

**Addendum 2: Revised Mussel Programmatic
Biological/Conference Opinion**

**Bridge and Culvert Replacements/Repairs/Rehabilitations
in Eastern North Carolina, NCDOT Divisions 1-8**

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CONSULTATION HISTORY

This section lists key events and correspondence during this conference/consultation. A complete administrative record of this conference/consultation is available from the U.S. Fish and Wildlife Service's (Service) Raleigh Field Office.

2019-09-11 – The Service issued the *Revised Programmatic Biological/Conference Opinion for Bridge and Culvert Replacements/Repairs/Rehabilitations in Eastern North Carolina, NCDOT Divisions 1-8*.

2021-06-01 – The Service issued *Addendum (1) to Revised Programmatic Biological/Conference Opinion for Bridge and Culvert Replacements/Repairs/Rehabilitations in Eastern North Carolina, NCDOT Divisions 1-8*.

2023-07-26 – The Service proposed to list the Green Floater as a threatened species along with designated critical habitat.

2024-06-12 – The Service received a draft *Eastern North Carolina Programmatic Biological Assessment (Green Floater and James Spiny mussel Addendum)*.

2024-06-19 – The Service provided comments on a draft addendum to the Programmatic Biological Assessment.

2024-10-11 – The Service received the final addendum to the Programmatic Biological Assessment and a letter from the Federal Highway Administration (FHWA) and US Army Corps of Engineers (USACE) requesting re-initiation of formal Section 7 conference/consultation for the proposed threatened Green Floater, proposed critical habitat for Green Floater, and the endangered James Spiny mussel.

2024-11-18 – The Service provided a draft *Addendum 2: Revised Programmatic Biological/Conference Opinion for Bridge and Culvert Replacements/Repairs/Rehabilitations in Eastern North Carolina, NCDOT Divisions 1-8* to the North Carolina Department of Transportation, FHWA, and USACE.

ADDENDUM 2: REVISED MUSSEL PROGRAMMATIC BIOLOGICAL/ CONFERENCE OPINION

1. INTRODUCTION

On September 11, 2019, the U.S. Fish and Wildlife Service (Service) issued *Revised Programmatic Biological/ Conference Opinion (PBO) for Bridge and Culvert Replacements/Repairs/ Rehabilitations in Eastern North Carolina, NCDOT Divisions 1-8*. This PBO addressed the federally listed Dwarf Wedgemussel, Tar River Spiny mussel, Yellow Lance, Atlantic Pigtoe, and critical habitat for Atlantic Pigtoe. On June 1, 2021, the Service issued an addendum to the PBO which addressed critical habitat for Yellow Lance. On July 26, 2023, the Service proposed to list the Green Floater as a federally threatened species along with designated critical habitat. As a result, the North Carolina Department of Transportation (NCDOT), Federal Highway Administration (FHWA), and U.S. Army Corps of Engineers (USACE) opted to initiate formal Section 7 conference to include the Green Floater and proposed critical habitat in the PBO. Additionally, the action agencies have taken this opportunity to add the federally endangered James Spiny mussel to the PBO by re-initiating formal Section consultation. With this second addendum, all federally listed and proposed listed mussel species and critical habitat within NCDOT Divisions 1-8 will be addressed by the PBO.

This Addendum 2 is intended to be appended to the original 2019 PBO and accompanying 2021 Addendum 1. The original 2019 PBO and 2021 Addendum 1 are still valid with the following additions/revisions. Section 2.7 (Programmatic Methodology) of the 2019 PBO is slightly revised to replace Identified Stream Reaches with Current Element Occurrences. New sections are added to address the Green Floater, Green Floater proposed critical habitat, and James Spiny mussel. Additional language is added to the Incidental Take Statement of the 2019 PBO to account for take of Green Floater and James Spiny mussel. The flowcharts in Appendix B1, B2 and B3 of the 2019 PBO are slightly revised to replace Identified Stream Reaches with Current Element Occurrences.

2. REVISED PROGRAMMATIC METHODOLOGY

The following text replaces all of Section 2.7 from the original 2019 PBO. The entire text is provided below with new revised language indicated in red.

The Action evaluated in this PBO includes the replacement of existing bridges, the repair and/or rehabilitation of existing bridges, the replacement or extension of existing culverts/pipes, and the bridge and culvert portions of highway widening projects within NCDOT Divisions 1-8 for a period of ten years (beginning in May 2018). For purposes of this PBO, pipes are considered as culverts. Projects that involve replacing an existing bridge with a culvert in areas which are likely to adversely affect federally listed/proposed mussel species are excluded from this consultation/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 listed/proposed mussel species may not qualify to use this PBO. If

questions arise as to the applicability of the PBO 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 PBO unless the new location portion does not cross any streams which may affect listed/proposed mussels.

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://ipac.ecosphere.fws.gov/>. The project planning tool is used to draw a polygon of the action area to develop a customized list of federally listed or proposed listed species and critical habitats that may be affected by a project.

Current Element Occurrence – The North Carolina Natural Heritage Program (NCNHP) collects information on occurrences of rare plants, animals, natural communities, and animal assemblages. Collectively, these are referred to as "elements," and the locations of these elements are referred to as "element occurrences" (EOs). The NCNHP maintains a list of EOs for all the mussel species covered in this PBO with GIS layers depicting the list. The EOs are categorized as either "current" or "historical." Typically, historical EOs have not had an observation of that species in that area within the past ~20 years, and current EOs have had an observation of that species within the past ~20 years. The NCNHP updates the data on their Data Explorer webpage quarterly, so it is possible that some current EOs are added, while others may be recategorized to the historical status throughout the year.

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 federally listed mussel species (see Section 4.3.4 for examples and benefits of the ILF program). A multi-agency/organization group of mussel 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) one or more listed mussel species, 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 PBO, the procedure for NCDOT will be to go to the IPaC webpage (<https://ipac.ecosphere.fws.gov/>) and either upload a shapefile or draw a polygon of the footprint of the project. A list of federally listed/proposed mussel species for that area will be returned. If one or more of the mussel species addressed in this PBO is identified as potentially being

present, then NCDOT will review the **current element occurrences** for the mussel species. A direct comparison between those **current element occurrences** should be made with the footprint of the proposed project to determine if the project will intersect a **current element occurrence** 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 listed/proposed mussel species as potentially being present, then there is **No Effect**. If IPaC does identify listed/proposed mussel species 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 a **current element occurrence** 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 a **current element occurrence** 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 listed/proposed species are observed. If so, then the biological conclusion is **MA-LAA**. If listed/proposed species 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 listed/proposed mussel species as potentially being present, then there is **No Effect**. If IPaC does identify listed/proposed mussel species as potentially being present and intersects a **current element occurrence** 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 a **current element occurrence** or is not within designated/proposed critical habitat, then the biological conclusion is **MANLAA**. 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 listed/proposed mussel species as potentially being present, then there is **No Effect**. If IPaC does identify listed/proposed mussel species as potentially being present and intersects a **current element occurrence** 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 a **current element occurrence** or is not within designated/proposed critical habitat, then a survey is

needed. If listed/proposed species are observed, then the programmatic process cannot be used, and the Service should be contacted. If no listed/proposed species were observed, then the biological conclusion is MA-NLAA and concurrence with that conclusion is automatically provided by the Service (see Section 3).

The aforementioned protocols were negotiated with the NCDOT, FHWA, and USACE. The NCDOT has affirmed its support of the protocols and regards the option to assume presence of mussel species as “a valuable tool to the Department by providing an avenue for the Section 7 Consultation to be taken off the critical path for project delivery” (Philip Harris, NCDOT Environmental Analysis Unit Head, personal email communication, May 11, 2018).

3. GREEN FLOATER

3.1. Status of Green Floater

This section summarizes best available data about the biology and condition of the Green Floater (*Lasmigona subviridis*) throughout its range that are relevant to formulating a conference opinion about the Action. The Service published a Species Status Assessment Report for the Green Floater on February 10, 2021 (USFWS 2021). The Service published its proposed rule to list the Green Floater as threatened with designated critical habitat on July 26, 2023 (88 FR 48294–48349).

3.1.1. Description of Green Floater

Green Floaters are small freshwater mussels with auricular or ear-shaped shells with a broader, slightly more swollen posterior end and a narrower, less inflated anterior end. Their shells are yellow to umber and rayed with fine linear dark green rays most concentrated on the posterior end. Adults may reach up to 5.5 centimeters, but smaller individuals are more common (Kendig 2014).

3.1.2. Life History of Green Floater

Green Floaters are typically found in small streams to large rivers with slow to moderate flows (not high currents), in areas that provide flow refugia (i.e., eddies and ponded areas in streams), with stable sand and gravel substrate and good water quality. Green Floaters are relatively short lived with variable annual recruitment, suggesting they maximize population growth during periods of favorable conditions. Green Floaters are hermaphroditic and can self-fertilize, which increases the probability of fertilization. Spawning and reproduction likely occur during the late summer or early fall. Over the winter months, they can directly metamorphose larvae (glochidia), releasing juveniles into the water column during the spring without requiring an intermediate host. Green Floaters can also use fish hosts such as Mottled Sculpin, Rock Bass, Central Stoneroller, Blacknose Dace, and Margined Madtom. In these cases, after being expelled into the water, glochidia attach to gills or fins of these fish where they undergo metamorphosis to the juvenile life stage. The Green Floater is an omnivore that presumably feeds on a wide variety of microscopic particulate matter (e.g., bacteria and algae). For more detailed information on Green

Floater life history, see Sections 2.4 and 2.5 of the Species Status Assessment Report (USFWS 2021).

3.1.3. Numbers, Reproduction, and Distribution of Green Floater

The Green Floater is historically native to the District of Columbia and 10 states (Alabama, Georgia, Maryland, New Jersey, New York, North Carolina, Pennsylvania, Tennessee, Virginia, and West Virginia). Green Floater populations are currently found in eight of the 10 states in their historical range and are considered extirpated in Alabama, Georgia, and the District of Columbia. They are also extirpated from multiple rivers across the rest of the range. Based on analysis of 179 analysis units (geographic units represented by 10-digit Hydrologic Unit Code watersheds in which there are recent or past Green Floater records), 84% of analysis units are currently considered to be in low or presumed extirpated condition and only 16% in high or medium condition. For more detailed information on numbers, reproduction, and distribution, see Chapters 5 and 6 of the Species Status Assessment Report (USFWS 2021).

3.1.4. Conservation Needs of and Threats to Green Floater

The Green Floater needs multiple resilient populations distributed widely across its range, and connectivity between populations (free flowing streams and rivers without barriers) is necessary for periodic genetic exchange. The primary stressors for the species are habitat loss or fragmentation, changes in water flows, and degraded water quality. These stressors are assumed to be caused by multiple sources such as development, energy production, and agriculture - with development appearing to be the primary source. For more detailed information on conservation needs and threats, see Chapter 4 of the Species Status Assessment Report (USFWS 2021).

3.2. Environmental Baseline for Green Floater

This section describes the best available data about the condition of the Green Floater in the Programmatic Action Area without the consequences caused by the proposed Action.

3.2.1. Action Area Numbers, Reproduction, and Distribution of Green Floater

The Programmatic Action Area falls within the South Atlantic Representative Unit in the Species Status Assessment Report (USFWS 2021) and covers all or part of 26 analysis units. The condition of these 26 analysis units is categorized below. For more detailed information on numbers, reproduction, and distribution within these analysis units, see Chapters 5 and 6 of the Species Status Assessment Report (USFWS 2021).

- 4 units (15%) historical current condition (Butcher Creek, Hyco River, Aarons Creek, and Rocky River)
- 6 units (23%) extirpated condition (Tabbs Creek, Crabtree Creek, Middle Creek, Swift Creek, Moccasin Creek, Buckhorn Reservoir)
- 11 units (42%) low current condition (Mayo River, Aycock Creek, Lynch Creek, Tar River Reservoir, Beech Branch, Otter Creek, Flat River, Walnut Creek, Upper Little River, Lower Uwharrie River, Eury Dam)

- 4 units (15%) medium current condition (Matrimony Creek, Cascade Creek, Hogans Creek, Eno River)
- 1 unit (4%) high current condition (Belews Lake).

3.2.2. Action Area Conservation Needs of and Threats to Green Floater

The conservation needs and threats to the Green Floater within the Programmatic Action Area are the same as those described throughout its range in Section 3.1.4.

3.3. Effects of the Action on Green Floater

The effects of the Action on the Green Floater are very similar to those described for the Dwarf Wedgemussel (*Alasmidonta heterodon*) in Sections 4.3.1., 4.3.2., 4.3.3., 4.3.4., and 4.3.5. of the 2019 PBO. The potential number of Green Floaters adversely affected is estimated as follows:

Over the past 10 years, the North Carolina Wildlife Resources Commission (NCWRC) Aquatics Database indicates that 1,754 mussel surveys were conducted within the Programmatic Action Area, with 417 live Green Floaters being observed. Although there is no published detection rate for Green Floater surveys, an average detection rate of 15% obtained during a 2010-2019 mark-recapture study (Ostby 2022) for James Spiny mussel (*Parvaspina collina*) is used as a surrogate. The ranges of Green Floater and James Spiny mussel overlap, and both mussels are of similar size, so detection rates of these species are assumed to be similar. Dividing 417 individuals by 0.15 yields 2,780 Green Floaters present in the surveyed reaches. Although the NCWRC Aquatics Database does not indicate the length of each survey, an assumed distance of 0.31 stream mile (500 meters) is used. This assumption is supported by the fact most surveys in the database are from ESA investigations, of which the Service generally requires to be 500 meters in length. Multiplying 0.31 by 1,754 surveys yields 543.74 miles of stream surveyed. Dividing the 2,780 estimated Green Floaters present in the surveyed area by 543.74 stream miles yields an estimated density of 5.11 Green Floaters/stream mile. Under normal circumstances, a downstream distance of 400 meters (0.25 stream mile) is generally considered to be the extent of detectable sedimentation effects. Multiplying this 0.25-mile downstream distance by the 166 estimated number of projects in the Programmatic Action Area that are within the range of the Green Floater equals approximately 41.5 stream miles potentially affected. With an estimated density of 5.11 Green Floaters/stream mile, an estimated number of Green Floaters potentially adversely affected equals 212 individuals. It is anticipated that most adverse effects would be temporary and non-lethal in nature, but some smaller but unknown number of Green Floaters may be killed.

3.4. Cumulative Effects on Green Floater

We are not aware of any non-federal actions in the Programmatic Action Area that may affect Green Floater. Therefore, cumulative effects are not relevant to formulating our opinion for the Action.

3.5. Conclusion for Green Floater

Green Floater populations are currently found in eight of the 10 states in their historical range but are in low or presumed extirpated condition in 84% of 179 analysis units. The primary stressors for the species are habitat loss or fragmentation, changes in water flows, and degraded water quality. This Addendum 2 to the PBO collectively analyses the potential effects of an estimated 166 individual bridge and culvert projects within the range of the Green Floater in the Programmatic Action Area. Each individual project has the potential to adversely affect juvenile or adult Green Floaters by one or more of the following ways: crushing, burying, direct siltation effects on individuals, siltation effects on habitat, or accidental spills of toxic substances. An estimated 212 adult Green Floater individuals may be adversely affected. The probability of any individual project having lethal effects on Green Floater is low; however, when considered programmatically, lethal effects are expected. Most adverse effects are expected to be temporary and non-lethal in nature. To minimize adverse effects to Green Floater, NCDOT will implement stringent erosion control measures and other BMPs to minimize turbidity and sediment input into streams.

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 opinion that the Action is not likely to jeopardize the continued existence of the Green Floater.

4. GREEN FLOATER PROPOSED CRITICAL HABITAT

4.1. Status of Green Floater Proposed Critical Habitat

This section summarizes best available data about the condition of all units of proposed critical habitat for Green Floater that are relevant to formulating a biological opinion about the Action. The Service published its proposed rule to designate critical habitat for the Green Floater on July 26, 2023 (88 FR 48294-48349).

4.1.1. Description of Green Floater Proposed Critical Habitat

Proposed critical habitat for Green Floater is comprised of approximately 1,586 river miles in eight units. All the units are currently occupied by the species and contain one or more of the physical and biological features (PBFs) essential to the conservation of the species. See Table 2 of 88 FR 48294-48349 for more detailed information on individual units. The proposed critical habitat provides the following PBFs essential to the conservation of the Green Floater:

- (1) Flows adequate to maintain both benthic habitats and stream connectivity, allow glochidia and juveniles to become established in their habitats, allow the exchange of nutrients and oxygen to mussels, and maintain food availability and spawning habitat for host fishes. The characteristics of such flows include a stable, not flashy, flow regime, with slow to moderate currents to provide refugia during periods of higher flows.
- (2) Suitable sand and gravel substrates and connected instream habitats characterized by stable stream channels and banks and by minimal sedimentation and erosion.

- (3) Sufficient amount of food resources, including microscopic particulate matter (plankton, bacteria, detritus, or dissolved organic matter).
- (4) Water and sediment quality necessary to sustain natural physiological processes for normal behavior, growth, and viability of all life stages, including, but not limited to, those general to other mussel species:
 - adequate dissolved oxygen
 - low salinity
 - low temperature (generally below 86°F)
 - low ammonia (generally below 0.5 parts per million total ammonia- nitrogen), PAHs, PCBs, and heavy metal concentrations
 - no excessive total suspended solids and other pollutants, including contaminants of emerging concern
- (5) The presence and abundance of fish hosts necessary for recruitment of the Green Floater (including, but not limited to, Mottled Sculpin, Rock Bass, Central Stoneroller, Blacknose Dace, and Margined Madtom).

4.1.2. Conservation Value of Green Floater Proposed Critical Habitat

The current distribution of the Green Floater is much reduced from its historical distribution. We anticipate that recovery will require maintaining and, where necessary, improving habitat and habitat connectivity to ensure the long-term viability of the Green Floater. We have determined that the areas containing one or more of the essential PBFs and occupied by the Green Floater are sufficient to maintain the species' resiliency, redundancy, and representation and to conserve the species. With the eight units of proposed critical habitat dispersed over a wide geographic area, this strategy helps ensure that catastrophic events (e.g., droughts, large pollution events, hurricanes) cannot simultaneously affect all known populations.

4.1.3. Conservation Needs for and Threats to Green Floater Proposed Critical Habitat

The features essential to the conservation of the Green Floater may require special management considerations or protection to reduce the following threats: (1) land-disturbing activities associated with development, (2) agriculture and forestry activities that do not implement best management practices to minimize soil erosion and increased overland flow, (3) barriers that fragment streams and rivers (e.g., dams and improperly installed or maintained culverts), (4) contaminants from point and non-point sources, (5) impacts of climate change, and (6) potential effects of nonnative species.

Management activities that could ameliorate these threats include: (1) protecting and restoring streams and streambank habitats, including stable sand and gravel substrates, (2) maintaining and restoring slow to moderate, not flashy, water flows in streams that may support the species, (3) maintaining and restoring connectivity between streams, (4) reducing or removing contaminants from waterways and sediments, (5) coordinating with landowners and local managers to implement best management practices during agriculture and forestry activities, and (6) minimizing the likelihood that agriculture or energy development projects will impact the quality or quantity of suitable habitat (88 FR 48294–48349).

4.2. Environmental Baseline for Green Floater Proposed Critical Habitat

This section describes the best available data about the condition of proposed critical habitat for the Green Floater in the Programmatic Action Area without the consequences caused by the proposed Action.

4.2.1. Programmatic Action Area Conservation Value of Green Floater Proposed Critical Habitat

Of the total 1,586 river miles of proposed critical habitat for the Green Floater, approximately 142.8 river miles (9%) are located within the Programmatic Action Area. Of the eight total proposed critical habitat units, two occur either wholly or partially within the Programmatic Action Area - Unit 6: Chowan-Roanoke Watershed (Rockingham and Caswell Counties) and Unit 7: Neuse-Pamlico Watershed (Orange, Person, Durham, Wake and Johnston Counties).

4.2.2. Programmatic Action Area Conservation Needs for Green Floater Proposed Critical Habitat

The conservation needs and threats to the Green Floater proposed critical habitat within the Programmatic Action Area are the same as those described in Section 4.1.3.

4.3. Effects of the Action on Green Floater Proposed Critical Habitat

The effects of the action on proposed critical habitat for Green Floater are very similar to those described for Atlantic Pigtoe (*Fusconaia masoni*) critical habitat in Sections 8.3.1., 8.3.2., 8.3.3., 8.3.4. and 8.3.5. of the 2019 PBO. The effects would apply to PBF numbers 2, 4, and 5 (see Section 4.1.1. above). However, NCDOT's use of BMPs (NCDOT 2003, 2014a, 2015, 2022) will greatly minimize these 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.

4.4. Cumulative Effects on Green Floater Proposed Critical Habitat

We are not aware of any non-federal actions in the Programmatic Action Area that may affect proposed critical habitat. Therefore, cumulative effects are not relevant to formulating our opinion for the Action.

4.5. Conclusion for Green Floater Proposed Critical Habitat

Approximately 9% of proposed critical habitat occurs within the Programmatic Action Area. The action may affect PBFs 2, 4 and 5, albeit most effects will be minor and temporary in nature. 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 opinion that the Action is not likely to result in the destruction or adverse modification of proposed critical habitat for the Green Floater.

5. JAMES SPINYMUSSEL

5.1. Status of James Spiny mussel

This section summarizes best available data about the biology and condition of the James Spiny mussel (*Parvaspina collina*) throughout its range that are relevant to formulating a biological opinion about the Action. The Service published its final rule to list the James Spiny mussel as endangered on July 22, 1988 (53 FR 27689-27693). The Service published a 5-Year Review: Summary and Evaluation in November 2022 (USFWS 2022).

5.1.1. Description of James Spiny mussel

The James Spiny mussel is a small freshwater mussel slightly less than three inches in length. Adults have a dark brown shell with prominent growth rings and occasionally, short spines on each valve. Young mussels have a shiny, yellow-gold and brown shell with or without one to three short spines. The foot and mantle tissue of adult mussels are typically orange (USFWS 2024).

5.1.2. Life History of James Spiny mussel

James Spiny mussels live in streams that vary in width from 1.5 – 80 meters and a depth of 0.15 – 2.0 meters. The species is found in a range of substrates, including sand, gravel, and cobble with or without boulders, pebbles, or silt. The water velocity at sites supporting the species is slow to moderate, in pools to riffles/runs (USFWS 2022). The species life cycle is like other North American unionids in that males release sperm into the water column, which are taken in by females during siphoning. Fertilized eggs are retained in the gills, which serve as brood pouches for developing larvae (glochidia). The glochidia are released into the water and must attach to an appropriate host fish. If attachment occurs, the glochidia metamorphose and drop from the fish as free-living juvenile mussels. The James Spiny mussel is a tachytictic (short-term) brooder and its eggs are fertilized in the spring and glochidia are released in spring and summer. Glochidia are released in a formation known as a conglutinate (USFWS 1990). Typical lifespan is estimated 15-20 years with at least 30 years being the maximum (USFWS 2022). For additional life history information, see Section 2.3.1.1. of the 5-Year Review (USFWS 2022).

5.1.3. Numbers, Reproduction, and Distribution of James Spiny mussel

The James Spiny mussel is found in the James River basin in Virginia and West Virginia and in the Upper Dan sub-basin of the Roanoke River basin in Virginia and North Carolina (USFWS 2024). Although there is an increased spatial distribution of the species since the time of listing, James Spiny mussels generally occur in relatively low density and abundance (< 10 individuals) at many sites across their range. Across its range, James Spiny mussel occupies 52% (32 of 61) of the historically occupied HUC12s, of which 23 were discovered since 1990 due to increased survey effort. Sections 2.3.1.2 and 2.3.1.5 of the 5-Year Review (USFWS 2022) provide additional detailed information on numbers, reproduction, and distribution of the species.

5.1.4. Conservation Needs of and Threats to James Spinemussel

The final listing rule described habitat modification as a major threat to James Spinemussel and the cause of its decline (53 FR 27689-27693). Adverse habitat changes were caused by dam construction, industrial pollution, chemical spills, channelization, agricultural runoff (including pesticides and fertilizers), and sewage discharges at multiple locations within the species' historical range in the James River basin. The final rule also indicated erosion and siltation from logging operations in the upper Craig Creek watershed and other locations as a threat to habitat. Recent information indicates that dams and activities related to land use modification remain threats throughout the species range and are expected to continue in the future. While construction of new dams is unlikely a current threat, most dams continue to be a threat by reducing connectivity and isolating James Spinemussel populations, reducing habitat quality and quantity, and changing hydrologic flow regime downstream of the dam. Water quality issues due to land use modification, in particular sedimentation/turbidity, nutrients, and contaminants, are widespread threats to James Spinemussel, while instream construction activities and livestock access to streams are localized threats in numerous waterbodies. Severe flooding/stormflow events are also localized but serious threats to James Spinemussel in some waterbodies. Land use changes, in particular increased development and impervious surface in watersheds, alter flow regimes and contribute to greater frequency and intensity of severe flood events. The threats of land disturbance activities are likely to increase in the future with projected increases in urban sprawl (USFWS 2022).

5.2. Environmental Baseline for James Spinemussel

This section describes the best available data about the condition of the James Spinemussel in the Programmatic Action Area without the consequences caused by the proposed Action.

5.2.1. Action Area Numbers, Reproduction, and Distribution of James Spinemussel

Within the Programmatic Action Area, the James Spinemussel is only found in Rockingham County. The James Spinemussel was discovered in the Dan River in 2000 and was the first documentation of the species outside the James River Basin. In 2017, four new sites in Rockingham County extended the range of the James Spinemussel 53 river miles downstream in the Dan River to near the North Carolina/Virginia border (USFWS 2022). One live individual was found at three of the sites and one shell was found at the other site, suggesting extremely low density and patchy distribution in the lower portion of the Dan River in North Carolina. The James Spinemussel was discovered in the Mayo River (a tributary to the Dan River) in 2001. Surveys from 2001-2002 found the species at multiple sites covering approximately 13.25 river miles, with 1-11 James Spinemussels observed at each site, totaling 35 across all sites. In 2008-2009, eight individuals at four sites were observed in the upper Mayo River. In 2016 only two older James Spinemussels were found across seven sites. The James Spinemussel population in the Mayo River appears to have low abundance and may be declining. James Spinemussels were discovered in the South Fork Mayo River (a tributary to the Mayo River) in 2002, but only 0.5 river mile occurs within the Programmatic Action Area.

5.2.2. Action Area Conservation Needs of and Threats to James Spiny mussel

The conservation needs and threats to the James Spiny mussel within the Programmatic Action Area are the same as those described throughout its range in Section 5.1.4.

5.3. Effects of the Action on James Spiny mussel

The effects of the Action on the James Spiny mussel are very similar to those described for the Dwarf Wedgemussel in Sections 4.3.1., 4.3.2., 4.3.3., 4.3.4., and 4.3.5. of the 2019 PBO. The potential number of James Spiny mussel adversely affected is estimated as follows:

Over the past 10 years, the NCWRC Aquatics Database indicates that 148 mussel surveys were conducted within the range of the James Spiny mussel within the Programmatic Action Area, with only 10 live James Spiny mussels being observed. Using an average detection rate of 15% obtained during a 2010-2019 mark-recapture study (Ostby 2022) for James Spiny mussel, the number of 10 live mussels is divided by 0.15 to obtain an estimated total number of 66.7 James Spiny mussels present in the surveyed reaches. Although the NCWRC Aquatics Database does not indicate the length of each survey, an assumed distance of 0.31 stream mile (500 meters) is used. This assumption is supported by the fact most surveys in the database are from ESA investigations, of which the Service generally requires to be 500 meters in length. Multiplying 0.31 by 148 surveys yields 45.88 miles of stream surveyed. Dividing the 66.7 estimated James Spiny mussels present in the surveyed area by 45.88 stream miles yields an estimated density of 1.45 James Spiny mussels/stream mile. Under normal circumstances, a downstream distance of 400 meters (0.25 stream mile) is generally considered to be the extent of detectable sedimentation effects. Multiplying this 0.25-mile downstream distance by the 21 estimated number of projects in the Programmatic Action Area that are within the range of the James Spiny mussel equals approximately 5.25 stream miles potentially affected. With an estimated density of 1.45 James Spiny mussels/stream mile, an estimated number of James Spiny mussels potentially adversely affected equals seven individuals. It is anticipated that most adverse effects would be temporary and non-lethal in nature, but some smaller but unknown number of James Spiny mussels may be killed.

5.4. Cumulative Effects on James Spiny mussel

We are not aware of any non-federal actions in the Programmatic Action Area that may affect James Spiny mussel. Therefore, cumulative effects are not relevant to formulating our opinion for the Action.

5.5. Conclusion for James Spiny mussel

Across its range, James Spiny mussel occupies 52% (32 of 61) of the historically occupied HUC12s, of which 23 were discovered since 1990 due to increased survey effort. The major threat to the species is habitat modification from dam construction, industrial pollution, chemical spills, channelization, agricultural runoff, and sewage discharges at multiple locations across its range. This Addendum 2 to the PBO collectively analyses the potential effects of an estimated 21 individual bridge and culvert projects within the range of the James Spiny mussel in the

Programmatic Action Area. Each individual project has the potential to adversely affect juvenile or adult James Spiny mussels by one or more of the following ways: crushing, burying, direct siltation effects on individuals, siltation effects on habitat, or accidental spills of toxic substances. An estimated seven adult James Spiny mussel individuals may be adversely affected. The probability of any individual project having lethal effects on James Spiny mussel is low; however, when considered programmatically, lethal effects are expected. Most adverse effects are expected to be temporary and non-lethal in nature. To minimize adverse effects to James Spiny mussel, NCDOT will implement stringent erosion control measures and other BMPs to minimize turbidity and sediment input into streams.

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 opinion that the Action is not likely to jeopardize the continued existence of the James Spiny mussel.

6. INCIDENTAL TAKE STATEMENT

The Service previously provided an Incidental Take Statement (ITS) for the Action in Section 9 of the 2019 PBO. Although no additional Reasonable and Prudent Measures, Terms and Conditions, or Monitoring and Reporting Requirements are necessary, the ITS is modified to include the following:

6.1. Amount or Extent of Take of Green Floater

The Service anticipates that the Action is reasonably certain to cause incidental take of individual Green Floaters consistent with the definition of harm resulting from either being crushed during construction or more likely experiencing sub-lethal adverse effects from sedimentation and turbidity. Based on survey data and estimated detection probabilities, an estimated 212 adult Green Floaters may be adversely affected. Most take would likely be sublethal; however, given the cryptic nature of this species, incidental take will likely not be detectable.

6.2. Amount or Extent of Take of James Spiny mussel

The Service anticipates that the Action is reasonably certain to cause incidental take of individual James Spiny mussels consistent with the definition of harm resulting from either being crushed during construction or more likely experiencing sub-lethal adverse effects from sedimentation and turbidity. Based on survey data and estimated detection probabilities, an estimated seven adult James Spiny mussels may be adversely affected. Most take would likely be sublethal; however, given the cryptic nature of this species, incidental take will likely not be detectable.

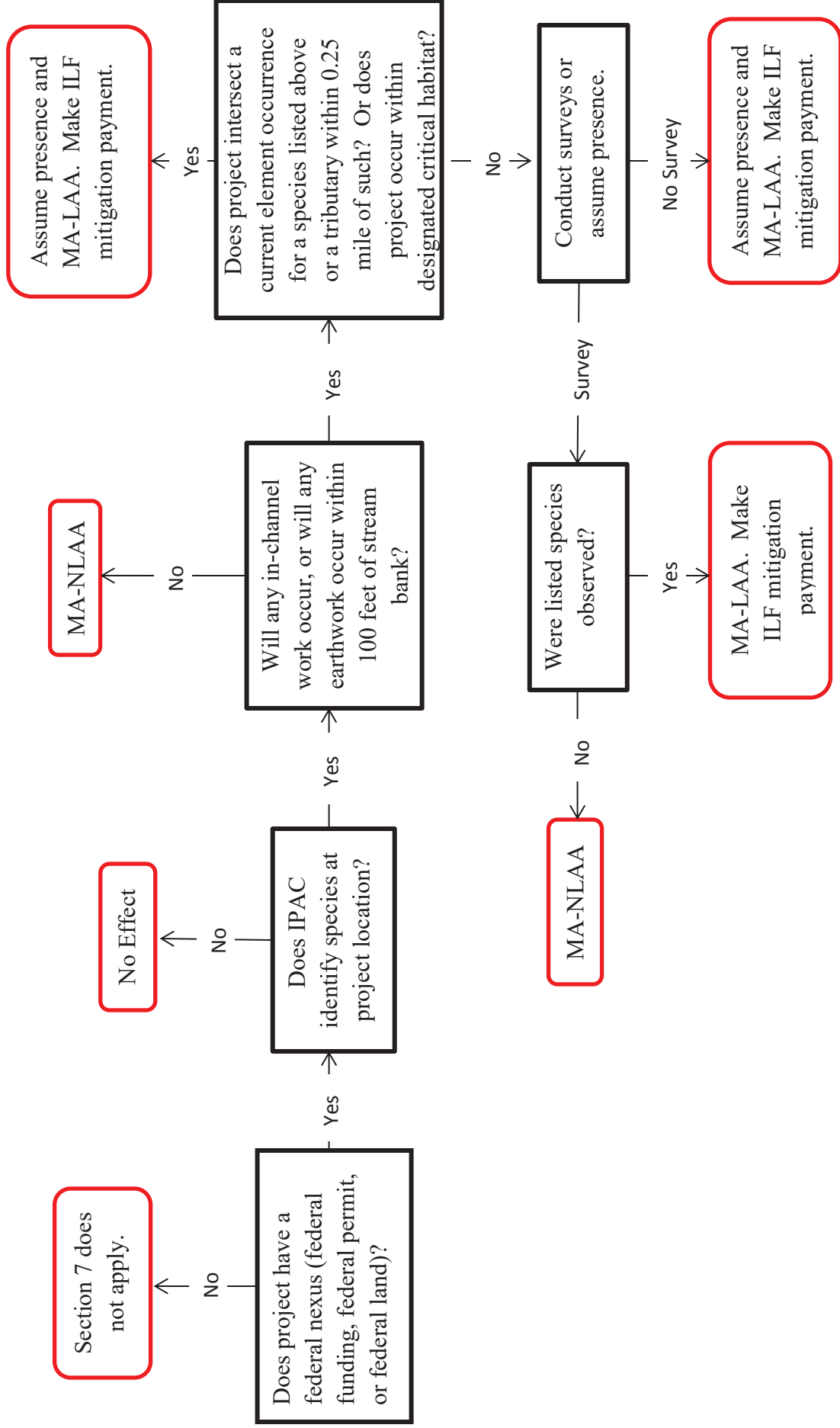
7. LITERATURE CITED

Below are new references not previously listed in the 2019 PBO.

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- U.S. Fish and Wildlife Service (USFWS). 2024. James Spinemussel (*Parvaspina collina*). Available online at <https://ecos.fws.gov/ecp/species/2212> . Accessed on November 7, 2024.

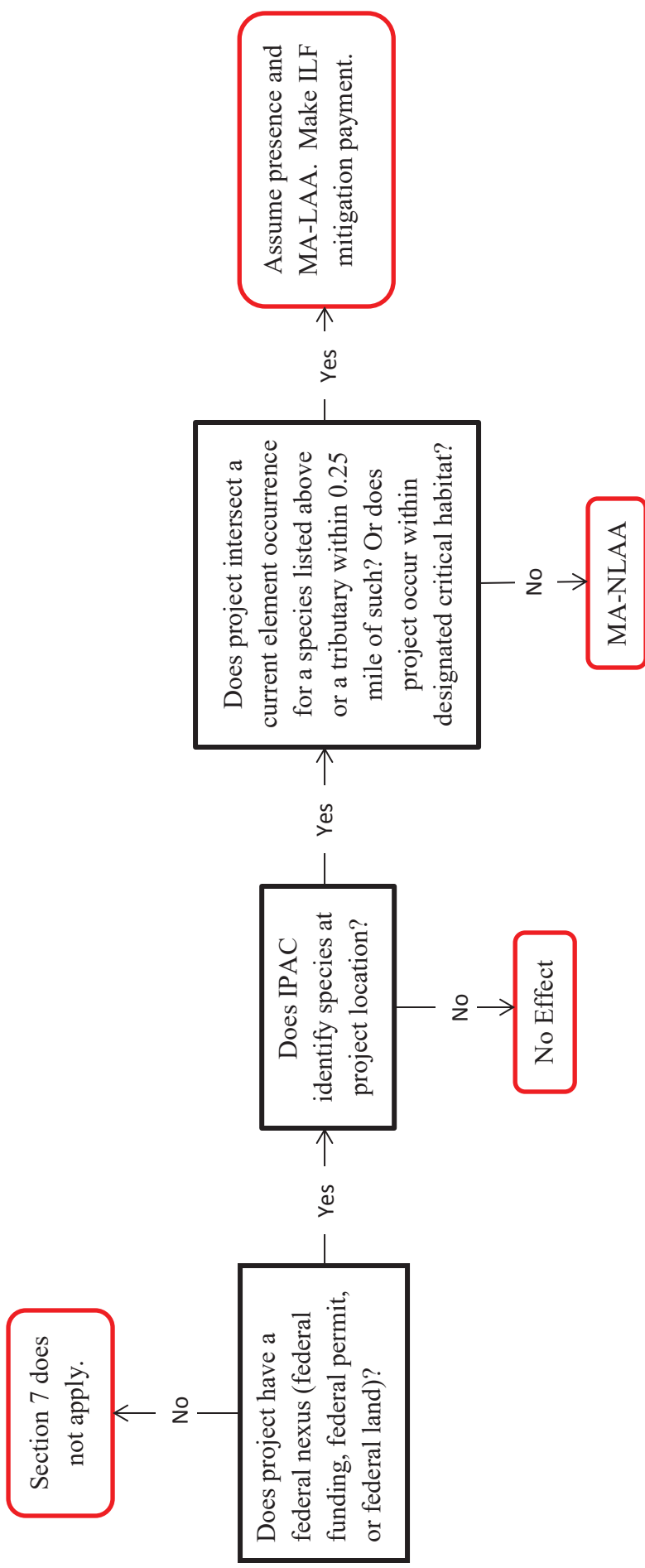
Appendix B1. Section 7 Mussel Programmatic Process – Bridge Replacement with Bridge/Repair/Rehabilitation Divisions 1-8 for Dwarf Wedgemussel, Tar River Spiny mussel, Yellow Lance, Atlantic Pigtoe, Green Floater and James Spiny mussel



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

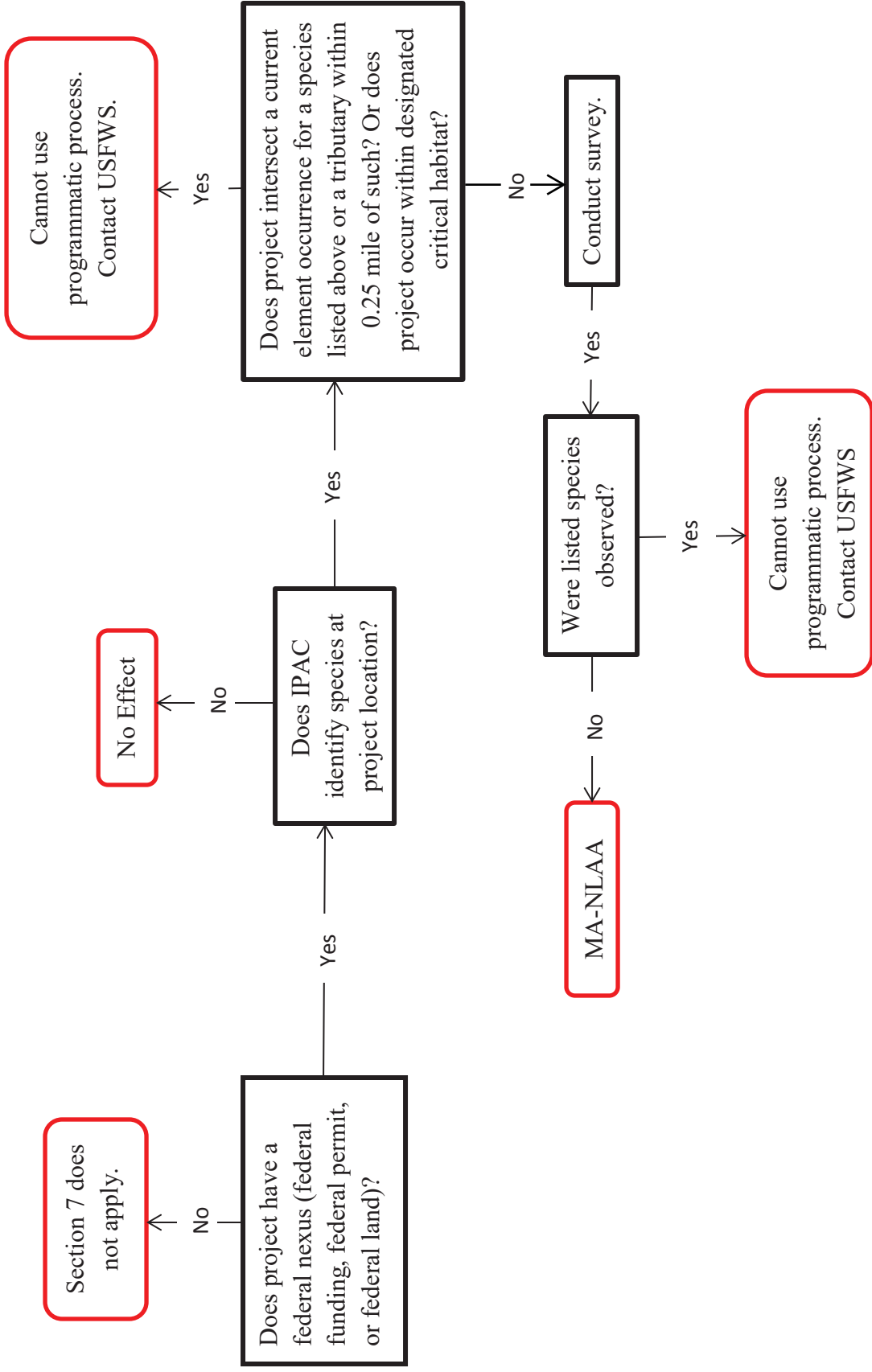
Appendix B2. Section 7 Mussel Programmatic Process – Culvert Replacement or Extension

Divisions 1-8 for Dwarf Wedgemussel, Tar River Spiny mussel, Yellow Lance, Atlantic Pigtoe, Green Floater and James Spiny mussel



*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 Mussel Programmatic Process – Bridge to Culvert Replacement Divisions 1-8 for Dwarf Wedgemussel, Tar River Spiny mussel, Yellow Lance, Atlantic Pigtoe, Green Floater and James Spiny mussel



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