Programmatic Conference Opinion

Bridge and Culvert Replacement/Repair/Rehabilitation Effects on Carolina Madtom and Neuse River Waterdog In NCDOT Divisions 2, 4, 5, and 7

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CONFERENCE HISTORY

This section lists key events and correspondence during the course of this conference. A complete administrative record of this conference is on file in the U.S. Fish and Wildlife Service's (Service) Raleigh Field Office.

2019-11-04 – The Service met with the North Carolina Department of Transportation (NCDOT) and consultants to discuss the development of a programmatic approach to conferencing.

2020-01-06 – The Service provided the NCDOT, Federal Highway Administration (FHWA), and U.S. Army Corps of Engineers (USACE) comments on a draft Programmatic Biological Assessment (PBA).

2020-02-13 – The Service received the final PBA (dated 2020-02-12) and a letter (dated 2020-02-10) from the FHWA and USACE requesting formal Section 7 conference for Carolina Madtom and Neuse River Waterdog.

2020-02-19 – The Service provided a letter to FHWA and USACE stating that all information required for initiation of formal conference was either included with their 2020-02-10 letter or was otherwise available.

2020-03-24 – The Service provided the FHWA, USACE, and NCDOT with a draft Programmatic Conference Opinion.

PROGRAMMATIC CONFERENCE OPINION

1. INTRODUCTION

A Biological Opinion (BO) is the document that states the findings of the U.S. Fish and Wildlife Service (Service) required under section 7 of 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.

A Conference Opinion (CO) is equivalent to a BO, but addresses species that are not yet listed under the ESA and/or proposed critical habitats not yet designated. Therefore, the ESA prohibitions against jeopardizing species, destroying critical habitat, and taking animals do not yet apply. The Service may adopt a CO as a BO if and when the evaluated species/critical habitat are listed/designated and while the action agency's discretion and involvement in the action continue.

A Programmatic Biological/Conference Opinion (PBO/PCO) addresses multiple actions on a program and/or regional basis, thus achieving efficiencies in the process. The federal actions addressed in this PCO are bridge and culvert replacement/repair/rehabilitation projects implemented by the North Carolina Department of Transportation (NCDOT) in NCDOT Divisions 2, 4, 5, and 7. For bridge and culvert projects that are federally funded, the Federal Highway Administration (FHWA) serves as the lead federal action agency. For bridge and culvert projects that are not federally funded, the U.S. Army Corps of Engineers (USACE) generally serves as the lead federal action agency when a Clean Water Act Section 404 permit is required. For the purposes of this PCO, these individual projects shall be collectively referred to as the Action. The FHWA and USACE have jointly initiated formal ESA Section 7 conference. This PCO considers the effects of the Action on Carolina Madtom and Neuse River Waterdog, and on proposed critical habitat for both species. All other species must be evaluated independently.

PBO/PCO Analytical Framework

A PBO/PCO that concludes a proposed federal action is *not* likely to *jeopardize the continued existence* of listed species and is *not* likely to result in the *destruction or adverse modification* of critical habitat fulfills the federal agency's responsibilities under §7(a)(2) of the ESA.

> *"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).
>
> "*Destruction or adverse modification* means a direct or indirect alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species" (50 CFR §402.02).

The Service determines in a PBO/PCO whether we expect an action to satisfy these definitions using the best available relevant data in the following analytical framework (see 50 CFR §402.02 for the regulatory definitions of *action, action area, environmental baseline, effects of the action*, and *cumulative effects*).

a. *Proposed Action*. Review the proposed federal action and describe the environmental changes its implementation would cause, which defines the action area.
b. *Status*. Review and describe the current range-wide status of the species or critical habitat.
c. *Environmental Baseline*. Describe the condition of the species or critical habitat in the action area, without the consequences to the listed species caused by the proposed action. The environmental baseline includes the past and present impacts of all federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed federal projects in the action area that have already undergone formal or early consultation, and the impacts of state or private actions which are contemporaneous with the consultation.
d. *Effects of the Action*. Predict all consequences to species or critical habitat caused by the proposed action, including the consequences of other activities caused by the proposed action, which are reasonably certain to occur. Activities caused by the proposed action would not occur but for the proposed action. Effects of the action may occur later in time and may include consequences that occur outside the action area.
e. *Cumulative Effects*. Predict all consequences to listed species or critical habitat caused by future non-federal activities that are reasonably certain to occur within the action area.
f. *Conclusion*. Add the effects of the action and cumulative effects to the environmental baseline, and in light of the status of the species, formulate the Service's opinion as to whether the action is likely to jeopardize species or adversely modify critical habitat.

2. PROPOSED ACTION

The Action includes NCDOT bridge replacements/repairs/rehabilitations, culvert replacements/repairs/extensions, and the bridge and culvert construction portions of road widening projects with a federal nexus in NCDOT Divisions 2, 4, 5 and 7 that are scheduled to be under construction during a ten-year period beginning June 2020. For the purposes of this PCO, pipes are considered as culverts. Some of the individual projects are listed in the current State Transportation Improvement Program (STIP, NCDOT 2019). However, the STIP is a 10-year planning document which is revised every two years; therefore, the exact number of bridge replacements may fluctuate as revisions occur and priorities change. In addition to the STIP, some bridge and culvert projects occur at the NCDOT Division level. Division level projects typically have a shorter planning horizon of approximately three years. Therefore, to obtain the approximate total number of projects to be covered at the Division level over ten years, extrapolation from the current known number is necessary. Currently, it is estimated that 584 individual projects may have adverse effects on the Carolina Madtom or Neuse River Waterdog. However, due to fluctuations in the STIP and uncertainty in extrapolation for Division level projects, an extra 10% is conservatively added for a total of 642 projects assumed. The Action will be evaluated here in four components: 1) in-water work, 2) land-based work, 3) post-construction activities, and 4) conservation measures. Given the programmatic nature of the evaluation, each component will be described in general terms with a list of standard activities. However, each individual bridge or culvert project will not utilize all activities listed.

2.1. In-Water Work

Most bridge replacements take less than nine months to complete, but the smallest bridges can be completed in as little as three to six months. Culvert replacements are typically even shorter in duration. Installation of new bridges may require the installation of an on-site detour bridge when the new bridge

is to be constructed on the same alignment as the existing bridge. However, off-site detours are generally utilized when practical. Some replacement bridges are built adjacent to the existing bridge while traffic is maintained on the old bridge. Occasionally, half of the new bridge is constructed adjacent to the old bridge and acts as the detour bridge while the original bridge is removed.

Foundations are required elements of every bridge construction. Bridge foundations consist of three general types: 1) drilled shafts, 2) columns on spread footings, and 3) driven piles with pile-supported caps or walls. Driven piles can be used to support temporary structures such as detour bridges and work bridges and can be used to provide additional support to spread footings.

In-water work may take place during many activities associated with bridge construction, including superstructure construction when a temporary in-stream work pad may be necessary to stage a crane to set girders or other parts of the superstructure. Best Management Practices (BMPs) are used to protect water quality during in-water work (NCDOT 2003, NCDOT 2014a, NCDOT 2015).

Bridge and culvert construction can include the following in-water activities:

- barge use - anchor spud installation, mooring, operation, stage equipment
- temporary work trestle/platform/temporary culvert crossing/detour bridge/causeway construction and removal
    - impact/vibratory pile driving
    - deck installation
    - removal of piles (vibratory hammer, direct pull, etc.)
    - placement and removal of riprap
    - drilled shaft installation
- bridge/culvert demolition and removal
    - work area isolation (cofferdam installation, impact/vibratory pile driving, dewatering via installation of jersey barriers, clean stone with impervious fabric, sand bags, etc.)
    - remove piles, footings, piers, bridge decking, rail bed, etc. (vibratory pile driver, clamshell bucket, containment boom)
    - wire saw concrete cutting, crane use
    - hoe ram use, debris containment, excavation
- substructure construction (piers, shafts, shaft caps, footings, abutments, foundations)
    - work area isolation (cofferdam installation, impact/vibratory pile driving, dewatering via installation of jersey barriers, clean stone with impervious fabric, sand bags, etc.)
    - drilled shaft construction (auger drills hole within casing) or impact pile driving
    - install casing, rebar
    - pour concrete
    - spread footing construction
    - riprap installation
    - bank stabilization
- superstructure construction
    - pier tables, cantilevers, decking, bridge rails, pre-cast concrete or steel girders, crane use

- culvert construction or placement
    - work area isolation (cofferdam installation, impact/vibratory pile driving, dewatering via installation of jersey barriers, clean stone with impervious fabric, sand bags, etc.)
    - stream diversion (excavated temporary channel, diversion pipe, temporary culvert, or through another barrel of the culvert)
    - channel excavation or reshaping
    - placement of pre-fabricated structure
    - construction in-place (including headwalls and wingwalls)
    - bank stabilization
    - armoring channel
    - restoring flow

2.2. Land-Based Work

Although some of the activities associated with the removal of an old bridge and construction of a new bridge may require in-water work, some activities such as the excavation and removal of abutments and land-based bents and the construction of new abutments and land-based bents may be completed entirely on land. For existing bridges with no bents in the water, all of the replacement activities will usually be completed entirely on land. In areas where excavation of old bridge components has occurred, riprap is typically placed to stabilize the stream banks or other areas at risk of scour.

All of the activities described below are typically associated with site preparation and/or staging areas. Staging areas are places where equipment, a temporary field office, and materials are temporarily stored or located in preparation for their use during construction. These areas are typically located within or adjacent to the construction site.

Tree Clearing and Grubbing

Clearing of trees and other vegetation will be performed to prepare the project area for construction activities. Clearing generally takes place within pre-marked areas necessary for construction purposes. Clearing consists of cutting and removing above-ground vegetation such as brush and trees, removing downed timber and other vegetative debris, and salvaging marketable timber. Grubbing will follow clearing operations to remove any remaining surface vegetation, roots, and buried debris.

Trees, stumps, and large roots will be removed from excavation areas to a depth sufficient to prevent such undesirable material from becoming mixed with the material being incorporated in the embankment. All extraneous matter will be removed and disposed of in fill or designated waste areas on or off-site by chipping, burying, burning, or other methods of disposal. Various methods and equipment will be used for this work.

Clearing and grubbing takes place within right-of-way (ROW) limits, but may also occur in utility easements and in temporary construction easements used to store construction vehicles and supplies (erosion control materials, steel rebar and mesh, small diameter culverts, traffic signs and posts, office trailers, etc.).

Earthwork
Earthwork is all earth moving activities that occur for bridge or culvert removal and construction, including associated activities such as preparation of staging areas, bridge approaches, alignments, embankments, fills, backfills, foundations, toe trenches, waste areas, borrow areas, temporary access road construction, utility relocation, stormwater treatment, ditch construction and stabilization, streambank stabilization, landscaping, and mitigation. Specific earthwork practices can include excavating (cutting), filling, ditching, backfilling, grading, embankment construction, augering, disking, ripping, grading, leveling, and borrowing and wasting of materials. Typical earthmoving equipment used includes haul trucks, dozers, excavators, scrapers, backhoes, and tractors.

Installation of Erosion and Sediment Control BMPs
This work includes the installation of erosion control devices such as silt fences, check dams, sediment basins, coir fiber matting, and temporary seeding (NCDOT 2003, NCDOT 2014a, NCDOT 2015).

2.3. Post-Construction Activities

In addition to temporary BMPs used during construction, NCDOT implements a post-construction stormwater program in accordance with their National Pollutant Discharge Elimination System (NPDES) permit. Post-construction structural BMPs are permanent controls that treat stormwater runoff from stabilized drainage areas to protect water quality, reduce pollutant loading, and minimize post-construction impacts to water quality (NCDOT 2014b). Because post-construction BMPs are permanent, they require a long-term maintenance commitment to function as designed.

Other post-construction activities include the following sub-activities:

- temporary BMP removal (silt fencing, check dams, sediment basin)
- fence installation
- landscaping/beautification/site stabilization
- reforestation

2.4. Conservation Measures

An in-lieu fee program has been developed for this programmatic conference (see Section 2.7). For individual bridge or culvert projects that may affect, and are likely to adversely affect (MA-LAA) Carolina Madtom or Neuse River Waterdog, the NCDOT will remit $25,000 for each bridge and $10,000 for each culvert (including pipe structures ≥72 inches) to the N.C. Nongame Aquatic Species Fund. Pipe structures <72 inches do not require payment into the Fund.

For all individual projects covered in this PCO that may affect (both MA-NLAA and MA-LAA) Carolina Madtom or Neuse River Waterdog, Design Standards in Sensitive Watersheds [15A NCAC 04B.0124 (b) – (e)] will be incorporated into the plans. Design Standards in Sensitive Watersheds are erosion control measures that exceed the standard BMPs (i.e., measures designed to provide protection from runoff of 25-year storm event). *Environmentally Sensitive Areas* shall also be designated and defined as a 50-foot buffer zone within the right-of-way (and any easements required for construction) on both sides of the stream measured from top of streambank. Within *Environmentally Sensitive Areas* the following shall apply:

- The contractor may perform clearing operations but not grubbing operations until immediately prior to beginning grading operations.
- Once grading operations begin in identified *Environmentally Sensitive Areas*, work shall progress in a continuous manner until complete.
- Erosion control devices shall be installed immediately following the clearing operation.
- Seeding and mulching shall be performed on the areas disturbed by construction immediately following final grade establishment.
- Seeding and mulching shall be done in stages on cut and fill slopes that are greater than 20 feet in height measured along the slope or greater than two acres in area, whichever is less.

The following commitments will apply to all bridge and culvert projects covered in this PCO which may affect (both MA-NLAA and MA-LAA) Carolina Madtom or Neuse River Waterdog:

- Offsite detours will be utilized to the maximum extent practicable.
- No heavy equipment will be placed in the streams.
- BMPs for bridge demolition and removal will be implemented (NCDOT 2003, NCDOT 2014a, NCDOT 2015, or newer).
- Bridges will be removed from the top down, first removing the asphalt with containment measures in place to prevent asphalt from dropping into the stream. The method of containment will be proposed by the contractor and approved by the project engineer. This will be followed by removal of the decking, girders, and finally the piles/shafts/columns.
- No new bents will be placed in the channel (unless justification is provided and then accepted by the Service).
- Existing abutments will be completely removed unless removal would result in destabilization of banks or increase adverse effects to Carolina Madtom or Neuse River Waterdog.
- Deck drains will not be allowed to discharge directly into the stream.
- Special sediment control fence (NCDOT Standard No. 1606.01) or a combination of special sediment control fence and standard silt fence will be installed between the top of the stream bank and bridge embankment. Once the disturbed areas of the project draining to these areas have been stabilized, the special sediment control fence and/or silt fence and all built up sediment adjacent to these devices will be removed to natural ground and stabilized with a native grass mix.
- All appropriate sedimentation and erosion control measures, throughout the project limits, will be maintained to ensure proper function following NCDOT Erosion and Sediment Control Design and Construction Manual and NCDOT Best Management Practices for Construction and Maintenance Activities.
- Coir fiber matting or clean riprap (underlain with geotextile) will be installed on the footprint of unclassified structure excavation near the streambanks.
- Embankment construction and grading shall be managed in such a manner as to prevent surface runoff/drainage from discharging untreated into the riparian buffer. All interim surfaces will be graded to drain to temporary erosion control devices. Temporary berms, ditches, etc. will be incorporated, as necessary, to treat runoff before discharging into the riparian buffer (as specified in NCDOT BMP manuals).

All sedimentation and erosion control measures will be appropriately maintained following NCDOT standards to ensure proper function of the measures. The NCDOT adheres to the permit conditions of

General Permit NCG 010000 to Discharge Stormwater under the National Pollutant Discharge Elimination System for Construction Activities. NCDOT is required to "select, install, implement and maintain best management practices (BMPs) and control measures that minimize pollutants in the discharge to meet the requirements of this permit." Among other conditions, the permit requires: 1) all erosion and sedimentation control measures must be inspected at least once every seven calendar days and 2) within 24 hours after any storm event of greater than 1.0 inch of rain per 24 hour period. It is understood that these requirements and implementation of other appropriate BMPs are monitored through multiple layers of oversight. At a minimum, the following personnel monitor erosion control measures:

- Contractor project manager
- NCDOT Division Environmental Officers and Environmental Specialists
- NCDOT Roadside Environmental Field Operations staff

2.5. Other Activities Caused by the Action

A PBO/PCO evaluates all consequences to species or critical habitat caused by the proposed federal action, including the consequences of other activities caused by the proposed action, that are reasonably certain to occur (see definition of "effects of the action" at 50 CFR §402.02). Additional regulations at 50 CFR §402.17(a) identify factors to consider when determining whether activities caused by the proposed action (but not part of the proposed action) are reasonably certain to occur. These factors include, but are not limited to:

(1) past experiences with activities that have resulted from actions that are similar in scope, nature, and magnitude to the proposed action;
(2) existing plans for the activity; and
(3) any remaining economic, administrative, and legal requirements necessary for the activity to go forward.

Utility Relocation

Utility relocation necessitated by a bridge or culvert project may involve both above and below-ground work, including tree clearing, mowing, and horizontal (directional) boring of a stream. In very rare circumstances (e.g. when a rock formation precludes directional boring), open trenching may occur.

Offsite Use Areas

Waste and borrow areas are used to dispose of and obtain materials for earthwork. Such sites are also subject to clearing and grubbing. As per NCDOT policy, each contractor is responsible for addressing federally listed/proposed threatened and endangered species issues at waste and borrow areas that occur offsite from the construction site.

2.6. Action Area

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). For an individual bridge or culvert project, the action area generally includes the limits of construction of the structure, the approach road, and any area receiving runoff from the construction activity, including the receiving stream extending over the distance potential discernible sedimentation effects are assumed to occur. For most bridge or culvert projects, 0.25 mile is generally presumed to be the downstream extent of detectable

sedimentation effects when appropriate sediment and erosion control BMPs are utilized. NCDOT utilizes state-of-the-art BMPs which prevent sedimentation from affecting aquatic resources more than 0.25 mile downstream of bridge crossings (David Harris, NCDOT Roadside Environmental Engineer, personal email communication on August 23, 2019). Lotic habitats impacted by sediment are easily recognized and characterized by a fine layer of clay, silt, and sand (Henley et al. 2000). There is no evidence or history of NCDOT projects indicating that effects of sedimentation exceed 0.25 mile in the presence of effective BMPs.

Since this PCO collectively evaluates a large number of individual projects, the action area for this PCO includes all the locations of individual bridge and culvert projects within NCDOT Divisions 2, 4, 5 and 7 (Figures 1 and 2) and is hereafter referred to as the Programmatic Action Area. The Programmatic Action Area covers 26 counties in eastern North Carolina and includes the following three EPA Level III Ecoregions: Piedmont, Southeastern Plains, and Middle Atlantic Coastal Plain (Griffith et al. 2002).

2.7. Programmatic Methodology

The Action evaluated in this PCO includes NCDOT bridge replacements/repairs/rehabilitations, culvert replacements/repairs/extensions, and the bridge and culvert construction portions of road widening projects with a federal nexus in NCDOT Divisions 2, 4, 5 and 7 that are scheduled to be under construction during a ten-year period beginning June 2020. For purposes of this PCO, pipes are considered as culverts. Projects that involve replacing an existing bridge with a culvert in areas which are likely to adversely affect the Carolina Madtom or Neuse River Waterdog are excluded from this conference (see Appendix B3). Furthermore, bridge replacements on streams that cannot be spanned with up to a single 120-foot permanent span will require additional review and may require a separate consultation/conference. Widening projects that run closely parallel to streams occupied by Carolina Madtom or Neuse River Waterdog may not qualify to use this PCO. If questions arise as to the applicability of the PCO for a specific project, NCDOT will request guidance from the Service as to the project's eligibility. The Service will respond to such requests within 30 days. Also, road widening projects with bridge/culvert components that also include a new location road component are excluded from this PCO unless the new location portion does not cross any streams which may affect Carolina Madtom or Neuse River Waterdog.

This programmatic methodology assumes suitable habitat is present. If no suitable habitat is present, the appropriate biological conclusion is "no effect" and no further evaluation is needed. This programmatic process is an optional process and does not preclude individual project review if that is in the interest of the FHWA and USACE.

If the above criteria are met, the project may be evaluated using one of the three protocols described below. These protocols are intended to flow in a step-by-step manner as depicted by the flowcharts in Appendices B1-B3. Integral to these protocols are the following terms:

IPaC – The Service's Information for Planning and Consultation project planning tool found at https://ecos.fws.gov/ipac/. IPaC uses a 10 digit Hydrological Unit Code (HUC).

Identified Stream Reach – The North Carolina Natural Heritage Program maintains a list of Element Occurrences for federally listed/proposed species with GIS layers depicting the list. This information has

been modified by the Service to provide shapefiles depicting the distribution of Carolina Madtom and Neuse River Waterdog. These shapefiles have been provided to NCDOT. As updates occur, the revisions will also be provided to NCDOT.

In-Lieu Fee (ILF) Program – a compensatory mitigation program where monetary payments are remitted to a fund for conservation. All ILF payments will go to and be administered by the N.C. Nongame Aquatic Species Fund. These funds will be used for the conservation and recovery of Carolina Madtom and Neuse River Waterdog (see Section 4.3.4 for examples and benefits of the ILF program). A multi-agency/organization group of species experts will determine how to expend the funds. For individual bridge or culvert projects that may affect, and are likely to adversely affect (MA-LAA) Carolina Madtom or Neuse River Waterdog, the NCDOT will remit $25,000 for each bridge and $10,000 for each culvert (including pipe structures $\geq$ 72 inches in diameter). Pipe structures < 72 inches in diameter do not require payment, but other conservation measures apply.

For purposes of this PCO, the procedure for NCDOT will be to go to the IPaC webpage (https://ecos.fws.gov/ipac/) and upload a shapefile of the footprint of the project (or draw the area on the map). A list of federally listed/proposed species for that area will be returned. If Carolina Madtom or Neuse River Waterdog is identified as potentially being present, then NCDOT will review the **identified stream reaches** for Carolina Madtom and Neuse River Waterdog. A direct comparison between those **identified stream reaches** should be made with the footprint of the proposed project to determine if the project will intersect an **identified stream reach** or a tributary within 0.25 mile of such. Individual projects will be evaluated using one of the following protocols.

Protocols

Bridge Replacement with Bridge/Repair/Rehabilitation (Appendix B1)

If the project has a federal nexus (federal funding, federal permit, or federal land), then Section 7 applies. If IPaC does not identify Carolina Madtom or Neuse River Waterdog as potentially being present, then there is **No Effect**. If IPaC does identify Carolina Madtom or Neuse River Waterdog as potentially being present, but no in-channel work or no earthwork will occur within 100 feet of the stream bank, then the biological conclusion is **MA-NLAA** (May Affect-Not Likely to Adversely Affect). If there will be in-channel or earthwork within 100 feet of the stream bank and the project intersects an **identified stream reach** or a tributary within 0.25 mile of such, or if the project occurs within designated/proposed critical habitat, then assume presence and **MA-LAA** (May Affect-Likely to Adversely Affect). If the project does not intersect an **identified stream reach** nor is it within designated/proposed critical habitat, then surveys may be conducted or presence assumed. If there is no survey conducted, then presence is assumed and a **MA-LAA** conclusion made. If a survey is conducted, note if Carolina Madtom or Neuse River Waterdog were observed. If so, then the biological conclusion is **MA-LAA**. If Carolina Madtom or Neuse River Waterdog were not observed, then the biological conclusion is **MA-NLAA**. In all cases where a **MA-LAA** biological conclusion is reached, an ILF payment will be paid. In all cases where a **MA-NLAA** biological conclusion is reached, concurrence with that conclusion is automatically provided by the Service (see Section 3).

Culvert Replacement or Extension (Appendix B2)

If the project has a federal nexus (federal funding, federal permit or federal land), then Section 7 applies. If IPaC does not identify Carolina Madtom or Neuse River Waterdog as potentially being present, then there is **No Effect**. If IPaC does identify Carolina Madtom or Neuse River Waterdog as potentially being

present and intersects an **identified stream reach** or a tributary within 0.25 mile of such, or if the project occurs within designated/proposed critical habitat, then presence is assumed and a **MA-LAA** biological conclusion is made. If the project does not intersect an **identified stream reach** or is not within designated/proposed critical habitat, then the biological conclusion is **MA-NLAA**. When a **MA-LAA** biological conclusion is reached, an ILF payment will be paid. When a **MA-NLAA** biological conclusion is reached, concurrence with that conclusion is automatically provided by the Service (see Section 3).

Bridge to Culvert Replacement (Appendix B3)
If the project has a federal nexus (federal funding, federal permit, or federal land), then Section 7 applies. If IPaC does not identify Carolina Madtom or Neuse River Waterdog as potentially being present, then there is **No Effect**. If IPaC does identify Carolina Madtom or Neuse River Waterdog as potentially being present and intersects an **identified stream reach** or a tributary within 0.25 mile of such, or if the project occurs within designated/proposed critical habitat, then the programmatic process cannot be used and the Service should be contacted. If the project does not intersect an **identified stream reach** or is not within designated/proposed critical habitat, then a survey is needed. If Carolina Madtom or Neuse River Waterdog are observed, then the programmatic process cannot be used and the Service should be contacted. If Carolina Madtom or Neuse River Waterdog were not observed, then the biological conclusion is **MA-NLAA** and concurrence with that conclusion is automatically provided by the Service (see Section 3).

3. PROGRAMMATIC CONCURRENCE

In addition to individual projects programmatically addressed in this PCO, the programmatic scope of the Action also includes individual projects which may affect, but are not likely to adversely affect (MA-NLAA) the Carolina Madtom and Neuse River Waterdog. This PCO provides advance Service concurrence with MA-NLAA conclusions that are consistent with the protocols defined in Section 2.7 and graphically depicted as flowcharts in Appendices B1-B3. The NCDOT, FHWA, and USACE are not required to provide any notification to the Service for such projects with the exception that NCDOT will annually report the number of projects utilizing this automatic advance concurrence (see Section 8.4). Except for exceeding the amount or extent of incidental take, the circumstances described in Section 10 of this PCO that require reinitiating consultation for the Action also apply.

4. CAROLINA MADTOM

This section provides the Service's PCO of the Action for the Carolina Madtom.

4.1. Status of Carolina Madtom

This section summarizes best available data about the biology and condition of the Carolina Madtom (*Noturus furiosus*) throughout its range that are relevant to formulating a conference opinion about the Action. The Service published its proposed rule to list the Carolina Madtom as endangered on May 22, 2019 (84 FR 23644–23691).

4.1.1. Species Description

The Carolina Madtom is a small catfish, reaching a maximum length of nearly five inches. When compared to other madtoms, the Carolina Madtom has a short, chunky body and a distinct color pattern. Three dark saddles along its back connect a wide, black stripe along its side extending from its snout to the base of its tail. The adipose fin has a dark blotch that does not quite reach the fin's edge, giving the impression of a fourth saddle. Yellowish to tan blotches space the saddles, while the rest of the fish is tan. The belly is un-speckled, and the tail has crescent-shaped brown bands near its edge and center. Its pectoral fins contain stinging spines (USFWS 2019).

4.1.2. Life History

The Carolina Madtom is a benthic insectivore that feeds primarily during the night, with peaks at dawn and dusk. Burr et al. (1989) observed that >95% of the food organisms in Carolina Madtom stomachs were larval midges, mayflies, caddisflies, dragonflies and beetle larvae. Carolina Madtoms occur in riffles, runs, and pools in medium to large streams and rivers. During the warm months, the species is found in or near swift current at depths of 1-3 feet. Juveniles inhabit slower currents, but some overlap with adults occurs. Stream bottom substrate composition is important for the species. Leaf litter, sand, gravel, and small cobble are all common substrates associated with the species, although the species is most often found over sand mixed with pea-sized gravel and leaf litter. During the breeding season, Carolina Madtoms shift to areas of moderate to slow flow with abundant cover used for nesting (Burr et al. 1989, Midway et al. 2009).

Female Carolina Madtoms reach reproductive maturity by two years, although the vast majority of gravid females observed are three years old. Age at first spawning for males is unknown; however, males have been found guarding nests or nest sites at age 2-4 years. Females produce 80-300 eggs per breeding season. The nesting season extends from about mid-May to late July. Nest sites are often found under or in relic freshwater mussel shells, under large pieces of water-logged tree bark, under rocks, or in discarded beverage bottles and cans partially buried on the stream bottom. All nests with embryos or larvae are guarded by solitary males. Hatchlings exhibit tightly cohesive schooling behavior (Burr et al. 1989).

4.1.3. Numbers, Reproduction, and Distribution

The Carolina Madtom is endemic to the Tar-Pamlico and Neuse River basins in North Carolina. Its historical distribution includes two physiographic provinces (Piedmont and Coastal Plain), comprising all major tributary systems of the Tar and Neuse Rivers (Burr and Lee 1985). Because of salt water influence, the habitats in the Trent River system are isolated from the Neuse River and its tributaries; therefore, the Trent River system is considered as a separate population even though it is geographically part of the larger Neuse River basin. Of the three historical Carolina Madtom populations, only two have observations in the last five years (Figure 3). The species is presumed extirpated from the southern portion of the range in the Trent River basin. Carolina Madtom abundance and distribution has declined considerably, with the species currently occupying approximately 26% of its historical range. Remaining populations are small and fragmented. Additional detailed information on the species' numbers, reproduction, and distribution can be found in Section 3.2 (pages 10-14) of the Species Status Assessment (USFWS 2018a).

4.1.4. Conservation Needs and Threats

The Carolina Madtom faces a variety of risks from declines in water quality, loss of stream flow, riparian and instream fragmentation, deterioration of instream habitats, and predation from the invasive Flathead Catfish (*Pylodictis olivaris*). These risks are expected to be exacerbated by urbanization and climate change. Detailed information on the species' conservation needs and threats can be found in Section 3.3 (pages 14-21) and Chapter 4 (pages 29-47) of the Species Status Assessment (USFWS 2018a).

4.2. Environmental Baseline for Carolina Madtom

This section describes the best available data about the condition of the Carolina Madtom in the Programmatic Action Area without the consequences caused by the proposed Action. Since the Programmatic Action Area encompasses the full range of the Carolina Madtom, the range-wide Status of the Species (Section 4.1) is the Environmental Baseline.

4.3. Effects of the Action on Carolina Madtom

In a PCO for a proposed listed species, the effects of the proposed action are all reasonably certain consequences to the species caused by the action, including the consequences of other activities caused by the action. Activities caused by the action would not occur but for the action. Consequences to species may occur later in time and may occur outside the action area.

We identified and described the activities included in the proposed Action in sections 2.1–2.4. We identified and described other activities caused by the proposed Action in section 2.5. Our analyses of the consequences caused by each of these activities follows.

4.3.1. In-Water Work

The following categories provide a range of potential effects to Carolina Madtom. Since the estimated 642 individual projects collectively addressed as the Action vary in size, design, and setting, each of the following may or may not apply to any specific project. It is anticipated that most adverse effects will be temporary and non-lethal in nature. However, when viewed programmatically, some lethal effects are expected across the Programmatic Action Area.

Extraction of Existing In-Water Bridge Bents

Extracting existing in-water bridge bents may disturb sediment which can be resuspended and ultimately redeposited downstream into Carolina Madtom habitat. Suspended sediment increases turbidity and can interfere with respiration, feeding, or spawning, while redeposited sediment can harm fish by degrading substrate and increasing exposure to pollutants (Ellis 1936, Hollis et al. 1964, Berkman and Rabeni 1987, American Fisheries Society 2020). However, work areas around in-water bents that are removed are often isolated from the water column by the use of sheet piling, coffer dams, or other methods, thus greatly minimizing turbidity and sedimentation.

Construction in Channel

The placement of permanent or temporary fill (e.g. drilled shafts, footings, and piles for permanent bridges, temporary detour bridges, and work bridges; roadway slope fill; causeways) could bury or crush Carolina Madtoms if present. While the species is mobile and theoretically can move away from danger, it is a nocturnal demersal species that spends the majority of its time under cover objects. When disturbed or threatened they immediately seek cover from the closest appropriate object (Tom Fox, formerly North Carolina Wildlife Resources Commission, personal communication), leading to them being more susceptible to being crushed than other aquatic species that are pelagic in nature. The noise and/or vibrations from the installation of such structures could disturb or alter the movements of Carolina Madtoms. The placement of bridge foundations may disturb sediment. However, work areas around in-water bents are isolated from the water column by the use of sheet piling, coffer dams, or other methods, thus greatly minimizing resuspension of sediment or downstream sedimentation effects.

Causeways

For larger bridges, the use of one or more causeways (usually constructed of riprap) is sometimes necessary to remove in-water bridge bents or to construct new in-water bents. The placement of the rock could crush Carolina Madtoms. Causeway construction could strand Carolina Madtoms in areas that are dewatered, or congregate them into ponded areas where temperature and dissolved oxygen levels may affect their survival. Carolina Madtoms could have their movements restricted by the presence of the causeway. The removal of causeways may resuspend and redeposit sediment, potentially harming Carolina Madtoms.

Demolition

Although NCDOT will take measures to contain bridge debris during demolition, there is always the chance that some bridge debris could inadvertently fall into the stream and crush Carolina Madtoms.

Construction Drilling

During investigative drilling for bridge footings and drill shafts, any Carolina Madtoms present in the immediate vicinity could be killed. The cuttings from drilling could potentially inundate cover habitat, nests, or egg masses that happen to be in the area. Drilling noise and vibrations may potentially affect the species. Catfish, such as the Carolina Madtom, possess Weberian ossicles, which make them sensitive to acoustic effects. Weberian ossicles are a series of small bones that connect the auditory system to the swim bladder. The gas filled swim bladder acts as a transducer that converts noise pressure waves to vibrations, which is why loud noises from drilling can affect these hearing specialists (Moyle and Cech 1988). Acoustic effects may be lethal or sublethal to fish. Sub-lethal effects can range from tissue damage to effects to the sensory system, which may affect their ability to detect predators.

Alterations in Flow

The removal of existing bridge bents from the channel may cause minor changes in the stream's flow pattern and velocity, which could be adverse or beneficial. Likewise, the replacement of a smaller culvert with a larger culvert may cause minor changes in the stream's flow pattern and velocity.

Bank Stabilization

In order to protect bridge foundations or reshaped banks at culverts, sometimes a small amount of bank stabilization is required. This is generally accomplished through placement of riprap along the stream

banks, which may extend down into the edge of the water. Any Carolina Madtoms present along the water's edge could be crushed.

Culvert Placement or Construction

The removal and construction/placement of culverts requires excavation within the channel, thus producing a potential source of downstream sedimentation. However, work areas around culverts are isolated from the water column by temporarily diverting the flow around the work site, thus greatly minimizing sedimentation. If culverts are not properly placed or constructed, they can serve as impediments to fish movements upstream. Additionally, improperly constructed culverts can create stream instability, thus producing a source of long-term siltation. However, NCDOT implements BMPs to minimize such potential effects (NCDOT 2003).

Beneficial Effects

In general, existing bridges with in-water bents are replaced with bridges that completely span the stream channel, or at least reduce the number of bents within the channel. Given that in-water bents can trap debris during high flows and can change stream hydraulics in the immediate vicinity of the structure (causing scour and sediment deposition), the elimination or reduction of in-water bents is expected to reduce bridge effects on stream flow patterns. Also, given that large debris piles must often be removed from in-water bents (creating additional channel disturbance and downstream sedimentation), the elimination or reduction of in-water bents will thus eliminate or reduce future disturbance from debris removal. Additionally, new bridges are generally longer than the bridges they replace, thus allowing the removal of some fill material within the floodplain. This allows the stream to access more of its floodplain, potentially reducing downstream bank scouring and sedimentation effects to Carolina Madtom.

4.3.2. Land-Based Work

The greatest construction related concern is prolonged erosion and sediment runoff from construction areas during or after clearing/grubbing, excavation of abutments, and earth moving activities. A major storm event could erode soil from within these disturbed areas and wash it into streams, causing harm by interfering with respiration, feeding, or spawning and otherwise degrading habitat for the Carolina Madtom. However, to avoid or minimize potential siltation effects, NCDOT has developed stringent erosion control measures (see Section 2.4) which greatly minimize sediment entering the streams. Assuming the proper installation and maintenance of these erosion control measures and full implementation of all conservation measures, the probability of effects from siltation leading to mortality is low. Except in the most extreme and rare circumstances, it is the Service's experience that the modern erosion control methods employed by NCDOT are effective at minimizing sediment entering a stream. Only in a catastrophic failure of erosion control measures would effects be expected to be lethal.

Although NCDOT employs BMPs to avoid contaminants from entering streams, there is always the chance of an accidental spill of petrochemicals, uncured concrete, or other toxic substances into a stream. Although such events are rare, they can cause significant harm to aquatic species (USDOJ 2003).

4.3.3. Post-Construction Activities

Since most post-construction activities described in this Action are related to permanent BMPs that are designed to protect water quality and/or to stabilize a construction site, their effects on the Carolina Madtom are expected to be beneficial.

4.3.4. Conservation Measures

While most of the conservation measures described in Section 2.4 are designed to minimize adverse effects to aquatic species, the ILF program is a substantial and proactive measure that would not only partially offset adverse effects to the Carolina Madtom within the Programmatic Action Area, but would be a significant tool in furthering the recovery of the species. All ILF payments will be remitted to the N.C. Nongame Aquatic Species Fund. The pooling of funding will allow the Service and its partners to carry out a more effective and holistic approach to the conservation and recovery of the Carolina Madtom and other federally listed/proposed aquatic species. A multi-agency/organization group of species experts will determine how to expend the funds. Potential projects include, but are not limited to, habitat preservation or restoration, species propagation to support augmentation or restoration, survey/monitoring, and research.

While still relatively new, the N.C. Nongame Aquatic Species Fund has already demonstrated its efficacy for aquatic species conservation by approving and funding two projects. First, the North Carolina Wildlife Resources Commission (NCWRC) filled two term-limited aquatic federally-listed species biologist positions in order to advance the recovery of four listed mussel species and the Carolina Madtom through active management and monitoring, an important field-oriented primary data collection and hands-on management component to the recovery of these species for which current field capacity was limited. Secondly, the approval and funding of the *Propagation, Augmentation, Reintroduction, Translocation, and Introduction (PARTI) Plans for the Yellow Lance, Dwarf Wedgemussel, and Atlantic Pigtoe* is expected to facilitate recovery of those species through augmentation and reintroduction (enhancing resilience, redundancy, and representation), which is an important complement to the existing investments in staff expertise and facilities in order to expand using augmentation and reintroductions in management.

4.3.5. Other Activities Caused by the Action

Utility relocations necessitated by bridge and culvert replacements could provide a potential source of additional, but likely minor (assuming directional boring of stream), sediment input into a stream. However, the use of proper sediment and erosion control measures would greatly minimize this potential. In the rare event that open trenching is utilized, downstream siltation could potentially harm the Carolina Madtom. Offsite use areas such as waste and borrow areas are unlikely to be located adjacent to a stream with Carolina Madtoms. However, should a contractor opt to pursue such a location, additional coordination would be required.

4.4. Cumulative Effects on Carolina Madtom

Cumulative effects are “those effects of future state or private activities, not involving federal activities, that are reasonably certain to occur within the action area of the federal action subject to consultation”

(50 CFR §402.02). In their request for conference, the FHWA and USACE did not describe, and the Service is not aware of, any future non-federal activities that are reasonably certain to occur within the Programmatic Action Area. Therefore, we anticipate no cumulative effects that we must consider in formulating our opinion for the Action.

4.5. Conclusion for Carolina Madtom

In this section, we summarize and interpret the findings of the previous sections (status, baseline, effects, and cumulative effects) relative to the purpose of the PCO for the Carolina Madtom, which is to determine whether the Action is likely to jeopardize its continued existence.

The Carolina Madtom is endemic to the Tar-Pamlico and Neuse River basins in North Carolina. Its entire range is within the Programmatic Action Area. Carolina Madtom abundance and distribution has declined considerably, with the species currently occupying approximately 26% of its historical range. Remaining populations are small and fragmented. The Carolina Madtom faces a variety of risks from declines in water quality, loss of stream flow, riparian and instream fragmentation, deterioration of instream habitats, and predation from the invasive Flathead Catfish.

This PCO collectively analyses the potential effects of an estimated 642 individual bridge and culvert projects referred to as the Action. Each individual project has the potential to kill, injure, or harm Carolina Madtoms by one or more of the following ways: crushing; burying; sedimentation effects on habitat; resuspended sediment interfering with respiration, feeding, or spawning; restriction of movement; injury from loud noises; or accidental spills of toxic substances. However, the species may or may not be present at any specific project location. To minimize adverse effects to aquatic species, NCDOT will implement BMPs and other substantial conservation measures. This includes stringent erosion control measures to minimize sediment entering streams. With the proper implementation of BMPs and other conservation measures, the probability of any one individual bridge or culvert project having adverse effects on the Carolina Madtom is low. The probability of lethal effects is even lower. Most adverse effects are expected to be temporary and non-lethal in nature. However, when considered programmatically, lethal effects are expected. The ILF program developed for this conference will provide substantial funding for a more effective and holistic approach to the conservation and recovery of the Carolina Madtom and other aquatic species within the Programmatic Action Area.

After reviewing the status of the species, the environmental baseline for the Programmatic Action Area, the effects of the Action and the cumulative effects, it is the Service's conference opinion that the Action is not likely to jeopardize the continued existence of the Carolina Madtom.

5. PROPOSED CRITICAL HABITAT FOR CAROLINA MADTOM

This section provides the Service's PCO of the Action for proposed critical habitat for the Carolina Madtom.

5.1. Status of Carolina Madtom Proposed Critical Habitat

This section summarizes best available data about the condition of all proposed units of critical habitat for Carolina Madtom that are relevant to formulating a conference opinion about the Action. The

Service published its proposed rule to designate critical habitat for Carolina Madtom on May 22, 2019 (84 FR 23644–23691).

5.1.1. Proposed Critical Habitat Description

Proposed critical habitat for Carolina Madtom is comprised of 257 river miles in the following seven separate units all located in North Carolina.

- Unit 1: TAR 1 – Upper Tar River. Unit 1 consists of 26 river miles of the Upper Tar River. This unit is currently occupied by the species and contains all the physical and biological features essential to the conservation of the species. The riparian land adjacent to the river is entirely privately owned.
- Unit 2: TAR 2 – Sandy/Swift Creek. Unit 2 consists of 66 river miles of Sandy and Swift Creeks. This unit is currently occupied and contains all of the physical and biological features necessary for the conservation of the species. The riparian land adjacent to this unit is predominantly privately owned (96%), with conservation parcels (2%) and state game lands (2%).
- Unit 3: TAR 3 – Fishing Creek Sub-basin. Unit 3 consists of approximately 86 river miles. This unit is currently occupied by the species and contains all of the physical and biological features necessary for the conservation of the species. The riparian land adjacent to the unit is divided between privately owned parcels (89%), state game lands and state park land (5%), and conservation parcels (6%).
- Unit 4: NR 1 – Upper Neuse River Sub-basin (Eno River). Unit 4 consists of approximately 20 river miles of the Upper Neuse River. This unit is not currently occupied by the species; however, there is one historical record in this unit from 1961. Although it is unoccupied, it does contain all of the physical and biological features necessary for the conservation of the species. This unit is essential for the conservation of the species because it will provide for population expansion and resiliency in known historical habitat. Riparian land adjacent to this unit is almost entirely (95%) within state park lands, local conservation parcels, and state game lands.
- Unit 5: NR 2 – Little River. Unit 5 consists of 28 river miles of the Upper and Lower Little River. This unit is currently occupied and contains all of the physical and biological features necessary for the conservation of the species. The riparian land adjacent to this unit is predominantly privately owned (99%) with some (1%) state conservation ownership.
- Unit 6: NR 3 – Contentnea Creek. Unit 6 consists of approximately 15 river miles of Contentnea Creek. At the time of writing the Species Status Assessment (USFWS 2018a), this unit was unoccupied with the last observation occurring in 2007. However, on July 18, 2018, one Carolina Madtom was observed occupying an artificial “madtom hotel” structure that was placed there to provide additional habitat and aid in future survey efforts. The riparian land adjacent to this unit is entirely privately owned.
- Unit 7: TR 1 – Trent River. Unit 7 consists of approximately 15 river miles of the Trent River. This unit is unoccupied by the species with the last known occurrence in 1985. Although it is unoccupied, it does contain all of the physical and biological features necessary for the conservation of the species. This unit is essential for the conservation of the species because it will provide for population expansion and resiliency in known historical habitat. All of the riparian land adjacent to this unit is privately owned.

Within the areas of proposed critical habitat, the following four physical and biological features (PBFs) were determined to be essential to the conservation of the Carolina Madtom:

1. Suitable substrates and connected instream habitats, characterized by geomorphically stable stream channels and banks (i.e., channels that maintain lateral dimensions, longitudinal profiles, and sinuosity patterns over time without an aggrading or degrading bed elevation) with habitats that support a diversity of native fish (such as stable riffle-run-pool habitats that provide flow refuges consisting of silt-free gravel, small cobble, coarse sand, and leaf litter substrates) as well as abundant cover used for nesting.

2. Adequate flows, or a hydrologic flow regime (which includes the severity, frequency, duration, and seasonality of discharge over time), necessary to maintain instream habitats where the species is found and to maintain connectivity of streams with the floodplain, allowing the exchange of nutrients and sediment for maintenance of the fish's habitat, food availability, and ample oxygenated flow for spawning and nesting habitat.

3. Water quality (including, but not limited to, conductivity, hardness, turbidity, temperature, pH, ammonia, heavy metals, and chemical constituents) necessary to sustain natural physiological processes for normal behavior, growth, and viability of all life stages.

4. Aquatic macroinvertebrate prey items, which are typically dominated by larval midges, mayflies, caddisflies, dragonflies, and beetle larvae.

5.1.2. Conservation Value

The current distribution of the Carolina Madtom is much reduced from its historical distribution. We anticipate that recovery will require continued protection of existing populations and habitat, as well as ensure there are adequate numbers in stable populations and that these populations occur over a wide geographic area. This strategy will help to ensure that catastrophic events, such as the effects of hurricanes (e.g. flooding that causes excessive sedimentation, nutrients, and debris to disrupt stream ecology), cannot simultaneously affect all known populations. Five of the proposed units are currently occupied. These units are large enough to be self-sustaining over time, despite fluctuations in local conditions. The remaining two unoccupied units contain all the physical and biological features necessary for the conservation of the species, and will provide for future population expansion and resiliency in portions of known historical habitat that is necessary to increase the viability of the species.

5.1.3. Conservation Needs and Threats

The features essential to the conservation of the Carolina Madtom may require special management considerations or protections to reduce the following threats: (1) urbanization of the landscape, including land conversion for urban and commercial use, infrastructure (roads, bridges, utilities), and urban water uses (water supply reservoirs, wastewater treatment, etc.); (2) nutrient pollution from agricultural activities that impact water quantity and quality; (3) significant alteration of water quality; (4) improper forest management or silviculture activities that remove large areas of forested wetlands and riparian systems; (5) dams, culverts, and utility pipe installation that creates barriers to movement; (6) impacts from invasive species; (7) changes and shifts in seasonal precipitation patterns as a result of climate

change; and (8) other watershed and floodplain disturbances that release sediments or nutrients into the water. Management activities that could ameliorate these threats include: use of BMPs designed to reduce sedimentation, erosion, and bank side destruction; protection of riparian corridors and leaving sufficient canopy cover along banks; moderation of surface and ground water withdrawals to maintain natural flow regimes; increased use of stormwater management and reduction of stormwater flows into the systems; and reduction of other watershed and floodplain disturbances that release sediments, pollutants, or nutrients into the water.

5.2. Environmental Baseline for Carolina Madtom Proposed Critical Habitat

This section describes the best available data about the condition of proposed critical habitat for the Carolina Madtom in the Programmatic Action Area without the consequences caused by the proposed Action. Since the Programmatic Action Area encompasses the full geographical extent of proposed critical habitat for Carolina Madtom, the range-wide Status of Proposed Critical Habitat (Section 5.1) is the Environmental Baseline.

5.3. Effects of the Action on Carolina Madtom Proposed Critical Habitat

In a PCO for proposed critical habitat, the effects of the proposed action are all reasonably certain consequences to its PBFs caused by the action, including the consequences of other activities caused by the action. Activities caused by the action would not occur but for the action. Consequences to proposed critical habitat features may occur later in time, but are limited to portions of the designation that occur within the action area.

We identified and described the activities included in the proposed Action in sections 2.1–2.4. We identified and described other activities caused by the proposed Action in section 2.5. Our analyses of the consequences caused by each of these activities follows.

5.3.1. In-Water Work

The primary potential effect of in-water work to proposed critical habitat is the resuspension of sediment when existing in-water structures are removed (i.e. bents and abutments). This resuspended sediment is transported downstream where it redeposits on the substrate. Although sediment transport is a normal process within a stream's flow regime (Poff et al. 1997), redeposited sediment could affect, at least temporarily, PBF 1, 3, and 4 (see Section 5.1.1 above). Redeposited sediment can render substrates as less suitable for habitat. Resuspended sediment increases turbidity which generally reduces water quality. Lower water quality and sediment affected substrates can then subsequently reduce the diversity and numbers of aquatic macroinvertebrate prey species. However, NCDOT's use of BMPs (NCDOT 2003, NCDOT 2015) will greatly minimize these potential effects. As such, these effects to the PBFs are expected to be minor and temporary, and thus would not appreciably diminish the value of the PBFs. The construction of temporary causeways has the potential to temporarily affect PBF 2 by restricting habitat connectivity. However, once the structure is removed, habitat connectivity would be restored.

Almost all existing NCDOT bridges are replaced with bridges that are longer and have either no bents in the water or with a reduced number of bents in the water. With increased bridge lengths, some existing fill in the floodplain for approach roads is often removed. This, along with removing or reducing the

number of bents in the channel, generally has the effect of removing unnatural constriction points in the stream which often cause scouring of the banks or channel. Therefore, the replacement of bridges has the potential for long-term improvement of PBF 1, 3, and 4 by reducing erosion and redeposition of sediment. Additionally, replacement of existing bridges with longer bridges has the potential for long-term improvement of PBF 2 by reconnecting the stream with more of its floodplain.

5.3.2. Land-Based Work

All bridge and culvert replacements involve some degree of earthwork along approach roads and adjacent stream banks. These disturbed areas create the potential to erode sediment into the stream and affect PBF 1, 3, and 4. There is also the potential for spills of petro-chemicals or other contaminants during construction which could affect PBF 3. However, NCDOT has developed stringent erosion control measures and other BMPs (see Section 2.4) to greatly minimize the potential for such effects. Assuming the proper installation and maintenance of erosion control measures and implementation of all appropriate BMPs, such effects to the PBFs are expected to be minor and temporary, and thus would not appreciably diminish the value of the PBFs.

5.3.3. Post-Construction Activities

Since most post-construction activities described in this Action are related to permanent BMPs that are designed to protect water quality and/or to stabilize a construction site, their effects on proposed critical habitat are expected to be beneficial.

5.3.4. Conservation Measures

The Conservation Measures, in part, are designed to reduce sedimentation effects. Therefore, their effects on proposed critical habitat are expected to be beneficial. In addition, the ILF payments could potentially be used to preserve or restore critical habitat and improve all PBFs.

5.3.5. Other Activities Caused by the Action

Utility relocations necessitated by bridge and culvert replacements could provide a potential source of additional, but likely minor (assuming directional boring of stream), sediment input into a stream. This sediment input into the stream could potentially affect PBF numbers 1, 3, and 4. However, the use of proper sediment and erosion control measures will greatly minimize this potential. Offsite use areas such as waste and borrow areas are unlikely to be located adjacent to a stream with designated/proposed critical habitat. However, should a contractor opt to pursue such a location, additional coordination would be required.

5.4. Cumulative Effects on Carolina Madtom Proposed Critical Habitat

Cumulative effects are “those effects of future state or private activities, not involving federal activities, that are reasonably certain to occur within the action area of the federal action subject to consultation” (50 CFR §402.02). In their request for conference, the FHWA and USACE did not describe, and the Service is not aware of, any future non-federal activities that are reasonably certain to occur within the

Programmatic Action Area. Therefore, we anticipate no cumulative effects that we must consider in formulating our opinion for the Action.

5.5. Conclusion for Carolina Madtom Proposed Critical Habitat

In this section, we summarize and interpret the findings of the previous sections (status, baseline, effects, and cumulative effects) relative to the purpose of the PCO for Carolina Madtom proposed critical habitat, which is to determine whether the Action is likely to result in its destruction or adverse modification.

The Programmatic Action Area encompasses all 257 river miles of Carolina Madtom proposed critical habitat. Five of the seven units are currently occupied. When considered programmatically, all four PBFs of the proposed critical habitat are likely to be adversely affected to some extent by sedimentation or temporary causeway construction. However, the implementation of stringent erosion control measures and BMPs as part of the Action will greatly minimize these effects. All such effects are expected to be minor and temporary, and thus will not appreciably diminish the value of the PBFs. The replacement of existing bridges with longer bridges will likely improve PBFs at some individual project sites. Also, the ILF program may potentially be used to improve critical habitat.

After reviewing the status of the proposed critical habitat, the environmental baseline for the Programmatic Action Area, the effects of the Action, and the cumulative effects, it is the Service's conference opinion that the Action is not likely to result in the destruction or adverse modification of proposed critical habitat for Carolina Madtom.

6. NEUSE RIVER WATERDOG

This section provides the Service's PCO of the Action for the Neuse River Waterdog.

6.1. Status of Neuse River Waterdog

This section summarizes best available data about the biology and condition of the Neuse River Waterdog (*Necturus lewisi*) throughout its range that are relevant to formulating a conference opinion about the Action. The Service published its proposed rule to list the Neuse River Waterdog as threatened on May 22, 2019 (84 FR 23644–23691).

6.1.1. Species Description

The Neuse River Waterdog is a fairly large salamander with adults typically growing to a length of about 11 inches. It has a reddish brown body with an irregular pattern of large blue or black spots. The Neuse River Waterdog has a laterally compressed tail the same coloration as the body; however, the belly is typically a dull brown or gray color with spots similar to those seen elsewhere on the body. Like the other members of the genus *Necturus*, it has four toes on its front and back feet as well as a set of large feathery gills. As juveniles, Neuse River Waterdogs are spotted like the adults but the basic body color is gray. Young individuals may also have a lighter stripe along the back with darker colored sides and black flecking. Larvae for this species are entirely brown except for two white spots, one behind each eye (NCPARC 2020).

6.1.2. Life History

Neuse River Waterdogs need clean, flowing water characterized by high dissolved oxygen concentrations (Brimley 1924, Ashton 1985, Braswell and Ashton 1985). The preferred habitats vary with the season, temperature, dissolved oxygen content, flow rate and precipitation. The species is much more active in colder seasons and when water is near-freezing. There is no evidence of migrational movement for the species. Home ranges of waterdogs often overlap, regardless of the sex or season. Males have a larger average home range of ~73 m^2 compared to ~17 m^2 for females. Waterdogs defend a territory, usually referred to as a home retreat area in a burrow or under a rock (Ashton 1985).

Longevity of Neuse River Waterdogs is not known, however its close relative *N. maculosus* may live for >30 years (McDaniel et al. 2009). Waterdogs reach sexual maturity at around 5.5-6.5 years, or at a length of ~4 inches SVL (snout-vent length, Fedak 1971). They breed once per year, with mating occurring in the fall/winter and spawning in the spring (Pudney et al. 1985). Females will lay a clutch of ~25-90 eggs in a rudimentary nest under large rocks in moderate currents (Cooper and Ashton 1985).

Both adults and larvae are opportunistic feeders (Braswell and Ashton 1985), commonly lying in wait for a small organism to swim or float by (Ashton 1985). However, Neuse River Waterdogs also use other feeding techniques when they are active at night, often leaving their retreats to actively search for food. They will eat most animals that are small enough for them to catch and swallow, and they have been known to eat snails, worms, spiders, and small fish among other prey (NCPARC 2020).

6.1.3. Numbers, Reproduction, and Distribution

The Neuse River Waterdog is endemic to the Tar, Neuse, and Trent River basins. Although geographically part of the larger Neuse River basin, the habitats in the Trent River system are isolated from the Neuse River and its tributaries because of salt water intrusion. Therefore, the Trent River system is considered as a separate population. These three populations are divided into nine Management Units (MUs). The Neuse River Waterdog is extant in all MUs (Figure 4); however, within those MUs it is presumed extirpated from 35% (14/40) of the historically occupied HUC10 watersheds. The species occupies streams in two physiographic regions – Piedmont and Coastal Plain. However, it has lost physiographic representation of an estimated 43% in Piedmont watersheds and an estimated 13% loss in Coastal Plain watersheds. Additional detailed information on the species' numbers, reproduction, and distribution can be found in Section 3.2 (pages 14-17) of the Species Status Assessment (USFWS 2018b).

6.1.4. Conservation Needs and Threats

The Neuse River Waterdog faces a variety of risks from declines in water quality, loss of stream flow, riparian and instream fragmentation, and deterioration of instream habitats. These risks are expected to be exacerbated by urbanization and climate change. Detailed information on the species' conservation needs and threats can be found in Section 3.3 (pages 18-25) and Chapter 4 (pages 33-53) of the Species Status Assessment (USFWS 2018b).

6.2. Environmental Baseline for Neuse River Waterdog

This section describes the best available data about the condition of the Neuse River Waterdog in the Programmatic Action Area without the consequences caused by the proposed Action. Since the

Programmatic Action Area encompasses the full range of the Neuse River Waterdog, the range-wide Status of the Species (Section 6.1) is the Environmental Baseline.

6.3. Effects of the Action on Neuse River Waterdog

In a PCO for a proposed listed species, the effects of the proposed action are all reasonably certain consequences to the species caused by the action, including the consequences of other activities caused by the action. Activities caused by the action would not occur but for the action. Consequences to species may occur later in time and may occur outside the action area.

We identified and described the activities included in the proposed Action in sections 2.1–2.4. We identified and described other activities caused by the proposed Action in section 2.5. Our analyses of the consequences caused by each of these activities follows.

6.3.1. In-Water Work

The effects of in-water work of the Action on Neuse River Waterdog are very similar to those of the Carolina Madtom described in Section 4.3.1 with the following two exceptions:

Construction Drilling
Since Neuse River Waterdogs do not possess Weberian ossicles as do catfish, there is no evidence that sound or vibrations will adversely affect the species.

Bank Stabilization
Since Neuse River Waterdogs utilize burrows in banks (Ashton 1985), they are likely more susceptible to being crushed when riprap is placed on banks.

6.3.2. Land-Based Work

The effects of land-based work of the Action on Neuse River Waterdog are very similar to those of the Carolina Madtom described in Section 4.3.2.

6.3.3. Post-Construction Activities

The effects of post-construction activities of the Action on Neuse River Waterdog are very similar to those of the Carolina Madtom described in Section 4.3.3.

6.3.4. Conservation Measures

The effects of conservation measures of the Action on Neuse River Waterdog are very similar to those of the Carolina Madtom described in Section 4.3.4.

6.3.5. Other Activities Caused by the Action

The effects of other activities caused by the Action on Neuse River Waterdog are very similar to those of the Carolina Madtom described in Section 4.3.5.

6.4. Cumulative Effects on Neuse River Waterdog

Cumulative effects are "those effects of future state or private activities, not involving federal activities, that are reasonably certain to occur within the action area of the federal action subject to consultation" (50 CFR §402.02). In their request for conference, the FHWA and USACE did not describe, and the Service is not aware of, any future non-federal activities that are reasonably certain to occur within the Programmatic Action Area. Therefore, we anticipate no cumulative effects that we must consider in formulating our opinion for the Action.

6.5. Conclusion for Neuse River Waterdog

In this section, we summarize and interpret the findings of the previous sections (status, baseline, effects, and cumulative effects) relative to the purpose of the PCO for the Neuse River Waterdog, which is to determine whether the Action is likely to jeopardize its continued existence.

The Neuse River Waterdog is endemic to the Tar, Neuse, and Trent River basins in North Carolina. Its entire range is within the Programmatic Action Area. The Neuse River Waterdog is extant in all MUs; however, within those MUs it is presumed extirpated from 35% of the historically occupied HUC10 watersheds. The species faces a variety of risks from declines in water quality, loss of stream flow, riparian and instream fragmentation, and deterioration of instream habitats.

This PCO collectively analyses the potential effects of an estimated 642 individual bridge and culvert projects referred to as the Action. Each individual project has the potential to kill, injure, or harm Neuse River Waterdogs by one or more of the following ways: crushing; burying; sedimentation effects on habitat; resuspended sediment interfering with respiration, feeding, or spawning; restriction of movement; or accidental spills of toxic substances. However, the species may or may not be present at any specific project location. To minimize adverse effects to aquatic species, NCDOT will implement BMPs and other substantial conservation measures. This includes stringent erosion control measures to minimize sediment entering streams. With the proper implementation of BMPs and other conservation measures, the probability of any one individual bridge or culvert project having adverse effects on the Neuse River Waterdog is low. The probability of lethal effects is even lower. Most adverse effects are expected to be temporary and non-lethal in nature. However, when considered programmatically, lethal effects are expected. The ILF program developed for this conference will provide substantial funding for a more effective and holistic approach to the conservation and recovery of the Neuse River Waterdog and other aquatic species within the Programmatic Action Area.

After reviewing the 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 conference opinion that the Action is not likely to jeopardize the continued existence of the Neuse River Waterdog.

7. PROPOSED CRITICAL HABITAT FOR NEUSE RIVER WATERDOG

This section provides the Service's PCO of the Action for proposed critical habitat for the Neuse River Waterdog.

7.1. Status of Neuse River Waterdog Proposed Critical Habitat

This section summarizes best available data about the condition of all proposed units of critical habitat for Neuse River Waterdog that are relevant to formulating a conference opinion about the Action. The Service published its proposed rule to designate critical habitat for Neuse River Waterdog on May 22, 2019 (84 FR 23644–23691).

7.1.1. Proposed Critical Habitat Description

Proposed critical habitat for Neuse River Waterdog is comprised of approximately 738 river miles in the following 16 separate units all located in North Carolina.

- Unit 1: TAR 1 – Upper Tar River. Unit 1 consists of 8.6 river miles of the Upper Tar River. The riparian land adjacent to this unit is primarily privately owned (86%) with several conservation parcels or easements (14%).
- Unit 2: TAR 2 – Upper Fishing Creek. Unit 2 consists of 10.5 river miles of Upper Fishing Creek. The riparian land adjacent to the unit is primarily privately owned (94%) with several conservation parcels or easements (6%).
- Unit 3: TAR 3a – Fishing Creek Sub-basin. Unit 3 consists of 62.8 river miles of lower Little Fishing Creek. The riparian land adjacent to the unit includes private land (91%), several conservation parcels (6%), and state game lands (3%).
- Unit 4: TAR 3b – Sandy/Swift Creek. Unit 4 consists of a 68.3 river mile segment of Sandy Creek. The riparian land adjacent to this unit includes private lands (97%), conservation parcels (1%), and state game lands (2%).
- Unit 5: TAR 3c – Middle Tar River sub-basin. Unit 5 consists of a 100 river mile segment of the Middle Tar River. The riparian land adjacent to this unit is nearly all private lands (99%) with less than (1%) conservation parcels, local parks, and a research station.
- Unit 6: TAR 3d – Lower Tar River Sub-basin. Unit 6 consists of 60.6 river miles in the Lower Tar River sub-basin. The riparian land adjacent to this unit consists of private land (97%), conservation parcels (2.5%), and state game lands (0.5%).
- Unit 7: NR 1 – Eno River. Unit 7 consists of 41.5 river miles of the Eno River. The riparian land adjacent to this unit includes private lands (61%), state park lands (25%), local government conservation parcels (12%), and state game lands (2%).
- Unit 8: NR 2 – Flat River. Unit 8 is a 17.4 river mile segment of the Flat River. The riparian land adjacent to this unit consists of some private land (49%) and extensive conservation parcels (51%), including demonstration forest, recreation areas, and state game lands.
- Unit 9: NR 3 – Middle Creek. Unit 9 is a 7.6 river mile segment of Middle Creek. The riparian land adjacent to this unit is predominantly privately owned (92%) with a few conservation parcels (8%).
- Unit 10: NR 4 – Swift Creek (Middle Neuse). Unit 10 is a 23.4 river mile stretch of Swift Creek. The riparian land adjacent to this unit is entirely privately owned.
- Unit 11: NR 5a – Little River. Unit 11 is a 89.6 river mile segment of the Little River. The riparian land adjacent to this unit is predominantly privately owned (90%) with some local municipal conservation parcels (10%).

- Unit 12: NR 5b – Mill Creek. Unit 12 is a 19 river mile segment of Mill Creek. The riparian land adjacent to this unit is predominantly privately owned (95%) with some conservation parcels (5%).
- Unit 13: NR 5c – Middle Neuse River. Unit 13 is a 40 river mile segment of the Middle Neuse River. The riparian land adjacent to this unit includes privately owned land (92%), conservation parcels (1%), and state park land (7%).
- Unit 14: NR 6 – Contentnea Creek/Lower Neuse River Sub-basin. Unit 14 is a 117 river mile reach including Contentnea Creek. The riparian land adjacent to this unit is nearly all privately-owned land (99%) with a small portion of conservation parcels (1%).
- Unit 15: NR 7 – Swift Creek. Unit 15 is a 10 river mile reach of Swift Creek. The riparian land adjacent to this unit is nearly all privately owned (99%) with some conservation parcels (1%).
- Unit 16: TR 1 – Trent River. Unit 16 is a 62 river mile reach of the Trent River. The riparian land adjacent to this unit is entirely privately owned.

Within the areas of proposed critical habitat, the following four physical and biological features (PBFs) were determined to be essential to the conservation of the Neuse River Waterdog:

1. Suitable substrates and connected instream habitats, characterized by geomorphically stable stream channels and banks (i.e., channels that maintain lateral dimensions, longitudinal profiles, and sinuosity patterns over time without an aggrading or degrading bed elevation) with habitats that support a diversity of native aquatic fauna (such as stable riffle-run-pool habitats that provide flow refuges consisting of silt-free gravel, small cobble, coarse sand, and leaf litter substrates) as well as abundant cover and burrows used for nesting.

2. Adequate flows, or a hydrologic flow regime (which includes the severity, frequency, duration, and seasonality of discharge over time), necessary to maintain instream habitats where the species is found and to maintain connectivity of streams with the floodplain, allowing the exchange of nutrients and sediment for maintenance of the waterdog's habitat, food availability, and ample oxygenated flow for spawning and nesting habitat.

3. Water quality (including, but not limited to, conductivity, hardness, turbidity, temperature, pH, ammonia, heavy metals, and chemical constituents) necessary to sustain natural physiological processes for normal behavior, growth, and viability of all life stages.

4. Invertebrate and fish prey items, which are typically hellgrammites, crayfish, mayflies, earthworms, snails, beetles, centipedes, slugs, and small fish.

7.1.2. Conservation Value

The current distribution of the Neuse River Waterdog is much reduced from its historical distribution. We anticipate that recovery will require continued protection of existing populations and habitat, as well as ensure there are adequate numbers in stable populations and that these populations occur over a wide geographic area. This strategy will help to ensure that catastrophic events, such as the effects of hurricanes (e.g. flooding that causes excessive sedimentation, nutrients, and debris to disrupt stream ecology), cannot simultaneously affect all known populations. All of the units are currently occupied by the species and contain some or all of the PBFs essential to the conservation of the species.

7.1.3. Conservation Needs and Threats

The features essential to the conservation of the Neuse River Waterdog may require special management considerations or protections to reduce the following threats: (1) urbanization of the landscape, including land conversion for urban and commercial use, infrastructure (roads, bridges, utilities), and urban water uses (water supply reservoirs, wastewater treatment, etc.); (2) nutrient pollution from agricultural activities that impact water quantity and quality; (3) significant alteration of water quality; (4) improper forest management or silviculture activities that remove large areas of forested wetlands and riparian systems; (5) dams, culverts, and utility pipe installation that creates barriers to movement; (6) impacts from invasive species; (7) changes and shifts in seasonal precipitation patterns as a result of climate change; and (8) other watershed and floodplain disturbances that release sediments or nutrients into the water. Management activities that could ameliorate these threats include: use of BMPs designed to reduce sedimentation, erosion, and bank side destruction; protection of riparian corridors and leaving sufficient canopy cover along banks; moderation of surface and ground water withdrawals to maintain natural flow regimes; increased use of stormwater management and reduction of stormwater flows into the systems; and reduction of other watershed and floodplain disturbances that release sediments, pollutants, or nutrients into the water.

7.2. Environmental Baseline for Neuse River Waterdog Proposed Critical Habitat

This section describes the best available data about the condition of proposed critical habitat for the Neuse River Waterdog in the Programmatic Action Area without the consequences caused by the proposed Action. Since the Programmatic Action Area encompasses the full geographical extent of proposed critical habitat for Neuse River Waterdog, the range-wide Status of Proposed Critical Habitat (Section 7.1) is the Environmental Baseline.

7.3. Effects of the Action on Neuse River Waterdog Proposed Critical Habitat

In a PCO for proposed critical habitat, the effects of the proposed action are all reasonably certain consequences to its PBFs caused by the action, including the consequences of other activities caused by the action. Activities caused by the action would not occur but for the action. Consequences to proposed critical habitat features may occur later in time, but are limited to portions of the designation that occur within the action area.

We identified and described the activities included in the proposed Action in sections 2.1–2.4. We identified and described other activities caused by the proposed Action in section 2.5. Our analyses of the consequences caused by each of these activities follows.

7.3.1. In-Water Work

The effects of in-water work of the Action on Neuse River Waterdog proposed critical habitat are very similar to those of the Carolina Madtom proposed critical habitat described in Section 5.3.1.

7.3.2. Land-Based Work

The effects of land-based work of the Action on Neuse River Waterdog proposed critical habitat are very similar to those of the Carolina Madtom proposed critical habitat described in Section 5.3.2.

7.3.3. Post-Construction Activities

The effects of post-construction activities of the Action on Neuse River Waterdog proposed critical habitat are very similar to those of the Carolina Madtom proposed critical habitat described in Section 5.3.3.

7.3.4. Conservation Measures

The effects of conservation measures of the Action on Neuse River Waterdog proposed critical habitat are very similar to those of the Carolina Madtom proposed critical habitat described in Section 5.3.4.

7.3.5. Other Activities Caused by the Action

The effects of other activities caused by the Action on Neuse River Waterdog proposed critical habitat are very similar to those of the Carolina Madtom proposed critical habitat described in Section 5.3.5.

7.4. Cumulative Effects on Neuse River Waterdog Proposed Critical Habitat

Cumulative effects are "those effects of future state or private activities, not involving federal activities, that are reasonably certain to occur within the action area of the federal action subject to consultation" (50 CFR §402.02). In their request for conference, the FHWA and USACE did not describe, and the Service is not aware of, any future non-federal activities that are reasonably certain to occur within the Programmatic Action Area. Therefore, we anticipate no cumulative effects that we must consider in formulating our opinion for the Action.

7.5. Conclusion for Neuse River Waterdog Proposed Critical Habitat

In this section, we summarize and interpret the findings of the previous sections (status, baseline, effects, and cumulative effects) relative to the purpose of the PCO for Neuse River Waterdog proposed critical habitat, which is to determine whether the Action is likely to result in its destruction or adverse modification.

The Programmatic Action Area encompasses all approximately 738 river miles of Neuse River Waterdog proposed critical habitat. All 16 of the units are currently occupied. When considered programmatically, all four PBFs of the proposed critical habitat are likely to be adversely affected to some extent by sedimentation or temporary causeway construction. However, the implementation of stringent erosion control measures and BMPs as part of the Action will greatly minimize these effects. All such effects are expected to be minor and temporary, and thus will not appreciably diminish the value of the PBFs. The replacement of existing bridges with longer bridges will likely improve PBFs at some individual project sites. Also, the ILF program may potentially be used to improve critical habitat.

After reviewing the status of the proposed critical habitat, the environmental baseline for the Action Area, the effects of the Action, and the cumulative effects, it is the Service's conference opinion that the Action is not likely to result in the destruction or adverse modification of proposed critical habitat for Neuse River Waterdog.

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(19)). In regulations, the Service further defines:

- "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;" (50 CFR §17.3) and
- "incidental take" as "takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the federal agency or applicant" (50 CFR §402.02).

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

The prohibitions against taking an endangered animal species found in ESA §9, and against taking a threatened animal species adopted by regulations under §4(d), do not apply until a species is listed. The preceding PCO evaluated effects of the Action on the Carolina Madtom and Neuse River Waterdog and their proposed critical habitats, which are not listed under the ESA. The Service advises the FHWA and USACE to consider implementing the reasonable and prudent measures provided below, which are intended to reduce the anticipated amount or extent of take of these species. Voluntary implementation of these measures according to the accompanying terms and conditions, and voluntary monitoring and reporting of taking as specified below, will facilitate adoption of the PCO as a Programmatic Biological Opinion (PBO) following listing of these species as endangered or threatened. Following such adoption, the reasonable and prudent measures, terms and conditions, and monitoring and reporting requirements provided below will become non-discretionary.

For the exemption in ESA §7(o)(2) to apply to the Action considered in a PBO, the FHWA and USACE must undertake the non-discretionary measures described in this ITS, and these measures must become binding conditions of any permit, contract, or grant issued for implementing the Action. The FHWA and USACE has a continuing duty to regulate the activity covered by this ITS. The protective coverage of §7(o)(2) may lapse if the FHWA or USACE fails to:

- assume and implement the terms and conditions; or
- require a permittee, contractor, or grantee to adhere to the terms and conditions of the ITS through enforceable terms that are added to the permit, contract, or grant document.

In order to monitor the impact of incidental take, the FHWA and USACE must report the progress of the Action and its impact on the species to the Service as specified in this ITS.

8.1. Amount or Extent of Take

This section specifies the amount or extent of take of listed wildlife species that the Action is reasonably certain to cause, which we estimated in the "Effects of the Action" section(s) of this PCO.

8.1.1. Carolina Madtom

The Service anticipates that the Action is reasonably certain to cause incidental take of individual Carolina Madtoms consistent with the definition of harm resulting from in-water work and land-based work (see Sections 4.3.1 and 4.3.2). However, we believe that incidental take for this species is difficult to determine. Incidental take that occurs due to sub-lethal levels of sedimentation or water quality degradation which temporarily disrupt movement, breeding, feeding, or sheltering of Carolina Madtoms is likely not detectable or measureable. Incidental take that results in injury or death from larger amounts of sedimentation or water quality degradation would be difficult to determine. Actual habitat degradation may be detectable, but knowing whether a specific degradation actually affected the species would be difficult to determine.

This PCO analyzes the adverse effects of an estimated 642 individual bridge and culvert projects over ten years across the entire Programmatic Action Area. However, Carolina Madtoms are likely not present at all of these estimated 642 individual project locations. Due to revisions in the STIP every two years and uncertainty in the number of individual projects at the Division level (see Section 2), and considering the programmatic nature of this consultation, the precise number of individual projects which are likely to cause incidental take cannot be known with certainty. Therefore, the following rationale is used to conservatively estimate the maximum level of incidental take.

Very few targeted Carolina Madtom surveys have been completed in the past 10 years, but many observations have been made while snorkeling for mussel surveys. Therefore, data for both fish and mussel surveys was analyzed over the past 10 years (2010-2019) to determine an incidental take level. The NCWRC Aquatics Database indicates that there have been 1523 surveys conducted in the potential range of the Carolina Madtom within the Programmatic Action Area. During these surveys 177 Carolina Madtoms were observed. Using a detection probability of 0.81 (Cope 2018), the number of 177 observed Carolina Madtoms is divided by 0.81 to obtain an estimated total number of 219 Carolina Madtoms present in the surveyed reaches. Although the NCWRC Aquatics Database does not indicate the length of each survey, an assumed distance of 0.31 mile (500 meters) is used (a distance typically requested by the Service). Multiplying 0.31 mile by 1523 surveys yields 472.13 miles of streams surveyed. Then dividing 219 estimated Carolina Madtoms present in that surveyed area by 472.13 miles yields an estimated density of 0.46 Carolina Madtoms/mile. Under normal circumstances, a downstream distance of 400 meters (0.25 mile) is generally considered to be the extent of detectable sedimentation effects. Multiplying this 0.25 mile downstream distance by the 642 estimated number of projects equals approximately 160.5 stream miles affected. With an estimated density of 0.46 Carolina Madtoms/mile, a conservative estimate of the maximum amount of Carolina Madtom take in the Programmatic Action Area is 74 individuals. It is anticipated that most of this take would be in the form of temporary non-lethal effects.

8.1.2. Neuse River Waterdog

The Service anticipates that the Action is reasonably certain to cause incidental take of individual Neuse River Waterdogs consistent with the definition of harm resulting from in-water work and land-based work (see Sections 6.3.1 and 6.3.2). However, we believe that incidental take for this species is difficult to determine. Incidental take that occurs due to sub-lethal levels of siltation or water quality degradation which temporarily disrupt movement, breeding, feeding, or sheltering of Neuse River Waterdogs is likely not detectable or measureable. Incidental take that results in injury or death from larger amounts of siltation or water quality degradation would be difficult to determine. Actual habitat degradation may be detectable, but knowing whether a specific degradation actually affected the species would be difficult to determine.

This PCO analyzes the adverse effects of an estimated 642 individual bridge and culvert projects over ten years across the entire Programmatic Action Area. However, Neuse River Waterdogs are likely not present at all of these estimated 642 individual project locations. Due to revisions in the STIP every two years and uncertainty in the number of individual projects at the Division level (see Section 2), and considering the programmatic nature of this consultation, the precise number of individual projects which are likely to cause incidental take cannot be known with certainty. Therefore, the following rationale is used to conservatively estimate the maximum level of incidental take.

Data from targeted surveys (NCWRC Aquatics Database and other sources) using minnow traps during winter was used to determine an incidental take level. From 2010-2019, there were 296 targeted surveys for Neuse River Waterdog with 261 observations. Using a detection probability of 0.80 (Teitsworth et al. 2020) the number of 261 observed Neuse River Waterdogs is divided by 0.80 to obtain an estimated total number of 327 present in the surveyed reaches. Although the NCWRC Aquatics Database does not indicate the length of each survey, an assumed distance of 0.31 mile (500 meters) is used (a distance typically requested by the Service). Multiplying 0.31 mile by 296 surveys yields 91.76 stream miles surveyed. Then dividing 327 estimated Neuse River Waterdogs present in that surveyed area by 91.76 stream miles yields an estimated density of 3.56 Neuse River Waterdogs/mile. Under normal circumstances, a downstream distance of 400 meters (0.25 mile) is generally considered to be the extent of detectable sedimentation effects. Multiplying this 0.25 mile downstream distance by the 642 estimated number of projects equals approximately 160.5 stream miles affected by the Programmatic Action. With an estimated density of 3.56 Neuse River Waterdogs/mile, a conservative estimate of the maximum amount of Neuse River Waterdog take in the Programmatic Action Area is 572 individuals. It is anticipated that most of this take would be in the form of temporary non-lethal effects.

8.2. Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measures (RPMs) are necessary or appropriate to minimize the impact of incidental take caused by the Action on Carolina Madtom and Neuse River Waterdog.

RPM 1. Schedule for ILF Payments. The ILF payments detailed in Section 2.7 will be remitted on a quarterly basis.

RPM 2. Utility Relocations. Utility relocations necessitated by bridge or culvert replacements must minimize sedimentation effects to Carolina Madtom and Neuse River Waterdog and their habitat.

8.3. Terms and Conditions

In order for the exemption from the take prohibitions of Section 9(a)(1) and of regulations issued under Section 4(d) of the ESA to apply to the Programmatic Action, the FWHA and USACE must comply with the terms and conditions (T&Cs) of this statement, provided below, which carry out the RPMs previously described. These T&Cs are mandatory. As necessary and appropriate to fulfill this responsibility, the FHWA and USACE must require any permittee, contractor, or grantee to implement these T&Cs through enforceable terms that are added to the permit, contract, or grant document.

T&C 1. Funding Agreement (RPM1). Within 60 days of the issuance of this PCO, NCDOT must provide to the Service a copy of the funding agreement that enables ILF payments to be remitted to the N.C. Nongame Aquatic Species Fund on a quarterly basis.

T&C 2. Directional Boring (RPM 2). Unless technically unfeasible, NCDOT must require utility relocations through streams to utilize directional (horizontal) boring instead of open trench cutting.

8.4. Monitoring and Reporting Requirements

In order to monitor the impacts of incidental take, the FHWA and USACE must report the progress of the Action and its impact on the species to the Service as specified in the ITS (50 CFR §402.14(i)(3)). This section provides the specific instructions for such monitoring and reporting (M&R). As necessary and appropriate to fulfill this responsibility, the FHWA and USACE must require any permittee, contractor, or grantee to accomplish the monitoring and reporting through enforceable terms that are added to the permit, contract, or grant document. Such enforceable terms must include a requirement to immediately notify the FHWA, USACE, and the Service if the amount or extent of incidental take specified in this ITS is exceeded during Action implementation.

M&R1. Project Submittal Form. NCDOT must develop a "Project Submittal Form" which includes the following information for bridge and culvert projects addressed through this formal conference/consultation:

1. county
2. stream
3. 10-digit HUC
4. structure #
5. WBS # and STIP # (if applicable)
6. road #
7. bridge or culvert?
8. replacement or repair or rehabilitation or extension?
9. Is bridge or culvert work part of road widening project?
10. estimated let date
11. species adversely affected
12. amount of ILF payment - $25,000 or $10,000
13. person(s) who made biological conclusion of MA-LAA

The Project Submittal Form should be a standardized fill-in form in a .pdf or similar format. The project reviewer must fill in the form for each bridge or culvert project that has a biological conclusion of MA-LAA arrived at through the Programmatic Methodology (see Section 2.7 and Appendices B1 and B2). Project Submittal Forms are not required for projects that receive automatic concurrence with a MA-NLAA biological conclusion that are consistent with the protocols defined in Section 2.7 and graphically depicted as flowcharts in Appendices B1-B3; however, documentation of MA-NLAA biological conclusions will be included in permit application files to the USACE. The completed Project Submittal Form will be emailed to the Service at the Raleigh Field Office. The NCDOT must designate staff in the Environmental Analysis Unit (or equivalent if organizational changes occur) that will submit the Project Submittal Forms and track all projects covered by this PCO. The expectation is that both Division level and Central Office managed projects will be submitted and tracked by the Environmental Analysis Unit to ensure consistency. If more than 642 bridge and culvert projects with a biological conclusion of MA-LAA are implemented between June 2020 and May 2030, then incidental take has been exceeded and reinitiation of formal consultation is required.

M&R 2. Report Number of Automatic Concurrences. Although Project Submittal Forms are not required for MA-NLAA conclusions, NCDOT must annually, via email, provide a total number of projects (cumulatively) with such conclusions that utilize the automatic advance concurrence for the species addressed in this PCO as described in Section 3.

M&R 3. Erosion Control Measures Failure. In the event of any visible sediment loss from any individual project site, a review of turbidity levels will be made upstream and downstream 400 meters (0.25 mile) to determine if sedimentation effects are occurring beyond 400 meters downstream. If visual observation of turbidity levels downstream appear to be elevated beyond upstream observations, the project inspector will contact the Division Environmental Officer. If determined that project-related sedimentation is occurring beyond 400 meters, the Service must be contacted immediately to discuss potential remediation.

9. CONSERVATION RECOMMENDATIONS

Section 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 PCO and that we believe are consistent with the authorities of the FHWA and USACE.

1. Provide additional training to NCDOT Division-level staff to further their understanding of the ecology and conservation of Carolina Madtom and Neuse River Waterdog.

10. REINITIATION NOTICE

Formal conference for the Action considered in this PCO is concluded. The FHWA and USACE may submit a written request to the Service to confirm the PCO as a PBO issued through formal consultation

if the FHWA and USACE retain discretionary involvement or control over the Action when species addressed in the PCO are listed, or when proposed critical habitats addressed in the PCO are designated. This request should advise the Service of any new information about the Action or its effects on such species or critical habitats that is relevant to adopting the PCO as a PBO, including the amount or extent of any taking of the newly-listed species that the Action has caused.

The ITS provided for non-listed species in a PCO does not become effective until such species are listed and the PCO is adopted as a PBO. At that time, the Service will review the Action to determine whether modifying the opinion and ITS to reflect new information is appropriate. If the Service finds no significant changes in the Action as proposed or in the information used during the conference, the Service will confirm the PCO as a PBO for the Action, which shall conclude formal consultation.

Thereafter, reinitiating consultation is required if the FHWA and USACE 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 PBO;
c. the Action is modified in a manner that causes effects to listed species or designated critical habitat not considered in this PBO; or
d. a new species is listed or critical habitat designated that the Action may affect.

In instances where the amount or extent of incidental take is exceeded, the FHWA and USACE are required to immediately request a reinitiation of formal consultation.

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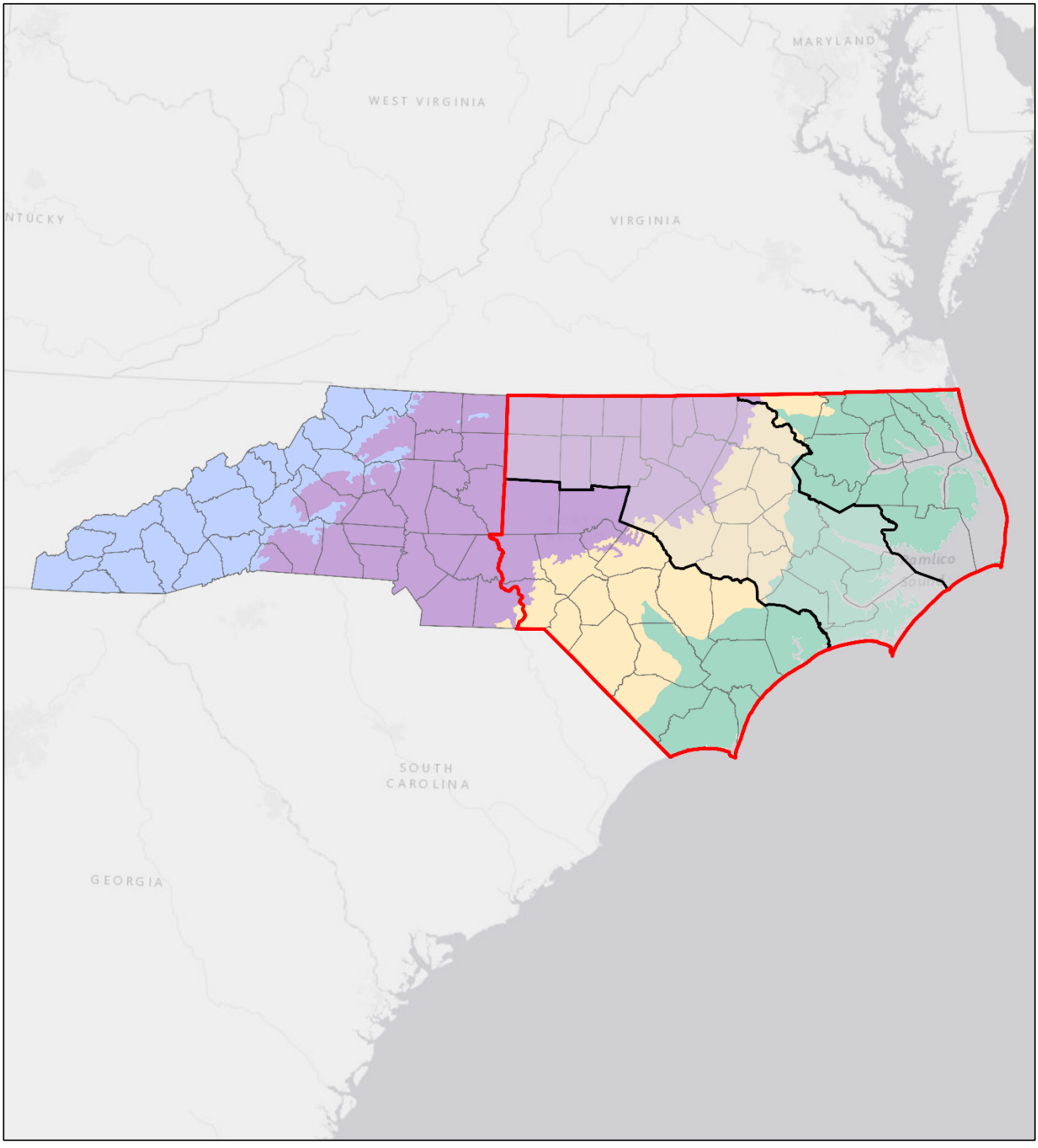


USFWS Raleigh Field Office Work Area
PBA Action Area
County Boundary

EPA Level III Ecoregions

Blue Ridge
Piedmont
Southeastern Plains
Middle Atlantic Coastal Plain

110 55 0 110 km

68.3 34.1 0 68.3 mi

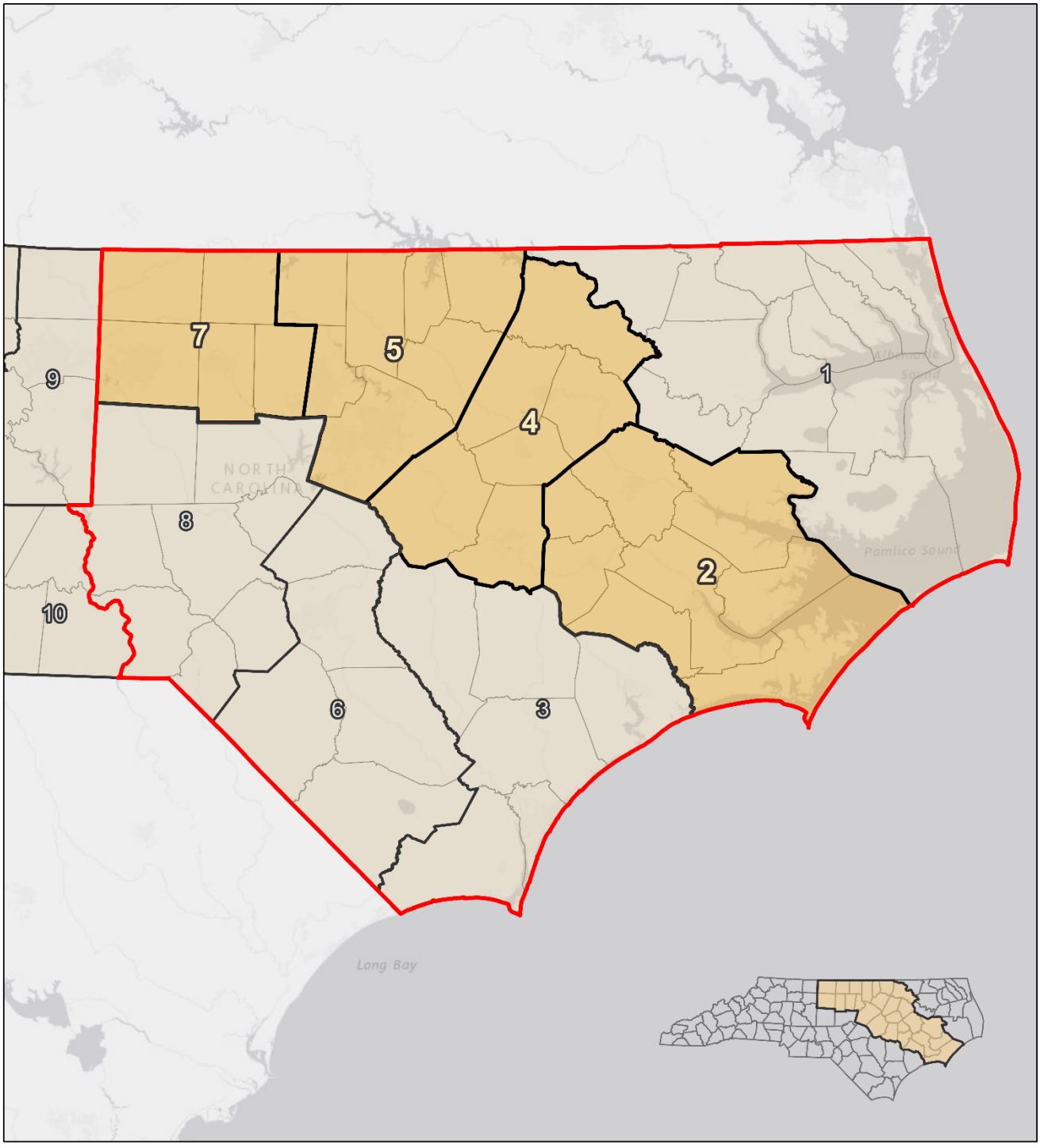
Source: EPA, NCDOT, USFWS
Figure Date: 11/12/2019

NV5 CALYX ENGINEERS + CONSULTANTS

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
ENVIRONMENTAL ANALYSIS UNIT

Programmatic Biological Assessment for Carolina Madtom and Neuse River Waterdog and Associated Critical Habitat

Figure 1



USFWS Raleigh Field Office Work Area

County Boundary

NCDOT Division Boundaries

Action Area Division

Other Division

60 30 0 60 km

37.3 18.6 0 37.3 mi

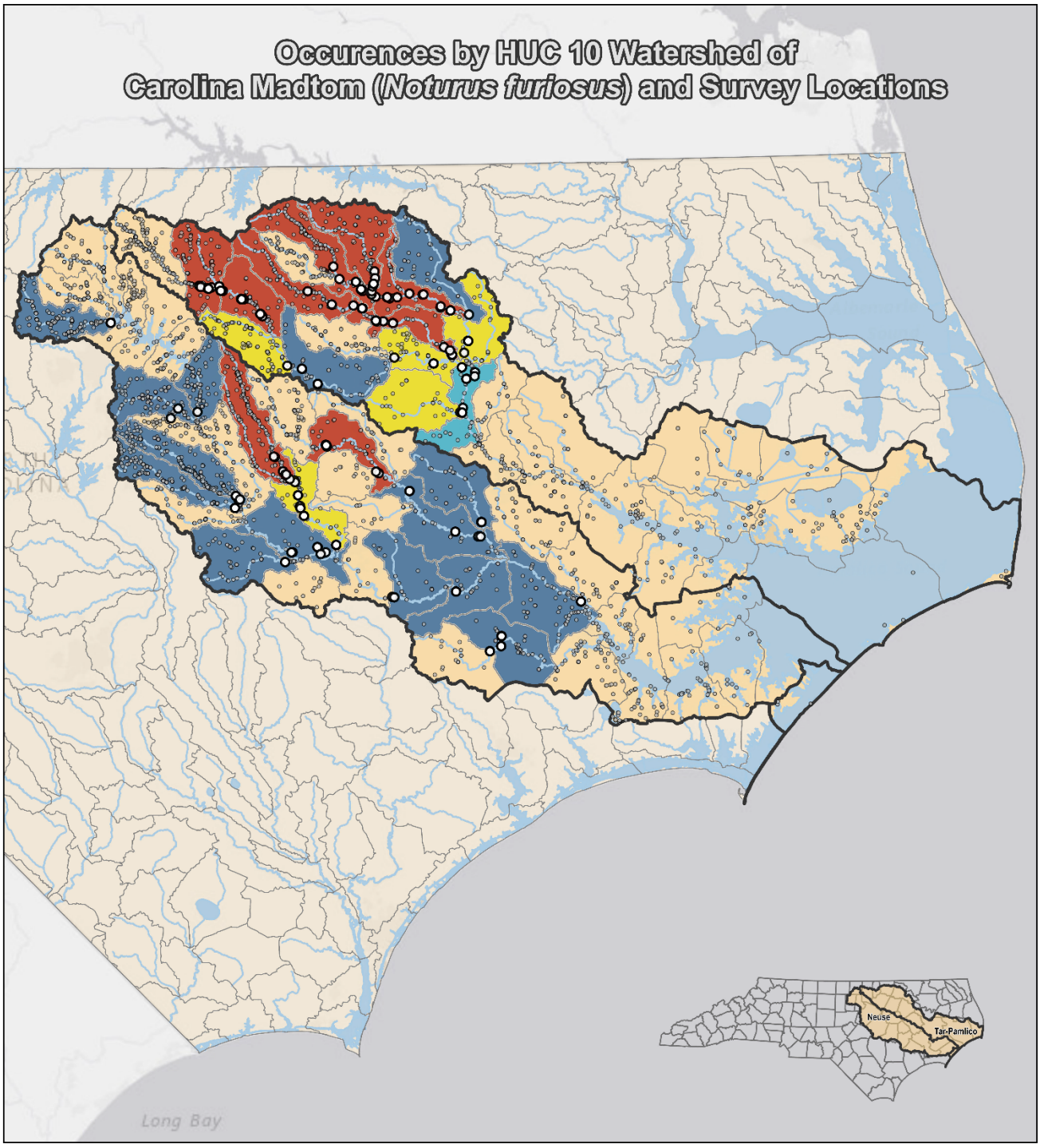
Source: NCDOT
Figure Date: 11/12/2019

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
ENVIRONMENTAL ANALYSIS UNIT

Programmatic Biological Assessment for Carolina Madtom and Neuse River Waterdog and Associated Critical Habitat

Figure 2

Occurences by HUC 10 Watershed of Carolina Madtom (*Noturus furiosus*) and Survey Locations



- Occurences
- Survey Location

Most Recent Record

- ≤5 years
- 6-10 years
- 11-15 years
- 16-20 years
- >20 years

- Surveyed Basin
- HUC 10 Boundary
- Major Stream
- Major Waterbody

45 23 0 45 km

27.9 13.9 0 27.9 mi

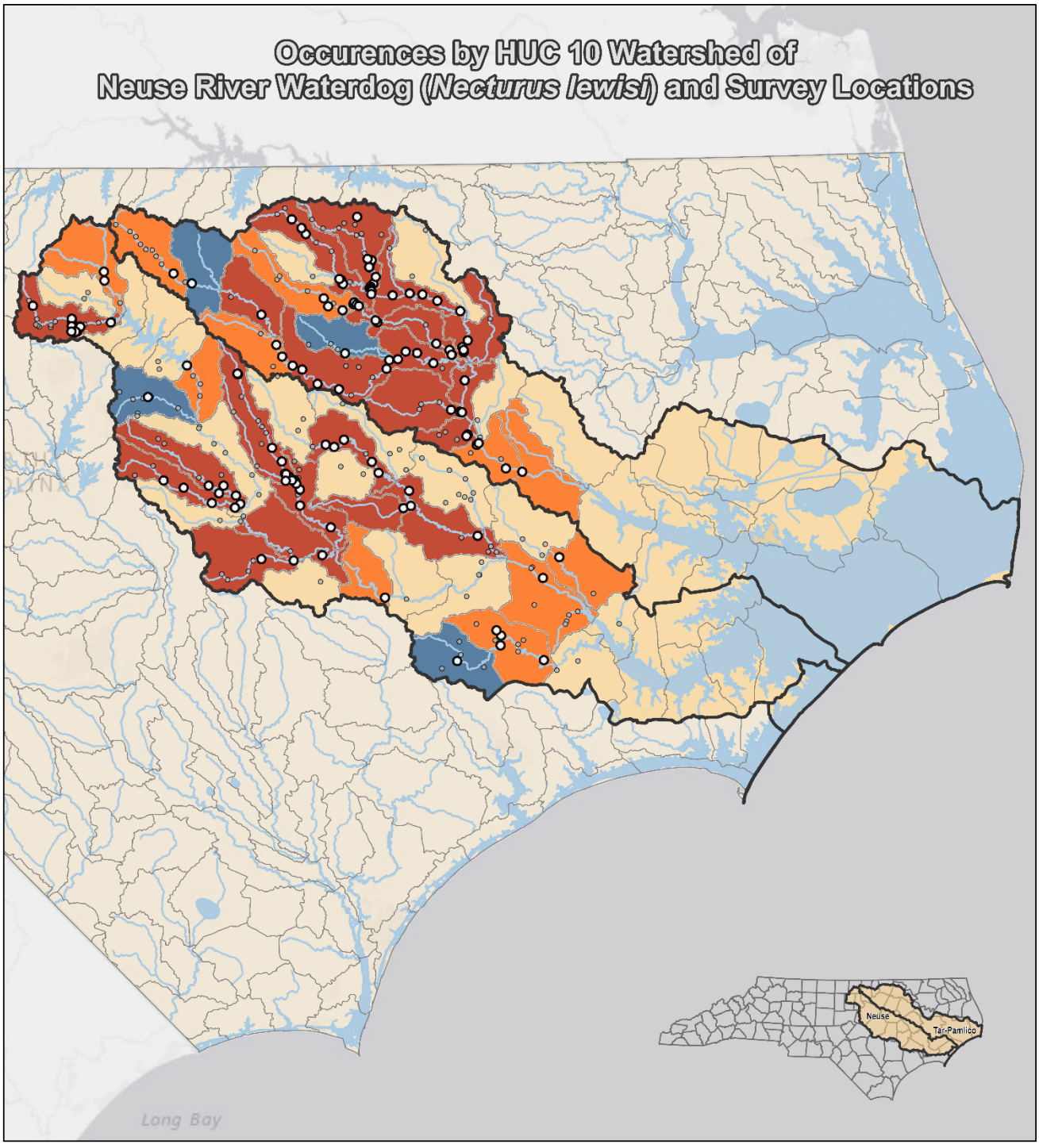
Source: NCDOT, NCDWR, NCMNS, NCWRC
Figure Date: 11/14/2019

NV5 CALYX ENGINEERS + CONSULTANTS

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
ENVIRONMENTAL ANALYSIS UNIT

Programmatic Biological Assessment for Carolina Madtom and Neuse River Waterdog and Associated Critical Habitat

Figure 3



Occurences
Survey Location

Most Recent Record

≤5 years
6-10 years
11-15 years
16-20 years
>20 years

Surveyed Basin
HUC 10 Boundary
Major Stream
Major Waterbody

45 23 0 45 km

27.9 13.9 0 27.9 mi

Source: NCDOT, NCWRC
Figure Date: 11/14/2019

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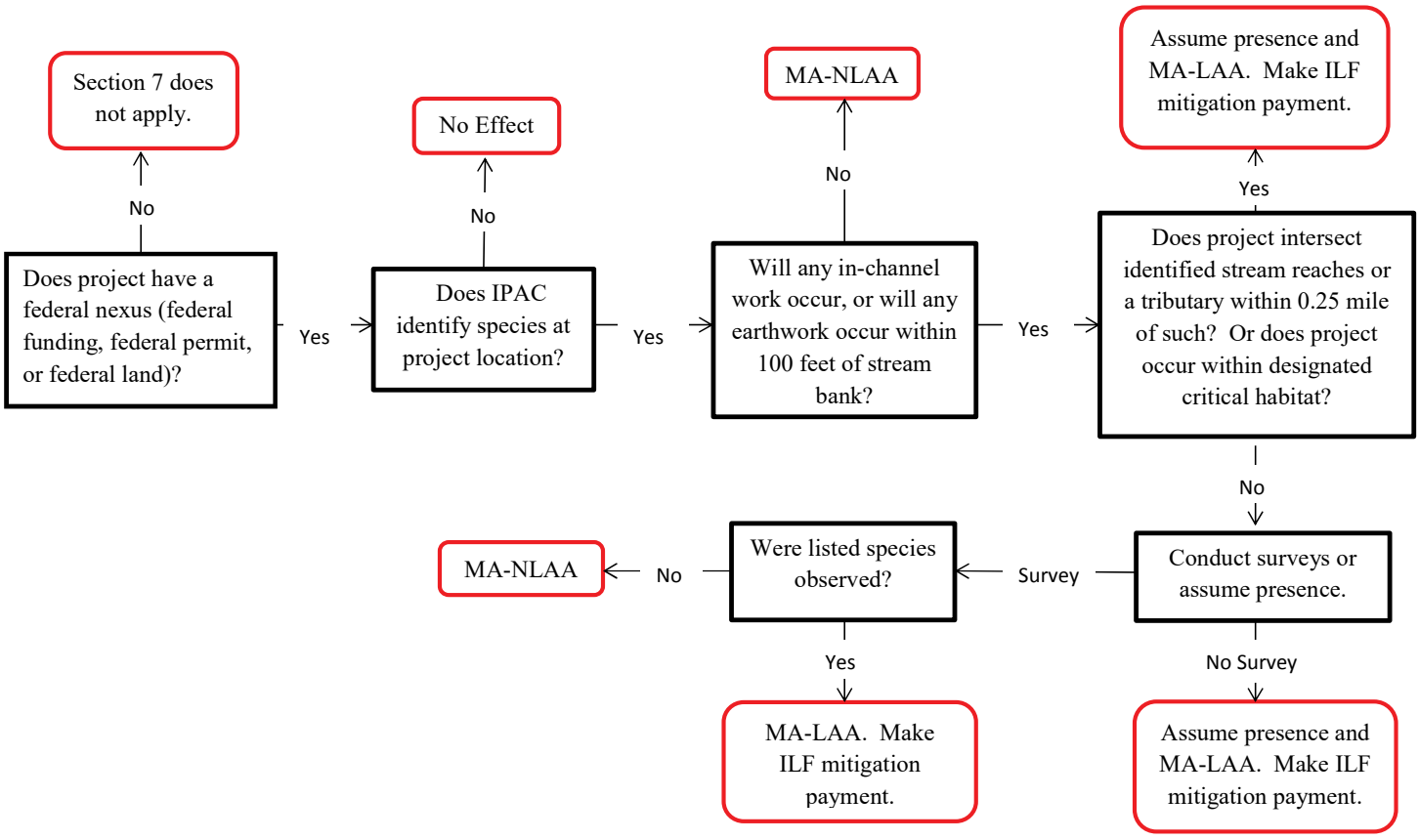
DEPARTMENT OF TRANSPORTATION
ENVIRONMENTAL ANALYSIS UNIT

Programmatic Biological Assessment for Carolina Madtom and Neuse River Waterdog and Associated Critical Habitat

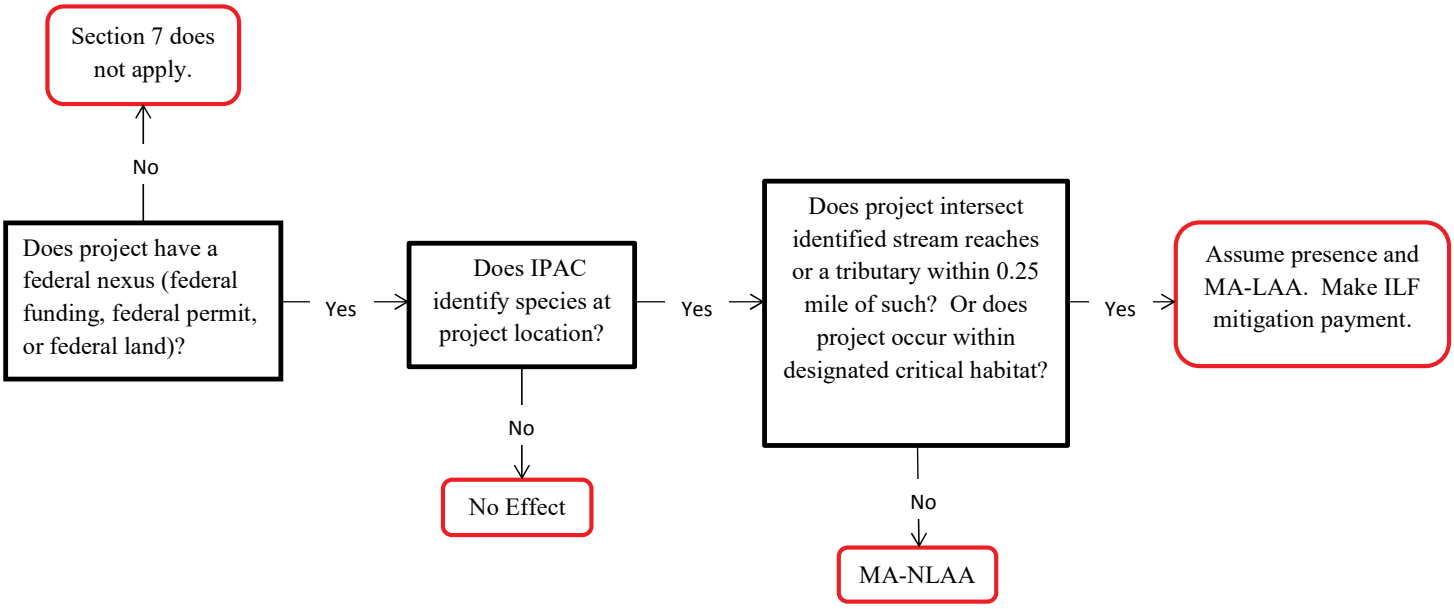
Figure 4

Appendix B1. Section 7 Programmatic Process – Bridge Replacement with Bridge/Repair/ Rehabilitation Divisions 2, 4, 5, and 7 for Carolina Madtom and Neuse River Waterdog



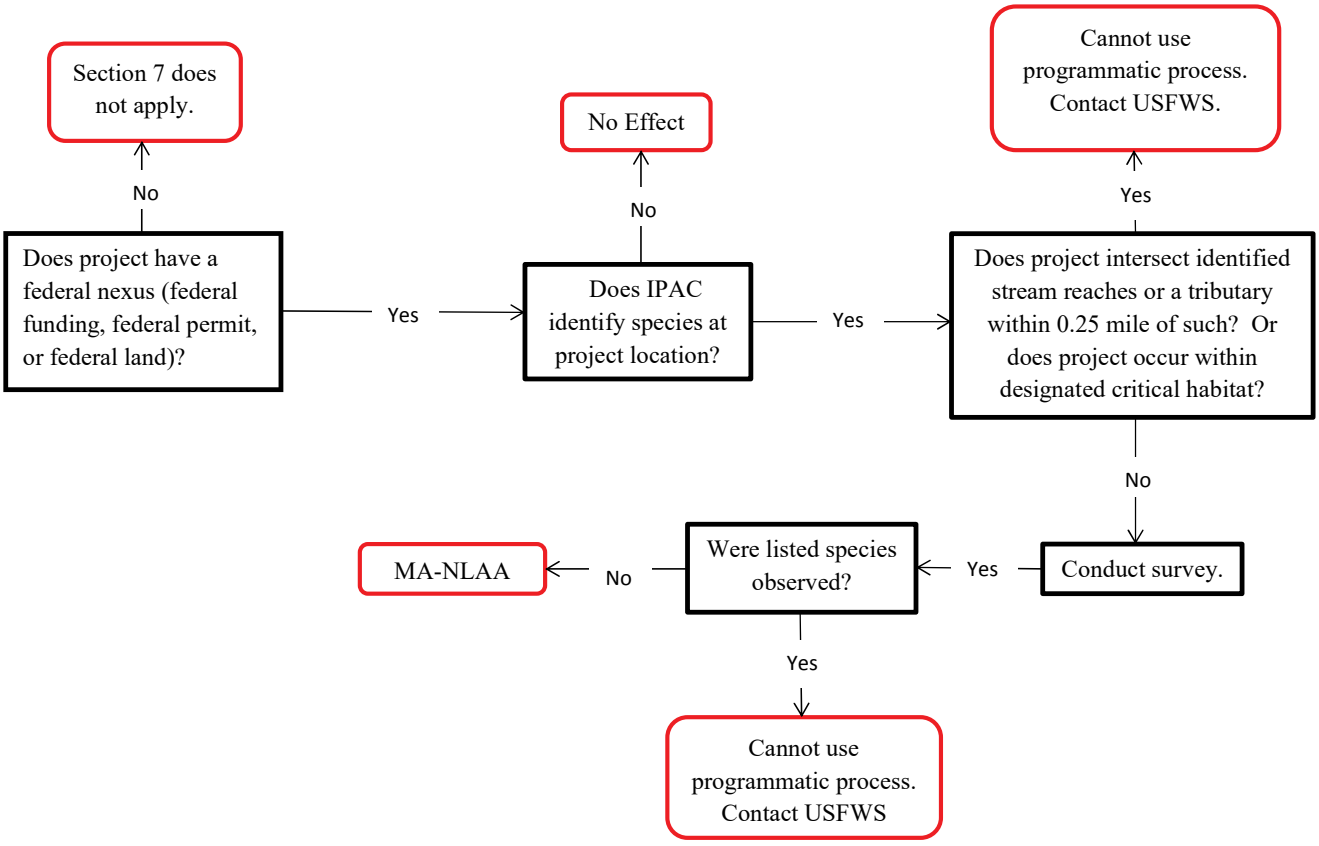
*This programmatic process assumes that all normal BMPs and on-site conservation measures regarding design, construction, and erosion control are implemented.

Appendix B2. Section 7 Programmatic Process – Culvert Replacement/Repair/Extension Divisions 2, 4, 5, and 7 for Carolina Madtom and Neuse River Waterdog



*This programmatic process assumes that all normal BMPs and on-site conservation measures regarding design, construction, and erosion control are implemented.

Appendix B3. Section 7 Programmatic Process – Bridge to Culvert Replacement Divisions 2, 4, 5, and 7 for Carolina Madtom and Neuse River Waterdog



*This programmatic process assumes that all normal BMPs and on-site conservation measures regarding design, construction, and erosion control are implemented.