

**National Culvert Removal, Replacement, and Restoration Aquatic Organism
Passage Grant Program
Fiscal Year 2023**

For

Division 2 Replacement of Structure Nos. 060032 and 060031

Over Bond Creek & an Unnamed Tributary to Bond Creek

Spring Creek Road

State Road 1912

Beaufort County, NC

Submitted By:

North Carolina Department of Transportation



February 2023

FY 2022 National Culvert Removal, Replacement, and Restoration Grant Program (Culvert AOP Program)

The DOT provides this FY 2022 Culvert AOP Program Application Template to assist project sponsors who intend to apply for a Culvert AOP Program FY 2022 grant. Interested eligible applicants should read the FY 2022 Culvert AOP Notice of Funding Opportunity (NOFO) in its entirety and especially where noted in this application template to submit eligible and competitive applications.

This is a copy of the official Application Template that is found on Grants.gov.

Basic Project Information

Basic Project Information – Provide a narrative for the below items on basic details pertinent to the project, including project name, description, location, involved parties, etc. Items in this section will be used to determine grant program eligibility as detailed in Section C of the NOFO.

1. Project Name	Replacement of Structure Nos. 060032 and 060031 Over Bond Creek & an Unnamed Tributary (UT) to Bond Creek on Spring Creek Road (SR 1912) in Beaufort County, North Carolina to Improve Aquatic Organism Passage
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Eligibility Criteria

<p>2. Project Description</p> <p style="text-align: center;">See Narrative below for further details</p>	<p>The culvert replacement project (Project) for which Culvert AOP Program funding is being requested occurs in Beaufort County, which is within the NCDOT Highway Division 2. The project will involve upgrading two culverts to a single box culvert design that will improve anadromous fish passage (AOP). The existing structures over Bond Creek and the UT to Bond Creek are double-barrel 119" x 67" corrugated aluminum structural plate pipe arch (CASPPA) culverts, with a streambed to crown clearance of 10'. The pipes on both of these culverts are deteriorated and lack headwalls.</p> <p>The recommended replacement structure will reduce the amount of pipe openings from two to one that will be much larger and have both headwalls and endwalls to facilitate possible fish passage.</p> <p>The Project will significantly improve aquatic habitat connectivity to a combined approximately 6.19 linear kilometers (km) (20,299 linear feet) in the Bond Creek watershed (1.17 km in Bond Creek, 5.02 km in UT Bond Creek). Additionally, the replacement structures will reduce flooding potential and stream velocity through the passage.</p>
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<p>3. Which of the following selection priorities does your project meet?</p> <p>See Narrative 2 for further details</p>	<p><i>(Check all that apply)</i></p> <p><input type="checkbox"/> Anadromous fish listed as endangered or threatened under the Endangered Species Act.</p> <p>Critical Habitat for the Atlantic Sturgeon is identified in the Pamlico River, which Bond Creek is a tributary to. Potential small, indirect benefits for the Atlantic Sturgeon and Shortnose Sturgeon are outlined in Narrative 2.</p> <p><input type="checkbox"/> Anadromous fish identified by NMFS or USFWS that could reasonably become listed as a Federally endangered species or a threatened species.</p> <p>While in 2013 and again in 2019 the NMFS determined that listing of river herring under the endangered species act was “not warranted”, this determination was based in part by the various management and regulatory protective initiatives that are in place. Additionally, the status assessment defined “the foreseeable future” for river herring as 12–18-year time frame (i.e., out to 2030-2036). Thus, it is possible that over this time the conservation and management initiatives prove to not be adequate to offset the various threats to the species. As such, it is very possible that one, or both species of river herring will warrant listing under the ESA in the future. More detailed information on this process is provided in Narrative 2.</p> <p><input checked="" type="checkbox"/> Anadromous fish identified by NMFS or USFWS as prey for endangered species, threatened species, or protected species.</p> <p><input checked="" type="checkbox"/> Anadromous fish identified by NMFS or USFWS as climate resilient stock. See Section H of the NOFO.</p> <p><input checked="" type="checkbox"/> Project that opens up more than 200 meters of upstream habitat for anadromous fish before the end of the natural habitat.</p>
<p>4. Which anadromous species does your project propose to benefit by meaningfully improving or restoring fish passage?</p>	<p><i>Alosa aestivalis</i> - Blueback Herring <i>Alosa pseudoharengus</i> – Alewife <i>Morone saxatilis</i> – Striped Bass</p> <p>See Narrative below for further details</p>
<p>5. Briefly describe how the proposed project benefits the anadromous species in item 4 above?</p>	<p>Full description found in Narrative below.</p>
<p>6. Culvert AOP Program Request amount:</p>	<p>Exact amount in year-of-expenditure dollars: \$ <u>892,000.00</u></p>

7. Total Project Cost:	Estimate in year-of-expenditure dollars: \$ <u>1,115,000.00</u>
8. Who is the Project Sponsor?	<p><i>(Name and identify which eligible applicant category applies. Select from the below statutory eligible applicants)</i></p> <p><input checked="" type="checkbox"/> State – North Carolina Department of Transportation</p> <p><input type="checkbox"/> Unit of local government</p> <p><input type="checkbox"/> Indian Tribe</p>
9. If a State or a unit of local government, indicate the percentage, type, and source of non-Federal match.	20% non-Federal matching funds will be provided from NCDOT Division 2 Maintenance funds.

10. Eligible Facility Type:	<p><i>(Identify which eligible structure that the proposed project addresses. Select from the below statutory eligible applicants)</i></p> <p><input checked="" type="checkbox"/> Culvert – This project will include two adjacent culverts.</p> <p><input type="checkbox"/> Weir</p>
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Additional Project Information

11. State(s) and/or tribal land in which the project is located:	Beaufort County, North Carolina
12. If a joint application, please provide organizational names of sub-recipients that will receive funds and other key partners.	N/A
13. Identify the Lead Applicant (who will also be the applicant responsible for administration of Culvert AOP Program funds if application is selected and the point of contact for the application).	<p>Lead Applicant North Carolina Department of Transportation 1536 Mail Service Center, Raleigh NC, 27699-1536</p> <p>Point of Contact Kevin Bowen, PE, Eastern Deputy Chief Engineer kgbowen@ncdot.gov</p>
14. What are the proposed design standards and specifications for ensuring resulting infrastructure provides for the safety of the traveling public over the service life of that infrastructure?	<p>Culvert and associated roadway design will follow the design practices laid out in NCDOT’s Roadway Design Manual, Structures Management Design Manual, and the NCDOT Guidelines for Drainage Studies and Hydraulic Design (2022).</p> <p>The objective of NCDOT Hydraulic design standards is to provide a 25 Year LOS for SR routes and a 50 Year LOS for NC, US, and Interstate routes, while also considering impacts for the 100 Year event, especially if in FEMA flood zones. If these design standards cannot be met (e.g., existing road overtops in less than the design year and limitations in raising road grade, limitations in structure replacement size due to road grade constraints, etc.) then the desire is to at least maintain existing LOS or improve relative to existing conditions. Preliminary design indicates that the recommended structure for the Bond Creek sites reduce backwater effects and reduce velocities while maintaining existing roadway grades.</p>

Location Information

<p>A. Location of eligible facility and project area:</p>	<p>SR 1912, Spring Creek Road, Beaufort County, North Carolina.</p>
<p>B. Provide name and description of the waterway and watershed.</p>	<p>Bond Creek is a tributary of the Pamlico River. As presented in the Project Description, the Tar River originates in Person County NC, and consists of a 15923.25 square kilometer (km²) (6,148 square mile (mi²)) watershed within North Carolina’s Piedmont and Atlantic Coastal Plain. As the Tar River becomes brackish, it becomes the Pamlico River near the city of Washington, North Carolina. Bond Creek’s confluence with the Pamlico River is located only approximately 18.51 RKM (11.5 mi) from where the river reaches the Pamlico Sound, an estuary that is nearly 160.9 km (100 mi) from north to south, and as wide as 40.23 km (25 mi) from east to west (Narrative 3).</p> <p>The Bond Creek watershed is reflective of much of North Carolina’s coastal region. Before reaching its confluence with the Pamlico River, Bond Creek has a confluence with South Creek before flowing into the Pamlico River (4.8 km downstream of the project area). The land use of the watershed is made up of more than half (51.4%) evergreen forest and woody wetlands, with the remainder split primarily by cultivated crop land (20.5%) and open water. The watershed upstream of the project areas has a higher percentage of cultivated crops (37.2%), showing that a higher percentage of the headwaters in Bond Creek are susceptible to agricultural runoff than the remainder of the watershed.</p> <p>Nearly 30% of the watershed of Bond Creek/UT Bond Creek upstream of the Project culverts is comprised of woody wetlands, which function to retain and regulate flows from the agricultural areas that make up much of the remaining watershed (USGS StreamStats, 2023). Therefore, Bond Creek and its floodplain is essential to safeguard the surrounding areas from flooding. Based on the First Street Foundation Flood Model Flood Factor Tool (Find Your Property's Climate Risks - Homepage Risk Factor), the city of Aurora has a major risk of severe flooding, with approximately 99% of properties subject to flooding. Likewise, the properties along Spring Creek Road near the Project crossing of Bond Creek have a “Major” risk of severe flooding. The proposed replacement structure will further the system’s ability to buffer the potential for severe flooding.</p>
<p>C. Provide Census FIPS codes or other geographic code identifiers for the facility location and project area.</p>	<p>Beaufort County NC Census FIPS Code - 37013</p>

<p>D. Provide geographic coordinates for the project.</p>	<p>Bond Creek Culvert Coordinates: 35.313008, -76.712272 UT Bond Creek Culvert Coordinates: 35.314512, -76.711022</p>
<p>E. Is the project located (entirely or partially) in a Federally designated community development zone?</p>	<p>The project area is not located within a Federally Designated Community Development Zone. However, it is located 9.2 km from neighboring Pamlico County that is identified in part as an Opportunity Zone (ID #: 37137950102).</p> <p>The project area is not located within a Federally Designated Empowerment Zone or Promise Zone. However, there are no Designated Empowerment/Promise Zones in North Carolina.</p> <p>The project area is located in Block Group 370139308001, has a Long-Term Vacancy rate of 9.43%, and a Maximum Poverty/ELI Value of 19.6.</p>

<p>F. Does the eligible project benefit an economically disadvantaged community or an area of persistent poverty? (See Section H of the NOFO – Definitions)</p>	<p>The Project is located in a Historically Disadvantaged Community Tract (# 9308), which makes up most of the area around the town of Aurora in Beaufort County.</p> <p>Beaufort County’s overall poverty rate is 20.1%, while Aurora has an estimated poverty rate of 41.72%.</p>
<p>G. Are the eligible facility and project area located on Federally recognized Tribal land?</p>	<p><input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p> <p>The Project area is not located within a FRTL. However, the Pamlico Indian Tribe historically lived along the Pamlico River in Beaufort County. The Pamlico Indian Tribe is not currently recognized on the state or federal level. With that being said, the Pamlico River/Sound are named after this Tribe’s influence on the area.</p>
<p>H. Is the project located in a rural area? (See Section H of the NOFO – Definitions)</p>	<p><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>The US Census Bureau uses the population threshold of 50,000 as a defined urbanized area. In 2021, Beaufort County had a total population of 44,468, with only 450 people living in Aurora, the closest town to the project area. The largest town in Beaufort County is Washington, which is situated at the mouth of the Tar River. The county seat of Beaufort County, Washington, has a population of 9,705.</p>

Project Costs

Project Costs – Provide information detailing the costs associated with the project. These costs will be used to determine the eligible award amount, how the project supports financial goals of the program, and other factors. More information on this section can be found in Section D.2.II of the NOFO.

<p>1. Culvert AOP Program Request Amount:</p>	<p>Exact amount in year-of-expenditure dollars: \$ <u>892,000.00</u></p>
<p>2. Estimated Total of Other Federal funding (excluding Culvert AOP Program request):</p>	<p>Estimate in year-of-expenditure dollars: \$ <u>0.00</u></p>

<p>3. Estimated Other Federal funding (excluding Culvert AOP Program) further detail:</p>	<p><i>(List each Federal Program and identify Formula or Discretionary, and the amount for each Federal Program, e.g.:</i> <i>Program: <u>N/A</u></i> <i>Amount: <u>\$ 0.00</u></i></p>
<p>4. Estimated non-Federal funding:</p>	<p><i>(Identify each source of non-Federal funding and estimated amount, e.g.</i> <i>Source: <u>NCDOT Division 2 Maintenance Funds</u></i> <i>Amount: <u>\$ 223,000.00</u></i></p>
<p>5. Future Eligible Project Cost (Sum of Culvert AOP Program request, Other Federal Funds, and non-Federal Funds, above):</p>	<p>Estimate in year-of-expenditure dollars: <u>\$1,115,000.00</u></p>
<p>6. Previously incurred project costs (if applicable):</p>	<p>Estimate in year-of-expenditure dollars: \$ 0.00</p>
<p>7. Total Project Cost (Sum of 'previous incurred' and 'future eligible')</p>	<p>Estimate in year-of-expenditure dollars: <u>\$1,115,000.00</u></p>
<p>8. If more than one culvert or weir, will project bundling be used to deliver the Project?</p>	<p>Yes or No. If yes, explain the intended benefits of project bundling. Yes – bundling the projects realizes cost efficiencies in all aspects of preliminary engineering, design, and permitting. Some construction efficiencies are also realized in terms of mob/demob and traffic control logistics. The culvert projects are along the same road so the replacement of both structures makes the road more resilient to flooding events.</p>
<p>9. If proposed project utilizes bundling, Cost of Unbundled Projects</p>	<p>Estimate in year-of-expenditure dollars: \$ <u>\$1,270,000.00</u></p>

<p>10. Amount of Future Eligible Costs by Project Type (if applicable):</p>	<p>Project type by structure (if bundling, include the unbundled cost in brackets [\$_])¹ (Ex. Culvert Replacement: \$1,000,000 [\$1,500,000])</p> <p>1. Project Type <u>Culvert Replacement</u> \$ <u>635,000</u> [<u>\$ 557,500</u>]</p> <p>2. Project Type <u>Culvert Replacement</u> \$ <u>635,000</u> [<u>\$ 557,500</u>]</p>
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¹ Costs of unbundled project will be compared with bundled costs to determine potential amount of cost savings and as a factor in the ability to unbundle projects for an award

Project Selection Criteria

Project Selection Criteria – Provide a narrative response on how the project responds to the selection criteria in Section E.1.a of the NOFO. In responding to Project Selection Criteria, refer to statutory selection priorities included in Section E of the NOFO and address them in the appropriate Project Selection Criteria.

Criterion #1: Conservation Benefits to Anadromous Fish	<p>Improving river herring access to potential spawning habitat is consistent with federal and state management initiatives to recover stocks to previous levels and prevent the need to list these species in the future. This improved access is expected to lead to increased reproduction and recruitment; thus, with more individuals being produced with each successive generation, there is a better chance that the local population could withstand some of the negative impacts of climate change into the future. The increased numbers of river herring produced will also increase available food resources for the anadromous Striped Bass.</p> <p>Indirect ecosystem benefits (Criterion 3) may provide indirect benefits to the federally endangered sturgeon species (Atlantic and Shortnose) known to utilize the Pamlico River. As mentioned, the Pamlico River is considered designated habitat for these species, so improvements to tributary waters could benefit the downstream habitat.</p>
Criterion #2: Regional and Watershed Context	<p>The localized improvements to spawning habitat access that will result from the culvert replacement project will benefit Blueback Herring and Alewife stocks in the larger Tar/Pamlico River Basin, as well as the overall South-Atlantic DPS.</p> <p>The Tar/Pamlico River Basin is within the South-Atlantic DPS for river herring. While river herring have close affinities to their natal rivers, there is a certain degree of straying (genetic exchange) between river basins within the overall metapopulations of both species. As such, any localized population improvements, such as those expected as a result of this project will contribute to the overall health of the large metapopulations. The highest amount of straying generally occurs towards the next closest river basin, which in this case is the Albemarle Sound (Roanoke and Chowan River Basins) to the North, and Neuse River to the south. The Albemarle Sound was selected by the NC Wildlife Resources Commission for a pilot river herring stocking program (Potoka, 2021).</p>

<p>Criterion #3: Ecosystem Benefits</p>	<p>In addition to the localized benefits to the river herring populations in the Pamlico River Basin and the regional benefits to the South-Atlantic DPS metapopulation expected from this project, there are several expected benefits to general ecosystem of the Pamlico River Basin.</p> <p>Overall ecosystem benefits associated with the project include improved habitat connectivity, as well as localized nutrient retention and reduction in flooding effects (See Narrative 2, Applicable Selection Priority 3.1).</p> <p>Additionally, increases in river herring numbers as a result of improved access to spawning habitat will benefit species that feed on river herring, most notably the Bald Eagle and Striped Bass (See Narrative 2, Applicable Selection Priority 3.3).</p>
<p>Criterion #4: Project Design and Delivery Methods</p>	<p>The existing crossing structures over Bond Creek are small culverts with two-barrel 60” x 52” Corrugated Steel Pipe Culvert, both with streambed to crown clearance of 10’. The two pipes in both culverts are severely deteriorated and experience frequent blockages from drift, that have resulted in flooding issues during major storms. Bond Creek is a tributary of the Tar/Pamlico River Basin. Aluminum box culverts allow for a better fit to natural stream dimensions. The culverts will be buried 1-foot into natural substrate. The Project will improve aquatic habitat connectivity to a combined approximately 6.18 RKM (3.85 RM) in the Bond Creek watershed, upstream of the project area. Additionally, the replacement structures will also reduce flooding potential and stream velocity through the passage. All necessary roadway, hydraulic, and structural design will follow established NCDOT design guidelines and policies. The project will take place within existing NCDOT right of way. The project will be documented with a CE and should only require general state and federal regulatory permits. More information is contained in the Narrative below under project description.</p>
<p>Criterion #5: Project Monitoring and Evaluation</p>	<p>The NC Wildlife Resource Commission has committed to performing a fish migration barrier assessment at Bond Creek before and after culvert replacement.</p> <p>In addition, NCDOT has approached the North Carolina Cooperative Fish and Wildlife Research Unit to develop a more extensive research and monitoring plan for this project should the grant be awarded.</p>

<p>Criterion #6: Climate Change, Sustainability, and Resilience</p>	<p>The NCDOT has a Resilience Policy to consider resilience to all disruptions, including those anticipated due to climate change, in all its work practices.</p> <p>The objective of NCDOT Hydraulic design standards is to provide a 25 Year LOS for SR routes and a 50 Year LOS for NC, US, and Interstate routes, while also considering impacts for the 100 Year event, especially if in FEMA flood zones. If these design standards cannot be met (e.g., existing road overtops in less than the design year and limitations in raising road grade, limitations in structure replacement size due to road grade constraints, etc.) then the desire is to at least maintain existing LOS or improve relative to existing conditions. Preliminary design indicates that the recommended structures for the Bond Creek sites will reduce backwater effects and reduce hydraulic velocities while maintaining existing roadway grades.</p> <p>Although the NMFS considers river herring as “more vulnerable to climate effects”, the improved access to spawning grounds that will occur as a result of the project, is expected to lead to increased recruitment; thus, with more individuals that are produced with each generation, there is a better chance that overtime the population could withstand some of the negative impacts of climate change (See Narrative below, Applicable Selection Priority 3.4 for further discussion).</p>
<p>Criterion #7: Equity and Barriers of Opportunity</p>	<p>The project is expected to benefit river herring, which historically had and continue to have cultural and dietary importance for many Indian Tribes along the Atlantic Coast. As an example of their cultural importance, the Passamaquoddy People in Maine entered into a cooperative restoration effort with USFWS, NOAA, and the ASMFC TEWG to restore the St. Croix Watershed and the once abundant river herring that the communities sustained themselves on for generations. River Herring was a traditional food fish, with evidence of the species’ use as far back as 4,000 years in Passamaquoddy fishing village sites.</p> <p>Members of the Pamlico Band of Skarure and Woccon Indians reside in the portion of North Carolina where the project is located (See Location Information Section G).</p> <p>This project also meets the Opportunity criterion because NCDOT in partnership with its Office of Civil Rights actively seeks to certify disadvantaged business enterprises and advertise available opportunities. Members of the Meherrin Indian Tribe reside in the portion of North Carolina</p>

	where the project is located (See Location Information Section G).
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Project Readiness Criteria

Project Readiness Criteria– Submit the requested information in Section E.1.b. for the DOT to conduct a review of the project readiness and environmental review and permitting risk criteria for the project and provide a summary. If the project includes multiple culverts or weirs, indicate the information for each structure included in the application and what impact would occur on the timeframes if the project were unbundled.

1. Environmental Review and Permitting Risk	The project addresses the Environmental Review and Permitting Risk criterion by ...
A. NEPA Status – Indicate if the determination will likely be the result of a Categorical Exclusion (CE), Environmental Assessment (EA), or Environmental Impact Statement (EIS).	<p>Planned or Actual Start of NEPA Date: <u>30 days after grant award</u></p> <p>Planned or Actual Completion of NEPA Date: <u>150 days after start</u></p> <p>Final NEPA Determination or current status of NEPA process:</p> <p>The Bond Creek culvert replacements will be classified as a Type I(A) CE action as defined in the Programmatic Agreement between USDOT FHWA NC Office and NCDOT (2019).</p>
B. Will all necessary environmental approvals and permits meet the project delivery timeline specified in the project schedule?	<p><input checked="" type="checkbox"/> Yes (<i>Please provide documentation</i>)</p> <p><input type="checkbox"/> No</p> <p>The NCDOT has designated liaisons within all the necessary regulatory agencies. These liaisons are assigned to work specifically on NCDOT projects. This ensures streamlined coordination and timely issuance of permits.</p>
C. Are there any prepared environmental studies or documents describing known project impacts and possible mitigation for those impacts?	<p><input checked="" type="checkbox"/> Yes (<i>Please provide documentation, preferably through a website link</i>)</p> <p><input type="checkbox"/> No</p> <p>Any unavoidable stream or wetland impacts that may be associated with the Bond Creek project will be mitigated through NCDOT's MOA with the NC Division of Mitigation Services.</p> <p>https://deq.nc.gov/about/divisions/mitigation-services/about-dms/enabling-legislation</p>

<p>D. Is the project currently programmed in the</p> <ul style="list-style-type: none"> • TIP • STIP • MPO Long Range Transportation Plan • State Long Range Transportation Plan 	<p><input type="checkbox"/> Yes</p> <p><input checked="" type="checkbox"/> No</p> <p><i>(Please specify in which plans the project is currently programmed, the year in which the project is currently programmed and provide the identifying number if applicable)</i></p>
<p>E. Have there been public engagement opportunities?</p>	<p><input type="checkbox"/> Yes <i>(Provide details, including the degree to which public comments and commitments have been integrated into project development and design)</i></p> <p><input checked="" type="checkbox"/> No</p>
<p>F. Will there be public engagement opportunities?</p>	<p><input checked="" type="checkbox"/> Yes <i>(Please provide details)</i></p> <p><input type="checkbox"/> No</p> <p>Adjacent property owners will be notified when ground surveys begin. Local law enforcement and school districts will be notified prior to construction.</p>
<p>2. Indicate detailed project schedule, including all major project milestones.</p>	<p>See Attachment 3. Actual schedule dates will depend on date of grant award. Scheduling will also be timed so that construction can be performed outside in-water work moratorium for anadromous fish.</p>
<p>3. Is right-of-way acquisition necessary?</p>	<p><input type="checkbox"/> Yes</p> <p><input checked="" type="checkbox"/> No</p> <p><input type="checkbox"/> Not Applicable</p> <p>If Yes, Planned or Actual Start of Right-of-Way Acquisition Date: _____</p> <p>Planned or Actual Completion of Right-of-Way Acquisition Date: _____</p>

<p>4. Right-of-way acquisition considerations (<i>if applicable</i>):</p>	<p>If right-of-way must be acquired for the project:</p> <p>1. Would right-of-way acquisition require relocation of any people or businesses?</p> <p>No Right-of-way acquisition is necessary for this project.</p> <p>2. If Yes, are people or businesses being relocated members of traditionally underserved and underrepresented populations (Environmental Justice communities)? If Yes, please describe.</p>
<p>5. Design Status (<i>if applicable</i>):</p>	<p>Planned or Actual Start of Preliminary Design Date: _____</p> <p>Planned or Actual Completion of Preliminary Design Date: _____</p> <p>Planned or Actual Start of Final Design Date: </p> <p>Planned or Actual Completion of Final Design Date: </p>
<p>6. Anticipated Construction Start Date (<i>if applicable</i>):</p>	<p>Date: _</p>
<p>7. Anticipated Project Completion Date (<i>if applicable</i>):</p>	<p>Date: _</p>
<p>8. Indicate potential project risks and strategies undertaken or that might be taken to mitigate those risks.</p>	<p>The Bond Creek project will take place entirely within existing NCDOT right of way. Utility conflicts at the site are minimal and coordination can begin as soon as funding is announced. Potential regulatory and permitting concerns have been mitigated through early coordination in the site selection process and designated liaisons within the regulatory agencies will ensure streamlined coordination and timely issuance of permits.</p>
<p>9. The summary on Project Readiness Criteria demonstrates...</p>	<p>NCDOT has both the financial capacity and staff (in-house and/or consultant) capacity to begin the project as soon as funding is announced.</p>

Narrative

Basic Project Information Sections #1-5

1. Project Name

The North Carolina Department of Transportation (NCDOT) is requesting \$ 892,000 in federal funds for the two adjacent culvert replacements (Culverts # 060032 and # 060031) over Bond Creek and a nearby unnamed tributary (UT) to Bond Creek on State Road (SR) 1912 (Spring Creek Road) in Beaufort County, North Carolina, to improve aquatic organism passage (AOP), particularly for two anadromous fish species, the Alewife (*Alosa pseudoharengus*) and Blueback Herring (*Alosa aestivalis*), collectively referred to as river herring. Another anadromous fish species, the Striped Bass (*Morone saxatilis*) is also expected to benefit from the project by increasing river herring numbers, which are a major food resource for the species. The NCDOT operates and maintains one of the nation's largest state-maintained highway systems, responsible for maintaining nearly 80,000 miles of roadways and over 18,000 bridges, culverts and pipes. These responsibilities are divided across the state into 14 regions, or highway divisions. The portion of the state immediately along the Atlantic Coastline is covered by three divisions, divisions 1-3 from north to south.

2. Project Description

The culvert replacement project (Project) for which federal funding is being requested occurs in Beaufort County, which is within the NCDOT Highway Division 2. The project is located in North Carolina's central coastal plain 4.82 river kilometers (RKM)/3.0 river miles (RM) upstream of the Pamlico River, which has several tributaries currently designated as anadromous fish spawning areas (AFSA), the closest of which being Durham Creek 24.94 RKM (15.5 RM) from the project area. Bond Creek up to the subject culverts a designated Striped Bass Management Area (15A NCAC 03R .0201). Once Bond Creek reaches its confluence with the Pamlico River, the river flows approximately 24.14 RKM (15,0 RM) before entering the Pamlico Sound, the largest estuary in North Carolina, which is bordered by the Outer Banks barrier islands. The project will involve upgrading two adjacent culverts to either single opening culverts. The existing crossing structures over Bond Creek are small culverts with two-barrel 60" x 52" Corrugated Steel Pipe Culvert, both with streambed to crown clearance of 10'. The two pipes in both culverts are severely deteriorated and experience frequent blockages from drift, that have resulted in flooding issues during major storms.

Bond Creek is a tributary of the Tar/Pamlico River Basin. The basin originates and has its headwaters in Vance, Person, and Granville counties, North Carolina. The entirety of the 6,148 square mile watershed is found within North Carolina, making it the third largest watershed in the state. The Bond Creek watershed consists of 4.1 RKM (2.55 RM) of second order stream, and 5.15 RKM (3.20 RM) of first order stream, for a total of 9.25 RKM (5.75 RM). The two channels meet approximately 0.64 RKM (0.4 RM) and 0.4 RKM (0.25 RM) respectively downstream of the two crossings (Structure #060032 and 060031). Below the confluence of the two channels, Bond Creek flows into the Pamlico River near the town of Aurora approximately 4.5 RKM (2.8 RM) downstream, where Muddy Creek also meets the Pamlico River. Just downstream of the confluence of the two project channels, Bond Creek widens significantly, to an average width of 122 meters (400 feet), steadily widening before reaching the Pamlico River. The drainage area where the two project channels converge is 5.95 square kilometers (3.7 square miles). The drainage areas above the two crossings are 2.43 square kilometers (1.51 square miles) above Bond Creek, and 3.44 square kilometers (2.14 square miles) above the UT to Bond Creek (USGS StreamStats, 2023).

The Project will improve aquatic habitat connectivity to a combined approximately 6.18 RKM (3.85 RM) in the Bond Creek watershed, upstream of the project area. Additionally, the replacement structures will also reduce flooding potential and stream velocity through the passage.

The NCDOT Culvert AOP Program Stakeholders Group (Stakeholders), which consists of representatives from NCDOT, NC Wildlife Resources Commission (WRC), NC Division of Marine Fisheries (DMF) and the National Marine Fisheries Service (NMFS), has identified various culvert crossing structures in the Highway Divisions 1-3 that pose varying degrees of impediments to aquatic species passage. As such, their respective removals would benefit anadromous fish species, particularly river herring. Potential sites were assigned a priority category of 1 through 3, with Tier 1 being the highest priority. Due to time constraints, the prioritization was primarily a “desktop” evaluation. The structures over Bond Creek/UT Bond Creek were assigned a Tier 1 (highest priority) status for structure replacement to eliminate the barrier.

Factors considered in assigning the priority Tier were proximity to designated AFSA¹ as well as the length of upstream reach that would be opened. In this case, the closest designated AFSA is located in Durham Creek, a tributary of the Pamlico River 24.94 RKM (15.5 RM) from the project culverts that has a confluence with the river upstream of Bond Creek’s. As previously mentioned, the project would improve 6,187 meters of upstream anadromous fish spawning habitat. The AFSA designation confirms presence of anadromous species; however, areas not identified as AFSA does not mean there is no presence of anadromous species.

The closer the proximity to AFSA the higher the site was ranked and secondly the upstream reach length was factored in. A longer upstream reach increased the benefit of structure removal and therefore a higher priority compared to a short reach. Additionally, fisheries biologists from WRC and DMF with experience in the respective watersheds also weighed in on prioritizing several of these sites and to confirm the potential benefit of the crossing improvements.

3. Applicable Selection Priorities

Eight species of anadromous fish known to occur in North Carolina (Table 1). Of the anadromous species listed in Table 1, the two species of river herring, Alewife and Blueback Herring are most likely to experience migration barriers from culverts, as they utilize smaller waterbodies to spawn compared to the other species, and culverts are more likely to occur over smaller waterbodies. Culverts have been identified as potential barriers to aquatic organism passage due to channel constriction, increased slope, unnatural channel bottom, perched outlets and susceptibility to damming and flooding effects caused by trapping debris. In addition to physical barriers to passage associated with culverts, low light levels inside culverts have been demonstrated to impede migration of river herring in North Carolina (Moser and Terra 1999). There also appears to be a relationship with higher flow velocity and turbidity in low light conditions that inhibit upstream migration (Kynard 1993). Peak spawning runs of river herring in North Carolina occur from early March to early May, a time of year where flows of the highest mean river flow.

Table 1. Anadromous Fish Species of North Carolina

Scientific Name	Common Name
<i>Acipenser brevirostrum</i>	Shortnose Sturgeon ¹

¹ Anadromous fish spawning areas are those areas where evidence of spawning of anadromous fishes has been documented by direct observation of spawning, capture of running ripe females, or capture of eggs or early larvae (15A NCAC 10C.0602)

<i>Acipenser oxyrinchus oxyrinchus</i>	Atlantic Sturgeon ¹
<i>Alosa aestivalis</i>	Blueback Herring
<i>Alosa mediocris</i>	Hickory Shad
<i>Alosa pseudoharengus</i>	Alewife
<i>Alosa sapidissima</i>	American Shad
<i>Morone saxatilis</i>	Striped Bass
<i>Petromyzon marinus</i>	Sea Lamprey ²

¹ These Sturgeon species are Federally and State Endangered. Anadromous fish spawning areas are those areas where evidence of spawning of anadromous fishes has been documented by direct observation of spawning, capture of running ripe females, or capture of eggs or early larvae (15A NCAC 10C.0602)

²- The Sea Lamprey is on the NCWRC freshwater list prioritized for conservation.

Upgrading this culvert to a single culvert with headwalls and endwalls that has a larger opening helps to eliminate the impediment of migrating fish from constricted channels caused by small pipe culverts to migrating fish. The larger opening allows for increased light penetration and less restricted flow within the crossing structure. This not only helps to lower velocities to allow for easier transition for migrating fish, but also lessens the susceptibility for the upstream area to flood during high flow events. The substrate in this case will also be improved, as the culvert will be buried allowing for the natural substrate to be present through the road crossing.

3.1 Anadromous fish listed as endangered or threatened

The Atlantic Sturgeon and Shortnose Sturgeon are the only two anadromous fish species protected under the Endangered Species Act (ESA) that occur in North Carolina. Both species are known to occur within the Pamlico River Basin, and the Pamlico River is designated as Critical Habitat (Carolina Unit-2) for the Atlantic Sturgeon, as the Tar-Pamlico River was identified as a spawning river for the species. The Critical Habitat Unit extends from the mouth of the Albemarle Sound (RKM 0), upstream to the Rocky Mount Mill Pond on the Tar River (RKM 199). Bond Creek flows into designated CH Unit at approximately RKM 11.

While neither sturgeon species are expected to utilize Bond Creek or its tributaries upstream of the project crossings, due to their small size and are thus, unlikely to directly benefit from the culvert replacement project, small indirect benefits might occur as a result of the overall ecosystem benefits realized through habitat connectivity, as well as localized nutrient retention and reduction in flooding effects. Smaller watersheds like Bond Creek help to process upland pollutants and mitigate flooding events, these functions can be improved by improving aquatic organism passage and restoring a more naturalized flow regime.

3.2 Anadromous fish that could reasonably become Federally listed under the ESA

As mentioned in **Narrative 2**, Applicable Selection Priority 3.1, the Atlantic Sturgeon and Shortnose Sturgeon, are the only two anadromous fish species in North Carolina protected under the endangered species act. However, stocks of the other anadromous fish species in the state have experienced significant declines compared to historical levels. Causes for the declines have been attributed to overfishing, habitat degradation, and complete, or partial loss of access to historical spawning habitat by dam and culvert construction.

Harvest moratoria and catch limits have also been enacted on nearly all anadromous species in North Carolina. In addition to the various harvest restrictions, various recovery initiatives have been implemented for river herring. The WRC began a blueback herring stocking program in the Chowan River Basin in 2012 (Potoka and Smith 2021) to determine the effectiveness of that type of program on increasing populations,

Official Application Template (NOFO **Narrative 1**) found on Grants.gov

with the intent that similar programs can then be implemented in other river basins supporting the species. The Chowan River is a tributary of the Albemarle Sound, which is the closest estuary to the north of the Pamlico Sound and is connected via the Croatan Sound near Roanoke Island, NC.

Because of the declining stocks, the NMFS evaluated whether listing river herring (Blueback Herring and/or Alewife) under the Endangered Species Act was warranted. In 2013 the NMFS issued a “not warranted” determination. However, after a lawsuit challenging this decision, the NMFS initiated a species status review, that led to a revised listing determination, which again led to a “not warranted” determination in 2019. Various existing conservation initiatives and regulatory protections were factored into the decision not to list. However, the status assessment defined “the foreseeable future” for river herring as 12–18-year time frame (*i.e.*, out to 2030-2036), or a three-generation timeframe. Thus, it is possible that over this time period the conservation and management initiatives that are in place or not adequate to offset the various threats to the species, which would necessitate the need for a re-evaluation. As such, it is very possible that one, or both species of river herring will warrant listing under the ESA in the future. More detailed information on this process is provided below.

On August 12, 2013, the NMFS issued a determination that listing was not warranted at that time. However, it was noted that they were committed to revisit the status of both river herring species in “three to five years” as there were significant data deficiencies. A lawsuit was brought against NMFS in February of 2015 challenging this decision not to list the Blueback Herring. As part of a negotiated agreement with the plaintiffs, NMFS committed to publishing a revised listing determination for Blueback Herring by 2019. A status review of both river herring species was then initiated in August 2017 to gather the necessary data on whether listing was warranted. The status review (NMFS 2019) identified four Distinct Population Segments (DPS) for the Alewife (Canada, Northern New England, Southern New England and Mid-Atlantic) and three DPS for Blueback Herring (Canada/Northern New England, Mid-Atlantic, and Southern Atlantic). The Pamlico River Basin is within the Mid-Atlantic DPS for both Alewife and Blueback Herring.

The status assessment used a “likelihood analysis” to evaluate the overall risk of extinction of both species, with a numerical ranking system that corresponded to “very low, low, medium and high” rankings. The range wide level of extinction risk for Alewife was rated as “low”, with each of the DPSs also low. Although the Mid-Atlantic DPS was ranked as low, it was slightly higher than the other DPSs (NMFS 2019). The Blueback Herring likewise had a range wide mean extinction risk score of “low” and “low” in the three DPSs (NMFS 2019).

Based on the level of extinction risks determined in the status assessment, the National Oceanic and Atmospheric Administration (NOAA) issued a determination on June 19, 2019, that listing of the Blueback Herring and Alewife was not warranted at that time (NOAA 2019). The factors that support this determination were the justification supporting this conclusion: “(1) The species are broadly distributed over a large geographic range, with no marine barriers to dispersal; (2) genetic data indicate that populations are not isolated; (3) overfishing is not currently occurring within the range; (4) the population size is sufficient to maintain population viability into the foreseeable future (5) there is no evidence that disease or predation is contributing to increasing the risk of extinction; and (6) there is no evidence that the species is currently suffering from compensatory processes (such as reduced likelihood of finding a mate or mate choice or diminished fertilization and recruitment success) or is at risk of extinction due to environmental variation or anthropogenic perturbations” (NOAA 2019).

While the final determination indicated both Alewife and Blueback Herring populations were at “historical low levels”, NOAA noted that “improved fisheries management efforts in recent years have

reduced fishing mortality rates in stocks and that hundreds of habitat improvement projects have been completed in the past 20 years” (NOAA 2019). This was one of the factors why the two river herring species did not meet the definition of either Endangered or Threatened under the ESA. There are several Federal, State, and non-governmental groups that support the ongoing research of the species as well as evaluate and guide the management efforts for the species. One such group, the Atlantic Coast River Herring Collective (River Herring Forum), is supported by NOAA Fisheries and Atlantic States Marine Fisheries (ASMFC) staff to “promote the conservation of the species, support information exchange, and encourage collaboration.” Therefore, although the species are not officially Federally listed, there are monitoring and species augmentation efforts in place to mitigate the ongoing loss of abundance.

While listing of the two river herring species under the ESA is currently not warranted, it is important to note that the status assessment defined “the foreseeable future” for river herring as 12–18-year time frame (*i.e.*, out to 2030-2036), or a three-generation timeframe. This is due to their species inherent reproductive strategy of high numbers of offspring, with short generation times. Thus, it is possible that over this time the conservation and management initiatives that are in place or not adequate to offset the various threats to the species, which would necessitate the need for a re-evaluation and possible listing.

3.3 Anadromous fish identified as prey for endangered, threatened, or protected species

While no longer protected under the ESA, the Bald Eagle (*Haliaeetus leucocephalus*), which is protected under the Bald and Golden Eagle Protection Act and is listed as “Threatened” in North Carolina (NCNHP 2022), occurs throughout the Pamlico River Basin and Pamlico Sound and has been documented to prey on river herring. Restoration of river herring spawning runs in the Sebasticook River in Maine via a combination of dam removal and fish lift installations in the system were shown to boost survival of immature Bald Eagles as it provided an abundant and “seasonably reliable food resource” (DeSorbo et al. 2015). In addition to the Bald Eagle species of wading birds like the Tricolored Heron (*Egretta tricolor*), which is listed as a species of Special Concern in North Carolina may also benefit from increases in river herring spawning runs in the project area, as over 90% of their diet consists of fish.

River herring are also a major food resource for many predatory fish species, including the anadromous Striped Bass. This species has long been an important commercial and recreational species that has provided economic benefit to states along the Atlantic Coastline, including North Carolina. It was also noted to be a major component of Native Americans diet. Striped Bass stocks have been subject to large fluctuations in numbers particularly since the mid-20th Century. Identified reasons for the fluctuations include fishing pressure, environmental pollution, loss and alteration of habitat, inadequacy of fisheries conservation and management practices, and natural causes. In the 1960’s there were consecutive years of reproductive failure in the rivers of North Carolina. Due to the risk of potential depletion of the species and its cultural and economic importance, the Atlantic Striped Bass Conservation Act was passed in 1984, which in conjunction with the Atlantic Coastal Cooperative Management Act of 1993 direct state and federal efforts to manage and protect the species. The project culverts are the upstream extent of a designated Striped Bass Management Area (15A NCAC 03R .0201) on Bond Creek.

3.4 Anadromous fish identified as climate resilient stock

The NMFS considers river herring as “more vulnerable to climate effects”. Threats associated with climate change were identified in the status review on river herring (NMFS 2019) and ranked for both species as a whole as well as each DPS. Potential consequences associated with climate change that were considered included changes in amount of preferred marine habitat, due to increased water temperature and changes in water composition, as well as adverse effects to spawning and early life stages due to changes in riverine flow, all of which could result in a contraction of range and increased risk of extinction.

The threats associated with climate change and vulnerability ranked “medium” for Alewife range wide. However, the southern portions of the range were at slightly higher risk than the northern portion (NMFS 2019). Likewise, the Blueback Herring rank was “medium” range wide. Since the Blueback Herring’s range occurs further south than the range of the Alewife, the species currently persists in warmer habitats and therefore, may be more resilient to warmer temperatures (NMFS 2019). The “medium” risk determination may suggest that river herring are moderately resilient to the effects of climate change. While improving access to spawning grounds will not in of itself increase resiliency to climate change, increasing spawning access, is expected to lead to increased recruitment; thus, the more individuals that are produced with each generation, there is a better chance that overtime the population could withstand some of the negative impacts of climate change.

3.5 Project that opens up more than 200 meters of upstream habitat

As mentioned in the project description, this culvert replacement project will open nearly 6.187 RKM of upstream habitat. The Spring Creek Road crossing is the only major road crossing in either of these streams’ watersheds, and therefore, their improvement would restore passage for almost the entirety of the watershed.

4. Anadromous Species Project Will Benefit

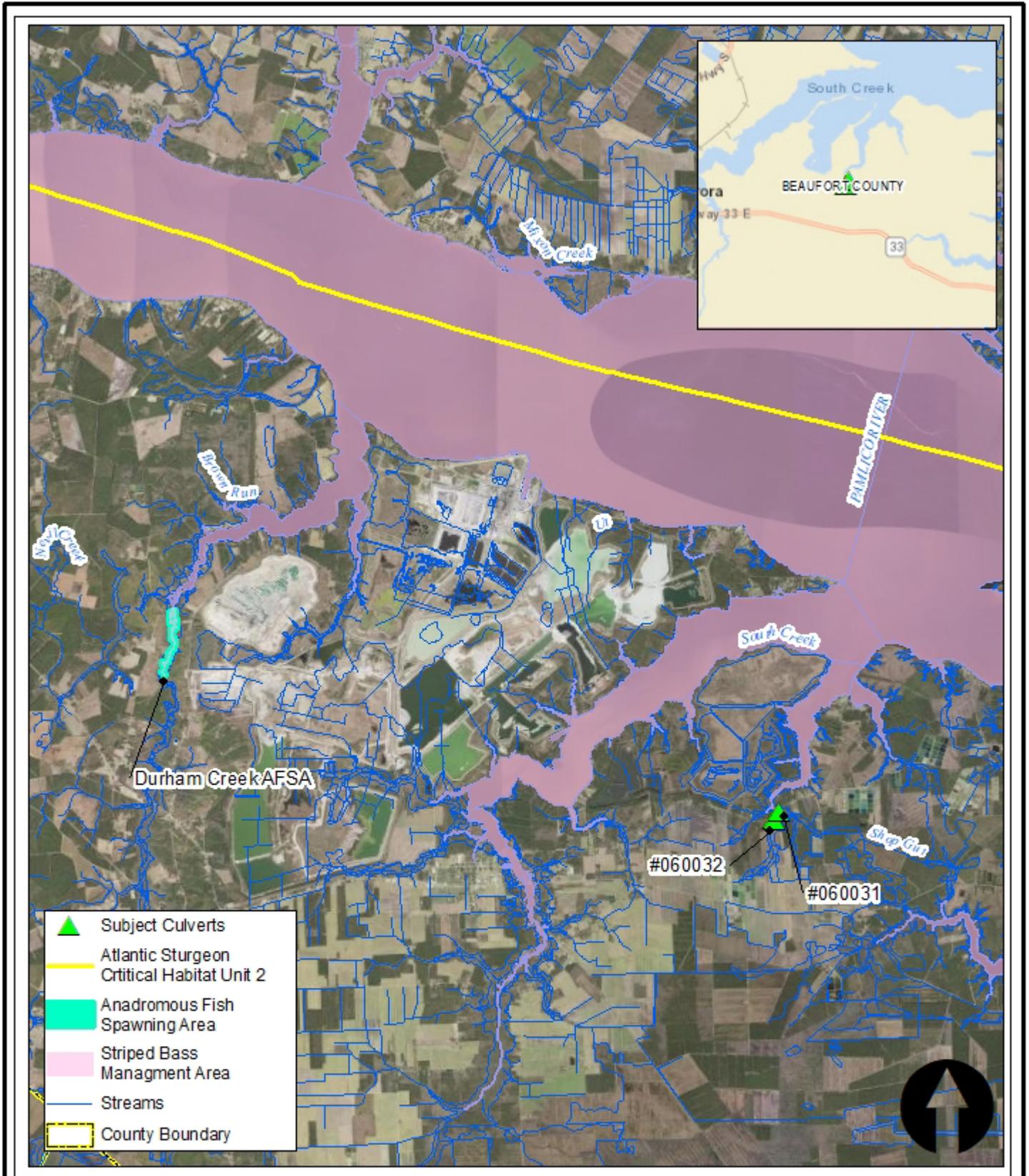
As mentioned, the two river herring species, Alewife and Blueback Herring, and the Striped Bass are most likely to directly benefit from this project’s completion. The other anadromous fish species known to occur in the Pamlico River Basin, could indirectly benefit from the project as a result of the overall ecosystem benefits.

5. Description of benefits to Anadromous Species

These two culvert replacements associated with the project will improve access to a combined 6.187 RKM of potential river herring spawning habitat upstream of the project area. This type of restoration is consistent with federal and state management initiatives to recover stocks to previous levels and prevent the need to list the species in the future.

Additionally, the anadromous Striped Bass population in the Pamlico River Basin will directly benefit from increased food resources (See **Narrative 2**, Applicable Selection Priority 3.3). The other anadromous fish species known to occur in the Pamlico River Basin, could indirectly benefit from the project as a result of the overall ecosystem benefits (See **Narrative 2**, Applicable Selection Priority 3.1).

Vicinity Map Including Closest AFSA and Other Common Management Rules



Prepared For:
National AOP Grant Program
 Replacement of Culvert #060032
 & #060031 Over Bond Creek
 & UT Bond Creek On SR 1912
 Vicinity Map and Nearest AFSA
 Beaufort County, North Carolina

Date: February 2023
 Scale: 0 0.5 1 Kilometers
 Job No.: 21-330
 Drawn By: TDH
 Checked By: TWS

Figure
1