days to the recommendations contained within the document.
5. Upon acceptance of the recommendations contained in the Management Summary, the SHPO, USFS, and the Catawba Indian Nation will issue the NCDOT documentation that the Data Recovery field investigations have been completed.
6. The analysis and report preparation, detailing archaeological work conducted at sites 31MG1806, 31MG1629, 31MG321, and the archaeological district composed of sites 31ST195, 31ST196, and 31ST204/204**, will be completed by the NCDOT, or their consultants, within eighteen (18) months after completion of the fieldwork.

II. Unanticipated Discovery

In accordance with 36 CFR 800.11(a), if NCDOT identifies additional cultural resource(s) during construction and determine them to be eligible for the NRHP, all work will be halted within the limits of the NRHP-eligible resource(s) and the FHWA and SHPO contacted. If after consultation with the Signatory and Concurring Party additional mitigation is determined necessary, the NCDOT, in consultation with the Signatory and Concurring Party, will develop and implement appropriate protection/mitigation measures for the resource(s). Inadvertent or accidental discovery of human remains will be handled in accordance with North Carolina General Statutes 65 and 70.

III. Dispute Resolution

Should any Signatory object within (30) days to any plans or documentation provided for review pursuant to this Agreement, the FHWA shall consult with the objecting party(ies) to resolve the objection. If the FHWA or objecting party(ies) determines that the objection cannot be resolved,

the FHWA will forward all documentation relevant to the dispute to the Advisory Council on Historic Preservation (Council). Within thirty (30) days after receipt of all pertinent documentation, the Council will either:

A. Provide the FHWA with recommendations, which the FHWA will take into account in reaching a final decision regarding the dispute, or
B. Notify the FHWA that it will comment pursuant to 36 CFR Section 800.7(c) and proceed to comment. Any Council comment provided in response to such a request will be taken into account by the FHWA, in accordance with 36 CFR Section 800.7 (c) (4) with reference to the subject of the dispute.

Any recommendation or comment provided by the Council will be understood to pertain only to the subject of the dispute; the FHWA's responsibility to carry out all of the actions under this agreement that are not the subject of the dispute will remain unchanged.

IV. Amendments

If any Signatory to this MOA believes that its terms cannot be carried out, or that an amendment to the terms must be made, that party(ies) shall immediately consult with the other party(ies) to develop amendments in accordance with 36 CFR 800.6(c)(7). If an amendment cannot be agreed upon, the dispute resolution process set forth in Section III will be followed.

V. Termination

Any Signatory to this MOA may terminate the agreement by providing notice to the other party(ies), provided that the party(ies) will consult during the period prior to termination to seek agreement on amendments or other actions that would avoid termination. Termination of this MOA will require compliance with 36 CFR 800. This MOA may be terminated by the execution of a subsequent MOA that explicitly terminates or supersedes its terms.

VI. Duration

Unless terminated as detailed above, this MOA will be in effect until FHWA, in consultation with the other Signatories, determines that all terms have satisfactorily been fulfilled or if NCDOT is unable or decides not to construct the Undertaking.

Execution of this Memorandum of Agreement by the FHWA and the North Carolina SHPO, its subsequent filing with the Council and implementation of its terms evidence that FHWA, has afforded the Council an opportunity to comment on the Undertaking, and that the FHWA, has taken into account the effects of the Undertaking on the aforementioned archaeological sites.

AGREE:

By: _____ Date: 12/13/18
Federal Highway Administration

By: _____ Date: 12/19/18
North Carolina State Historic Preservation Officer

By: _____ Date: 12/13/2018
North Carolina Department of Transportation

CONCUR:

By: _____ Date: 1/30/19
United States Forest Service

By: _____ Date: _____
Catawba Indian Nation

MEMORANDUM OF AGREEMENT
AMONG THE
FEDERAL HIGHWAY ADMINISTRATION,
THE UNITED STATES FOREST SERVICE,
THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION,
THE CATAWBA INDIAN NATION,
AND
NORTH CAROLINA STATE HISTORIC PRESERVATION OFFICER
FOR THE
IMPROVEMENTS TO NC 24/NC 27 FROM NC 740 IN ALBEMARLE TO THE PROPOSED TROY BYPASS,
STANLY & MONTGOMERY COUNTIES, NORTH CAROLINA,
TIP NOS. R-2530B, B-4974, & R-2527,
FEDERAL AID NO. STBG-0024(083) R-2530B

Execution of this Memorandum of Agreement by the FHWA and the North Carolina SHPO, its subsequent filing with the Council and implementation of its terms evidence that FHWA, has afforded the Council an opportunity to comment on the Undertaking, and that the FHWA, has taken into account the effects of the Undertaking upon archaeological site 31WA1997/1997.

FILED:

By: _____ Date: _____
Advisory Council on Historic Preservation

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 3, 2019

In Reply Refer To:
HDA-NC

Ms. Caitlin Rogers
Catawba Indian Nation
Tribal Historic Preservation Office
Rock Hill, SC 29730

Dear Ms. Rogers:

Included via E-mail for signature is the Memorandum of Agreement (MOA) for the improvements to NC 24/NC 27, from NC 740 in Albemarle to the proposed Troy Bypass, Stanly and Montgomery Counties, NC TIP Projects R-2530B, B-4974, and R-2527. Once the Catawba Indian Nation has signed the MOA please return to me via e-mail no later than 30 days from our transmittal of the MOA via e-mail. A copy of the fully executed MOA will be e-mailed to you once it has been filed with the Advisory Council on Historic Preservation.

This MOA is to resolve the adverse effect that the highway project will have upon archaeological sites 31MG1806, 31MG1629, 31MG321, and the archaeological district composed of sites 31ST195, 31ST196, and 31ST204/204** which have been determined eligible for the National Register of Historic Places (NRHP) under Criterion D.

Should you have any questions, please contact Felix Davila at (919) 747-7021 or at Felix.Davila@dot.gov.

Sincerely,

Felix Davila

For John F. Sullivan, III, P.E.
Division Administrator

Attachment: MOA

ec: Mr. Shane C. Petersen, NCDOT
Ms. Beverly Robinson, NCDOT
Mr. Matt T. Wilkerson, NCDOT

United States Department of the Interior

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

April 19, 2019

Jeff Hemphill
North Carolina Department of Transportation
Environmental Analysis Unit
1598 Mail Service Center
Raleigh, North Carolina 27699-1598

Dear Mr. Hemphill:

This letter is in response to your email of April 11, 2019 which provided the U.S. Fish and Wildlife Service (Service) with the biological conclusion of the North Carolina Department of Transportation that the proposed widening of NC 24/27 from NC 73 to the Troy Bypass in Montgomery County (STIP No. R-2527) may affect, but is not likely to adversely affect the federally endangered Schweinitz's sunflower (*Helianthus schweinitzii*). The following response is provided in accordance with Section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531-1543).

According to information provided, the project area has been surveyed multiple times for Schweinitz's sunflower, with the most recent survey being October 18, 2017. No Schweinitz's sunflowers were observed. Based on the survey results and other available information, the Service concurs with your conclusion that the proposed action may affect, but is not likely to adversely affect Schweinitz's sunflower. We believe that the requirements of Section 7(a)(2) of the ESA have been satisfied. 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:

Andy Williams, USACE, Wake Forest, NC

UWHARRIE NATIONAL FOREST
HWY 24/27 EXPANSION PROJECT
OVERVIEW MAP 1 OF 3

NOTE: We prefer not to have any fence along the FS property line.

If there has to be fencing along the FS property it will need to be a non-combustible fence/guard rail stipulation.

We've identified places where access is needed and or maintain the current access points.

Olive Jones
GIS Editor
05/15/2019

0 2 4 Miles

- Access Pts Needed
- Fence
- R2527 Expanded Study Area
- Rail Roads
- Roads
- Uwharrie Burn Blocks
- FS Land
- Water
- Private

N

UWHARRIE NATIONAL FOREST
HWY 24/27 EXPANSION PROJECT
MAP 3 OF 3

NOTE: We prefer not to have any fence along the FS property line.

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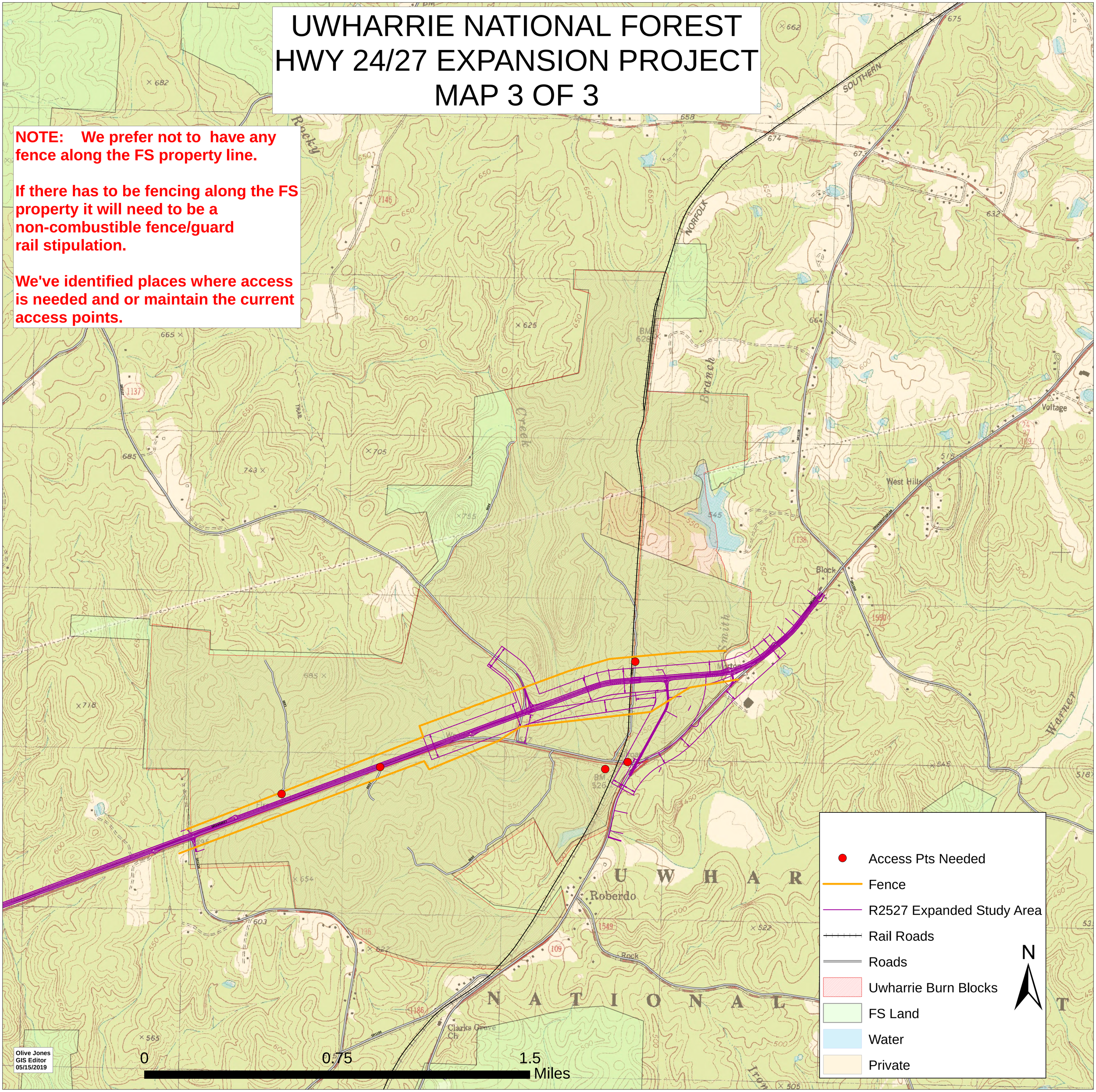

Olive Jones
GIS Editor
05/15/2019

UWHARRIE NATIONAL FOREST
HWY 24/27 EXPANSION PROJECT
MAP 3 OF 3

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UWHARRIE NATIONAL FOREST

Access Pts Needed
HWY 24/27 Trail Head Parking
Fence
R2527 Expanded Study Area
Rail Roads
Trails
Roads
Uwharrie Burn Blocks
FS Land
Water
Private

N

0 0.75 1.5 Miles

Olive Jones
GIS Editor
05/15/2019