DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS–R4–ES–2018–0046; FF09E21000 FXES1111090FEDR 223]

RIN 1018–BD12

Endangered and Threatened Wildlife and Plants; Threatened Species Status With Section 4(d) Rule for Atlantic Pigtoe and Designation of Critical Habitat

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), list the Atlantic pigtoe, (*Fusconaia masoni*), a freshwater mussel species from Virginia and North Carolina, as a threatened species with a rule issued under section 4(d) of the Endangered Species Act of 1973 (Act), as amended. We also designate critical habitat for the species under the Act. In total, approximately 563 river miles (906 river kilometers) fall within 17 units of critical habitat in Bath, Botetourt, Brunswick, Craig, Dinwiddie, Greensville, Halifax, Lunenburg, Mecklenburg, Nottoway, Pittsylvania, and Sussex Counties, Virginia, and in Durham, Edgecombe, Franklin, Granville, Halifax, Johnston, Montgomery, Nash, Orange, Person, Pitt, Randolph, Rockingham, Vance, Wake, Warren, and Wilson Counties, North Carolina. This rule extends the Act's protections to the species and its designated critical habitat.

DATES: This rule is effective December 16, 2021.

ADDRESSES: This final rule is available on the internet at *http://www.regulations.gov* under Docket No. FWS–R4–ES–2018–0046. Comments and materials we received, as well as supporting documentation we used in preparing this rule, are available for public inspection at *http://www.regulations.gov.*

The coordinates or plot points from which the maps are generated are included in the decision file for this critical habitat designation and are available at *http://www.regulations.gov* at Docket No. FWS–R4–ES–2018–0046 and the shapefiles for the critical habitat designation are available on the Service's Environmental Conservation Online System (ECOS) website at *http://ecos.fws.gov/ecp/species/5164.* Any additional tools or supporting information that we developed for this critical habitat designation will also be available at the Service's website set out above or at *http://www.regulations.gov.*

FOR FURTHER INFORMATION CONTACT: Pete Benjamin, Field Supervisor, U.S. Fish and Wildlife Service, Raleigh Ecological Services Field Office, 551F Pylon Drive, Raleigh, NC 27606; telephone 919–816–6408. Persons who use a telecommunications device for the deaf (TDD) may call the Federal Relay Service at 800–877–8339.

SUPPLEMENTARY INFORMATION:

Executive Summary

Why we need to publish a rule. Under the Act, if we determine that a species is an endangered or threatened species throughout all or a significant portion of its range, we are required to promptly publish a proposal to list the species in the **Federal Register** and make a determination on our proposal within one year. If there is substantial disagreement regarding the sufficiency and accuracy of the available data relevant to the proposed listing, we may extend the final determination for not more than six months. To the maximum extent prudent and determinable, we must designate critical habitat for any species that we determine to be an endangered or threatened species under the Act. When we list a species as a threatened species, we issue such regulations as deemed necessary and advisable to provide for the conservation of such species. In addition, we may by regulation prohibit with respect to any threatened species any act prohibited under section 9(a)(1) of the Act for endangered species. Listing a species as an endangered or threatened species, designation of critical habitat, and protection of threatened species can only be completed by issuing a rule.

What this document does. This rule finalizes the listing of the Atlantic pigtoe (*Fusconaia masoni*) as a threatened species with a rule issued under section 4(d) of the Act (a ''4(d) rule'') and designates critical habitat in 17 units totaling approximately 563 river miles (906 river kilometers (km)) within portions of 12 counties in Virginia and 17 counties in North Carolina.

The basis for our action. Under section 4(a)(1) of the Act, we may determine that a species is an endangered or threatened species based on any of five factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence. We have determined that habitat degradation (Factor A), resulting from the cumulative impacts of land use change and associated watershed-level effects on water quality, water quantity, habitat connectivity, and instream habitat suitability, poses the largest risk to the future viability of the Atlantic pigtoe. This stressor primarily consists of habitat changes: The buildup of fine sediments, the loss of flowing water, instream habitat fragmentation, and impairment of water quality, and it is exacerbated by the effects of climate change (Factor E). Further, the existing regulatory mechanisms are not adequate to reduce these threats so that the species would not warrant listing (Factor D).

Section 4(a)(3) of the Act requires the Secretary of the Interior (Secretary) to designate critical habitat concurrent with listing to the maximum extent prudent and determinable. Section 3(5)(A) of the Act defines critical habitat as (i) the specific areas within the geographical area occupied by the species, at the time it is listed, on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protections; and (ii) specific areas outside the geographical area occupied by the species at the time it is listed, upon a determination by the Secretary that such areas are essential for the conservation of the species. Section 4(b)(2) of the Act states that the Secretary must make the designation on the basis of the best scientific data available and after taking into consideration the economic impact, the impact on national security, and any other relevant impacts of specifying any particular area as critical habitat.

Economic analysis. In accordance with section 4(b)(2) of the Act, we prepared an economic analysis of the impacts of designating critical habitat. On October 11, 2018, we published an announcement of, and solicited public comments on, the draft economic analysis (83 FR 51570). The September 22, 2020, revisions to proposed critical habitat (85 FR 59487) did not affect the economic analysis because the impacts on the counties with new proposed units were already factored into the original analysis. We received no comments on the draft economic analysis and adopted the draft economic analysis as final.

Peer review and public comment. Prior to development of our October 11, 2018, proposed rule, we received peer reviews of the Species Status

Assessment (SSA) report from two experts, which informed our assessment that we used for this rulemaking. Information we received from peer review is incorporated into this final rule. We also considered all comments and information we received from the public during two public comment periods.

Previous Federal Actions

Please refer to the proposed listing rule for the Atlantic pigtoe (83 FR 51570) for a detailed description of previous Federal actions concerning this species. We published a proposed listing, 4(d) rule, and critical habitat designation for the Atlantic pigtoe on October 11, 2018 (83 FR 51570); we accepted public comments on the proposed rule for 60 days, ending December 10, 2018. Based on information we received during the public comment period, on September 22, 2020, we proposed a revised 4(d) rule and critical habitat designation for the Atlantic pigtoe (85 FR 59487); we accepted public comments on the proposed revisions as well as the October 11, 2018, proposed rule for 30 days, ending October 22, 2020. Please refer to the October 11, 2018, and September 22, 2020, documents for detailed descriptions of other previous Federal actions concerning this species.

Supporting Documents

An SSA team prepared an SSA report for the Atlantic pigtoe. The SSA team was composed of Service biologists, in consultation with other species experts. The SSA report represents a compilation of the best scientific and commercial data available concerning the status of the Atlantic pigtoe, including the impacts of past, present, and future factors (both negative and beneficial) affecting the species. The SSA report and other materials relating to this rule can be found *at http://www.regulations.gov* under Docket No. FWS–R4–ES–2018–0046.

Summary of Changes From the Proposed Rule

This final rule incorporates several changes to our proposed rule (83 FR 51570; October 11, 2018) based on the comments we received during that proposal's 60-day comment period as well as during the reopened public comment (see 85 FR 59487; September 22, 2020), which are summarized below under Summary of Comments and Recommendations. Minor, nonsubstantive changes and corrections were made throughout this rule in response to comments. Based on these comments, we also incorporated as appropriate new information into our SSA report, including updated survey information. The information we received during both public comment periods did not change our determination that the Atlantic pigtoe is a threatened species.

We received substantive comments on the proposed 4(d) rule and critical habitat designation, and we made changes to both of these as a result. We made changes to the 4(d) rule exceptions to the incidental take prohibitions as follows:

- For incidental take resulting from species restoration efforts by State wildlife agencies, we now include monitoring, which is necessary to determine the success of captive propagation and stocking efforts;
- For channel restoration projects, we remove erroneous mention of second- to third-order streams, and we add language to require surveys for and relocation of Atlantic pigtoe observed prior to commencement of restoration action;
- For bank stabilization projects, we add a requirement that appropriate ''native'' vegetation, including woody and herbaceous species appropriate for the region and habitat, be used for stabilization; and
- For forestry-related actions, we use alternative language provided by NCFS and VDOF (see *(13) Comment* under Summary of Comments and Recommendations, below).

We have also changed the way in which the provisions of the 4(d) rule will appear at 50 CFR 17.45(a). We no longer generally refer to the 50 CFR 17.31 prohibitions and exceptions to those prohibitions, but instead specify the applicable prohibitions in the 4(d) rule. In addition, for clarity and readability, we present separate lists for the general exceptions to the prohibitions and the exceptions from prohibitions for specific types of incidental take. However, these changes are simply formatting changes and do not affect the substance of the 4(d) rule.

For the critical habitat designation, we removed proposed Unit 3 (Middle James River) based on comments received from the VADWR (see *(9) Comment* under Summary of Comments and Recommendations, below). This removal changes the numbering of all following units (Units 4 through 18 become Units 3 through 17); therefore, revisions to the proposed critical habitat designation described in the September 22, 2020, document (85 FR 59487) differ slightly, but only by unit numbering, than as presented in this rule. We added two critical habitat units (Sappony Creek Unit (now Unit 3) and Little Grassy Creek Unit (now Unit 8)) and modified four units (Nottoway River Subbasin (now Unit 4), Dan River (now Unit 6), Upper/Middle Tar River Subbasin (now Unit 9), Sandy/Swift Creek (now Unit 10)) of the critical habitat designation for Atlantic pigtoe, for a total critical habitat designation of 563 river miles (906 river kilometers), an increase of 21 river miles (34 river kilometers) from the October 11, 2018, proposed designation.

We also added information about regulatory mechanisms to Factors Influencing Atlantic Pigtoe Viability (below), including information about state endangered species laws, state and federal stream protections, and state and federal water quality programs.

Summary of Comments and Recommendations

In the October 11, 2018, and September 22, 2020, proposed rules, we requested that all interested parties submit written comments. We also contacted appropriate Federal and State agencies, scientific experts and organizations, and other interested parties and invited them to comment on the proposed rules. Newspaper notices inviting general public comment were published in the USA Today legal notice section on October 25, 2018, and October 1, 2020. Although we invited requests for a public hearing in both proposed rules, we did not receive any requests for a public hearing. All substantive information received during both comment periods has either been incorporated directly into this final determination or is addressed below. For topics we received comments on during both comment periods, we specify whether the comments were received as part of the initial comment period (October 11–December 10, 2018) or the reopened comment period (September 22–October 22, 2020).

Peer Reviewer Comments

In accordance with our peer review policy published on July 1, 1994 (59 FR 34270), and our August 22, 2016, memorandum updating and clarifying the role of peer review of listing actions under the Act, we solicited expert opinion regarding the SSA report from six knowledgeable individuals with scientific expertise that included familiarity with Atlantic pigtoe and its habitat, biological needs, and threats. We received responses from two of those individuals. We reviewed all comments we received from the peer reviewers for substantive issues and new information regarding the information contained in the SSA report. The peer reviewers generally

concurred with our methods and conclusions, and provided additional information, clarifications, and suggestions to improve the SSA report. Peer reviewer comments are addressed in the following summary and were incorporated into the SSA report as appropriate.

(1) Comment: One peer reviewer noted that redundancy calculations provided in the Summary Table of the SSA report were confusing and asked us to clarify changes in redundancy for current condition.

Our Response: Because redundancy relates to the number and distribution of populations, we used the number of occupied watersheds, or HUCs (Hydrologic Unit Codes), to clarify changes in redundancy, as summarized in Table ES–1 of the SSA report. For current condition, there has been a 60 percent reduction in redundancy across the species' historical range (*i.e.,* 31 out of 81 HUCs are now currently occupied; 31/81 = 0.4, which equates to a reduction of 0.6 or 60 percent).

State Agency Comments

We received comments from six State agencies: The North Carolina Wildlife Resources Commission (NCWRC), the Georgia Department of Natural Resources (GADNR), the Virginia Department of Wildlife Resources (VADWR), the South Carolina Department of Natural Resources (SCDNR), the North Carolina Forest Service (NCFS), and the Virginia Department of Forestry (VDOF). Because we received several comments from both NCFS and VDOF and the public regarding forestry considerations, we address most NCFS and VDOF comments in the *Public Comments* section, below.

(2) Comment: The GADNR recommended we use an occupancy model analysis to inform our population factors.

Our Response: Occupancy modeling relies on multiple visits to the same site over time, thus allowing for an estimation of detection. At the time of SSA analysis (2015–2016), the available rangewide data were not conducive for use with occupancy models. We did not receive additional occupancy data during the public comment periods that would allow us to conduct an occupancy model analysis.

(3) Comment: The NCWRC noted that it has not been able to do intensive surveys for Atlantic pigtoe in portions of the Cape Fear River Basin. It suggested that the Optimistic Scenario consider the potential to find additional populations in the Piedmont to reflect that the species exists in areas where surveys have not been updated and habitat conditions have not changed.

Our Response: The narrative portion of the SSA report acknowledges the possibility of finding new locations for the species. However, those findings are not reflected in the Scenario table because the potential future abundances are not known and therefore cannot be incorporated into future condition categorization.

(4) Comment: The NCWRC commented that several areas within the known range of the Atlantic pigtoe have not been surveyed sufficiently since 2005 to conclude that the species is not present.

Our Response: We recognize that detection is imperfect; therefore, we involved NCWRC biologists in the development of the SSA report and sought their input into the decision to use 2005 as the earliest date for ''current.'' This year was selected based on the perceived adequacy of survey effort from 2005–2015 for justifying current species presence/absence conclusions. Ultimately, we relied on data provided by each state's agency biologists to develop the distribution and abundance heat maps contained in Appendix B of the SSA report.

(5) Comment: The NCWRC noted that many of the critical habitat reaches lack definable limits that can be precisely described and recommended that critical habitat units start and end at distinct locations, such as tributary confluences or road crossings.

Our Response: For the purposes of this rule, critical habitat reaches are defined based on Natural Heritage species ''element occurrences.'' An element occurrence is an area of land and/or water in which a species or ecological community is present. Since these comprise the best available scientific information, we used them for unit boundaries rather than relying on a tributary confluence or road crossing. Both coordinates or plot points from which the maps are generated and shapefiles are available (see **ADDRESSES**, above) to help users precisely identify limits on a map.

(6) Comment: The NCWRC recommended the 4(d) rule be clarified to state that provisions of sections 7 and 9(a)(1) of the Act will not apply to those areas where Atlantic pigtoe are stocked by NCWRC or Service biologists into unoccupied habitat. This clarification will allow biologists to stock Atlantic pigtoe in suitable yet currently unoccupied habitat within the species' historical range without these restored populations being subject to the provisions of sections 7 and 9(a)(1) of the Act.

Our Response: We recognize the special and unique relationship with our State natural resource agency partners in contributing to conservation of listed species. Therefore, under the final 4(d) rule, any qualified employee or agent of a State conservation agency, that is a party to a cooperative agreement with the Service in accordance with section 6(c) of the Act, and who is designated by his or her agency for such purposes, will be able to conduct activities designed to conserve Atlantic pigtoe that may result in otherwise prohibited take without additional authorization.

Nothing in this final 4(d) rule changes in any way the consultation requirements under section 7 of the Act. However, interagency cooperation may be further streamlined through planned programmatic consultations for the species between Federal agencies and the Service, where appropriate.

(7) Comment: The NCWRC provided recommendations, with supporting data, to revise the 4(d) rule language by adding (a) monitoring to the species restoration exception for incidental take; (b) language to the channel restoration exception for incidental take that requires surveys for and relocation of Atlantic pigtoe observed prior to commencement of restoration action; and (c) language to the incidental take exception resulting from bank stabilization projects to add a requirement that appropriate ''native'' vegetation, including woody and herbaceous species appropriate for the region and habitat, be used for stabilization.

Our Response: The suggested revisions are important considerations to include in the exceptions outlined and provide for the conservation of the Atlantic pigtoe, therefore we made the suggested revisions to the 4(d) rule.

(8) Comment: The NCWRC provided recommendations, with supporting data, to revise several critical habitat units, truncating two units (*i.e.,* removing 3.8 river miles from Upper/Middle Tar River Subbasin and 8.2 river miles from Sandy/Swift Creek), adding occupied habitat to two units (10 river miles to Upper/Middle Tar River Subbasin and 7 river miles to Dan River), and creating a new unit (Little Grassy Creek). During the reopened comment period, the VADWR suggested the removal of the Middle James River critical habitat unit, noting that the last detection of living Atlantic pigtoe in that reach was in the late 1960s.

Our Response: As announced in our reopening of the rule, we reviewed this new information received from State agencies, in conjunction with all prior

data. In doing so, we noted an accidental omission error during our mapping of critical habitat that resulted in the omission of a 2011 observation of Atlantic pigtoe in Sappony Creek. Based on the new information, we made several revisions to the proposed critical habitat designation. We removed 3.8 river miles and added 10 river miles to Unit 9 (Upper/Middle Tar River Subbasin) for a net change of 6.2 additional river miles. We removed 8.2 river miles from Unit 10 (Sandy/Swift Creek), added 3.5 river miles to Sturgeon Creek and 10.3 river miles to Nottoway River in Unit 4 (Nottoway River Subbasin). Further, we added 7 river miles to Unit 6 (Dan River). We created two new units based on the data received and the accidental omission, including the Sappony Creek Unit (Unit 3; 4 river miles) and the Little Grassy Creek Unit (Unit 8; 3 river miles). Addition of these units did not change the economic analysis, as both units are in counties that were included as part of the original analysis. We removed the originally proposed Unit 3 (Middle James River) because the VADWR data indicated that the Atlantic pigtoe does not currently occupy habitat in that part of the system; therefore, this unit no longer meets the criteria for designation as critical habitat as we determined that designation of unoccupied critical habitat is not essential for the conservation of the species (see Criteria Used to Identify Critical Habitat, below). All of these modifications were included in our reopening of the rule (85 FR 59487).

(9) Comment: The VADWR provided data for a newly recorded occurrence for Atlantic pigtoe, located approximately 500 meters (m) downstream of proposed critical habitat Unit 5. The commenter asked that the new information be recorded, but did not believe extending the proposed critical habitat another 500 to 600 m, in addition to the 8 km currently proposed for designation, would significantly benefit the conservation and recovery of Atlantic pigtoe. They also stated that potential delays in the proposed listing due to another reopening of the comment period on the critical habitat designation would be detrimental to the overall conservation and recovery of the species.

Our Response: The Service acknowledges receipt of the new occurrence record and appreciates the commenter's perspective on moving forward with listing and designation of critical habitat without delay. We concur that adding a small length of stream to an existing critical habitat unit would not be a significant benefit to the species, and would not contribute substantially to the previously identified strategy that we have deemed essential for the conservation of the species. We note that a critical habitat designation does not signal that habitat outside the designated area is unimportant or may not be valuable for recovery of the species. We have updated the SSA report accordingly.

(10) Comment: The SCDNR stated that our initial assumption that Atlantic pigtoe does not currently occur in South Carolina was incorrect. Specifically, the agency indicated that data do not exist to assert that South Carolina populations of Atlantic pigtoe are extirpated from the State. It mentioned the possibility that Atlantic pigtoe persists in areas of the State where it was thought to be historically, but has lacked concentrated survey efforts, especially in the Edisto and Pee Dee basins. The SCDNR indicated that survey efforts that have taken place are not adequate to determine the presence or absence of a rare species.

Our Response: We acknowledge the concerns of the SCDNR that targeted surveys for Atlantic pigtoe are needed in South Carolina watersheds. We updated the SSA report to include a statement that few surveys have been conducted in the Edisto and Pee Dee basins in South Carolina. However, based on current scientific information, the species has not been observed since the 1800s in South Carolina; therefore, we did not include areas in South Carolina as part of the currently occupied range. The Service will work closely with SCDNR and other States' agencies to evaluate priorities for data collection and monitoring related to the recovery of Atlantic pigtoe, including ensuring information is collected in South Carolina to make better determinations of presence/absence in South Carolina watersheds that would be informative for status reviews and recovery metrics.

(11) Comment: The SCDNR agreed with language of the proposed 4(d) rule's silvicultural exception ''to clarify that the BMPs [best management practices] must result in protection of the habitat features that provide for breeding, feeding, sheltering, and dispersal needs of the Atlantic pigtoe.'' However, the SCDNR recommended that we use the streamside management zones applied to Municipal Water Supplies in the Virginia BMP Technical Manual (2011), because they are more appropriate for protecting the species than those recommended for trout. They commented that BMPs that include these wider streamside management zones will minimize the impact of the silviculture activities including impacts from access roads and skid trails on the species by reducing sedimentation and protecting water quality by filtering excess nutrients.

Our Response: The Virginia BMP Streamside Management Zone (SMZ) widths for municipal water supplies, to which the SCDNR refers, are 100, 150, or 200 feet on each side of a waterbody (stream or lake), depending on the percent slope of adjacent lands (VDOF 2011, p. 15). While we acknowledge that the Virginia forestry BMP manual includes guidance for SMZ widths adjacent to municipal water supplies, we conclude that applying those, or the trout SMZs, in the 4(d) rule would introduce confusion among forest landowners and practitioners.

A primary reason for citing SMZs for trout in the preamble of our revised proposal (85 FR 59487; September 22, 2020) was that trout and the Atlantic pigtoe are similarly sensitive to sedimentation and thermal inputs. We acknowledge and agree with the SCDNR's point, supported by the scientific literature, that the sedentary nature of mussels renders them especially vulnerable to habitat degradation, including sedimentation and pollution (*e.g.,* ammonia, as mentioned in the comment letter). However, some resources (including Mayer et al. (2005), cited in SCDNR's letter) indicate that SMZ width alone may not be an effective measure of SMZ function. For example, buffer width significantly explained only 14 percent of a buffer's nitrogen removal effectiveness: ''forested and wetland buffers showed no relationship between buffer width and nitrogen removal effectiveness'' (Mayer et al. 2005, p. 5). While the Mayer study concluded that wider buffers were more consistently effective in nitrogen removal, it also concluded that other factors related to subsurface flow (*e.g.,* soil type, hydrology, biogeochemistry) were crucial. These findings regarding forested SMZ widths agree with those from the NCFS's most recent assessment of forestry BMPs; while the assessment found that wider buffers were generally associated with fewer risks to water quality, a model of the data showed a less than 10 percent probability of risk to water quality at buffer widths of 50 feet regardless of ecoregion (*i.e.,* Mountains, Piedmont, Coastal Plain), and that much narrower SMZ widths in some ecoregions achieved the same low probability of risk (Coats et al. 2017, p. 32), suggesting that there are more effective approaches to water quality protection in silviculture than prescribing a uniform SMZ width for all situations.

Our intent in the 4(d) rule for excepting incidental take resulting from forestry and silviculture activities is to relieve some regulatory burden on operations for which proper implementation of BMPs may offer a net conservation benefit. Therefore, based on the best available science and the comments we received, we have revised the 4(d) rule language to specify outcome-based management goals necessary for conservation of the species and its habitat to provide for the breeding, feeding, survival, and shelter of the Atlantic pigtoe, rather than prescribing a particular management practice with which to achieve necessary species and habitat protection (see II. Final Rule Issued Under Section 4(d) of the Act, below, for more information).

(12) Comment: During the first comment period, the NCFS suggested that it would be beneficial to focus only on BMPs and not include forest practice guidelines (FPGs) or forest certification standards in the 4(d) rule, because the FPGs and certification standards refer to State-approved BMPs as the guideline for management. Subsequently, during the second comment period, two commenters from State forestry agencies (VDOF and NCFS) offered alternative language for the entirety of the silvicultural component of the proposed 4(d) rule. They noted that this alternative language was drafted with the intent of applicability in targeted watersheds of the eastern Piedmont region and upper Coastal Plain region, where most of the Atlantic pigtoe's known current occupancy and proposed critical habitat is located. They also noted that their alterative language may be useful in other future listings of aquatic species. The suggested alternative language for the 4(d) rule exception follows: ''Forestry-related activities, including silvicultural practices, forest management work and fire control tactics, that achieve all of the following: 1. Establish a streamside management zone alongside the margins of each occupied waterway. 2. Restrain visible sedimentation caused by the forestry-related activity from entering the occupied waterway. 3. Maintain groundcover within the streamside management zone of the occupied waterway, and promptly re-establish groundcover if disturbed. 4. Limit installation of new vehicle or equipment crossings of the occupied waterway to only where necessary for the forestry-related activity. Such crossings shall: (a) Have erosion and sedimentation control measures installed to divert surface runoff away and restrain visible sediment from entering the waterway; (b) Allow for movement of aquatic organisms within the waterway; and (c) Have groundcover applied and maintained through completion of the forestry-related activity. 5. Prohibit the use of tracked or wheeled vehicles for reforestation site preparation within the streamside management zone of the occupied waterway. 6. Prohibit locating log decks, skid trails, new roads, and portable mill sites in the streamside management zone of the occupied waterway. 7. Prohibit obstruction and impediment of the flow of water within the occupied waterway, caused by direct deposition of debris or soil by the forestry-related activity. 8. Maintain shade over the occupied waterway similar to that observed prior to the forestry-related activity. 9. Prohibit discharge of any solid waste, petroleum, pesticide, fertilizer, or other chemical into the occupied waterway.''

Our Response: The Service appreciates the constructive communications with State forestry agencies during the public comment periods, their willingness to express the challenges that the proposed 4(d) rule posed for implementation and forestry operation oversight, and their collaborative effort to offer alternative 4(d) rule language that will be more straightforward to implement and communicate to forestry practitioners. Importantly, the language offered by the NCFS and VDOF during the second comment period also conveys the necessity of achieving the water quality outcomes the Service intended for the protection of Atlantic pigtoe and its habitat, while reducing the regulatory burden associated with strict adherence to the 4(d) rule's provisions. We have revised the 4(d) rule language to reflect these suggested changes for the forestry exception (see Summary of Changes from the Proposed Rule, below).

Public Comments

(13) Comment: Several comments we received, both from the public and from three State forestry agencies (VDOF, NCFS, and SC Forestry Commission (SCFC)), indicated the Service did not explain or justify the necessity for two-zoned SMZs, for SMZs wider than those already recommended by State forestry BMPs within the geographic range of the Atlantic pigtoe, or for SMZs related to Virginia and North Carolina trout waters being applied to the majority of waters where the Atlantic pigtoe occurs. Some comments further suggested that references to trout rules or BMPs beyond those already required within the range of the Atlantic pigtoe would be confusing and challenging to implement. Several such comments further questioned any additional conservation benefit that SMZs wider than those currently recommended in State BMPs would provide.

Our Response: In the preamble of our September 22, 2020, proposed rule (85 FR 59487), we addressed comments we received on the October 11, 2018, proposed rule (83 FR 51570), that stated the proposed 4(d) language related to ''highest standard BMPs'' was too vague or confusing. In the September 22, 2020, proposed rule, it was our intent to provide additional discussion and detail for the proposed 4(d) incidental take exception resulting from silviculture. By referring to BMPs related to trout waters, specifically SMZs, we intended to use a frame of reference that would be familiar to forest landowners for species sensitive to sedimentation and thermal effects on stream waters. The proposed regulation text in the September 22, 2020, proposed rule outlined BMPs, but did not include references to trout. However, we understand that the references to trout waters in the preamble of that document has caused considerable confusion for multiple reasons, including: (1) The Atlantic pigtoe mostly occurs in watersheds absent of trout; (2) the preamble did not clearly state how the Atlantic pigtoe is similarly sensitive to sedimentation (a primary factor responsible for the adoption of BMPs specific to trout waters); and (3) multiple other regulations and recommended practices already exist in watersheds where the Atlantic pigtoe occurs (*e.g.,* region-specific State BMPs, riparian buffer rules in some watersheds). We have carefully considered and addressed the concerns of the commenters by revising the final 4(d) rule to specify the outcome-based habitat management goals necessary to provide habitat for the breeding, feeding, survival, and sheltering of the Atlantic pigtoe, rather than prescribing a particular management practice with which to achieve necessary habitat protection (*e.g.,* we removed the two-zoned SMZs of variable width; see II. Final Rule Issued Under Section 4(d) of the Act and Regulation Promulgation, below, for more information).

(14) Comment: We received many comments, from both the public and from State forestry agencies (SCFC and VDOF), noting that State-approved BMPs are sufficient for the protection of the Atlantic pigtoe. These commenters also maintained that mandatory adoption of BMPs is not necessary as BMP implementation rates are already high.

Our Response: When properly implemented, BMPs can offer a substantial improvement to water quality compared to forestry operations where BMPs are not implemented or not properly implemented; therefore, we have included an exception for incidental take resulting from silviculture and forest management in the final 4(d) rule. Intact riparian buffers (*i.e.,* SMZs) have been cited as important contributing factors for protecting mussels against excess sedimentation and nutrient input from a variety of consumptive land uses (O'Driscoll et al. 2014, pp. 87–90; Osterling and Hogberg 2014, p. 219). Streams with forested buffers have been shown to have greater mussel species evenness; less ammonia, nitrogen, and solar radiation input; and less fluctuation of daily temperatures than streams with narrow, grassy riparian zones (Morris and Corkum 1996, pp. 580–584).

The commenters also provided information that indicates forestry BMP implementation across the nation and Southeast region are generally high; we agree, but assert that implementation of effective BMPs in forest management is not universal. A 2018 report by the Southern Group of State Foresters (SGSF) shows that overall BMP implementation rates have increased over the last 20 years, more markedly in some States than in others (*e.g.,* BMP implementation in Virginia was the lowest of all the southeastern States (76 percent) as recently as 2007, but increased to 94 percent by 2016 (SGSF 2018, p. 10)). Virginia's most recent BMP monitoring report indicated that audits of 240 sites in 2018 resulted in findings of significant water quality risk in only four cases, and that none of them had active sedimentation during the audit visit (VDOF 2020, p. 3). However, they also reported that despite overall high BMP implementation rates, three very important categories that often lead to water quality concerns (roads, crossings, and skid trails), sometimes lag behind other categories with regard to implementation percentage (VDOF 2020, p. 3). Data from the SGSF show North Carolina has the lowest overall implementation rate (84 percent) in the Southeast, with other State implementation rates ranging from 89 to 99 percent (SGSF 2018, p. 10). The most recent survey of BMP implementation in North Carolina showed that implementation rates—while averaging 84 percent Statewide—varied among regions within the State, and with respect to the type of BMP being evaluated (Coats 2017, pp. 8–41). The NCFS reported that BMPs were not applied or properly implemented in 4,584 opportunities in their assessments, and that 30 percent of these cases posed a risk to water quality (Coats 2017, p. 8). The NCFS also reported that 74 percent of all identified risks to water quality were associated with the lack of application or improper implementation of BMPs related to stream crossings (average implementation rate = 79 percent; range 72–83 percent), SMZs (average implementation rate = 86 percent; range 72–91 percent), and post-harvest rehabilitation of a site (average implementation rate = 71 percent; range 53–83 percent) (Coats 2017, pp. 8, 9, 18–19, 26–34). Such incidents of improperly or unused BMPs and their associated risks to water quality and habitat, as illustrated by these reports, are important to acknowledge in the context of rare, imperiled species, where any one particular localized event may result in further imperilment of a population or hamper recovery of the species.

Development and refinement of BMPs has resulted in substantial improvements to forestry's impacts on water quality in recent decades and has created a culture of water stewardship in the forest landowner community, making this stakeholder group an important ally in the conservation of imperiled species. The reduced risks to water quality justify our inclusion of a 4(d) incidental take exception resulting from forestry and silviculture for the Atlantic pigtoe, but the remaining presence of sedimentation risk supports the need to specify conditions required for the exception to apply. Forest management activities in the range of the Atlantic pigtoe that are not expected to meet the conditions of the 4(d) rule exception could still occur via consultation with the Service under section 7 or a conservation agreement under section 10 of the Act.

Existing BMPs will be sufficient for the protection of the Atlantic pigtoe if they are widely implemented in watersheds where the species occurs and are implemented appropriately such that forest management operations maintain compliance with State regulatory requirements, and that they achieve management goals related to conserving and maintaining suitable habitat for the Atlantic pigtoe, which closely mirror State forestry regulations on water quality. State-approved BMPs, properly implemented, protect water quality and help conserve aquatic species, including the Atlantic pigtoe. Forest landowners who properly implement those BMPs are helping conserve the species, and this final 4(d) rule is an incentive for all landowners to properly implement those BMPs to avoid any possible take liability. Further, those forest landowners who are third-party-certified to a credible forest management standard are providing audited certainty that BMPs are being implemented across the landscape.

(15) Comment: Some of the comments concerning BMPs also suggested that assessments of water quality using aquatic insects as indicators confirm that BMPs are protective of water quality and habitat for aquatic species.

Our Response: Much of the literature shared by commenters on the effectiveness of BMPs for protecting aquatic species and their habitats relies on aquatic macroinvertebrate assessments, mostly of aquatic insects. While they are a common rapid field assessment method for monitoring or measuring water quality, current scientific information does not support the assertion made by several commenters that presence or recovery of insects is a proxy for suitable habitat recovery after disturbance (*i.e.,* a sedimentation event) for benthic invertebrates like the Atlantic pigtoe, or a proxy for recolonization of mussels after such a disturbance. While reliance on effects to aquatic insect communities is a useful rapid assessment tool for water quality, there is a gap in the best available science about how that resilience relates to comparatively long-lived animals, such as unionid freshwater mussels (*e.g.,* the Atlantic pigtoe). Some research comparing how macroinvertebrate insect assessments relate to other taxa (*e.g.,* amphibians, fishes, zooplankton) indicates that insect assessments do not correspond well in evaluations of watershed land use or anthropogenic effects on water quality and water resources for these species (*e.g.,* Brazner et al. 2007, pp. 625–627; Kovalenko et al. 2019, entire; Herlihy et al. 2020, entire). Further, some studies recommend using assessments from multiple taxa to better evaluate the response of biological integrity in streams to anthropogenic activities (Herlihy et al. 2020, p. 10; Hughes et al. 2000, pp. 437–440). The risks of water quality impacts to many taxa are emphasized in studies, highlighting the utility of aquatic insect assessments for evaluating forestry BMPs, along with the need for research on forestry BMP effectiveness for the protection of taxa other than aquatic insects (Warrington et al. 2017, entire). Freshwater mussels have been recognized for decades as important for biomonitoring of environmental health

because of their sedentary nature, long lifespans, and complex life history (Van Hassel and Farris 2007, entire).

A number of other differences between aquatic insects and unionid mussels makes comparisons of their responses to water quality tenuous and demands careful consideration in applying the results from one to the other. Most aquatic insects (particularly those widely used in assessments) are not rare species; thus, the impact of any single or isolated event is likely to be more easily masked at the population level. Further, the aquatic larval phase of macroinvertebrate insects typically emphasized in assessments is of short duration (*e.g.,* aquatic phases ranging less than 1 to 2 years for many mayflies (Ephemeroptera; Voshell 2002, p. 270); 1 to 2 years for many stoneflies (Plecoptera; Voshell 2002, p. 310); less than 1 to 2 years for most caddisflies (Trichoptera; Voxhell 2002, p. 375)) and acute effects in the recent past (less than 5 years) may not present in assessment data. This is facilitated by the immigration of aquatic insects back into impacted stream reaches by downstream drift or other mechanisms, including the adult winged flight stage, which allows immigration from other nearby waterbodies or from downstream reaches (Waters 1972, entire).

Conversely, Atlantic pigtoe is a rare, sedentary mussel living in stream bed substrates, with different ecological requirements and a decades-long lifespan. Extirpation of Atlantic pigtoe from a stream reach after an impact to the population (*e.g.,* a sedimentation event that suffocates mussels in the stream bed or impairs reproduction in a given year) would have longer lasting consequences, and recolonization can be hampered by many factors, such as: The Atlantic pigtoe's typically small population sizes, low reproductive success, instream barriers to the migration of host fishes, distance between populations that can serve as potential recolonization sources, and long generation time (approximately 10 to 12 years; Service 2021, p. 66). Again, we recognize that widespread implementation of BMPs has unquestionable benefits to water quality and likely Atlantic pigtoe habitat; however, we also recognize that additional quantification of the effects of BMPs on mussels would be valuable, particularly given the differential life history characteristics between macroinvertebrate taxa.

(16) Comment: Some commenters stated that the Service did not provide evidence that the Atlantic pigtoe is a sensitive species, and at least one commenter stated that failure to describe its sensitivity or similarity to trout sensitivity is arbitrary and capricious.

Our Response: In our October 11, 2018, proposed rule (83 FR 51570), we included several details related to the ecological requirements of the Atlantic pigtoe (*e.g.,* high dissolved oxygen, silt-free substrates), referenced the SSA report, and included a summary of risk factors to the species (*e.g.,* primarily habitat degradation, including the buildup of fine sediments, the loss of flowing water, instream habitat fragmentation, and impairment of water quality). In our September 22, 2020, revisions to the proposed rule (85 FR 59487), we provided additional information, including statements on the effects of sedimentation to the Atlantic pigtoe (*e.g.,* Silted stream bottoms suffocate filter feeding animals and decrease the stream's insect population, an important source of food for host fish (VDOF 2011, p. 37). Siltation also makes mussel and host fish reproduction difficult (Service 2021, pp. 29, 41, 47, 57). Transformed juvenile mussels require clean gravel/coarse sand substrates with oxygenated water to successfully become adults (Service 2021, p. 11). Lastly, a silted bottom substrate can result in mortality (Service 2021, pp. 29, 59)). (see 85 FR 59490). The September 22, 2020 revisions to the proposed rule were specific to the 4(d) rule and designation of critical habitat, and it directed readers to the initial listing proposal, the SSA report, and previous Federal actions for additional detailed information about the Atlantic pigtoe. The commenters may not have realized that the September 22, 2020, document discussed a subset, but did not repeat the entirety, of the proposals published in the October 11, 2018, proposed rule; the focus of the September 22, 2020, document was on the substantive revisions proposed. However, the concerns of the commenters have been carefully considered and are addressed in this rule by removing references to trout and providing more detailed information about the Atlantic pigtoe, its habitat requirements, and its sensitivity to threats, particularly sedimentation, using the best available scientific information about this species and relevant information from related species (*i.e.,* freshwater bivalves).

(17) Comment: A few commenters highlighted proposed or final rules for other aquatic species that they say indicate a Service precedent for accepting State-approved forestry BMPs as sufficient for protection of a species in a 4(d) rule's exceptions, and that they think that approach should also apply to the Atlantic pigtoe's 4(d) rule.

Our Response: All 4(d) rules establish species-specific regulations to provide for the conservation of a threatened species and must be considered within the context of that species' needs. Because all species are unique, measures included in some 4(d) rules should not be considered to set a precedent for future 4(d) rules on other species. Although it may be practical to consider the implications of how 4(d) rules are implemented for species with overlapping geographic ranges and habitat needs, we still must ensure that each 4(d) rule establishes the regulations necessary and advisable to provide for the conservation of species listed as threatened. We also note that several of the commenters' examples do not apply to threatened species or are not from a 4(d) rule. For example, commenters referenced language in the preamble of the final rule listing the Black Warrior waterdog (*Necturus alabamensis*) as an endangered species and designating critical habitat (83 FR 257; January 3, 2018) that refers to Alabama's forestry BMPs in the Summary of Factors Affecting the Species discussion. Other comments we received referred to BMP discussions not for species' listing actions but for critical habitat designations (*e.g.,* candy darter (*Etheostoma osburni*), diamond darter (*Crystallaria cincotta*), and big sandy crayfish (*Cambarus callainus*)) that listed BMPs among activities that can ameliorate threats to critical habitat. Comments also referenced the pearl darter (*Percina aurora*), a species listed as threatened in 2017 (82 FR 43885; September 20, 2017) when our regulations at 50 CFR 17.31 applied to threatened species all of the provisions of 50 CFR 17.21 for endangered species unless we promulgated species-specific provisions under section 4(d) of the Act for the threatened species; the pearl darter listing rule (82 FR 43885; September 20, 2017) included silviculture with BMPs among actions unlikely to result in a violation of the Act's section 9, and that rule also discussed poor silviculture under the Summary of Factors Affecting the Species. Finally, some comments referenced the trispot darter (*Etheostoma trisella*), which is a threatened species listing with a species-specific 4(d) rule that includes an exception for silviculture. The final 4(d) rule for the trispot darter (85 FR 61619; September 30, 2020) has an incidental take exception for silviculture practices and forest management activities that includes

requirements for implementing State BMPs for SMZs, stream crossings, and forest roads, among others; removing logging debris from stream channels; and limiting activities to only a portion of the year if they involve spawning habitat. Although the trispot darter 4(d) rule is the most similar among the commenters' examples to this rule for the Atlantic pigtoe (*i.e.,* a threatened species listing rule with a 4(d) rule incidental take exception for silviculture), we are required to tailor the 4(d) rule to the Atlantic pigtoe, based on what is necessary and advisable to provide for the conservation specifically of the Atlantic pigtoe. Furthermore, a mobile darter has a different life history than a sessile freshwater mussel, and likewise has different responses to sedimentation or water quality inputs. The Service considers existing local environmental rules, local environmental conditions, and other factors, *in toto,* and tailors regulations to the management needs of species within that context to ensure prohibitions and exceptions to prohibitions for threatened species outlined in 4(d) rules are specific to the considerations for each particular species.

(18) Comment: Two comments expressed concern that, if the proposal were made final with forest management requirements in the 4(d) rule's exceptions that exceed State-recommended BMPs for the areas in which the Atlantic pigtoe occurs, the 4(d) rule for the Atlantic pigtoe would set a precedent not founded in the best available scientific information.

Our Response: See our response to *(17) Comment,* above. The species-specific nature of 4(d) rules is inherently incompatible with setting precedents because we must consider the needs of the individual species being listed within each rule. The Atlantic pigtoe's 4(d) rule does not prescribe management restrictions; rather, it provides for the conservation of the species by outlining prohibitions (*e.g.,* take) that are compatible with the overall conservation of the species, and sets forth exceptions to those prohibitions for activities that are expected not to impede conservation. The Atlantic pigtoe's 4(d) rule's exceptions to prohibitions provide specific information on the conditions required for being excepted from incidental take resulting from certain activities. The 4(d) rule does not prohibit silvicultural management; activities resulting in incidental take not included in the 4(d) rule's exceptions to prohibitions could still be covered under a conservation agreement under section 10 of the Act or authorized via section 7 of the Act. The 4(d) rule's incidental take exceptions are intended to provide some relief from regulatory burden, while outlining the conditions necessary and advisable for the conservation of the species.

As discussed above (see our response to *(13) Comment,* above), we have revised the 4(d) rule by removing the two-zoned SMZ requirement over concerns related to confusion and challenging implementation of multiple sets of forestry-related rules and guidelines already in place within the geographic range of the Atlantic pigtoe.

(19) Comment: During the first public comment period, two commenters noted that the meaning of ''highest-standard'' BMPs as stated in the proposed 4(d) rule is unclear. They indicate that each forestry BMP stands on its own merits; there are not different classes or degrees or standards of BMPs. Indeed, on some sites, it may be adequate to apply a limited number of BMPs, while on other sites, a more comprehensive set of BMPs may be appropriate. One of the commenters suggested that to avoid confusion, the 4(d) rule should say, ''State-approved best management practices'' or an equivalent phrase.

After revisions to the 4(d) rule, during the second comment period, several commenters requested that we revise the proposed 4(d) rule to ''only reference State-approved BMPs without addition or modification.'' Another commenter (NCFS) suggested an alternative to incorporate by reference a section of the Code of Federal Regulations (CFR) related to compliance with the exemption from permitting to discharge dredged or fill material into waters of the United States (*i.e.,* 33 CFR 323.4(a)(6)(ix): The discharge shall not take, or jeopardize the continued existence of, a threatened or endangered species as defined under the Endangered Species Act, or adversely modify or destroy the critical habitat of such species.) The NCFS asserted that a 4(d) rule for the Atlantic pigtoe should be written to cross-reference these existing Federal regulations and apply concurrent compliance with the requirements of both the Clean Water Act (CWA; 33 U.S.C. 1251 *et seq.*) and Endangered Species Act, through a blanket section 7 consultation.

Our Response: In response to the comments from the first public comment period, we modified the proposed 4(d) rule language to provide specific details for SMZ widths that will be most protective of the habitat for the species (85 FR 59487; September 22, 2020), similar to those ''more substantial'' BMPs considered for streams that are designated ''trout waters'' and already implemented by both Virginia's and North Carolina's State forestry programs. We also modified the 4(d) rule language to use the phrase ''State-approved BMPs'' as suggested by the original commenter.

In response to additional comments we received during the second comment period (specifically those suggesting reference to the U.S. Army Corps of Engineers' regulations at 33 CFR 323.4(a)(6)(ix), which set forth exemptions for CWA permitting requirements for the construction of farm roads, forest roads, or temporary roads for moving mining equipment), we find that these regulations are not designed to conservation species such as Atlantic pigtoe. The CFR reference suggested by the commenter is provides no specific guidance on implementing the exempted activities to avoid take of or jeopardy to endangered or threatened species. The use of State-approved BMPs for forestry to meet the CWA exemption are not species conservation regulatory requirements. Furthermore, State forestry BMP manuals do not represent a law or requirement; they are a set of recommended practices for achieving compliance with water quality regulations, and BMP manuals are subject to change. In fact, the NCFS has recently proposed revisions to the NC BMP manual (Gerow 2020, pers. comm.); this highlights the need to provide specific information for the conservation of a species in the text of the 4(d) rule. It is the responsibility of the Service under the Endangered Species Act to provide guidance on how to avoid take of or jeopardy to endangered and threatened species, and the Act guides the Service to establish a species-specific 4(d) rules for threatened species, including language stating prohibitions and exceptions to prohibitions for the protection of the species.

Finally, nothing in this final 4(d) rule will change in any way the consultation requirements under section 7 of the Act. However, interagency cooperation may be further streamlined through planned programmatic consultations for the species between Federal agencies and the Service, where appropriate.

(20) Comment: Two commenters stated that SMZs are part of a suite of BMPs and that they should not be proposed alone.

Our Response: We proposed the incidental take exception resulting from forestry to include multiple State-approved BMPs, highlighting considerations for SMZs because of their importance to stream habitat, along with considerations for stream

crossings, skid trails, and access roads. However, commenters have demonstrated particular concern and confusion over that portion of the proposed incidental take exception resulting from forestry activities with specifications on SMZs. As noted in our response to *(13) Comment,* above, we have revised the 4(d) rule's incidental take exception to include the suite of BMPs.

(21) Comment: During the first comment period, the NCFS commented that forestry-related, site-disturbing activities must protect riparian areas, indicating that the multiple layers of existing State-enacted riparian zone protections are sufficient to restrain sediment from negatively impacting habitat for the Atlantic pigtoe and other species. They referenced a U.S. Department of Agriculture study demonstrating that the use of BMPs and compliance with the State's standards effectively maintained water quality and sustained the populations of benthic macroinvertebrates, and noted that the results from this study demonstrate that forestry operations will not impact Atlantic pigtoe habitat. They recommended that compliance with State-enacted riparian buffer rules should be deemed as concurrent compliance with the 4(d) rule's prohibitions as well as concurrent protection of critical habitat. In addition, we received several comments indicating that a 4(d) rule that includes overly specific prescriptive measures for protecting water quality and habitat for the Atlantic pigtoe would be confusing to communicate to landowners and challenging to implement.

Our Response: State regulations are susceptible to change (as described in the SSA report, section 4.2); therefore, it is necessary to detail the requirements needed for the Atlantic pigtoe in the Federal listing rule, which includes the 4(d) rule. The reference to the paired watershed study is not specifically relevant to the Atlantic pigtoe, as that study focused on water quality only (not instream or streamside habitat) and impacts to benthic macroinvertebrates that did not include freshwater mussels. Therefore, in our 4(d) rule, we articulate outcome-based habitat management that, if followed, will eliminate sedimentation threats to Atlantic pigtoe habitat and is excepted from incidental take prohibitions.

(22) Comment: One commenter recommended that the Service remove from the descriptions of critical habitat units references to silviculture being a potential source of pollution. The commenter indicated that the forestry sector in general believes that such references may have had some credence a generation or more ago, but the advent of BMPs, their proven effectiveness, and high implementation rates make such references incorrect today.

Our Response: The best available science indicates that proper implementation of forestry BMPs reduces negative effects on water quality compared to historical silvicultural practices and compared to current practices that do not apply or properly implement BMPs. However, although BMPs generally are implemented at high rates, they are not universally applied or always properly implemented, and forest management activities can still contribute to high sediment loads. As noted above, the most recent assessment of BMP implementation by the NCFS reported that the majority of risks to water quality identified during the assessment were associated with forest managers' failure to use or properly apply BMPs related to SMZs, stream crossings, and post-harvest restoration (Coats 2017, pp. 8–34). We also acknowledge that there are multiple sources of sediment and other pollutants. That said, we have removed from the critical habitat descriptions the statements about silvicultural runoff as a source of pollution, and we have replaced them with language about management activities that will benefit habitat for the species, such as riparian buffer restoration, reduced surface and groundwater withdrawals, stormwater retrofits, elimination of direct stormwater discharges, and implementation of the highest levels of wastewater treatment practicable.

(23) Comment: One commenter noted that the Service's proposed critical habitat designation for the Atlantic pigtoe is inadequate to ensure the conservation of the species because the Service has only proposed critical habitat within the species' currently occupied habitat, neglecting the essential protection of unoccupied habitat pursuant to 16 U.S.C. 1532(5)(A)(ii).

Our Response: We did not propose to designate any areas outside the geographical area currently occupied by the species because we did not find any unoccupied areas to be essential for the conservation of the species. We have determined that the designation of critical habitat within eight occupied management units currently categorized as moderately or highly resilient across the physiographic representation of the species' range will conserve the species. Efforts to improve the resiliency of populations in currently occupied streams should increase viability to the point that the protections of the Act are no longer necessary. See Criteria Used to Identify Critical Habitat, below, for more information.

(24) Comment: One commenter noted that the Service's failure to protect as critical habitat the currently unoccupied habitat across Georgia, South Carolina, North Carolina, and Virginia that soon may be subject to anticipated State restocking efforts undermines the Service's charge under the Act to fashion a concerted regulatory scheme to ensure the long-term viability of this species by bolstering its range and resiliency. The commenter called upon the Service to designate suitable, unoccupied critical habitat in each of the 12 river basins in the Atlantic pigtoe's historical range to prevent the further deterioration of their once-and-future habitat.

Our Response: We are working in coordination with State efforts to re-establish extirpated Atlantic pigtoe populations via captive propagation. Designation of critical habitat is not required for these species restoration efforts, and as discussed above (see our responses to *(8) Comment* and *(23) Comment,* above), we have determined that designation of unoccupied critical habitat is not essential for the conservation of the species. In our final 4(d) rule for the Atlantic pigtoe, we are excepting incidental take resulting from captive propagation and reintroduction efforts, as we recognize these efforts further the conservation of the species. Excepting incidental take resulting these activities under the 4(d) rule enables each State to proceed with stocking that is not subject to incidental take. In addition, section 6 of the Act provides that the Service shall cooperate to the maximum extent practicable with the States in carrying out programs authorized by the Act. Therefore, the final 4(d) rule also provides that any qualified employee or agent of a State conservation agency that is a party to a cooperative agreement with the Service in accordance with section 6(c) of the Act, who is designated by his or her agency for such purposes, would be able to conduct activities designed to conserve Atlantic pigtoe that may result in otherwise prohibited take without additional authorization.

I. Final Listing Determination

Background

Please refer to the October 11, 2018, proposed rule (83 FR 51570), the September 22, 2020, document (85 FR 59487), and the SSA report for a full summary of species information. These documents are available at *http://*

www.regulations.gov under Docket No. FWS–R4–ES–2018–0046.

The Atlantic pigtoe is a small freshwater mussel with a sub-rhomboidal shaped shell. Although larger specimens exist, the Atlantic pigtoe rarely exceeds 50 millimeters (mm) (2 inches (in)) in length. The known historical range of the Atlantic pigtoe included 12 populations in Atlantic river basins from Virginia to Georgia. However, surveys conducted from 2005 to 2019 indicate that the currently occupied range of the Atlantic pigtoe consists of seven populations in Virginia and North Carolina. The Atlantic pigtoe is dependent on clean, moderate-flowing water with high dissolved oxygen content in creek and riverine environments. Historically, the most abundant populations existed in creeks and rivers with excellent water quality, and where stream flows were sufficient to maintain clean, silt-free substrates. It is associated with gravel and coarse sand substrates at the downstream edge of riffles (shallow water with rapid currents running over gravel or rocks), and less commonly occurs in cobble, silt, or sand detritus mixtures. Because this species prefers more pristine conditions, it typically occurs in headwaters of rural watersheds.

The Atlantic pigtoe is presumed to be an omnivore. Adults primarily filter feed on a wide variety of microscopic particulate matter suspended in the water column, including phytoplankton, zooplankton, bacteria, detritus, and dissolved organic matter, although juveniles tend to pedal feed in the sediment (Alderman and Alderman 2014, p. 9). Like most freshwater mussels, the Atlantic pigtoe has a unique life cycle that relies on fish hosts for successful reproduction. Following release from the female mussel, sticky packets of floating glochidia (larvae) attach to the gills and scales of host minnows. The larvae stay attached to the host fish until they complete metamorphosis, when they release from the fish and fall to the substrate.

The Atlantic pigtoe has been documented in all major river basins in the Atlantic coastal drainages from the James River Basin in Virginia south to the Altamaha River Basin in Georgia, and from the foothills of the Appalachian Mountains to the Coastal Plain. However, abundance and distribution of the species has declined, with the species currently occupying approximately 40 percent of its historical range. Most of the remaining populations are small and fragmented, only occupying a fraction of reaches that were historically occupied. Recent surveys found Atlantic pigtoes remain in seven populations in Virginia and North Carolina; however, only three populations have multiple documented occurrences within the past 16 years. This decrease in abundance and distribution has resulted in largely isolated contemporary populations. Evidence suggests that the range reduction of the species corresponds to habitat degradation resulting from the cumulative impacts of land use change and associated watershed-level effects on water quality, water quantity, habitat connectivity, and instream habitat suitability.

Regulatory and Analytical Framework

Regulatory Framework

Section 4 of the Act (16 U.S.C. 1533) and its implementing regulations (50 CFR part 424) set forth the procedures for determining whether a species is an ''endangered species'' or a ''threatened species.'' The Act defines an ''endangered species'' as a species that is in danger of extinction throughout all or a significant portion of its range, and a ''threatened species'' as a species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. The Act requires that we determine whether any species is an ''endangered species'' or a ''threatened species'' because of any of the following factors:

(A) The present or threatened destruction, modification, or curtailment of its habitat or range;

(B) Overutilization for commercial, recreational, scientific, or educational purposes;

(C) Disease or predation;

(D) The inadequacy of existing regulatory mechanisms; or

(E) Other natural or manmade factors affecting its continued existence.

These factors represent broad categories of natural or human-caused actions or conditions that could have an effect on a species' continued existence. In evaluating these actions and conditions, we look for those that may have a negative effect on individuals of the species, as well as other actions or conditions that may ameliorate any negative effects or may have positive effects.

We use the term ''threat'' to refer in general to actions or conditions that are known to or are reasonably likely to negatively affect individuals of a species. The term ''threat'' includes actions or conditions that have a direct impact on individuals (direct impacts), as well as those that affect individuals through alteration of their habitat or required resources (stressors). The term ''threat'' may encompass—either together or separately—the source of the action or condition or the action or condition itself.

However, the mere identification of any threat(s) does not necessarily mean that the species meets the statutory definition of an ''endangered species'' or a ''threatened species.'' In determining whether a species meets either definition, we must evaluate all identified threats by considering the expected response by the species, and the effects of the threats—in light of those actions and conditions that will ameliorate the threats—on an individual, population, and species level. We evaluate each threat and its expected effects on the species, then analyze the cumulative effect of all of the threats on the species as a whole. We also consider the cumulative effect of the threats in light of those actions and conditions that will have positive effects on the species, such as any existing regulatory mechanisms or conservation efforts. The Secretary determines whether the species meets the definition of an ''endangered species'' or a ''threatened species'' only after conducting this cumulative analysis and describing the expected effect on the species now and in the foreseeable future.

The Act does not define the term ''foreseeable future,'' which appears in the statutory definition of ''threatened species.'' Our implementing regulations at 50 CFR 424.11(d) set forth a framework for evaluating the foreseeable future on a case-by-case basis. The term ''foreseeable future'' extends only so far into the future as the Service can reasonably determine that both the future threats and the species' responses to those threats are likely. In other words, the foreseeable future is the period of time in which we can make reliable predictions. ''Reliable'' does not mean ''certain''; it means sufficient to provide a reasonable degree of confidence in the prediction. Thus, a prediction is reliable if it is reasonable to depend on it when making decisions.

It is not always possible or necessary to define foreseeable future as a particular number of years. Analysis of the foreseeable future uses the best scientific and commercial data available and should consider the timeframes applicable to the relevant threats and to the species' likely responses to those threats in view of its life-history characteristics. Data that are typically relevant to assessing the species' biological response include species-specific factors such as lifespan, reproductive rates or productivity,

certain behaviors, and other demographic factors.

Our proposed rule described ''foreseeable future'' as the extent to which we can reasonably rely on predictions about the future in making determinations about the future conservation status of the species. The Service since codified its understanding of foreseeable future at 50 CFR 424.11(d) (84 FR 45020; August 27, 2019). In those regulations, we explain the term ''foreseeable future'' extends only so far into the future as the Service can reasonably determine that both the future threats and the species' responses to those threats are likely. The Service will describe the foreseeable future on a case-by-case basis, using the best available data and taking into account considerations such as the species' life-history characteristics, threat-projection timeframes, and environmental variability. The Service need not identify the foreseeable future in terms of a specific period of time.

These regulations did not significantly modify the Service's interpretation of the term ''foreseeable future''; rather they codified a framework that sets forth how the Service will determine what constitutes the foreseeable future based on our long-standing practice. However, the regulations at 50 CFR 424.11(d) do not apply to this final rule because the October 11, 2018, proposed rule for the Atlantic pigtoe (83 FR 51570) published prior to the effective date of the final rule amending 50 CFR 424.11(d) (84 FR 45020; August 27, 2019). Our assessment of the ''foreseeable future'' for the Atlantic pigtoe, as presented in our October 11, 2018, proposed rule and this final rule, has not changed.

Analytical Framework

The SSA report documents the results of our comprehensive biological review of the best scientific and commercial data regarding the status of the species, including an assessment of the potential threats to the species. The SSA report does not represent a decision by the Service on whether the species should be listed as an endangered or threatened species under the Act. However, it does provide the scientific basis that informs our regulatory decisions, which involve the further application of standards within the Act and its implementing regulations and policies. The following is a summary of the key results and conclusions from the SSA report; the full SSA report can be found at *http://www.regulations.gov* under Docket No. FWS–R4–ES–2018–0046.

To assess Atlantic pigtoe viability, we used the three conservation biology principles of resiliency, redundancy, and representation (the ''3 Rs'') (Shaffer and Stein 2000, pp. 306–310). Briefly, resiliency supports the ability of the species to withstand environmental and demographic stochasticity (for example, wet or dry, warm or cold years), redundancy supports the ability of the species to withstand catastrophic events (for example, droughts, large pollution events), and representation supports the ability of the species to adapt over time to long-term changes in the environment (for example, climate changes). In general, the more resilient and redundant a species is and the more representation it has, the more likely it is to sustain populations over time, even under changing environmental conditions. Using these principles, we identified the species' ecological requirements for survival and reproduction at the individual, population, and species levels, and described the beneficial and risk factors influencing the species' viability.

The SSA process can be divided into three sequential stages. During the first stage, we evaluated the individual species' life-history needs. In the next stage, we assessed the historical and current condition of the species' demographics and habitat characteristics, including an explanation of how the species arrived at its current condition. In the final stage, we made predictions about the species' responses to positive and negative environmental and anthropogenic influences. Throughout all of these stages, we used the best available information to characterize viability as the ability of a species to sustain populations in the wild over time. We use this information to inform our regulatory decision.

Summary of Biological Status and Threats

In this discussion, we review the biological condition of the species and its resources, and the threats that influence the species' current and future condition, in order to assess the species' overall viability and the risks to that viability.

To evaluate the current and future viability of the Atlantic pigtoe, we assessed a range of conditions to allow us to consider the species' resiliency, representation, and redundancy. Populations were delineated using the 12 river basins that Atlantic pigtoe mussels historically occupied: The James, Chowan, Roanoke, Tar, Neuse, Cape Fear, Pee Dee, Catawba, Edisto, Savannah, Ogeechee, and Altamaha River basins. Because the river basin level is at a very coarse scale, populations were further delineated using management units (MUs). The MUs were defined as one or more U.S. Geological Survey Hydrological Unit Code (HUC) 10 watersheds that species experts identified as the most appropriate unit for assessing population-level resiliency. To provide context for the current condition of the species using the 3 Rs, we considered the historical range as context for the species' resiliency, redundancy, and representation on the landscape in the past. However, in addressing the current condition of the 3 Rs, only extant populations were analyzed.

To assess resiliency, we qualitatively analyzed data related to three population factors (MU occupancy, recruitment, and abundance) and four habitat elements (water quality, water quantity/flow, instream substrate, and habitat connectivity). Overall population condition rankings and habitat condition rankings were determined by combining these factors and elements.

We described representation for the Atlantic pigtoe in terms of river basin variability (known from 12 historical river basins, currently extant in 7), physiographic variability (Mountains, Piedmont, and Coastal Plain), and historical latitudinal variability (Virginia south to Georgia). We assessed Atlantic pigtoe redundancy by first evaluating occupancy within each of the hydrologic units (*i.e.,* HUC10s) that constitute MUs, and then evaluating occupancy at the MU, and ultimately the population level.

Factors Influencing Atlantic Pigtoe Viability

Aquatic systems face a multitude of natural and anthropogenic factors that may impact the status of species within those systems (Neves et al. 1997, p. 44). Generally, these factors can be categorized as either environmental stressors (*e.g.,* development, agriculture practices, improper forest management) or systematic changes (*e.g.,* climate change, invasive species, dams or other barriers). The largest threats to the future viability of the Atlantic pigtoe consist of habitat degradation from stressors influencing water quality, water quantity, instream habitat, and habitat connectivity. All of these threats are exacerbated by the effects of climate change. A brief summary of these primary stressors is presented below; for a full description of these stressors, refer to chapter 4 of the SSA report (Service 2021, pp. 45–61). We did not find that the species faces significant threats from overutilization for commercial,

recreational, scientific, or education purposes, or from disease or predation.

Environmental Stressors

Development: Development refers to urbanization of the landscape, including (but not limited to) land conversion for urban and commercial use, infrastructure (roads, bridges, utilities), and urban water uses (water supply reservoirs, wastewater treatment, etc.). The effects of urbanization may include alterations to water quality, water quantity, and habitat (both in stream and streamside) (Ren et al. 2003, p. 649; Wilson 2015, p. 424). These alterations adversely affect both Atlantic pigtoe adults, which require clear, flowing water with a temperature less than 35 degrees Celsius (°C) (95 degrees Fahrenheit (°F)) and a dissolved oxygen greater than 3 milligrams per liter (mg/L), and juveniles, which require very specific interstitial chemistry to complete that life stage: Low salinity (similar to 0.9 parts per thousand (ppt)), low ammonia (similar to 0.7 mg/L), low levels of copper and other contaminants, and dissolved oxygen greater than 1.3 mg/L.

Impervious surfaces associated with development negatively affect water quality when pollutants that accumulate on impervious surfaces are washed directly into the streams during storm events. Storm water runoff affects such water quality parameters as temperature, pH, dissolved oxygen, and salinity, which in turn alter the water chemistry and could make habitat unsuitable for the Atlantic pigtoe. Concentrations of contaminants, including nitrogen, phosphorus, chloride, insecticides, polycyclic aromatic hydrocarbons, and personal care products, increase with urban development (Giddings et al. 2009, p. 2; Bringolf et al. 2010, p. 1311).

Urban development can also lead to increased variability in streamflow, typically increasing the amount of water entering a stream after a storm and decreasing the time it takes for the water to travel over the land before entering the stream (Giddings et al. 2009, p. 1). Stream habitat is altered either directly via channelization or clearing of riparian areas, or indirectly via high stream flows that reshape the channel and cause sediment erosion (Giddings et al. 2009, p. 2). Impervious surfaces associated with increased development cause rain water to accumulate and flow rapidly into storm drains, thereby becoming overheated, which can stress or kill mussels when it enters streams. Pollutants like gasoline, oil, and fertilizers are also washed directly into streams and can kill mussels and other aquatic organisms. The large volumes and velocity of water, combined with the extra debris and sediment entering streams following a storm, can stress, displace, or kill Atlantic pigtoes and the host fish species on which they depend. Many of the known host fish of the Atlantic pigtoe can tolerate short periods of turbidity associated with rain events; however, the cyprinid host fish typically do not persist in streams with consistently high sedimentation. Changes in flow may also result in turbidity that can reduce feeding efficiency and eliminate spawning habitat due to lack of clean gravel substrate.

A further risk of urbanization is the accompanying road development that often results in improperly constructed culverts at stream crossings. These culverts act as barriers, either if flow through the culvert varies significantly from the rest of the stream, or if the culvert ends up being perched above the stream bed so that host fish (and, therefore, the Atlantic pigtoe) cannot pass through them. This leads to loss of access to quality habitat, as well as fragmented habitat and a loss of connectivity between populations. This can limit both genetic exchange and recolonization opportunities.

All of the river basins within the range of this species are affected to some extent by development, ranging from 3 percent of the Black River subbasin in the Cape Fear River Basin to 70 percent of the Crabtree Creek subbasin in the Neuse River Basin (based on the 2011 National Land Cover Data). The Neuse River basin in North Carolina contains one-sixth of the entire State's population, indicating heavy development pressure on the watershed. As another example, the Middle James MU (in the James population) contains 159 impaired stream miles (*i.e.,* waters that exceed water quality standards for a particular parameter), 2 major discharges, 32 minor discharges, and over 1,300 road crossings. Similarly, the Muddy Creek MU is currently made up of 12.3 percent impervious surfaces. For complete data on all of the populations, refer to appendix C of the SSA report.

Agricultural Practices: The main impacts to the Atlantic pigtoe from agricultural practices are from nutrient pollution and water pumping for irrigation. Fertilizers and animal manure, which are both rich in nitrogen and phosphorus, are the primary sources of nutrient pollution from agricultural sources when agricultural best management practices are not used. Excess nutrients impact water quality when it rains or when water and soil containing nitrogen and phosphorus wash into nearby waters or leach into the water table and ground waters causing algal blooms. These algal blooms can harm freshwater mussels by suffocating host fish and decreasing available oxygen in the water column.

It is common practice to pump water for irrigation from adjacent streams or rivers into a reservoir pond, or to spray the stream or river water directly onto crops. If the water withdrawal is excessive or done illegally, this may cause impacts to the amount of water available to downstream sensitive areas during low flow months, resulting in dewatering of channels and stranding of mussels, leading to desiccation and death. The Cape Fear River basin has 33 reservoirs, many of them supplying water to some of the most populated areas in North Carolina, including the Triad (Greensboro and High Point), Chapel Hill, Fayetteville, and Wilmington. All told, this basin contains one-fifth of the entire State's population and is the most industrialized basin, as well as home to the most large-scale livestock operations in the State. However, according to the 2011 National Land Cover Data, all of the watersheds within the range of the Atlantic pigtoe are affected by agricultural land uses, most with 20 percent or more of the watershed having been converted to agricultural use.

Incompatible Forest Management: Silvicultural activities, when performed according to strict forest practices guidelines (FPGs) or BMPs, can retain adequate conditions for aquatic ecosystems; however, when FPGs/BMPs are not followed or are implemented poorly, these practices can also contribute to the myriad of stressors facing aquatic systems in the Southeast. Both small- and large-scale clearing of forests have been shown to have a significant impact upon the physical, chemical, and biological characteristics of adjacent small streams (Allan 1995, pp. 324–327; Valente-Neto 2015, p. 116). Clearcutting and harvests in riparian systems can eliminate shade provided by forest canopies, exposing streams to more sunlight and increasing the instream water temperature (Swift and Messer 1971, p. 111; Hewlett and Forston 1982, p. 983; GB Rishel 1982, p. 112; Lynch et al. 1984, p. 161; Allan 1995, p. 325; Keim and Shoenholtz 1999, p. 197; Carroll et al. 2004, p. 275; B.D. Clinton 2011, p. 979; Caldwell et al. 2014, p. 3). The increase in stream temperature and light after deforestation of riparian areas alters the macroinvertebrate and other aquatic species richness and abundance composition in streams (Wenger 1999, p. 35; Caldwell et al. 2014, p. 3). As

stated above, the Atlantic pigtoe is sensitive to changes in temperature, and sustained temperature increases will stress and possibly lead to mortality for this species.

Forestry activities can include the construction of logging roads through the riparian zone, and this can directly degrade nearby stream environments. Roads can cause point-source pollution and sedimentation, as well as sediment traveling downstream into sensitive habitats. These effects lead to stress and mortality for the species, as discussed under *Development,* above, and as reported in studies of forestry-related sedimentation effects on survival of aquatic invertebrates (Osterling et al. 2008, pp. 1368–1369; Reid et al. 2013, pp. 571, 577; O'Driscoll et al. 2014, pp. 87–90; Osterling and Hogberg 2014, pp. 215–217, 219; Osterling 2015, pp. 448–450; Osterling 2019, pp. 444, 446–448). While BMPs are widely adhered to now, they were not historically a common practice, and implementation is still imperfect. The most recent surveys of BMP implementation rates in North Carolina show that they average approximately 83–90 percent in river basins where Atlantic pigtoe occurs (Coats 2017, p. 38), and in Virginia, the most recent average Statewide BMP implementation rate was 91.8 percent (VDOF 2020, p. 2). Accordingly, while incompatible implementation is rare, the failure to implement BMPs or inadequate implementation can have negative effects on sensitive aquatic species. Acute impacts associated with episodic events may be particularly consequential for long-lived, sedentary species like the Atlantic pigtoe. Further, the most recent assessment of forestry BMPs in North Carolina reported that improperly implemented BMPs associated with SMZs and stream crossings were among the most frequently associated with risks to water quality (Coats 2017, p. 9); VDOF similarly identified stream crossings, along with roads and skid trails, among the BMP categories frequently associated with water quality concerns (VDOF 2020, p. 3).

Systemic Changes

Climate Change: Aquatic systems are encountering changes and shifts in seasonal patterns of precipitation and runoff as a result of climate change. While mussels evolved in habitats that experience seasonal fluctuations in discharge, global weather patterns can have an impact on the normal regimes (*e.g.,* El Niño or La Niña). Both excessively high (*i.e.,* floods and storms) and excessively low (*i.e.,* droughts) flows can adversely affect the species.

As to droughts, even naturally occurring low flow events can cause mussels to become stressed, either because they must exert significant energy to move to deeper waters or they may succumb to desiccation. Because late summer and early fall are stressful periods for the species due to low flows, droughts during this time of year can be especially harmful, resulting in increased mortality rates. Atlantic pigtoe habitat must have adequate flow to deliver oxygen, enable passive reproduction, and deliver food to filter-feeding mussels. Further, flow removes contaminants and fine sediments from interstitial spaces, preventing mussel suffocation. Droughts have impacted all river basins within the range of Atlantic pigtoe, from an ''abnormally dry'' ranking for North Carolina and Virginia in 2001 on the Southeast Drought Monitor scale to the highest ranking of ''exceptionally dry'' for the entire range of the species in 2002 and 2007. In 2015, the entire Southeast ranged from ''abnormally dry'' to ''moderate drought'' or ''severe drought.'' These data covered the first week in September, which, as noted above, is a very sensitive time for drought to be affecting the species. The Middle Neuse tributaries of the Neuse River basin had consecutive drought years from 2005 through 2012, indicating sustained stress on the species over a long period of time.

Increases in the frequency and strength of storms events alter stream habitat. Stream habitat is altered either directly via channelization or clearing of riparian areas, or indirectly via high stream flows that reshape the channel and cause sediment erosion. The large volumes and velocity of water, combined with the extra debris and sediment entering streams following a storm, stress, displace, or kill Atlantic pigtoes and the host fish species on which they depend.

Sedentary freshwater mussels have limited ability to seek refuge from droughts and floods, and they are completely dependent on specific water temperatures to complete their physiological requirements. Changes in water temperature lead to stress, increased mortality, and also increase the likelihood of extinction.

Invasive Species: Nonnative species are invading aquatic communities and altering biodiversity by competing with native species for food, light, or breeding and nesting areas in many areas across the range of the Atlantic pigtoe. For example, the Asian clam (*Corbicula fluminea*) alters benthic substrates, competes with native species for limited resources, and causes ammonia spikes in surrounding water when they die off en masse. Native mussel growth is negatively associated with Asian clam abundance, indicating invasive clams may be a pervasive stressor to native species (Haag et al. 2021, pp. 451–454). Juvenile mussels need low levels of ammonia to survive, and freshwater mollusks are more sensitive than previously known to some chemical pollutants, including ammonia (Augspurger et al. 2003, entire and references therein). The Asian clam is ubiquitous across the southeastern United States and is present in watersheds across the range of the Atlantic pigtoe.

The flathead catfish (*Pylodictis olivaris*) is an apex predator that feeds on almost anything, including other fish, crustaceans, and mollusks. Predation by flathead catfish diminishes host fish communities, reducing the amount of fish available as hosts for the mussels to complete their glochidia life stage. Introductions of flathead catfish into rivers in North Carolina and Georgia have led to steep declines in numbers of native fish (Service 2021, p. 59). The flathead catfish has been documented in six of the seven river systems currently inhabited by the Atlantic pigtoe (James, Roanoke, Tar, Neuse, Cape Fear, and Yadkin-Pee Dee).

Hydrilla (*Hydrilla verticillata*), an aquatic plant, alters habitat, decreases flows, and contributes to sediment buildup in streams. Hydrilla occurs in several watersheds where the Atlantic pigtoe occurs, including recent documentation from the upper Neuse system and the Tar River. The dense growth is altering the flow in these systems and causing sediment buildup, which can cause suffocation in filter-feeding mussels. While data are lacking on hydrilla currently having population-level effects on the Atlantic pigtoe, the spread of this invasive plant is expected to increase in the future.

Dams and Barriers: Extinction and extirpation of North American freshwater mussels can be traced to impoundment and inundation of riffle habitats in all major river basins of the central and eastern United States. Upstream of dams, the change from flowing to impounded waters, increased depths, increased buildup of sediments, decreased dissolved oxygen, and the drastic alteration in resident fish populations can threaten the survival of mussels and their overall reproductive success. Downstream of dams, fluctuations in flow regimes, minimal releases and scouring flows, seasonal dissolved oxygen depletion, reduced or increased water temperatures, and changes in fish assemblages can also

threaten the survival and reproduction of many mussel species.

Because Atlantic pigtoes use smaller host fish (*e.g.,* darters and minnows), they are even more susceptible to impacts from habitat fragmentation due to increasing distance between suitable habitat patches and a low likelihood of host fish swimming over that distance. Even improperly constructed culverts at stream crossings can act as significant barriers and have some similar effects as dams on stream systems (see discussion under *Development,* above). These barriers not only fragment habitats along a stream course, they also contribute to genetic isolation of the Atlantic pigtoe. Nearly all of the MUs containing Atlantic pigtoe populations have been impacted by dams, with as few as 2 dams in Mill Creek in the James River basin to 237 dams throughout the Middle Neuse basin (Service 2021, appendix D). The Middle Neuse also contains over 5,000 stream crossings, so connectivity in that basin has been severely affected by barriers. Only the Edisto River basin within the range of the Atlantic pigtoe has not been impacted by dams.

Regulatory Mechanisms

State Endangered Species Laws

Each state within the range of the Atlantic Pigtoe has state-level legislation modeled after the federal Endangered Species Act: In Virginia it is both the Virginia Endangered Species Act and the Endangered Plant and Insect Species Act, in North Carolina it is the North Carolina Endangered Species Act, in South Carolina it is the Nongame and Endangered Species Conservation Act, and in Georgia it is the Endangered Wildlife Act. Animal species that are protected by the state laws are regulated by state wildlife agencies: The Virginia Department of Game and Inland Fisheries, the North Carolina Wildlife Resources Commission, the South Carolina Department of Natural Resources, and the Georgia Department of Natural Resources.

The state endangered species protection laws allow the state wildlife agencies to identify, document, and protect any animal species that is considered rare or in danger of extinction. In most of the states (VA, NC, SC, GA), illegal activities include take, transport, export, processing, selling, offering for sale, or shipping species, and the penalty for doing so is a misdemeanor crime, usually resulting in a fine of no more than $1,000 or imprisonment not to exceed a year (Pellerito 2002, entire). There are no mechanisms for recovery, consultation, or critical habitat designation other than in North Carolina where conservation plans must be developed for all state listed species (Pellerito 2002, Snape and George 2010, p.346). In addition, nothing in the North Carolina Endangered Species Act ''shall be construed to limit the rights of a landholder in the management of his lands for agriculture, forestry, development, or any other lawful purpose'' (NC GS 113–332).

State and Federal Stream Protections (Buffers & Permits)

A buffer is a strip of trees, plants, or grass along a stream or wetland that naturally filters out dirt and pollution from rain water runoff before it enters rivers, streams, wetlands, and marshes (SELC 2014, p.2). Several state laws require setbacks or buffers, and all allow variances/waivers for those restrictions. Virginia's Chesapeake Bay Preservation Act requires 100-foot buffers on all perennial streams in designated ''Resource Protection Areas.'' North Carolina used to have buffer requirements in specific watersheds (*e.g.,* Tar-Pamlico, Neuse, Catawba, Jordan Lake, and Goose Creek), however, the NC Legislature enacted a Regulatory Reform effort, including ''Riparian Buffer Reform'' that allowed for the amendment of the buffer rules to allow/exempt development (see Session Law 2012–200, Section 8 and Session Law 2015–246, Section 13.1, G.S. 143–214.23A (NCDEQ 2016, entire)). North Carolina also has guidance for 200 foot riparian buffer protections for streams draining to listed aquatic species habitats (NCWRC 2002, p.11). In South Carolina, 30–45 ft buffer management zones are required for stormwater management (SCDHEC 2016, entire). In Georgia, all state waters are protected by a 25-foot vegetated buffer, and trout waters have a 50-foot vegetated buffer requirement.

Section 401 of the federal Clean Water Act (CWA) requires that an applicant for a federal license or permit provide a certification that any discharges from the facility will not degrade water quality or violate water-quality standards, including state-established water quality standard requirements. Section 404 of the CWA establishes a program to regulate the discharge of dredged and fill material into waters of the United States. Permits to fill wetlands and fill, culvert, bridge or re-align streams or water features are issued by the U.S. Army Corps of Engineers under Nationwide, Regional General Permits or Individual Permits.

- Nationwide Permits are for ''minor'' impacts to streams and wetlands, and do not require an intense review process. These impacts usually include stream impacts under 150 feet, and wetland fill projects up to 0.50 acres. Mitigation is usually provided for the same type of wetland or stream impacted, and is usually at a 2:1 ratio to offset losses and make the ''no net loss'' closer to reality.
- Regional General Permits are for various specific types of impacts that are common to a particular region; these permits will vary based on location in a certain region/state.
- Individual permits are for the larger, higher impact and more complex projects. These require a complex permit process with multi-agency input and involvement. Impacts in these types of permits are reviewed individually and the compensatory mitigation chosen may vary depending on project and types of impacts.

State and Federal Water Quality Programs

Current State regulations regarding pollutants are designed to be protective of aquatic organisms; however, freshwater mollusks may be more susceptible to some pollutants than the test organisms commonly used in bioassays. Additionally, water quality criteria may not incorporate data available for freshwater mussels (March et al. 2007, pp. 2,066–2,067). A multitude of bioassays conducted on 16 mussel species (summarized by Augspurger et al. 2007, pp. 2025–2028) show that freshwater mollusks are more sensitive than previously known to some chemical pollutants, including chlorine, ammonia, copper, fungicides, and herbicide surfactants. Another study found that nickel and chlorine were toxic to a federally threatened mussel species at levels below the current criteria (Gibson 2015, pp. 90–91). The study also found mussels are sensitive to SDS (sodium dodecyl sulfate), a surfactant commonly used in household detergents, for which water quality criteria do not currently exist. Several studies have demonstrated that the criteria for ammonia developed by EPA in 1999 were not protective of freshwater mussels (Augspurger et al. 2003, p. 2,571; Newton et al. 2003, pp. 2,559–2,560; Mummert et al. 2003, pp. 2,548–2,552). However, in 2013 EPA revised its recommended criteria for ammonia. The new criteria are more stringent and reflect new toxicity data on sensitive freshwater mollusks (78 FR 52192, August 22, 2013; p. 2). All of the states in the range of the Atlantic Pigtoe have not yet adopted the new ammonia criteria. NPDES permits are valid for 5 years, so even after the new criteria are

adopted, it could take several years before facilities must comply with the new limits.

TMDL, or Total Maximum Daily Load, is a regulatory term from the CWA describing a plan for restoring impaired waters that identify the maximum amount of a pollutant that a body of water can receive while still maintaining water quality standards. In North Carolina, despite management actions that started in the mid-1990s, long term monitoring and trend analyses have demonstrated that TMDL goals have not been met: ''Despite the fact that the targeted point and nonpoint pollution sources have been able to meet their nutrient reductions, total nitrogen and total phosphorous concentrations do not show a downward trend and loads have not permanently fallen below 1991 baseline load goals'' (as referenced (p.6) in SRI public comment letter on Yellow Lance Listing to USFWS, 6/5/2017).

Under the CWA, states are required to review their water quality standards and classifications every three years to make any modifications necessary to protect the waters of the state (NCDEQ 2016, entire). During this process, known as the Triennial Review, state water quality staff review current EPA guidelines, scientific data, and public comments and make recommendations for any changes of the water quality standards. In North Carolina, the most recent triennial review started in 2007 and was not completed until 2015 (NCDEQ 2016, entire). The state of North Carolina has not addressed water quality standards for several pollutants of concern for freshwater mussles, particularly ammonia, despite the EPA's 2013 recommended ambient water quality criteria for ammonia (as referenced (p.7) in SRI public comment letter on Yellow Lance Listing to USFWS, 6/5/2017).

In summary, despite existing authorities such as the Clean Water Act, pollutants continue to impair the water quality throughout the current range of the Atlantic Pigtoe. State and Federal regulatory mechanisms have helped reduce the negative effects of point source discharges since the 1970s, yet these regulations are difficult to implement and regulate. While new water quality criteria are being developed that take into account more sensitive aquatic species, most criteria currently do not. It is expected that several years will be needed to implement new water quality criteria throughout the range.

Synergistic Effects

In addition to impacting the species individually, it is likely that several of the above-summarized risk factors are acting synergistically or additively on the species. The combined impact of multiple stressors is likely more harmful than a single stressor acting alone. For example, in the Meherrin River MU, there are four stream reaches with 34 miles of impaired streams. They have low benthic-macroinvertebrate scores, low dissolved oxygen, low pH, and contain *Escherichia coli* (also known as *E. coli*). There are 16 non-major and 2 major discharges within this MU, along with 7 dams, and 676 road crossings. Additionally, droughts were recorded for 4 consecutive years (2007–2010) in this MU. The combination of all of these stressors on the sensitive aquatic species in this habitat has probably impacted Atlantic pigtoe, in that only two individuals have been recorded here since 2005, and therefore are affecting the species more severely in combination than any factor alone.

We note that, by using the SSA framework to guide our analysis of the scientific information documented in the SSA report, we have not only analyzed individual effects on the species, but we have also analyzed their potential cumulative effects. We incorporate the cumulative effects into our SSA analysis when we characterize the current and future condition of the species. To assess the current and future condition of the species, we undertake an iterative analysis that encompasses and incorporates the threats individually and then accumulates and evaluates the effects of all the factors that may be influencing the species, including threats and conservation efforts. Because the SSA framework considers not just the presence of the factors, but to what degree they collectively influence risk to the entire species, our assessment integrates the cumulative effects of the factors and replaces a standalone cumulative effects analysis.

Conservation Actions

The Service and State wildlife agencies are working with numerous partners to provide technical guidance and offering conservation tools to meet both species and habitat needs in aquatic systems in North Carolina. Land trusts are targeting key parcels for acquisition; Federal and State biologists are surveying and monitoring species occurrences; and, recently, there has been a concerted effort to ramp up captive propagation and species population restoration via augmentation, expansion, and reintroduction efforts. In 2014, NCWRC staff and partners began a concerted effort to propagate the Atlantic pigtoe in hopes of augmenting existing populations in the Tar and Neuse River basins. In July 2015, 250 Atlantic pigtoes were stocked into Sandy Creek, a tributary of the Tar River. Annual monitoring to evaluate growth and survival is planned, and additional propagation and stocking efforts will continue in upcoming years (Service 2021, p. 59).

Current Condition of Atlantic Pigtoe

The historical range of the Atlantic pigtoe included 12 populations in Atlantic river basins from Virginia to Georgia. The surveys conducted from 2005 to 2018 indicate that the currently occupied range of the Atlantic pigtoe consists of 13 MUs within 7 populations in Virginia and North Carolina, in the Tar, Neuse, James, Chowan, Roanoke, Cape Fear, and Yadkin-Pee Dee River basins. The species is presumed extirpated from the southern portion of its range, including the Catawba, Edisto, Savannah, Ogeechee, and Altamaha River basins. The Atlantic pigtoe currently (defined as the observation of at least one specimen from 2005 to 2019) occupies 13 of the 81 historically occupied MUs. At the population level, the overall current condition (= resiliency) of the extant populations was estimated to be high for the Tar Population; moderate for the Neuse Population; and low for the James, Chowan, Roanoke, Cape Fear, and Yadkin-Pee Dee populations.

The Atlantic pigtoe currently has reduced adaptive potential due to limited representation (compared with historical representation) in seven river basins and three physiographic regions. The species retains 58 percent of its known river basin variability, but, as discussed above, distribution has been reduced in the James, Chowan, Roanoke, Cape Fear, and Yadkin-Pee Dee populations. In addition, although the species continues to maintain physiographic representation in all three regions it historically occupied, occupancy has decreased in each region. A 67 percent estimated loss has occurred in the Mountain region's watersheds, 48 percent loss in the Piedmont region's watersheds, and 76 percent loss in the Coastal Plain region's watersheds. Latitudinal variability is also reduced and is largely limited to the central portions of its historical range, primarily in the Tar and Neuse basins.

Redundancy was estimated as the number of historically occupied MUs that remain currently occupied. The species has limited redundancy within the James, Chowan, Roanoke, and Cape Fear River populations, and only two

populations (Tar and Neuse) have multiple moderate or highly resilient MUs. Overall, the species has decreased redundancy across its range due to an estimated 60 percent reduction in occupancy compared to historical levels.

Future Scenarios

For the purpose of this assessment, we define viability as the ability of the species to sustain populations in the wild over time. To help address uncertainty associated with the degree and extent of potential future stressors and their impacts on the needs of the species, the 3 Rs were applied using four plausible future scenarios. We devised these scenarios by eliciting expert information on the primary stressors anticipated to affect the species into the future: Habitat loss and degradation due to urbanization and the effects of climate change. The models that were used to forecast both urbanization and climate change projected 50 years in the future. Synergistic interactions are possible between the effects of climate change and the effects of other potential threats, such as development. Increases in temperature and changes in precipitation are likely to affect stream dynamics, which will in turn affect the Atlantic pigtoe. However, it is difficult to project how climate change will affect stream dynamics because there can be both an increase in storm events as well as an increase in low flow, or drought, conditions. Uncertainty about how stream dynamics will respond to climate change, combined with uncertainty about how changes in instream habitat conditions would affect suitability for Atlantic pigtoe, make projecting possible synergistic effects of climate change on the Atlantic pigtoe too speculative. Below, we provide a brief summary of each plausible future scenario (see Table 1); for more detailed information on these models and their projections, please see the SSA report (Service 2021, chapter 3).

Under Scenario 1, the ''Status Quo'', factors that influence current populations of Atlantic pigtoe were assumed to remain constant over the 50 year time horizon. Under this scenario a loss of resiliency, representation, and redundancy is expected. Under this scenario, we predicted that no MUs would remain in high condition, 2 would be in moderate condition, 6 would be in low condition, and 20 MUs would be likely extirpated. Redundancy would be reduced to two MUs in the Tar Population. Representation would also be reduced, primarily with reduced variability in the Mountains and Coastal Plain.

Under scenario 2, the ''Pessimistic'', factors that negatively influence Atlantic pigtoe populations get worse. We predicted substantial losses of resiliency, representation, and redundancy. Redundancy would be reduced to 4 MUs in just two populations, and the resiliency of those populations is expected to be low; 24 MUs were predicted to be extirpated. All measures of representation are predicted to decline under this scenario, leaving remaining Atlantic pigtoe populations underrepresented in river basin and physiographic variability.

Under scenario 3, the ''Optimistic'', factors that influence the habitat conditions where Atlantic pigtoe populations exist were predicted to slightly improve over the 50 year time horizon. We predicted slightly higher levels of resiliency, representation, and redundancy than were estimated under the Status Quo or Pessimistic options. Two MUs would be in high condition, 5 in moderate condition, and 5 would be in low condition, but 16 would remain extirpated. Despite predictions of population persistence in the Chowan and Pee Dee river basins, these populations are expected to retain only low levels of resiliency; thus, levels of representation are also predicted to decline under this scenario.

Finally, under scenario 4, the ''Opportunistic'', landscape-level factors that influence populations of Atlantic pigtoe were predicted to get moderately worse. We predicted reduced levels of resiliency, representation, and redundancy. None of the MUs would be in high condition, 3 would be in moderate condition, 5 would be in low condition, and 20 would be likely extirpated. Redundancy would be reduced by losing 6 MUs compared to current condition. Under the ''Opportunistic'' scenario, representation is predicted to be reduced, with only 6 (50 percent) of the former 12 occupied river basins remaining occupied and with reduced variability in all three physiographic regions. This expected reduction in both the number and distribution of resilient populations is likely to make the species vulnerable to catastrophic disturbance.

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Table 1. Current and Future Scenario Summary for Atlantic Pigtoe.

POPULATIONS: Management Units	Future Scenarios of Population Conditions				
	Current	**Status Quo**	**Pessimistic**	**Optimistic**	**Opportunistic**
James: Craig Creek Subbasin	Moderate	Low	Likely Extirpated	Moderate	Moderate
James: Mill Creek	Presumed Extirpated	Likely Extirpated	Likely Extirpated	Likely Extirpated	Likely Extirpated
James: Rivanna	Presumed Extirpated	Likely Extirpated	Likely Extirpated	Likely Extirpated	Likely Extirpated
James: Upper James	Presumed Extirpated	Likely Extirpated	Likely Extirpated	Likely Extirpated	Likely Extirpated
James: Middle James	Very Low	Likely Extirpated	Likely Extirpated	Likely Extirpated	Likely Extirpated
James: Appomattox	Presumed Extirpated	Likely Extirpated	Likely Extirpated	Likely Extirpated	Likely Extirpated
Chowan: Nottoway	Moderate	Likely Extirpated	Likely Extirpated	Low	Low
Chowan: Meherrin	Low	Likely Extirpated	Likely Extirpated	Likely Extirpated	Likely Extirpated
Roanoke: Dan River Subbasin	Low	Likely Extirpated	Likely Extirpated	Moderate	Likely Extirpated
Roanoke: Roanoke	Presumed Extirpated	Likely Extirpated	Likely Extirpated	Likely Extirpated	Likely Extirpated
Tar: Upper/Middle Tar	High	Low	Low	Moderate	Low
Tar: Lower Tar	Low	Low	Likely Extirpated	Low	Likely Extirpated
Tar: Fishing Ck	High	Moderate	Low	High	Moderate
Tar: Sandy-Swift	High	Moderate	Low	High	Moderate
Neuse: Upper Neuse	Moderate	Low	Likely Extirpated	Moderate	Low
Neuse: Middle Neuse	Moderate	Likely Extirpated	Likely Extirpated	Low	Likely Extirpated
Cape Fear: New Hope	Moderate	Low	Likely Extirpated	Low	Likely Extirpated
Cape Fear: Deep River Subbasin	Low	Likely Extirpated	Likely Extirpated	Moderate	Low
Cape Fear: Mainstem	Presumed Extirpated	Likely Extirpated	Likely Extirpated	Likely Extirpated	Likely Extirpated
Cape Fear: Black	Presumed Extirpated	Likely Extirpated	Likely Extirpated	Likely Extirpated	Likely Extirpated
Pee Dee: Muddy	Presumed Extirpated	Likely Extirpated	Likely Extirpated	Likely Extirpated	Likely Extirpated
Pee Dee: Uwharrie/Little	Low	Low	Low	Low	Low
Pee Dee: Goose/Lanes	Presumed Extirpated	Likely Extirpated	Likely Extirpated	Likely Extirpated	Likely Extirpated
Catawba	Presumed Extirpated	Likely Extirpated	Likely Extirpated	Likely Extirpated	Likely Extirpated
Edisto	Presumed Extirpated	Likely Extirpated	Likely Extirpated	Likely Extirpated	Likely Extirpated
Savannah	Presumed Extirpated	Likely Extirpated	Likely Extirpated	Likely Extirpated	Likely Extirpated
Ogeechee	Presumed Extirpated	Likely Extirpated	Likely Extirpated	Likely Extirpated	Likely Extirpated
Altamaha	Presumed Extirpated	Likely Extirpated	Likely Extirpated	Likely Extirpated	Likely Extirpated

Determination of the Atlantic Pigtoe's Status

Section 4 of the Act (16 U.S.C. 1533) and its implementing regulations (50 CFR part 424) set forth the procedures for determining whether a species meets the definition of an ''endangered species'' or a ''threatened species.'' The Act defines an ''endangered species'' as a species that is in danger of extinction throughout all or a significant portion of its range, and a ''threatened species'' as a species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. The Act requires that we determine whether a species meets the definition of endangered species or threatened species because of any of the following factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) Overutilization for commercial, recreational, scientific, or educational purposes; (C) Disease or predation; (D) The inadequacy of existing regulatory mechanisms; or (E) Other natural or manmade factors affecting its continued existence.

Atlantic Pigtoe's Status Throughout All of Its Range

We have carefully assessed the best scientific and commercial information available regarding the past, present, and future threats to the Atlantic pigtoe. Currently the Atlantic pigtoe is presumed extirpated from 54 percent (15) of the historically occupied MUs; of the remaining currently extant populations (13 MUs), 57 percent are characterized as moderately or highly resilient, and 43 percent are currently characterized by low resiliency. Many of the streams that remain part of the current species' range are estimated to be in low or very low condition with decreased occupancy of Atlantic pigtoe.

The Atlantic pigtoe faces threats from declines in water quality, loss of stream flow, riparian and instream fragmentation, and deterioration of instream habitats (Factor A). These threats, which are expected to be exacerbated by continued urbanization (Factor A) and effects of climate change (Factor E), will impact the future viability of the Atlantic pigtoe. We did not find that the Atlantic pigtoe was impacted by overutilization (Factor B), or by disease or predation (Factor C). While there are regulatory mechanisms in place that may benefit the Atlantic pigtoe, the existing regulatory mechanisms did not reduce the impact of the stressors to the point that the species is not at risk of extinction (Factor D).

Given current and future decreases in resiliency, populations become more vulnerable to extirpation from stochastic events, in turn, resulting in concurrent losses in representation and redundancy. The range of plausible future scenarios of Atlantic pigtoe habitat conditions and population factors suggest reduced viability into the future.

We considered whether the Atlantic pigtoe is currently in danger of extinction and determined that endangered status is not appropriate. Notwithstanding the number of populations that are no longer extant, several moderately resilient populations remain over portions of the species' historical range. The historical range of the Atlantic pigtoe included streams and rivers in 12 Atlantic Slope drainages from the James River Basin to the Altamaha River Basin, with the documented historical distribution in 28 MUs within those basins. Currently, the Atlantic pigtoe is presumed extirpated from 54 percent (15) of the historically occupied MUs and 5 of the drainages. Of the remaining 13 occupied MUs, 3 (21 percent) are estimated to be highly resilient and 5 (36 percent) moderately resilient, with 5 (43 percent) having low resiliency. Eight moderate to high resiliency MUs provide the ability for the species to withstand stochastic disturbance events. Scaling up from the MU to the population level, 1 of 12 former populations (the Tar population) was estimated to have high resiliency, 1 population (the Neuse population) was estimated to have moderate resiliency, 5 populations (the James, Chowan, Roanoke, Cape Fear, and Yadkin-Pee Dee populations) had low estimated resiliency, and 5 of the former 12 populations are presumed extirpated; this means that 42 percent of the species' historical range has been eliminated. Seventy-one percent of streams that remain part of the current species' range are estimated to be in low condition as defined in the SSA report. The species continues to maintain physiographic representation in all 3 regions it historically occupied, although occupancy has decreased in each region by between 48 and 76 percent. However, while threats are currently acting on the species and many of those threats are expected to continue into the future (see below), we did not find that the species is currently in danger of extinction throughout all of its range. With eight moderately or highly resilient MUs in three physiographic regions, the current condition of the species still provides resiliency, redundancy, and representation such that it is not at risk of extinction now.

However, after evaluating threats to the species and assessing the cumulative effect of the threats under the Act's section 4(a)(1) factors, we predict that the population and habitat factors that we used to determine the resiliency, representation, and redundancy for the Atlantic pigtoe will continue to decline. Fifty years was considered ''foreseeable'' in this case because it included projections from both available models, and Atlantic pigtoes are a long-lived and slow-growing species. We can reliably predict both the future threats and the species' responses to those threats over 50 years as presented in the models of predicted urbanization and climate change.

As discussed above, the range of plausible future scenarios of Atlantic pigtoe habitat conditions and population factors projects reduced viability into the future. Under all future scenarios, resiliency is low in a majority of the remaining populations, and many populations are likely extirpated so that redundancy and representation are predicted to be significantly reduced. This expected reduction in both the number and distribution of sufficiently resilient populations is likely to make the species vulnerable to catastrophic disturbance. Our analysis of the species' future conditions show that habitat modification and destruction (Factor A) and other natural and manmade factors (Factor E) will continue to impact the resiliency, representation, and redundancy for the Atlantic pigtoe so that it is likely to become in danger of extinction throughout all or a significant portion of its range within the foreseeable future.

Atlantic Pigtoe's Status Throughout a Significant Portion of Its Range

Under the Act and our implementing regulations, a species may warrant listing if it is in danger of extinction or likely to become so in the foreseeable future throughout all or a significant portion of its range. The court in *Center for Biological Diversity* v. *Everson,* 2020 WL 437289 (D.D.C. Jan. 28, 2020) (*Center for Biological Diversity*), vacated the aspect of the Final Policy on Interpretation of the Phrase ''Significant Portion of Its Range'' in the Endangered Species Act's Definitions of ''Endangered Species'' and ''Threatened Species'' (79 FR 37578; July 1, 2014) that provided that the Service does not undertake an analysis of significant portions of a species' range if the species warrants listing as threatened throughout all of its range. Therefore,

we proceed to evaluate whether the species is endangered in any significant portion of its range—that is, whether there is any portion of the species' range for which both (1) the portion is significant; and (2) the species is in danger of extinction in that portion. Depending on the case, it might be more efficient for us to address the ''significance'' question or the ''status'' question first. We can choose to address either question first. Regardless of which question we address first, if we reach a negative answer with respect to the first question that we address, we do not need to evaluate the other question for that portion of the species' range.

Following the court's holding in *Center for Biological Diversity,* we now consider whether there are any significant portions of the species' range where the species is in danger of extinction now (*i.e.,* endangered). In undertaking this analysis for the Atlantic pigtoe, we chose to address the status question first—we considered information pertaining to the geographic distribution of both the species and the threats that the species faces to identify any portions of the range where the species is endangered.

Specifically, we considered whether the threats are geographically concentrated in any portion of the species' range at a biologically meaningful scale. We examined the following threats: Declines in water quality, loss of stream flow, riparian and instream fragmentation, and deterioration of instream habitats, including cumulative effects. Overall, we found that threats are likely acting on individuals or MUs, or even basins (populations), similarly across the species' range. These threats are certain to occur, and in those basins with MUs that are predominantly in low condition currently, the populations are facing the same threats as those in moderate or high resiliency condition.

Thus, there are no portions of the species' range where the species has a different status from its rangewide status. Therefore, no portion of the species' range provides a basis for determining that the species is in danger of extinction in a significant portion of its range, and we determine that the species is likely to become in danger of extinction within the foreseeable future throughout all of its range. This is consistent with the courts' holdings in *Desert Survivors* v. *Department of the Interior,* No. 16–cv–01165–JCS, 2018 WL 4053447 (N.D. Cal. Aug. 24, 2018), and *Center for Biological Diversity* v. *Jewell,* 248 F. Supp. 3d, 946, 959 (D. Ariz. 2017).

Determination of Status

Our review of the best available scientific and commercial information indicates that the Atlantic pigtoe meets the Act's definition of a threatened species. Therefore, we are listing the Atlantic pigtoe as a threatened species in accordance with sections 3(20) and 4(a)(1) of the Act.

Available Conservation Measures

Conservation measures provided to species listed as endangered or threatened species under the Act include recognition, recovery actions, requirements for Federal protection, and prohibitions against certain practices. Recognition through listing results in public awareness, and conservation by Federal, State, Tribal, and local agencies, private organizations, and individuals. The Act encourages cooperation with the States and requires that recovery actions be carried out for all listed species. The protection required by Federal agencies and the prohibitions against certain activities are discussed, in part, below.

The primary purpose of the Act is the conservation of endangered and threatened species and the ecosystems upon which they depend. The ultimate goal of such conservation efforts is the recovery of these listed species, so that they no longer need the protective measures of the Act. Section 4(f) of the Act requires the Service to develop and implement recovery plans for the conservation of endangered and threatened species. The recovery planning process involves the identification of actions that are necessary to halt or reverse the species' decline by addressing the threats to its survival and recovery. The goal of this process is to restore listed species to a point where they are secure, self-sustaining, and functioning components of their ecosystems.

Recovery planning includes the development of a recovery outline shortly after a species is listed and preparation of a draft and final recovery plan. The recovery outline guides the immediate implementation of urgent recovery actions and describes the process to be used to develop a recovery plan. Revisions of the plan may be done to address continuing or new threats to the species, as new substantive information becomes available. The recovery plan identifies recovery criteria for review of when a species may be ready for for removal from protected status (''delisting''), and methods for monitoring recovery progress. Recovery plans also establish a framework for agencies to coordinate their recovery efforts and provide estimates of the cost of implementing recovery tasks. Recovery teams (composed of species experts, Federal and State agencies, nongovernmental organizations, and stakeholders) are often established to develop recovery plans. When completed, the recovery outline, draft recovery plan, and the final recovery plan will be available on our website (*http://www.fws.gov/endangered*) or from our Raleigh Ecological Services Field Office (see **FOR FURTHER INFORMATION CONTACT**).

Implementation of recovery actions generally requires the participation of a broad range of partners, including other Federal agencies, States, Tribes, nongovernmental organizations, businesses, and private landowners. Examples of recovery actions include habitat restoration (*e.g.,* restoration of native vegetation), research, captive propagation and reintroduction, and outreach and education. The recovery of many listed species cannot be accomplished solely on Federal lands because their range may occur primarily or solely on non-Federal lands. To achieve recovery of these species requires cooperative conservation efforts on private, State, and Tribal lands.

Following publication of this rule, funding for recovery actions will be available from a variety of sources, including Federal budgets, State programs, and cost share grants for non-Federal landowners, the academic community, and nongovernmental organizations. In addition, pursuant to section 6 of the Act, the States of Virginia, North Carolina, South Carolina, and Georgia will be eligible for Federal funds to implement management actions that promote the protection or recovery of the Atlantic pigtoe. Information on our grant programs that are available to aid species recovery can be found at: *http://www.fws.gov/grants.*

Please let us know if you are interested in participating in recovery efforts for the Atlantic pigtoe. Additionally, we invite you to submit any new information on this species whenever it becomes available and any information you may have for recovery planning purposes (see **FOR FURTHER INFORMATION CONTACT**).

Section 7(a) of the Act requires Federal agencies to evaluate their actions with respect to any species that is listed as an endangered or threatened species and with respect to its critical habitat, if any is designated. Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR part 402. Section 7(a)(2) of the Act requires Federal

agencies to ensure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of any endangered or threatened species or destroy or adversely modify its critical habitat. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency must enter into consultation with the Service.

Federal agency actions within the species' habitat that may require conference or consultation or both as described in the preceding paragraph may include, but are not limited to, management and any other landscape-altering activities on Federal lands administered by the Service, U.S. Forest Service, and National Park Service; issuance of section 404 Clean Water Act (33 U.S.C. 1251 *et seq.*) permits by the U.S. Army Corps of Engineers; and construction and maintenance of roads or highways by the Federal Highway Administration.

It is our policy, as published in the **Federal Register** on July 1, 1994 (59 FR 34272), to identify to the maximum extent practicable at the time a species is listed, those activities that would or would not constitute a violation of section 9 of the Act. The intent of this policy is to increase public awareness of the effect of a listing on proposed and ongoing activities within the range of the listed species. The discussion below regarding protective regulations under section 4(d) of the Act complies with our policy.

II. Final Rule Issued Under Section 4(d) of the Act

Background

Section 4(d) of the Act contains two sentences. The first sentence states that the Secretary shall issue such regulations as she deems necessary and advisable to provide for the conservation of species listed as threatened. The U.S. Supreme Court has noted that statutory language like ''necessary and advisable'' demonstrates a large degree of deference to the agency (see *Webster* v. *Doe,* 486 U.S. 592 (1988)). Conservation is defined in the Act to mean the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to the Act are no longer necessary. Additionally, the second sentence of section 4(d) of the Act states that the Secretary may by regulation prohibit with respect to any threatened species any act prohibited under section 9(a)(1), in the case of fish or wildlife, or section 9(a)(2), in the case of plants. Thus, the combination of the two sentences of section 4(d) provides the Secretary with wide latitude of discretion to select and promulgate appropriate regulations tailored to the specific conservation needs of the threatened species. The second sentence grants particularly broad discretion to the Service when adopting the prohibitions under section 9.

The courts have recognized the extent of the Secretary's discretion under this standard to develop rules that are appropriate for the conservation of a species. For example, courts have upheld rules developed under section 4(d) as a valid exercise of agency authority where they prohibited take of threatened wildlife, or include a limited taking prohibition (see *Alsea Valley Alliance* v. *Lautenbacher,* 2007 U.S. Dist. Lexis 60203 (D. Or. 2007); *Washington Environmental Council* v. *National Marine Fisheries Service,* 2002 U.S. Dist. Lexis 5432 (W.D. Wash. 2002)). Courts have also upheld 4(d) rules that do not address all of the threats a species faces (see *State of Louisiana* v. *Verity,* 853 F.2d 322 (5th Cir. 1988)). As noted in the legislative history when the Act was initially enacted, ''once an animal is on the threatened list, the Secretary has an almost infinite number of options available to [her] with regard to the permitted activities for those species. [She] may, for example, permit taking, but not importation of such species, or [s]he may choose to forbid both taking and importation but allow the transportation of such species'' (H.R. Rep. No. 412, 93rd Cong., 1st Sess. 1973).

Exercising its authority under section 4(d), the Service has developed a rule that is designed to address the Atlantic pigtoe's specific threats and conservation needs. Although the statute does not require us to make a ''necessary and advisable'' finding with respect to the adoption of specific prohibitions under section 9, we find that this rule as a whole satisfies the requirement in section 4(d) of the Act to issue regulations deemed necessary and advisable to provide for the conservation of the Atlantic pigtoe. As discussed above under Summary of Biological Status and Threats, we have concluded that the Atlantic pigtoe is likely to become in danger of extinction within the foreseeable future primarily due to habitat degradation from stressors influencing water quality, water quantity, instream habitat, and habitat connectivity. The provisions of this 4(d) rule will promote conservation of the Atlantic pigtoe by encouraging management of the landscape in ways that meet both land management considerations and the conservation needs of the Atlantic pigtoe. The provisions of this rule are one of many tools that the Service will use to promote the conservation of the Atlantic pigtoe.

Provisions of the 4(d) Rule

This 4(d) rule will provide for the conservation of the Atlantic pigtoe by prohibiting the following activities, except as otherwise authorized or permitted: Importing or exporting; take; possession and other acts with unlawfully taken specimens; delivering, receiving, transporting, or shipping in interstate or foreign commerce in the course of commercial activity; or selling or offering for sale in interstate or foreign commerce.

Import/export, possession, transportation, sale, and commerce are of concern for many aquatic mollusks, primarily because they are sought after for use as fishing bait and for human consumption. Regulating these activities will help protect the Atlantic pigtoe from exploitation.

Under the Act, ''take'' means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Some of these provisions have been further defined in regulation at 50 CFR 17.3. Take can occur knowingly or otherwise, by direct and indirect impacts, and intentionally or incidentally. Protecting the Atlantic pigtoe from direct forms of take, such as physical injury or killing or unauthorized handling or collecting of the species, whether incidental or intentional, will help preserve and recover the species. Therefore, we prohibit intentional take of Atlantic pigtoe, including, but not limited to, capturing, handling, trapping, collecting, or other activities.

Also, as discussed above under Summary of Biological Status and Threats, habitat degradation from stressors influencing water quality, water quantity, instream habitat, and habitat connectivity are affecting the status of the Atlantic pigtoe. Across the species' range, stream and water quality have been degraded physically by sedimentation, pollution, contaminants, impoundments, channelization, destruction of riparian habitat, and loss of riparian vegetation due to development, agricultural practices, land conversion, incompatible forest management, invasive species, and dams and barriers. Other habitat or hydrological alteration (such as ditching, draining, diverting, dredging, snagging, impounding, channelization, or modification of stream channels or

banks; discharge of fill material into stream channels; or diversion or alteration of surface or ground water flow into or out of a stream) will impact the habitat of the species. Regulating incidental take that may result from these activities will help preserve the species' remaining populations, slow their rate of decline, and decrease synergistic, negative effects from other threats. Therefore, we prohibit incidental take of the Atlantic pigtoe resulting from activities that destroy, alter, or degrade the habitat in the manner described above.

As discussed above, during both of the public comment periods, the Service received numerous comments on its proposal to exempt from these prohibitions incidental take resulting from silvicultural practices and forest management activities (see Summary of Comments and Recommendations, above). Forestry BMPs, when properly implemented, protect water quality and help conserve aquatic species, including the Atlantic pigtoe. Forest landowners who properly implement those BMPs are helping conserve the pigtoe, and this 4(d) rule is an incentive for all landowners to properly implement BMPs to avoid any take implications. Further, those forest landowners who are third-party certified to a credible forest management standard are providing audited certainty that BMP implementation is taking place across the landscape.

To address any uncertainty regarding which silvicultural and forest management BMPs will satisfy the 4(d) rule's exception for incidental take resulting from silvicultural practices and forest management activities, our regulations specify the conditions that must be met. Further, we revised our 4(d) rule language to clarify that to qualify for the exception, the BMPs must result in protection of the habitat features that provide for the breeding, feeding, sheltering, and dispersal needs of the Atlantic pigtoe, which will in turn provide for the conservation of the species. In waterbodies that support listed aquatic species, a wider SMZ is more effective at reducing sedimentation, maintaining lower water temperatures through shading, and introducing food (such as leaves and insects) into the food chain (VDOF 2011, p. 37). Ninety percent of the food in forested streams comes from bordering vegetation (NCWRC 2002, p. 6; Service 2006, p. 6; Stewart et al. 2000, p. 210; Service 2021, p. 11). Atlantic pigtoes require cool, well-oxygenated water, and a clean stream bottom (Service 2021, p. 11). A lack of these features limits the number of pigtoes a stream can support. Aquatic habitat and suitable water temperature can be maintained even during logging operations when streamside vegetation is left intact (VDOF 2011, p. 37). The exception for incidental take associated with these activities seeks to ensure these characteristics are maintained for the conservation of the Atlantic pigtoe.

Therefore, under this 4(d) rule, most prohibitions and provisions of 50 CFR 17.21 for endangered wildlife apply to the Atlantic pigtoe, except that incidental take resulting from the following actions is not prohibited:

(1) Species restoration efforts by State wildlife agencies, including collection of broodstock, tissue collection for genetic analysis, captive propagation, and subsequent stocking into currently occupied and unoccupied areas within the historical range of the species, and follow-up monitoring.

(2) Channel restoration projects that create natural, physically stable, ecologically functioning streams (or stream and wetland systems) that are reconnected with their groundwater aquifers. These projects can be accomplished using a variety of methods, but the desired outcome is a natural channel with low shear stress (force of water moving against the channel); bank heights that enable reconnection to the floodplain; a reconnection of surface and groundwater systems, resulting in perennial flows in the channel; riffles and pools composed of existing soil, rock, and wood instead of large imported materials; low compaction of soils within adjacent riparian areas; and inclusion of riparian wetlands. Streams reconstructed in this way would offer suitable habitats for the Atlantic pigtoe and contain stable channel features, such as pools, glides, runs, and riffles, which could be used by the species for spawning, rearing, growth, feeding, dispersal, and other normal behaviors. Prior to restoration action, surveys to determine presence of Atlantic pigtoe must be performed, and if located, mussels must be relocated prior to project implementation.

(3) Bank stabilization projects that use bioengineering methods to replace pre-existing, bare, eroding stream banks with vegetated, stable stream banks, thereby reducing bank erosion and instream sedimentation and improving habitat conditions for the species. Following these bioengineering methods, stream banks may be stabilized using native species live stakes (live, vegetative cuttings inserted or tamped into the ground in a manner that allows the stake to take root and grow), native species live fascines (live branch cuttings, usually willows, bound together into long, cigar-shaped bundles), or native species brush layering (cuttings or branches of easily rooted tree species layered between successive lifts of soil fill). Native species vegetation includes woody and herbaceous species appropriate for the region and habitat conditions. These methods do not include the sole use of quarried rock (rip-rap) or the use of rock baskets or gabion structures.

(4) Forestry-related activities, including silvicultural practices, forest management work, and fire control tactics, that implement State-approved BMPs. In order for this exception to apply to forestry-related activities, these BMPs must achieve all of the following:

(a) Establish a streamside management zone alongside the margins of each waterway.

(b) Restrain visible sedimentation caused by the forestry-related activity from entering the waterway.

(c) Maintain native groundcover within the streamside management zone of the waterway, and promptly re-establish native groundcover if disturbed.

(d) Limit installation of vehicle or equipment crossings of the waterway to only where necessary for the forestry-related activity. Such crossings must:

(i) Have erosion and sedimentation control measures installed to divert surface runoff away and restrain visible sediment from entering the waterway;

(ii) Allow for movement of aquatic organisms within the waterway; and

(iii) Have native groundcover applied and maintained through completion of the forestry-related activity.

(e) Prohibit the use of tracked or wheeled vehicles for reforestation site preparation within the streamside management zone of the waterway.

(f) Prohibit locating log decks, skid trails, new roads, and portable mill sites in the streamside management zone of the waterway.

(g) Prohibit obstruction and impediment of the flow of water within the waterway that is caused by direct deposition of debris or soil by the forestry-related activity.

(h) Maintain shade over the waterway similar to that observed prior to the forestry-related activity.

(i) Prohibit discharge of any solid waste, petroleum, pesticide, fertilizer, or other chemical into the waterway.

We reiterate that these actions and activities may result in some minimal level of take of the Atlantic pigtoe, but they are unlikely to negatively impact the species' conservation and recovery efforts. To the contrary, we expect they would have a net beneficial effect on the

species. Across the species' range, instream habitats have been degraded physically by sedimentation and by direct channel disturbance. The activities in the 4(d) rule will correct some of these problems, creating more favorable habitat conditions for the species.

We may issue permits to carry out otherwise prohibited activities, including those described above, involving threatened wildlife under certain circumstances. Regulations governing permits are codified at 50 CFR 17.32. With regard to threatened wildlife, a permit may be issued for the following purposes: for scientific purposes, to enhance propagation or survival, for economic hardship, for zoological exhibition, for educational purposes, for incidental taking, or for special purposes consistent with the purposes of the Act. The statute also contains certain exemptions from the prohibitions, which are found in sections 9 and 10 of the Act.

We recognize the special and unique relationship with our State natural resource agency partners in contributing to conservation of listed species. State agencies often possess scientific data and valuable expertise on the status and distribution of endangered, threatened, candidate, and at-risk species of wildlife and plants. State agencies, because of their authorities and their close working relationships with local governments and landowners, are in a unique position to assist the Service in implementing all aspects of the Act. In this regard, section 6 of the Act provides that the Service shall cooperate to the maximum extent practicable with the States in carrying out programs authorized by the Act. Therefore, any qualified employee or agent of a State conservation agency that is a party to a cooperative agreement with the Service in accordance with section 6(c) of the Act, who is designated by his or her agency for such purposes, will be able to conduct activities designed to conserve the Atlantic pigtoe that may result in otherwise prohibited take without additional authorization.

Nothing in this 4(d) rule will change in any way the recovery planning provisions of section 4(f) of the Act, the consultation requirements under section 7 of the Act, or the ability of the Service to enter into partnerships for the management and protection of the Atlantic pigtoe. However, interagency cooperation may be further streamlined through planned programmatic consultations for the species between Federal agencies and the Service.

III. Critical Habitat

Background

Critical habitat is defined in section 3 of the Act as:

(1) The specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the Act, on which are found those physical or biological features

(a) Essential to the conservation of the species, and

(b) Which may require special management considerations or protection; and

(2) Specific areas outside the geographical area occupied by the species at the time it is listed, upon a determination that such areas are essential for the conservation of the species.

Our regulations at 50 CFR 424.02 define the geographical area occupied by the species as an area that may generally be delineated around species' occurrences, as determined by the Secretary (*i.e.,* range). Such areas may include those areas used throughout all or part of the species' life cycle, even if not used on a regular basis (*e.g.,* migratory corridors, seasonal habitats, and habitats used periodically, but not solely by vagrant individuals).

Conservation, as defined under section 3 of the Act, means to use and the use of all methods and procedures that are necessary to bring an endangered or threatened species to the point at which the measures provided pursuant to the Act are no longer necessary. Such methods and procedures include, but are not limited to, all activities associated with scientific resources management such as research, census, law enforcement, habitat acquisition and maintenance, propagation, live trapping, and transplantation, and, in the extraordinary case where population pressures within a given ecosystem cannot be otherwise relieved, may include regulated taking.

Critical habitat receives protection under section 7 of the Act through the requirement that Federal agencies ensure, in consultation with the Service, that any action they authorize, fund, or carry out is not likely to result in the destruction or adverse modification of critical habitat. The designation of critical habitat does not affect land ownership or establish a refuge, wilderness, reserve, preserve, or other conservation area. Such designation does not allow the government or public to access private lands. Such designation does not require implementation of restoration, recovery, or enhancement measures by non-Federal landowners. Where a landowner requests Federal agency funding or authorization for an action that may affect a listed species or critical habitat, the Federal agency would be required to consult with the Service under section 7(a)(2) of the Act. However, even if the Service were to conclude that the proposed activity would result in destruction or adverse modification of the critical habitat, the Federal action agency and the landowner are not required to abandon the proposed activity, or to restore or recover the species; instead, they must implement ''reasonable and prudent alternatives'' to avoid destruction or adverse modification of critical habitat.

Under the first prong of the Act's definition of critical habitat, areas within the geographical area occupied by the species at the time it was listed are included in a critical habitat designation if they contain physical or biological features (1) which are essential to the conservation of the species and (2) which may require special management considerations or protection. For these areas, critical habitat designations identify, to the extent known using the best scientific and commercial data available, those physical or biological features that are essential to the conservation of the species (such as space, food, cover, and protected habitat). In identifying those physical or biological features within an area, we focus on the specific features that support the life-history needs of the species, including but not limited to, water characteristics, soil type, geological features, prey, vegetation, symbiotic species, or other features. A feature may be a single habitat characteristic, or a more complex combination of habitat characteristics. Features may include habitat characteristics that support ephemeral or dynamic habitat conditions. Features may also be expressed in terms relating to principles of conservation biology, such as patch size, distribution distances, and connectivity.

Under the second prong of the Act's definition of critical habitat, we can designate critical habitat in areas outside the geographical area occupied by the species at the time it is listed, upon a determination that such areas are essential for the conservation of the species. We determine whether unoccupied areas are essential for the conservation of the species by considering the life-history, status, and conservation needs of the species. This determination is further informed by any generalized conservation strategy, criteria, or outline that may have been

developed for the species to provide a substantive foundation for identifying which features and specific areas are essential to the conservation of the species and, as a result, the development of the critical habitat designation. For example, an area currently occupied by the species but that was not occupied at the time of listing may be essential to the conservation of the species and may be included in the critical habitat designation.

Section 4 of the Act requires that we designate critical habitat on the basis of the best scientific data available. Further, our Policy on Information Standards Under the Endangered Species Act (published in the **Federal Register** on July 1, 1994 (59 FR 34271)), the Information Quality Act (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001 (Pub. L. 106–554; H.R. 5658)), and our associated Information Quality Guidelines provide criteria, establish procedures, and provide guidance to ensure that our decisions are based on the best scientific data available. They require our biologists, to the extent consistent with the Act and with the use of the best scientific data available, to use primary and original sources of information as the basis for recommendations to designate critical habitat.

When we are determining which areas should be designated as critical habitat, our primary source of information is generally the information from the SSA report and other information developed during the listing process for the species. Additional information sources may include any generalized conservation strategy, criteria, or outline that may have been developed for the species; the recovery plan for the species; articles in peer-reviewed journals; conservation plans developed by States and counties; scientific status surveys and studies; biological assessments; other unpublished materials; or experts' opinions or personal knowledge.

Habitat is dynamic, and species may move from one area to another over time. We recognize that critical habitat designated at a particular point in time may not include all of the habitat areas that we may later determine are necessary for the recovery of the species. For these reasons, a critical habitat designation does not signal that habitat outside the designated area is unimportant or may not be needed for recovery of the species. Areas that are important to the conservation of the species, both inside and outside the critical habitat designation, will continue to be subject to: (1) Conservation actions implemented under section 7(a)(1) of the Act; (2) regulatory protections afforded by the requirement in section 7(a)(2) of the Act for Federal agencies to ensure their actions are not likely to jeopardize the continued existence of any endangered or threatened species; and (3) the prohibitions found in section 9 of the Act. Federally funded or permitted projects affecting listed species outside their designated critical habitat areas may still result in jeopardy findings in some cases. These protections and conservation tools will continue to contribute to recovery of the species. Similarly, critical habitat designations made on the basis of the best available information at the time of designation will not control the direction and substance of future recovery plans, habitat conservation plans (HCPs), or other species conservation planning efforts if new information available at the time of those planning efforts calls for a different outcome.

On August 27, 2019, we published a final rule in the **Federal Register** (84 FR 45020) to amend our regulations concerning the procedures and criteria used for listing or removing species from the Lists of Endangered and Threatened Wildlife and Plants and designating critical habitat. That rule became effective on September 26, 2019, but, as stated in that rule, the revisions it sets forth apply to classification and critical habitat rules for which a proposed rule was published after September 26, 2019. We published our proposed critical habitat designation for the Atlantic pigtoe on October 11, 2018 (83 FR 51570); therefore, the revisions set forth in the August 27, 2019, final rule do not apply to this final designation of critical habitat for the Atlantic pigtoe and this final rule follows the version of § 424.12 that was in effect prior to September 26, 2019.

Physical or Biological Features Essential to the Conservation of the Species

In accordance with section 3(5)(A)(i) of the Act and regulations at 50 CFR 424.12(b), in determining which areas we will designate as critical habitat from within the geographical area occupied by the species at the time of listing, we consider the physical or biological features that are essential to the conservation of the species and which may require special management considerations or protection. The regulations at 50 CFR 424.02 define ''physical or biological features essential to the conservation of the species'' as the features that occur in specific areas and that are essential to support the life-history needs of the species, including, but not limited to, water characteristics, soil type, geological features, sites, prey, vegetation, symbiotic species, or other features. A feature may be a single habitat characteristic or a more complex combination of habitat characteristics. Features may include habitat characteristics that support ephemeral or dynamic habitat conditions. Features may also be expressed in terms relating to principles of conservation biology, such as patch size, distribution distances, and connectivity. For example, physical features essential to the conservation of the species might include gravel of a particular size required for spawning, alkaline soil for seed germination, protective cover for migration, or susceptibility to flooding or fire that maintains necessary early-successional habitat characteristics. Biological features might include prey species, forage grasses, specific kinds or ages of trees for roosting or nesting, symbiotic fungi, or a particular level of nonnative species consistent with conservation needs of the listed species. The features may also be combinations of habitat characteristics and may encompass the relationship between characteristics or the necessary amount of a characteristic essential to support the life history of the species.

In considering whether features are essential to the conservation of the species, we may consider an appropriate quality, quantity, and spatial and temporal arrangement of habitat characteristics in the context of the life-history needs, condition, and status of the species. These characteristics include, but are not limited to, space for individual and population growth and for normal behavior; food, water, air, light, minerals, or other nutritional or physiological requirements; cover or shelter; sites for breeding, reproduction, or rearing (or development) of offspring; and habitats that are protected from disturbance.

Summary of Essential Physical or Biological Features

We derive the specific physical or biological features essential for the conservation of the Atlantic pigtoe from studies of this species' habitat, ecology, and life history. The primary habitat elements that influence resiliency of the Atlantic pigtoe include water quality, water quantity, substrate, and habitat connectivity. A full description of the needs of individuals, populations, and the species is available from the SSA report (Service 2021, p. 11). We have determined that the following physical

or biological features are essential to the conservation of Atlantic pigtoe:

(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 freshwater mussel and native fish (such as stable riffle-run-pool habitats that provide flow refuges consisting of silt-free gravel and coarse sand substrates).

(2) Adequate flows, or a hydrologic flow regime (which includes the severity, frequency, duration, and seasonality of discharge over time), necessary to maintain benthic 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 mussel's and fish hosts' habitat, food availability, spawning habitat for native fishes, and the ability for newly transformed juveniles to settle and become established in their habitats.

(3) Water and sediment 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) The presence and abundance of fish hosts necessary for recruitment of the Atlantic pigtoe.

Special Management Considerations or Protection

When designating critical habitat, we assess whether the specific areas within the geographical area occupied by the species at the time of listing contain features which are essential to the conservation of the species and which may require special management considerations or protection. Special management considerations or protection may be required of the Federal action agency to eliminate, or to reduce to negligible levels, the threats affecting the physical and biological features of each unit. The features essential to the conservation of the Atlantic pigtoe may require special management considerations or protections to reduce the following threats: (1) Urbanization of the landscape, including (but not limited to) 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) incompatible forest management or silviculture activities that remove large areas of forested wetlands or riparian systems; (5) culvert and 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, but are not limited to: Use of BMPs designed to reduce sedimentation, erosion, and bank side destruction; protection of riparian corridors and maintenance of 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.

Criteria Used To Identify Critical Habitat

As required by section 4(b)(2) of the Act, we use the best scientific data available to designate critical habitat. In accordance with the Act and our implementing regulations at 50 CFR 424.12(b), we review available information pertaining to the habitat requirements of the species and identify specific areas within the geographical area occupied by the species at the time of listing and any specific areas outside the geographical area occupied by the species to be considered for designation as critical habitat.

The current distribution of the Atlantic pigtoe is much reduced from its historical distribution. We anticipate that recovery will require continued protection of existing populations and habitat, and it will need to ensure that there are adequate numbers of mussels occurring 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. Rangewide recovery considerations, such as maintaining existing genetic diversity and striving for representation of all major portions of the species' current range, were considered in formulating this critical habitat designation.

Sources of data for the critical habitat designation include multiple databases maintained by universities and State agencies for Virginia and North Carolina, and numerous survey reports on streams throughout the species' range (see SSA report). We have also reviewed available information that pertains to the habitat requirements of this species. Sources of information on habitat requirements include studies conducted at occupied sites and published in peer-reviewed articles, agency reports, and data collected during monitoring efforts (Service 2021, p. 11).

Areas Occupied at the Time of Listing

We identified stream channels that currently support populations of the Atlantic pigtoe. We defined ''current'' as stream channels with observations of the species from 2005 to the present, as described in the SSA report and supported by the species' life history and habitat stability over time (Service 2021, p. 10). Due to the breadth and intensity of survey effort done for freshwater mussels throughout the known range of the species, species experts found that it is reasonable to assume that streams with no positive surveys since 2005 should not be considered occupied for the purpose of our analysis. However, since each particular area is not surveyed every year, and these cryptic mussels have a 42 percent detection probability, only one negative survey would not be sufficient to determine that the species is not present. Therefore, it is reasonable to assume that if the species had been seen within the past 15 years that it could be considered currently occupied. Specific habitat areas were delineated based on Natural Heritage Element Occurrences (EOs) following NatureServe's occurrence delineation protocol for freshwater mussels (NatureServe 2018). These EOs provide habitat for Atlantic pigtoe subpopulations and are large enough to be self-sustaining over time, despite fluctuations in local conditions. The EOs contain stream reaches with interconnected waters so that host fish containing Atlantic pigtoe glochidia can move between areas, at least during certain flows or seasons.

We consider the following streams to be occupied by the species at the time of listing: Craig Creek, Mill Creek, Sappony Creek, Nottoway River Subbasin, Meherrin River, Dan River, Aarons Creek, Little Grassy Creek, Upper/Middle Tar River Subbasin, Sandy/Swift Creek, Fishing Creek

Subbasin, Lower Tar River, Upper Neuse River Subbasin, Middle Neuse River Subbasin, New Hope Creek, Deep River Subbasin, and Little River Subbasin (see Final Critical Habitat Designation, below). The critical habitat designation does not include all streams known to have been occupied by the species historically; instead, it includes only the currently occupied streams within the historical range that have also retained the physical or biological features that will allow for the maintenance and expansion of existing populations.

Areas Outside the Geographic Area Occupied at the Time of Listing

We are not designating any areas outside the geographical area currently occupied by the species because we did not find any unoccupied areas that were essential for the conservation of the species. The protection of eight moderately or highly resilient MUs across the physiographic representation of the range will sufficiently reduce the risk of extinction. Improving the resiliency of populations in the currently occupied streams will increase viability to the point that the protections of the Act are no longer necessary.

Critical Habitat Maps

When determining critical habitat boundaries, we used Geographic Information System (GIS) hydrology data layers that can differ slightly based on the scale of the map; therefore, users should use published coordinates for upstream and downstream boundaries (see **ADDRESSES**). We also made every effort to avoid including developed areas such as lands covered by buildings, pavement, and other structures because such lands lack physical or biological features necessary for the Atlantic pigtoe. The scale of the maps we prepared under the parameters for publication within the Code of Federal Regulations may not reflect the exclusion of such developed lands. Any such lands inadvertently left inside critical habitat boundaries shown on the maps of this rule have been excluded by text in the rule and are not designated as critical habitat. Therefore, a Federal action involving these lands will not trigger section 7 consultation under the Act with respect to critical habitat and the requirement of no adverse modification unless the specific action will affect the physical or biological features in the adjacent critical habitat.

We are designating as critical habitat areas that we have determined are occupied at the time of listing (*i.e.,* currently occupied) and that contain one or more of the physical or biological features that are essential to support life-history processes of the species. Units are designated based on one or more of the physical or biological features being present to support the Atlantic pigtoe's life-history processes. All units contain all of the identified physical or biological features and support multiple life-history processes.

The critical habitat designation is defined by the map or maps, as modified by any accompanying regulatory text, presented at the end of this document under Regulation Promulgation. We include more detailed information on the boundaries of the critical habitat designation in the discussion of individual units below. We will make the coordinates on which each map is based available to the public on *http://www.regulations.gov* under Docket No. FWS–R4–ES–2018–0046.

Final Critical Habitat Designation

We are designating 17 units as critical habitat for the Atlantic pigtoe. The critical habitat areas described below constitute our best assessment at this time of areas that meet the definition of critical habitat. Those 17 units are: (1) Craig Creek, (2) Mill Creek, (3) Sappony Creek, (4) Nottoway River Subbasin, (5) Meherrin River, (6) Dan River, (7) Aarons Creek, (8) Little Grassy Creek, (9) Upper/Middle Tar River Subbasin, (10) Sandy/Swift Creek, (11) Fishing Creek Subbasin, (12) Lower Tar River, (13) Upper Neuse River Subbasin, (14) Middle Neuse River Subbasin, (15) New Hope Creek, (16) Deep River Subbasin, and (17) Little River. Table 2 below shows the occupied units.

TABLE 2—CRITICAL HABITAT UNITS FOR THE ATLANTIC PIGTOE

Critical habitat unit	Riparian ownership	River miles (kilometers)
1. JR1—Craig Creek	Private; Federal	29 (46.7)
2. JR2—Mill Creek	Private	1 (1.6)
3. CR1—Sappony Creek	Private	4 (6.6)
4. CR2—Nottoway River Subbasin	Private; Federal	64 (103)
5. CR3—Meherrin River	Private	5 (8)
6. RR1—Dan River	Private	14 (22.5)
7. RR2—Aarons Creek	Private	12 (19.3)
8. RR3—Little Grassy Creek	Private	3 (4.8)
9. TR1—Upper/Middle Tar River Subbasin	Private; Easements	91 (146.5)
10. TR2—Sandy/Swift Creek	Private; State; Easements	50 (80.5)
11. TR3—Fishing Creek Subbasin	Private; State; Easements	85 (136.8)
12. TR4—Lower Tar River	Private; State; Easements	30 (48.3)
13. NR1—Upper Neuse River Subbasin	Private; State; Easements	60 (95)
14. NR2—Middle Neuse River Subbasin	Private; State; County; Easements	61 (98.2)
15. CF1—New Hope Creek	Private; Easements	4 (6.4)
16. CF2—Deep River Subbasin	Private	10 (16.1)
17. YR1– Little River	Private; Easements	40 (64.4)
Total		563 (906)

Note: Mileage may not sum due to rounding.

We present brief descriptions of all units, and reasons why they meet the definition of critical habitat for the Atlantic pigtoe, below. All units are considered occupied.

James River Population

Unit 1: JR1—Craig Creek, Craig and Botetourt Counties, Virginia

Unit 1 consists of 29 river mi (46.7 river km) of Craig Creek near VA Route 616 northeast of New Castle downstream to just below VA Route 817 crossing. The land adjacent to Craig Creek is primarily private, although approximately 1 mi (1.6 km) of land along the river is federally owned by George Washington and Jefferson National Forest (GWJ NF), and 2.5 mi (4 km) consists of conservation easements. The unit contains all of the physical or biological features that are essential to support life-history processes of the Atlantic pigtoe.

Special management considerations or protection may be required to address excess nutrients, sediment, and pollutants that enter the creek and serve as indicators of other forms of pollution such as bacteria and toxins, reducing water quality for the species. Sources of these types of pollution are wastewater, agricultural runoff, and urban stormwater runoff. Five stream reaches, totaling approximately 21 river miles, are impaired for aquatic life in the lower Craig Creek watershed. Impairment is indicated by low benthic-macroinvertebrate bioassessments, pH issues, high temperature, and fecal coliform. Given the stormwater and nonpoint source pollution identified as contributing to water quality issues in this unit, special management considerations including riparian buffer restoration, reduced surface and groundwater withdrawals, stormwater retrofits, eliminating direct stormwater discharges, and implementing highest levels of wastewater treatment practicable will benefit the species' habitat in this unit.

The GWJ NF surrounds the Craig Creek Subbasin; protections and management of the GWJ NF will likely enable habitat conditions (water quality, water quantity/flow, instream substrate, and connectivity) to remain high into the future. Targeted species restoration in conjunction with current associated-species restoration efforts in Johns, Dicks, and Little Oregon Creeks within the Craig Creek Subbasin will likely improve the Atlantic pigtoe's resiliency in these areas. Maintenance of forested buffer conditions is essential to retaining high-quality instream habitat in this unit.

Unit 2: JR2—Mill Creek, Bath County, Virginia

Unit 2 consists of a 1-mile (1.6-km) segment of Mill Creek at the VA39 (Mountain Valley Road) crossing. The land surrounding the creek is privately owned. The unit contains all of the physical or biological features that are essential to support life-history processes of the Atlantic pigtoe.

Special management considerations or protection may be required within Unit 2 to address excess nutrients, sediment, and pollutants that enter the creek and serve as indicators of other forms of pollution such as bacteria and toxins. Sources of these types of pollution are wastewater, agricultural runoff, and urban stormwater runoff. Given the urban stormwater and nonpoint source pollution identified as contributing to water quality issues in this unit, special management considerations including riparian buffer restoration, reduced surface and groundwater withdrawals, stormwater retrofits, eliminating direct stormwater discharges, increasing open space in the watershed, and implementing highest levels of wastewater treatment practicable will benefit the species' habitat in this unit.

The GWJ NF surrounds most of the Mill Creek watershed; protections and management of the GWJ NF will likely enable habitat conditions to remain high into the future. Targeted species restoration in conjunction with current associated-species restoration efforts in Mill Creek will likely improve the Atlantic pigtoe's resiliency in these areas. Maintenance of forested buffer conditions is essential to retaining high-quality instream habitat in this unit.

Chowan River Population

Unit 3: CR1—Sappony Creek, Dinwiddie County, Virginia

Unit 3 consists of 4 river miles (6.6 river km) of Sappony Creek beginning just upstream of the Seaboard Railroad crossing and ending just downstream of the Shippings Road (SR709) crossing. The riparian areas on either side of the river are privately owned. The unit contains all of the physical or biological features that are essential to support life-history processes of the Atlantic pigtoe.

Special management considerations or protection may be required to address excess sediment and pollutants that enter the creek and serve as indicators of other forms of pollution such as bacteria and toxins, reducing water quality for the species. Sources of these types of pollution are likely agricultural and silvicultural runoff. Special management focused on agricultural and silviculture BMPs, maintenance of forested buffers, and connection of protected riparian corridors will benefit habitat for the species in this unit.

Unit 4: CR2—Nottoway River Subbasin, Nottoway, Lunenburg, Brunswick, Dinwiddie, Greensville, and Sussex Counties, Virginia

Unit 4 consists of 64 river miles (103 river km) of the Nottoway River, and a portion of Sturgeon Creek, beginning downstream of the Nottoway River's confluence with Dickerson Creek and ending just downstream of Little Mill Road, and includes Sturgeon Creek upstream of Old Stage Road. Land bordering the river is primarily privately owned, although some of the land is part of the Fort Pickett National Guard Installation (see Exemptions, below), containing 14.2 mi (23 km) of conservation parcels. The unit contains all of the physical or biological features that are essential to support life-history processes of the Atlantic pigtoe.

Special management considerations or protection may be required within this unit to address a variety of threats. In the past decade, the Nottoway River suffered from several seasonal drought events, which not only caused very low dissolved oxygen conditions but also decreased food delivery because of minimal flows. In addition, these conditions led to increased predation rates on potential host fishes that were concentrated into low-flow refugia (*e.g.,* pools). Urban stormwater and nonpoint source pollution have been identified as contributing to water quality issues in this unit; therefore, special management considerations for riparian buffer restoration, reduced surface and groundwater withdrawals, and stormwater retrofits will benefit the habitat in this unit. Additional special management considerations or protection may be required within this unit to address low water levels as a result of water withdrawals and drought.

Unit 5: CR3—Meherrin River, Brunswick County, Virginia

Unit 5 consists of 5 river miles (8 river km) of the Meherrin River, from approximately 1.5 miles below the confluence with Saddletree Creek under VA Highway 46 (Christana Highway) to VA715 (Iron Bridge Road). The land on either side of the river is privately owned. The unit contains all of the physical or biological features that are essential to support life-history processes of the Atlantic pigtoe.

Special management considerations or protection may be required within

this unit to address a variety of threats. Like the Nottoway River, the Meherrin River has been affected by seasonal droughts, resulting in low flow conditions and low dissolved oxygen conditions. The rural nature of the unit will benefit from following agricultural and silvicultural BMPs. Additional special management considerations or protection such as riparian buffer protection, reduced surface and groundwater withdrawals, and water conservation programs may be required within this unit to address low water levels as a result of water withdrawals and drought.

Roanoke River Population

Unit 6: RR1—Dan River, Pittsylvania County, Virginia, and Rockingham County, North Carolina

Unit 6 consists of 14 river miles (22.5 river km) of the Dan River along the border of Virginia and North Carolina from just upstream of NC Highway 700 near Eden, North Carolina, into Pittsylvania County, Virginia, and downstream to the confluence with Williamson Creek in Rockingham County, North Carolina. The land on either side of the river is privately owned. The unit contains all of the physical or biological features that are essential to support life-history processes of the Atlantic pigtoe.

Special management considerations or protection may be required within this unit to address threats. For example, a Duke Energy Coal Ash spill occurred upstream of this unit in February 2014; subsequent actions related to mitigating the effects of the spill will ultimately benefit the habitat in this unit, potentially allowing species restoration efforts.

Unit 7: RR2—Aarons Creek, Granville County, North Carolina, and Mecklenburg and Halifax Counties, Virginia

Unit 7 consists of 12 river miles (19.3 river km) of Aarons Creek, from NC96 in Granville County, North Carolina, downstream across the North Carolina-Virginia border to just upstream of VA602 (White House Road) along the Mecklenburg County-Halifax County line in Virginia. Land on either side of the river is privately owned. The unit contains all of the physical or biological features that are essential to support life-history processes of the Atlantic pigtoe.

Special management considerations or protection may be required within this unit to address a variety of threats. There are two impaired stream reaches totaling approximately 12 river miles (19.3 river km) in the Aarons Creek watershed. An ''impairment'' designation by the State here is a result of low dissolved oxygen and low benthic-macroinvertebrate assessment scores. Special management focused on maintaining riparian buffers and following BMPs will be important for the habitat in this unit.

Unit 8: RR3—Little Grassy Creek, Granville County, North Carolina

Unit 8 consists of 3 river miles (4.8 river km) of Little Grassy Creek in Granville County, North Carolina, beginning at the Crawford Currin Road crossing and ending at the confluence with Grassy Creek. The riparian areas on either side of the river are privately owned. The unit contains all of the physical or biological features that are essential to support life-history processes of the Atlantic pigtoe.

Special management considerations or protection may be required to address excess sediment and pollutants that enter the creek and serve as indicators of other forms of pollution such as bacteria and toxins, reducing water quality for the species. Sources of these types of pollution are likely agricultural and silvicultural runoff. Given the nonpoint source pollution identified as contributing to water quality issues in this unit, special management considerations related to riparian buffer protection and restoration and reduced surface and groundwater withdrawals will benefit the species' habitat in this unit.

Tar River Population

Unit 9: TR1—Upper/Middle Tar River Subbasin, Granville, Vance, Franklin, and Nash Counties, North Carolina

This unit consists of 91 river miles (146.5 river km) of the mainstem of the upper and middle Tar River as well as several tributaries (Bear Swamp Creek, Fox Creek, Crooked Creek, Cub Creek, and Shelton Creek), all in North Carolina. The portion of Cub Creek starts near Hobgood Road and continues to the confluence with the Tar River; the Tar River portion starts just upstream of the NC158 bridge and goes downstream to the NC 581 crossing; the Shelton Creek portion starts upstream of NC158 and goes downstream to the confluence with the Tar River; the Bear Swamp Creek portion begins upstream of Dyking Road and goes downstream to the confluence with the Tar River (and includes an unnamed tributary upstream of Beasley Road); the Fox Creek portion begins downstream of NC 561 and goes to the confluence with the Tar River; and the Crooked Creek portion begins upstream of NC98 crossing and goes downstream to confluence with Tar River. Land bordering the river and creeks is mostly privately owned (79 mi (119 km)), with some areas in public ownership or easements (12 mi (17 km)). The unit contains all of the physical or biological features that are essential to support life-history processes of the Atlantic pigtoe.

Special management considerations or protection may be required within this unit to address a variety of threats. Excessive amounts of nitrogen and phosphorus run off the land or are discharged into the waters, causing too much growth of microscopic or macroscopic vegetation and leading to extremely low levels of dissolved oxygen. As a result, there are six ''impaired'' stream reaches (as defined on the State's 303d list) totaling approximately 32 river miles in the unit. Expansion or addition of new wastewater discharges are also a threat to habitat in this unit. Special management focused on agricultural BMPs, implementing highest levels of treatment of wastewater practicable, maintenance of forested buffers, and connection of protected riparian corridors will benefit habitat for the species in this unit.

Unit 10: TR2—Sandy/Swift Creek, Warren, Franklin, and Nash Counties, North Carolina

This unit consists of a 50-mile (80.5-km) segment of Sandy/Swift Creek beginning at Southerland Mill Road and continuing downstream to NC301. Land bordering the river and creeks is mostly privately owned (42 mi (80 km)), with some areas covered by protective easements (8 mi (13 km)). The unit contains all of the physical or biological features that are essential to support life-history processes of the Atlantic pigtoe.

Special management considerations or protection may be required within this unit to address a variety of threats. Excessive amounts of nitrogen and phosphorus run off the land or are discharged into the waters, causing excessive growth of microscopic or macroscopic vegetation and leading to extremely low levels of dissolved oxygen; there is one ''impaired'' stream reach totaling approximately 5 river miles (8 river km) in this unit. Given the nonpoint source pollution identified as contributing to water quality issues in this unit, special management considerations including riparian buffer protection and restoration, connection of protected riparian corridors, reduced surface and groundwater withdrawals,

and stormwater retrofits will benefit habitat for the species in this unit.

Unit 11: TR3—Fishing Creek Subbasin, Warren, Halifax, Franklin, and Nash Counties, North Carolina

This unit consists of 85 river miles (136.8 river km) in Fishing Creek, Little Fishing Creek, Shocco Creek, and Maple Branch. The Shocco Creek portion begins downstream of the NC58 bridge and continues to the confluence with Fishing Creek; the entirety of Maple Branch is included, down to the confluence with Fishing Creek; Fishing Creek begins at Axtell Ridgeway Road (SR1112) downstream to I–95; and Little Fishing Creek begins upstream of Briston Brown Road (SR1532) downstream to the confluence with Fishing Creek. The land bordering the creeks includes private parcels (56 miles (90 km)), protective easements (14 miles (23 km)), and State game lands (15 miles (24 km)). The unit contains all of the physical or biological features that are essential to support life-history processes of the Atlantic pigtoe.

Special management considerations or protection may be required within this unit to address a variety of threats. Excessive amounts of nitrogen and phosphorus run off the land or are discharged into the waters, causing excessive growth of microscopic or macroscopic vegetation and leading to extremely low levels of dissolved oxygen. Given the nonpoint source pollution identified as contributing to water quality issues in this unit, special management considerations including riparian buffer restoration, reduced surface and groundwater withdrawals, and stormwater retrofits will benefit habitat for the species in this unit.

Unit 12: TR4—Lower Tar River, Edgecombe and Pitt Counties, North Carolina

This unit consists of 30 river miles (48.3 river km) of the Lower Tar River, lower Swift Creek, and Fishing Creek in Edgecombe County, North Carolina, from NC97 near Leggett, North Carolina, to the Edgecombe-Pitt County line near NC33. Land along the river is divided between private parcels, protective easements, State game lands, and State park land. The unit contains all of the physical or biological features that are essential to support life-history processes of the Atlantic pigtoe.

Special management considerations or protection may be required within this unit to address a variety of threats. Excessive amounts of nitrogen and phosphorus run off the land or are discharged into the waters, causing excessive growth of microscopic or macroscopic vegetation and leading to extremely low levels of dissolved oxygen. Special management focused on agricultural BMPs, maintenance of forested buffers, and connection of protected riparian corridors will benefit habitat for the species in this unit.

Neuse River Population

Unit 13: NR1—Upper Neuse River Subbasin, Person, Durham, and Orange Counties, North Carolina

This unit consists of 60 river miles (95 river km) in four reaches including Flat River, Little River, Eno River, and the Upper Eno River. The unit contains all of the physical or biological features that are essential to support life-history processes of the Atlantic pigtoe.

The Flat River reach consists of 19 river miles (30.6 river km) in the Flat River Subbasin in Person and Durham Counties, North Carolina, including the South Flat River downstream of Dick Coleman Road, the North Flat River near Parsonage Road, and Deep Creek near Helena-Moriah Road downstream where each river converges into the Flat River downstream of State Forest Road. Land along the Flat River subunit includes mostly private parcels, with some easements (1 mi (1.7 km)) and State forest land (1.4 mi (2.3 km)).

The Little River Subbasin includes 18 river miles (29 river km) of the North Fork and South Fork Little Rivers in Orange and Durham Counties, North Carolina, bordered by mostly private land and 0.2 mi (0.4 km) of conservation easements.

The Upper Eno River reach consists of 4 river miles (6.4 river km) in Orange County, North Carolina, including the West Fork Eno River upstream of Cedar Grove Road to the confluence with McGowan Creek. This subunit is bordered by 3 miles (4.8 km) of private land and 1 mile (1.6 km) of conservation parcels.

The Eno River reach consists of 18 river miles (29 river km) in Orange and Durham Counties, North Carolina, from below Eno Mountain Road to NC15–501. Land bordering the river contains nearly all State park land (17 mi (27.4 km)) and 0.3 mi (0.45 km) of conservation parcels; the remaining land is privately owned.

Special management considerations or protection may be required within this unit to address a variety of threats. Large quantities of nutrients (especially nitrogen) contributed by fertilizers and animal waste washed from lawns, urban developed areas, farm fields, and animal operations are impacting aquatic ecosystems in this unit. More than 300 permitted point-source sites discharge wastewater into streams and rivers in the basin. Development is also impacting areas along the Upper Neuse River. Special management considerations in this unit include using the highest available wastewater treatment technologies, retrofitting stormwater systems, eliminating direct stormwater discharges, increasing open space, maintaining connected riparian corridors, and treating invasive species (like hydrilla).

Unit 14: NR2—Middle Neuse River Subbasin, Wake, Johnston, Wilson Counties, North Carolina

This unit consists of 61 river miles (98.2 river km) in five reaches including Swift Creek, Middle Creek, Upper Little River, Middle Little River, and Contentnea Creek, all in North Carolina. The unit contains all of the physical or biological features that are essential to support life-history processes of the Atlantic pigtoe and currently supports some breeding, feeding, and sheltering needs for the species.

The Middle Creek reach is 19 river miles (30.6 river km) below Old Stage Road downstream to below Crantock Road, and the Swift Creek reach is 25 river miles (40.2 river km) from Lake Benson downstream to confluence with the Neuse, both in Wake and Johnston Counties. They are primarily bordered by private land with 1.2 mi (1.9 km) of easement parcels.

The Upper Little River reach includes 4 river miles (6.4 river km) of the Upper Little River from the confluence with Perry Creek to Fowler Road in Wake County, North Carolina. The land along this stream reach is primarily county-owned (3.4 mi (5.4 km) with some private parcels.

The Middle Little River reach includes 11 river miles (17.7 river km) from Atkinsons Mill downstream to NC301 in Johnston County, North Carolina. This area is bordered predominantly by private land and 0.2 mi (0.4 km) of conservation parcels.

The Contentnea Creek reach consists of 2 river miles (3.2 river km) below Buckhorn Reservoir to just below Sadie Road near NC581 in Wilson County, North Carolina, bordered entirely by private land.

Special management considerations or protection may be required within this unit to address a variety of threats. Large quantities of nutrients (especially nitrogen) contributed by fertilizers and animal waste washed from lawns, urban developed areas, farm fields, and animal operations are impacting aquatic ecosystems in this unit. More than 300 permitted point-source sites discharge wastewater into streams and rivers in

the basin. Development is also impacting areas along the Middle Neuse River.

There are 49 State-defined ''impaired'' stream reaches totaling approximately 447 river miles (719.4 river km) in this unit. There are many factors that cause an impairment label to be given by the State, including low benthic-macroinvertebrate assessment scores, low pH, poor fish community scores, low dissolved oxygen, polychlorinated biphenyls (PCBs), copper, and zinc. There are 349 non-major and 6 major (Apex Water Reclamation Facility, Central Johnston County Waste Water Treatment Plant, Cary Waste Water Treatment Plant, City of Raleigh Wastewater Treatment Plant, Dempsey Benton Water Treatment Plant, and Terrible Creek Waste Water Treatment Plant) permitted discharges in this MU. Special management related to developed areas, including using the best available wastewater treatment technologies, retrofitting stormwater systems, eliminating direct stormwater discharges, increasing open space in the watershed, and maintaining connected riparian corridors, will be important to maintain habitat in this unit.

Cape Fear Population

Unit 15: CF1—New Hope Creek, Orange County, North Carolina

This unit consists of 4 river miles (6.4 river km) of habitat in the New Hope Creek from NC86 to Mimosa Road. The land bordering the creek includes private parcels and 2.5 mi (4 km) of conservation easements. The unit contains all of the physical or biological features that are essential to support life-history processes of the Atlantic pigtoe.

Special management considerations or protection may be required within this unit to address a variety of threats. Large quantities of nutrients (especially nitrogen) contributed by fertilizers and animal waste washed from lawns, urban developed areas, farm fields, and animal operations are impacting aquatic ecosystems in this unit. More than 200 permitted point-source sites discharge wastewater into streams and rivers in the basin. Development is also impacting areas along New Hope Creek.

Special management, including using the best available wastewater treatment technologies, retrofitting stormwater systems, eliminating direct stormwater discharges, increasing open space in the watershed, and maintaining connected riparian corridors, may be required to maintain habitat in this unit.

Unit 16: CF2—Deep River Subbasin, Randolph County, North Carolina

The Deep River Subbasin unit consists of 10 river miles (16.1 river km), including the mainstem between Richland and Brush Creeks as well as Richland Creek from Little Beane Store Road to the confluence with the Deep River and Brush Creek from Brush Creek Road to the confluence with the Deep River. Land bordering the area is privately owned. The unit contains all of the physical or biological features that are essential to support life-history processes of the Atlantic pigtoe.

The Deep River Subbasin is situated in a mostly rural part of the Cape Fear River Basin, and large-scale agriculture and livestock operations are present. Special management considerations or protection may be required within this unit to ensure the use of agriculture BMPs, especially preventing cattle access to streams, as well as protecting forested riparian buffers to benefit habitat in this unit. The invasive plant hydrilla has recently been identified in the Deep River, and special management will likely be required to eradicate the infestation to improve habitat conditions to meet the breeding, feeding, and sheltering needs of Atlantic pigtoe.

Yadkin-Pee Dee River Population

Unit 17: YR1—Little River, Randolph and Montgomery Counties, North Carolina

This unit consists of 40 river miles (64.4 river km) of Little River from SR1114 downstream to Okeewemee Star Road, including the West Fork Little River from NC134 to the confluence with the Little River. Land along the river is predominantly privately owned, with 0.7 mi (1.15 km) of parcels in conservation easements. The unit contains all of the physical or biological features that are essential to support life-history processes of the Atlantic pigtoe.

Habitat fragmentation from dams and reservoirs is impacting the aquatic ecosystems in this unit. Sedimentation from intensive agriculture is the top pollution problem in the basin. Special management considerations or protection may include the use of agricultural BMPs, especially preventing cattle access to streams, as well as protecting forested riparian buffers to benefit habitat in this unit.

Effects of Critical Habitat Designation

Section 7 Consultation

Section 7(a)(2) of the Act requires Federal agencies, including the Service, to ensure that any action they fund, authorize, or carry out is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of designated critical habitat of such species.

We published a final rule revising the definition of destruction or adverse modification on August 27, 2019 (84 FR 44976). 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.

If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency (action agency) must enter into consultation with us. Examples of actions that are subject to the section 7 consultation process are actions on State, Tribal, local, or private lands that require a Federal permit (such as a permit from the U.S. Army Corps of Engineers under section 404 of the Clean Water Act (33 U.S.C. 1251 *et seq.*) or a permit from the Service under section 10 of the Act) or that involve some other Federal action (such as funding from the Federal Highway Administration, Federal Aviation Administration, or the Federal Emergency Management Agency). Federal actions not affecting listed species or critical habitat—and actions on State, Tribal, local, or private lands that are not federally funded, authorized, or carried out by a Federal agency—do not require section 7 consultation.

Compliance with the requirements of section 7(a)(2) is documented through our issuance of:

(1) A concurrence letter for Federal actions that may affect, but are not likely to adversely affect, listed species or critical habitat; or

(2) A biological opinion for Federal actions that may affect, and are likely to adversely affect, listed species or critical habitat.

When we issue a biological opinion concluding that a project is likely to jeopardize the continued existence of a listed species and/or destroy or adversely modify critical habitat, we provide reasonable and prudent alternatives to the project, if any are identifiable, that would avoid the likelihood of jeopardy and/or destruction or adverse modification of critical habitat. We define ''reasonable and prudent alternatives'' (at 50 CFR 402.02) as alternative actions identified during consultation that:

(1) Can be implemented in a manner consistent with the intended purpose of the action,

(2) Can be implemented consistent with the scope of the Federal agency's legal authority and jurisdiction,

(3) Are economically and technologically feasible, and

(4) Would, in the Service Director's opinion, avoid the likelihood of jeopardizing the continued existence of the listed species and/or avoid the likelihood of destroying or adversely modifying critical habitat.

Reasonable and prudent alternatives can vary from slight project modifications to extensive redesign or relocation of the project. Costs associated with implementing a reasonable and prudent alternative are similarly variable.

Regulations at 50 CFR 402.16 set forth requirements for Federal agencies to reinitiate formal consultation on previously reviewed actions. These requirements apply when the Federal agency has retained discretionary involvement or control over the action (or the agency's discretionary involvement or control is authorized by law) and, subsequent to the previous consultation: (1) If the amount or extent of taking specified in the incidental take statement is exceeded; (2) if new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) if the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion; or (4) if a new species is listed or critical habitat designated that may be affected by the identified action.

In such situations, Federal agencies sometimes may need to request reinitiation of consultation with us, but the regulations also specify some exceptions to the requirement to reinitiate consultation on specific land management plans after subsequently listing a new species or designating new critical habitat. See the regulations for a description of those exceptions.

Application of the ''Adverse Modification'' Standard

The key factor related to the adverse modification determination is whether implementation of the proposed Federal action directly or indirectly alters the designated critical habitat in a way that appreciably diminishes the value of the critical habitat as a whole for the conservation of the listed species. As discussed above, the role of critical habitat is to support physical or biological features essential to the conservation of a listed species and provide for the conservation of the species.

Section 4(b)(8) of the Act requires us to briefly evaluate and describe, in any proposed or final regulation that designates critical habitat, activities involving a Federal action that may violate section 7(a)(2) of the Act by destroying or adversely modifying such habitat, or that may be affected by such designation.

Activities that the Service may, during a consultation under section 7(a)(2) of the Act, consider likely to destroy or adversely modify critical habitat include, but are not limited to:

(1) Actions that would alter the minimum flow or the existing flow regime. Such activities could include, but are not limited to, impoundment, channelization, water diversion, water withdrawal, and hydropower generation. These activities could eliminate or reduce the habitat necessary for the growth and reproduction of the Atlantic pigtoe by decreasing or altering flows to levels that would adversely affect its ability to complete its life cycle.

(2) Actions that would significantly alter water chemistry or temperature. Such activities could include, but are not limited to, release of chemicals (including pharmaceuticals, metals, and salts), biological pollutants, or heated effluents into the surface water or connected groundwater at a point source or by dispersed release (non-point source). These activities could alter water conditions to levels that are beyond the tolerances of the Atlantic pigtoe and result in direct or cumulative adverse effects to individuals and their life cycles.

(3) Actions that would significantly increase sediment deposition within the stream channel. Such activities could include, but are not limited to, excessive sedimentation from livestock grazing, road construction, channel alteration, incompatible forestry activities, off-road vehicle use, and other watershed and floodplain disturbances. These activities could eliminate or reduce the habitat necessary for the growth and reproduction of the Atlantic pigtoe by increasing the sediment deposition to levels that would adversely affect its ability to complete its life cycle.

(4) Actions that would significantly increase the filamentous algal community within the stream channel. Such activities could include, but are not limited to, release of nutrients into the surface water or connected groundwater at a point source or by dispersed release (non-point source). These activities can result in excessive filamentous algae filling streams and reducing habitat for the Atlantic pigtoe, degrading water quality during algal decay, and decreasing oxygen levels at night from algal respiration to levels below the tolerances of the mussel.

(5) Actions that would significantly alter channel morphology or geometry. Such activities could include, but are not limited to, channelization, impoundment, road and bridge construction, mining, dredging, and destruction of riparian vegetation. These activities may lead to changes in water flows and levels that would degrade or eliminate the Atlantic pigtoe and/or its habitats. These actions can also lead to increased sedimentation and degradation in water quality to levels that are beyond the tolerances of the Atlantic pigtoe.

(6) Actions that result in the introduction, spread, or augmentation of nonnative aquatic species in occupied stream segments, or in stream segments that are hydrologically connected to occupied stream segments, even if those segments are occasionally intermittent, or introduction of other species that compete with or prey on the Atlantic pigtoe. Possible actions could include, but are not limited to, stocking of nonnative fishes or other related actions. These activities can introduce parasites or disease to mollusks; result in direct predation; or affect the growth, reproduction, and survival of Atlantic pigtoes.

Finally, we note that for any of the six categories of actions outlined above, we and the relevant Federal agency may find that the agency's anticipated actions affecting critical habitat may be appropriate to consider programmatically in section 7 consultation. Programmatic consultations can be an efficient method for streamlining the consultation process by addressing an agency's multiple similar, frequently occurring, or routine actions expected to be implemented in a given geographic area. Programmatic section 7 consultation can also be conducted for an agency's proposed program, plan, policy, or regulation that provides a framework for future proposed actions. We are committed to responding to any agency's request for a programmatic consultation, when appropriate and subject to the approval of the Service Director, as a means to streamline the regulatory process and avoid time-consuming and inefficient multiple individual consultations.

Exemptions

Application of Section 4(a)(3) of the Act

The Sikes Act Improvement Act of 1997 (Sikes Act) (16 U.S.C. 670a) required each military installation that includes land and water suitable for the conservation and management of natural resources to complete an integrated natural resources management plan (INRMP) by November 17, 2001. An INRMP integrates implementation of the military mission of the installation with stewardship of the natural resources found on the base. Each INRMP includes:

(1) An assessment of the ecological needs on the installation, including the need to provide for the conservation of listed species;

(2) A statement of goals and priorities;

(3) A detailed description of management actions to be implemented to provide for these ecological needs; and

(4) A monitoring and adaptive management plan.

Among other things, each INRMP must, to the extent appropriate and applicable, provide for fish and wildlife management; fish and wildlife habitat enhancement or modification; wetland protection, enhancement, and restoration where necessary to support fish and wildlife; and enforcement of applicable natural resource laws.

The National Defense Authorization Act for Fiscal Year 2004 (Pub. L. 108–136) amended the Act to limit areas eligible for designation as critical habitat. Specifically, section 4(a)(3)(B)(i) of the Act (16 U.S.C. 1533(a)(3)(B)(i)) provides that the Secretary shall not designate as critical habitat any lands or other geographical areas owned or controlled by the Department of Defense, or designated for its use, that are subject to an INRMP prepared under 16 U.S.C. 670a, if the Secretary determines in writing that such plan provides a benefit to the species for which critical habitat is proposed for designation.

We consult with the military on the development and implementation of INRMPs for installations with listed species. We analyze INRMPs developed by military installations located within the range of critical habitat designations to determine if they meet the criteria for exemption from critical habitat under section 4(a)(3) of the Act.

Approved INRMPs

We have identified one area within the critical habitat designation that consists of Department of Defense lands with a completed, Service-approved INRMP. The Army National Guard—Maneuver Training Center Fort Pickett (Fort Pickett) is located in southeastern Virginia on 41,000 acres in three counties: Nottoway, Brunswick, and Dinwiddie. Fort Pickett is federally owned land that is managed by the Virginia Army National Guard and is subject to all federal laws and regulations. The Fort Pickett INRMP covers fiscal years 2017–2021, and serves as the principal management plan governing all natural resource activities on the installation. Among the goals and objectives listed in the INRMP is habitat management for rare, threatened, and endangered species, and the Atlantic pigtoe is included in this plan. Management actions that benefit the Atlantic pigtoe include maintenance and improvement of habitat, monitoring mussel populations, and improving water quality. Additional elements of the management actions included in the INRMP that will benefit Atlantic pigtoe and its habitat are forest management, stream and wetland protection zones, and public outreach and education.

Fourteen river miles (22.5 km) of Unit 4 (CR2—Nottoway River Subbasin) are located within the area covered by this INRMP. Based on the above considerations, and in accordance with section 4(a)(3)(B)(i) of the Act, we have determined that the identified streams are subject to the Fort Pickett INRMP and that conservation efforts identified in the INRMP will provide a benefit to the Atlantic pigtoe. Therefore, streams within this installation are exempt from critical habitat designation under section 4(a)(3) of the Act. We are not including approximately 14 river miles (22.5 river km) of habitat in this critical habitat designation because of this exemption.

Consideration of Impacts Under Section 4(b)(2) of the Act

Section 4(b)(2) of the Act states that the Secretary shall designate and make revisions to critical habitat on the basis of the best available scientific data after taking into consideration the economic impact, national security impact, and any other relevant impact of specifying any particular area as critical habitat. The Secretary may exclude an area from critical habitat if we determine that the benefits of such exclusion outweigh the benefits of specifying such area as part of the critical habitat, unless we determine, based on the best scientific data available, that the failure to designate such area as critical habitat will result in the extinction of the species. In making the determination to exclude a particular area, the statute on its face, as well as the legislative history, are clear that the Secretary has broad discretion regarding which factor(s) to use and how much weight to give to any factor. On December 18, 2020, we published a final rule in the **Federal Register** (85 FR 82376) revising portions of our regulations pertaining to exclusions of critical habitat. These final regulations became effective on January 19, 2021, and apply to critical habitat rules for which a proposed rule was published after January 19, 2021. Consequently, these new regulations do not apply to this final rule.

Under section 4(b)(2) of the Act, we may exclude an area from designated critical habitat based on economic impacts, impacts on national security, or any other relevant impacts. In considering whether to exclude a particular area from the designation, we identify the benefits of including the area in the designation, identify the benefits of excluding the area from the designation, and evaluate whether the benefits of exclusion outweigh the benefits of inclusion. If the analysis indicates that the benefits of exclusion outweigh the benefits of inclusion, the Secretary may exercise discretion to exclude the area only if such exclusion would not result in the extinction of the species. We describe below the process that we undertook for taking into consideration each category of impacts and our analyses of the relevant impacts.

Consideration of Economic Impacts

Section 4(b)(2) of the Act and its implementing regulations require that we consider the economic impact that may result from a designation of critical habitat. In order to consider economic impacts, we prepared an incremental effects memorandum (IEM) and screening analysis which, together with our narrative and interpretation of effects we consider our draft economic analysis (DEA) of the proposed critical habitat designation and related factors (IEc, 2018, entire). The analysis, dated April 13, 2018, was made available for public review from October 11, 2018, through December 10, 2018 (83 FR 51570). We then accepted public comments on the analysis for an additional 30 days, from September 22, 2020, through October 22, 2020, when we published a revised proposed critical habitat designation (85 FR 59487). The DEA addressed probable economic impacts of critical habitat designation for the Atlantic pigtoe. Following the close of the comment periods, we reviewed and evaluated all information submitted during the comment periods that may pertain to our consideration of the probable incremental economic

impacts of this critical habitat designation. Additional information relevant to the probable incremental economic impacts of critical habitat designation for the Atlantic pigtoe is summarized below and available in the screening analysis for the Atlantic pigtoe (IEc, 2018, entire), available at *http://www.regulations.gov.*

Executive Orders (E.O.s) 12866 and 13563 direct Federal agencies to assess the costs and benefits of available regulatory alternatives in quantitative (to the extent feasible) and qualitative terms. Consistent with the E.O. regulatory analysis requirements, our effects analysis under the Act may take into consideration impacts to both directly and indirectly affected entities, where practicable and reasonable. If sufficient data are available, we assess to the extent practicable the probable impacts to both directly and indirectly affected entities. As part of our screening analysis, we considered the types of economic activities that are likely to occur within the areas likely affected by the critical habitat designation. In our March 19, 2018, IEM describing probable incremental economic impacts that may result from the proposed designation, we first identified probable incremental economic impacts associated with each of the following categories of activities: (1) Federal lands management (National Park Service, U.S. Forest Service, Department of Defense); (2) agriculture; (3) forest management/silviculture/timber; (4) development; (5) recreation; (6) restoration activities; and (7) transportation. We considered each industry or category individually. Additionally, we considered whether the activities have any Federal involvement. Critical habitat designation generally will not affect activities that do not have any Federal involvement; under the Act, designation of critical habitat only affects activities conducted, funded, permitted, or authorized by Federal agencies. This rule lists the Atlantic pigtoe as a threatened species, and, on the effective date of this rule (see **DATES**, above), in areas where the Atlantic pigtoe is present, under section 7 of the Act, Federal agencies will be required to consult with the Service on activities they fund, permit, or implement that may affect the species.

In our IEM, we attempted to clarify the distinction between the effects that will result from the species being listed and those attributable to the critical habitat designation (*i.e.,* difference between the jeopardy and adverse modification standards) for the Atlantic pigtoe. Because critical habitat is being designated concurrently with the listing, it has been our experience that it is more difficult to discern which conservation efforts are attributable to the species being listed and those which will result solely from the designation of critical habitat. However, the following specific circumstances in this case help to inform our evaluation: (1) The essential physical or biological features identified for critical habitat are the same features essential for the life requisites of the species, and (2) any actions that would result in sufficient harm or harassment to constitute jeopardy to the Atlantic pigtoe would also likely adversely affect the essential physical or biological features of critical habitat. The IEM outlines our rationale concerning this limited distinction between baseline conservation efforts and incremental impacts of the designation of critical habitat for this species. This evaluation of the incremental effects has been used as the basis to evaluate the probable incremental economic impacts of this designation of critical habitat.

The critical habitat designation for the Atlantic pigtoe totals approximately 563 river miles (906 river km), all of which are currently occupied by the species. In these areas, any actions that may affect the species or its habitat will likely also affect critical habitat, and it is unlikely that any additional conservation efforts will be required to address the adverse modification standard over and above those recommended as necessary to avoid jeopardizing the continued existence of the species. Therefore, the only additional costs that are expected in all of the critical habitat designations are administrative costs, due to the fact that this additional analysis will require time and resources by both the Federal action agency and the Service. However, it is believed that, in most circumstances, these costs would not reach the threshold of ''significant'' under E.O. 12866. We anticipate a maximum of 109 section 7 consultations annually at a total incremental cost of less than $230,000 per year. The addition of two units did not affect the economic analysis because the analysis was done at county level, and the new units were included in the initial calculations.

Exclusions

Exclusions Based on Economic Impacts

As discussed above, the Service considered the economic impacts of this critical habitat designation, and the Secretary is not exercising her discretion to exclude any areas from this designation of critical habitat for the Atlantic pigtoe based on economic impacts. A copy of the IEM and screening analysis with supporting documents may be obtained by contacting the Raleigh Ecological Services Field Office (see **FOR FURTHER INFORMATION CONTACT**) or by downloading from the internet at *http://www.regulations.gov.*

Exclusions Based on National Security Impacts or Homeland Security Impacts

Section 4(a)(3)(B)(i) of the Act (see Exemptions, above) may not cover all Department of Defense lands or areas that pose potential national-security concerns (*e.g.,* a DoD installation that is in the process of revising its INRMP for a newly listed species or a species previously not covered). If a particular area is not covered under section 4(a)(3)(B)(i), national-security or homeland-security concerns are not a factor in the process of determining what areas meet the definition of ''critical habitat.'' Nevertheless, when designating critical habitat under section 4(b)(2), the Service must consider impacts on national security, including homeland security, on lands or areas not covered by section 4(a)(3)(B)(i). Accordingly, we will always consider for exclusion from the designation areas for which Department of Defense, Department of Homeland Security, or another Federal agency has requested exclusion based on an assertion of national-security or homeland-security concerns. We have determined that, other than the land exempted under section 4(a)(3)(B)(i) of the Act based upon the existence of an approved INRMP (see Exemptions, above), the lands within the designation of critical habitat for the Atlantic pigtoe are not owned or managed by the Department of Defense or Department of Homeland Security. Furthermore, we did not receive any requests for exclusion from any federal agency responsible for homeland or national security. Therefore, we anticipate no impact on national security, and the Secretary is not exercising her discretion to exclude any areas from the final designation based on impacts on national security.

Exclusions Based on Other Relevant Impacts

Under section 4(b)(2) of the Act, we consider any other relevant impacts, in addition to economic impacts and impacts on national security. Other relevant impacts may include, but are not limited to, impacts to Tribes, States, local governments, public health and safety, community interests, the environment (such as increased risk of

wildfire or pest and invasive species management), Federal lands, and conservation plans, agreements, or partnerships. To identify other relevant impacts that may affect the exclusion analysis, we consider a number of factors, including whether there are permitted conservation plans covering the species in the area such as HCPs, safe harbor agreements, or candidate conservation agreements with assurances, or whether there are non-permitted conservation agreements and partnerships that may be impaired by designation of, or exclusion from, critical habitat. In addition, we look at whether Tribal conservation plans and partnerships, Tribal resources, or government-to-government relationships of the United States with Tribal entities may be affected by the designation. We also consider any State, local, public-health, community-interest, environmental, or social impacts that might occur because of the designation.

In preparing this designation, we have determined that there are currently no HCPs or other management plans for the Atlantic pigtoe, and the designation does not include any Tribal lands or trust resources. We anticipate no impact on Tribal lands, partnerships, or HCPs from this critical habitat designation. Accordingly, the Secretary is not exercising her discretion to exclude any areas from the final designation based on other relevant impacts.

Required Determinations

Regulatory Planning and Review (Executive Orders 12866 and 13563)

Executive Order 12866 provides that the Office of Information and Regulatory Affairs (OIRA) in the Office of Management and Budget will review all significant rules. OIRA has determined that this rule is not significant.

Executive Order 13563 reaffirms the principles of E.O. 12866 while calling for improvements in the nation's regulatory system to promote predictability, to reduce uncertainty, and to use the best, most innovative, and least burdensome tools for achieving regulatory ends. The executive order directs agencies to consider regulatory approaches that reduce burdens and maintain flexibility and freedom of choice for the public where these approaches are relevant, feasible, and consistent with regulatory objectives. E.O. 13563 emphasizes further that regulations must be based on the best available science and that the rulemaking process must allow for public participation and an open exchange of ideas. We have developed this rule in a manner consistent with these requirements.

Regulatory Flexibility Act (5 U.S.C. 601 et seq.)

Under the Regulatory Flexibility Act (RFA; 5 U.S.C. 601 *et seq.*), as amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA; 5 U.S.C. 801 *et seq.*), whenever an agency is required to publish a notice of rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the effects of the rule on small entities (*i.e.,* small businesses, small organizations, and small government jurisdictions). However, no regulatory flexibility analysis is required if the head of the agency certifies the rule will not have a significant economic impact on a substantial number of small entities. The SBREFA amended the RFA to require Federal agencies to provide a certification statement of the factual basis for certifying that the rule will not have a significant economic impact on a substantial number of small entities.

According to the Small Business Administration, small entities include small organizations such as independent nonprofit organizations; small governmental jurisdictions, including school boards and city and town governments that serve fewer than 50,000 residents; and small businesses (13 CFR 121.201). Small businesses include manufacturing and mining concerns with fewer than 500 employees, wholesale trade entities with fewer than 100 employees, retail and service businesses with less than $5 million in annual sales, general and heavy construction businesses with less than $27.5 million in annual business, special trade contractors doing less than $11.5 million in annual business, and agricultural businesses with annual sales less than $750,000. To determine whether potential economic impacts to these small entities are significant, we considered the types of activities that might trigger regulatory impacts under this designation as well as types of project modifications that may result. In general, the term ''significant economic impact'' is meant to apply to a typical small business firm's business operations.

Under the RFA, as amended, and as understood in the light of recent court decisions, Federal agencies are required to evaluate the potential incremental impacts of rulemaking on those entities directly regulated by the rulemaking itself; in other words, the RFA does not require agencies to evaluate the potential impacts to indirectly regulated entities. The regulatory mechanism through which critical habitat protections are realized is section 7 of the Act, which requires Federal agencies, in consultation with the Service, to ensure that any action authorized, funded, or carried out by the agency is not likely to destroy or adversely modify critical habitat. Therefore, under section 7, only Federal action agencies are directly subject to the specific regulatory requirement (avoiding destruction and adverse modification) imposed by critical habitat designation. Consequently, it is our position that only Federal action agencies will be directly regulated by this critical habitat designation. The RFA does not require evaluation of the potential impacts to entities not directly regulated. Moreover, Federal agencies are not small entities. Therefore, because no small entities will be directly regulated by this rulemaking, the Service certifies that this critical habitat designation will not have a significant economic impact on a substantial number of small entities.

In summary, we have considered whether the designation will result in a significant economic impact on a substantial number of small entities. For the above reasons and based on currently available information, we certify that this critical habitat designation will not have a significant economic impact on a substantial number of small business entities. Therefore, a regulatory flexibility analysis is not required.

Energy Supply, Distribution, or Use—Executive Order 13211

Executive Order 13211 (Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use) requires agencies to prepare Statements of Energy Effects when undertaking certain actions. In our economic analysis, we did not find that the designation of this critical habitat will significantly affect energy supplies, distribution, or use. Therefore, this action is not a significant energy action, and no Statement of Energy Effects is required.

Unfunded Mandates Reform Act (2 U.S.C. 1501 et seq.)

In accordance with the Unfunded Mandates Reform Act (2 U.S.C. 1501 *et seq.*), we make the following findings:

(1) This final rule will not produce a Federal mandate. In general, a Federal mandate is a provision in legislation, statute, or regulation that would impose an enforceable duty upon State, local, or Tribal governments, or the private sector, and includes both ''Federal

intergovernmental mandates'' and ''Federal private sector mandates.'' These terms are defined in 2 U.S.C. 658(5)–(7). ''Federal intergovernmental mandate'' includes a regulation that ''would impose an enforceable duty upon State, local, or Tribal governments'' with two exceptions. It excludes ''a condition of Federal assistance.'' It also excludes ''a duty arising from participation in a voluntary Federal program,'' unless the regulation ''relates to a then-existing Federal program under which $500,000,000 or more is provided annually to State, local, and Tribal governments under entitlement authority,'' if the provision would ''increase the stringency of conditions of assistance'' or ''place caps upon, or otherwise decrease, the Federal Government's responsibility to provide funding,'' and the State, local, or Tribal governments ''lack authority'' to adjust accordingly. At the time of enactment, these entitlement programs were: Medicaid; Aid to Families with Dependent Children work programs; Child Nutrition; Food Stamps; Social Services Block Grants; Vocational Rehabilitation State Grants; Foster Care, Adoption Assistance, and Independent Living; Family Support Welfare Services; and Child Support Enforcement. ''Federal private sector mandate'' includes a regulation that ''would impose an enforceable duty upon the private sector, except (i) a condition of Federal assistance or (ii) a duty arising from participation in a voluntary Federal program.''

The designation of critical habitat does not impose a legally binding duty on non-Federal Government entities or private parties. Under the Act, the only regulatory effect is that Federal agencies must ensure that their actions do not destroy or adversely modify critical habitat under section 7. While non-Federal entities that receive Federal funding, assistance, or permits, or that otherwise require approval or authorization from a Federal agency for an action, may be indirectly impacted by the designation of critical habitat, the legally binding duty to avoid destruction or adverse modification of critical habitat rests squarely on the Federal agency. Furthermore, to the extent that non-Federal entities are indirectly impacted because they receive Federal assistance or participate in a voluntary Federal aid program, the Unfunded Mandates Reform Act would not apply, nor would critical habitat shift the costs of the large entitlement programs listed above onto State governments.

(2) We do not believe that this final rule will significantly or uniquely affect small governments because the government-owned lands being designated as critical habitat are owned by the States of Virginia and North Carolina. These government entities do not fit the definition of ''small governmental jurisdiction.'' Therefore, a Small Government Agency Plan is not required.

Takings—Executive Order 12630

In accordance with E.O. 12630 (Government Actions and Interference with Constitutionally Protected Private Property Rights), we have analyzed the potential takings implications of designating critical habitat for Atlantic pigtoe in a takings implications assessment. The Act does not authorize the Service to regulate private actions on private lands or confiscate private property as a result of critical habitat designation. Designation of critical habitat does not affect land ownership, or establish any closures, or restrictions on use of or access to the designated areas. Furthermore, the designation of critical habitat does not affect landowner actions that do not require Federal funding or permits, nor does it preclude development of habitat conservation programs or issuance of incidental take permits to permit actions that do require Federal funding or permits to go forward. However, Federal agencies are prohibited from carrying out, funding, or authorizing actions that would destroy or adversely modify critical habitat. A takings implications assessment has been completed and concludes that this designation of critical habitat for Atlantic pigtoe does not pose significant takings implications for lands within or affected by the designation.

Federalism—Executive Order 13132

In accordance with E.O. 13132 (Federalism), this final rule does not have significant Federalism effects. A federalism summary impact statement is not required. In keeping with Department of the Interior and Department of Commerce policy, we requested information from, and coordinated development of this critical habitat designation with, appropriate State resource agencies in Virginia and North Carolina. From a federalism perspective, the designation of critical habitat directly affects only the responsibilities of Federal agencies. The Act imposes no other duties with respect to critical habitat, either for States and local governments, or for anyone else. As a result, the final rule does not have substantial direct effects either on the States, or on the relationship between the national government and the States, or on the distribution of powers and responsibilities among the various levels of government. The designation may have some benefit to these governments because the areas that contain the features essential to the conservation of the species are more clearly defined, and the physical or biological features of the habitat necessary to the conservation of the species are specifically identified. This information does not alter where and what federally sponsored activities may occur. However, it may assist these local governments in long-range planning because these local governments no longer have to wait for case-by-case section 7 consultations to occur.

Where State and local governments require approval or authorization from a Federal agency for actions that may affect critical habitat, consultation under section 7(a)(2) will be required. While non-Federal entities that receive Federal funding, assistance, or permits, or that otherwise require approval or authorization from a Federal agency for an action, may be indirectly impacted by the designation of critical habitat, the legally binding duty to avoid destruction or adverse modification of critical habitat rests squarely on the Federal agency.

Civil Justice Reform—Executive Order 12988

In accordance with Executive Order 12988 (Civil Justice Reform), the Office of the Solicitor has determined that the rule does not unduly burden the judicial system and that it meets the requirements of sections 3(a) and 3(b)(2) of the Order. We are designating critical habitat in accordance with the provisions of the Act. To assist the public in understanding the habitat needs of the species, this final rule identifies the physical or biological features essential to the conservation of the species. The areas of designated critical habitat are presented on maps, and the rule provides several options for the interested public to obtain more detailed location information, if desired.

Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.)

This rule does not contain information collection requirements, and a submission to the Office of Management and Budget (OMB) under the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 *et seq.*) is not required. We may not conduct or sponsor and you are not required to respond to a collection of information unless it displays a currently valid OMB control number.

National Environmental Policy Act (42 U.S.C. 4321 et seq.)

We have determined that environmental assessments and environmental impact statements, as defined under the authority of the National Environmental Policy Act (NEPA), need not be prepared in connection with adopted pursuant to section 4(a) of the Act. We published a notice outlining our reasons for this determination in the **Federal Register** on October 25, 1983 (48 FR 49244). This position was upheld by the U.S. Court of Appeals for the Ninth Circuit (*Douglas County* v. *Babbitt,* 48 F.3d 1495 (9th Cir. 1995), cert. denied 516 U.S. 1042 (1996)).

Government-to-Government Relationship With Tribes

In accordance with the President's memorandum of April 29, 1994 (Government-to-Government Relations with Native American Tribal Governments; 59 FR 22951), Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments), and the Department of the Interior's manual at 512 DM 2, we readily acknowledge our responsibility to communicate meaningfully with recognized Federal Tribes on a government-to-government basis. In accordance with Secretarial Order 3206 of June 5, 1997 (American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act), we readily acknowledge our responsibilities to work directly with Tribes in developing programs for healthy ecosystems, to acknowledge that Tribal lands are not subject to the same controls as Federal public lands, to remain sensitive to Indian culture, and to make information available to Tribes. We have identified no Tribal interests that will be affected by this rule.

References Cited

A complete list of all references cited is available on the internet at *http://www.regulations.gov* and upon request from the Raleigh Ecological Services Field Office (see **FOR FURTHER INFORMATION CONTACT**).

Authors

The primary authors of this rule are the staff members of the U.S. Fish and Wildlife Service Species Assessment Team and Raleigh Ecological Services Field Office.

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, Transportation.

Regulation Promulgation

Accordingly, we amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as set forth below:

PART 17—ENDANGERED AND THREATENED WILDLIFE AND PLANTS

■ 1. The authority citation for part 17 continues to read as follows:

Authority: 16 U.S.C. 1361–1407; 1531–1544; and 4201–4245, unless otherwise noted.

■ 2. Amend § 17.11(h) by adding an entry for ''Pigtoe, Atlantic'' to the List of Endangered and Threatened Wildlife in alphabetical order under CLAMS to read as follows:

§ 17.11 Endangered and threatened wildlife.

* * * * *

(h) * * *

Common name	Scientific name	Where listed	Status	Listing citations and applicable rules
*	*	*	*	*
CLAMS				
*	*	*	*	*
Pigtoe, Atlantic	*Fusconaia masoni*	Wherever found	T	86 FR [insert **Federal Register** page where the document begins], November 16, 2021; 50 CFR 17.45(a); [4d] 50 CFR 17.95(f).[CH]
*	*	*	*	*

■ 3. Revise § 17.45 to read as follows:

§ 17.45 Special rules—snails and clams.

(a) Atlantic pigtoe (*Fusconaia masoni*)—(1) *Prohibitions.* The following prohibitions that apply to endangered wildlife also apply to the Atlantic pigtoe. Except as provided under paragraphs (a)(2) and (3) of this section and §§ 17.4 and 17.5, it is unlawful for any person subject to the jurisdiction of the United States to commit, to attempt to commit, to solicit another to commit, or cause to be committed, any of the following acts in regard to this species:

(i) Import or export, as set forth at § 17.21(b) for endangered wildlife.

(ii) Take, as set forth at § 17.21(c)(1) for endangered wildlife.

(iii) Possession and other acts with unlawfully taken specimens, as set forth at § 17.21(d)(1) for endangered wildlife.

(iv) Interstate or foreign commerce in the course of commercial activity, as set forth at § 17.21(e) for endangered wildlife.

(v) Sale or offer for sale, as set forth at § 17.21(f) for endangered wildlife.

(2) *General exceptions from prohibitions.* In regard to this species, you may:

(i) Conduct activities as authorized by a permit under § 17.32.

(ii) Take, as set forth at § 17.21(c)(2) through (c)(4) for endangered wildlife.

(iii) Take, as set forth at § 17.31(b).

(iv) Possess and engage in other acts with unlawfully taken Atlantic pigtoe, as set forth at § 17.21(d)(2) through (4) for endangered wildlife.

(3) *Exceptions from prohibitions for specific types of incidental take.* The following entities and activities that cause take that is incidental to an otherwise lawful activity are not in violation of the prohibitions:

(i) Species restoration efforts by State wildlife agencies, including collection of broodstock, tissue collection for genetic analysis, captive propagation, and subsequent stocking into currently occupied and unoccupied areas within the historical range of the species, and follow-up monitoring.

(ii) Channel restoration projects that create natural, physically stable, ecologically functioning streams (or stream and wetland systems) that are reconnected with their groundwater aquifers. These projects can be accomplished using a variety of methods, but the desired outcome is a natural channel with low shear stress (force of water moving against the channel); bank heights that enable reconnection to the floodplain; a reconnection of surface and

groundwater systems, resulting in perennial flows in the channel; riffles and pools comprised of existing soil, rock, and wood instead of large imported materials; low compaction of soils within adjacent riparian areas; and inclusion of riparian wetlands. Streams reconstructed in this way would offer suitable habitats for the Atlantic pigtoe and contain stable channel features, such as pools, glides, runs, and riffles, which could be used by the species and its host fish for spawning, rearing, growth, feeding, migration, and other normal behaviors. Prior to restoration action, surveys to determine presence of Atlantic pigtoe must be performed, and if located, mussels must be relocated prior to project implementation.

(iii) Bank stabilization projects that use bioengineering methods to replace pre-existing, bare, eroding stream banks with vegetated, stable stream banks, thereby reducing bank erosion and instream sedimentation and improving habitat conditions for the species. Following these bioengineering methods, stream banks may be stabilized using native species live stakes (live, vegetative cuttings inserted or tamped into the ground in a manner that allows the stake to take root and grow), native species live fascines (live branch cuttings, usually willows, bound together into long, cigar-shaped bundles), or native species brush layering (cuttings or branches of easily rooted tree species layered between successive lifts of soil fill). Native vegetation includes woody species appropriate for the region and habitat conditions. These methods do not include the sole use of quarried rock (rip-rap) or the use of rock baskets or gabion structures.

(iv) Forestry-related activities, including silvicultural practices, forest management work, and fire control tactics, that implement State-approved best management practices. In order for this exception to apply to forestry-related activities, these best management practices must achieve all of the following:

(A) Establish a streamside management zone alongside the margins of each waterway.

(B) Restrain visible sedimentation caused by the forestry-related activity from entering the waterway.

(C) Maintain native groundcover within the streamside management zone of the waterway, and promptly re-establish native groundcover if disturbed.

(D) Limit installation of vehicle or equipment crossings of the waterway to only where necessary for the forestry-related activity. Such crossings shall:

(*1*) Have erosion and sedimentation control measures installed to divert surface runoff away and restrain visible sediment from entering the waterway;

(*2*) Allow for movement of aquatic organisms within the waterway; and

(*3*) Have native groundcover applied and maintained through completion of the forestry-related activity.

(E) Prohibit the use of tracked or wheeled vehicles for reforestation site preparation within the streamside management zone of the waterway.

(F) Prohibit locating log decks, skid trails, new roads, and portable mill sites in the streamside management zone of the waterway.

(G) Prohibit obstruction and impediment of the flow of water within the waterway that is caused by direct deposition of debris or soil by the forestry-related activity.

(H) Maintain shade over the waterway similar to that observed prior to the forestry-related activity.

(I) Prohibit discharge of any solid waste, petroleum, pesticide, fertilizer, or other chemical into the waterway.

(b) [Reserved]

■ 4. Amend § 17.95(f) immediately following the entry for ''Rabbitsfoot (*Quadrilla cylindrica cylindrica*)'' by adding an entry for ''Atlantic Pigtoe (*Fusconaia masoni*)'' to read as follows:

§ 17.95 Critical habitat—fish and wildlife.

* * * * *

(f) *Clams and Snails.*

* * * * *

Atlantic Pigtoe (Fusconaia masoni)

(1) Critical habitat units are depicted for Bath, Botetourt, Brunswick, Craig, Dinwiddie, Greensville, Halifax, Lunenburg, Mecklenburg, Nottoway, Pittsylvania, and Sussex Counties in Virginia, and Durham, Edgecombe, Franklin, Granville, Halifax, Johnston, Montgomery, Nash, Orange, Person, Pitt, Randolph, Rockingham, Vance, Wake, Warren, and Wilson Counties in North Carolina, on the maps in this entry.

(2) Within these areas, the physical or biological features essential to the conservation of Atlantic pigtoe consist of the following components:

(i) 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 freshwater mussel and native fish (such as stable riffle-run-pool habitats that provide flow refuges consisting of silt-free gravel and coarse sand substrates).

(ii) Adequate flows, or a hydrologic flow regime (which includes the severity, frequency, duration, and seasonality of discharge over time), necessary to maintain benthic 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 mussel's and fish hosts' habitat, food availability, spawning habitat for native fishes, and the ability for newly transformed juveniles to settle and become established in their habitats.

(iii) Water and sediment 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.

(iv) The presence and abundance of fish hosts necessary for recruitment of the Atlantic pigtoe.

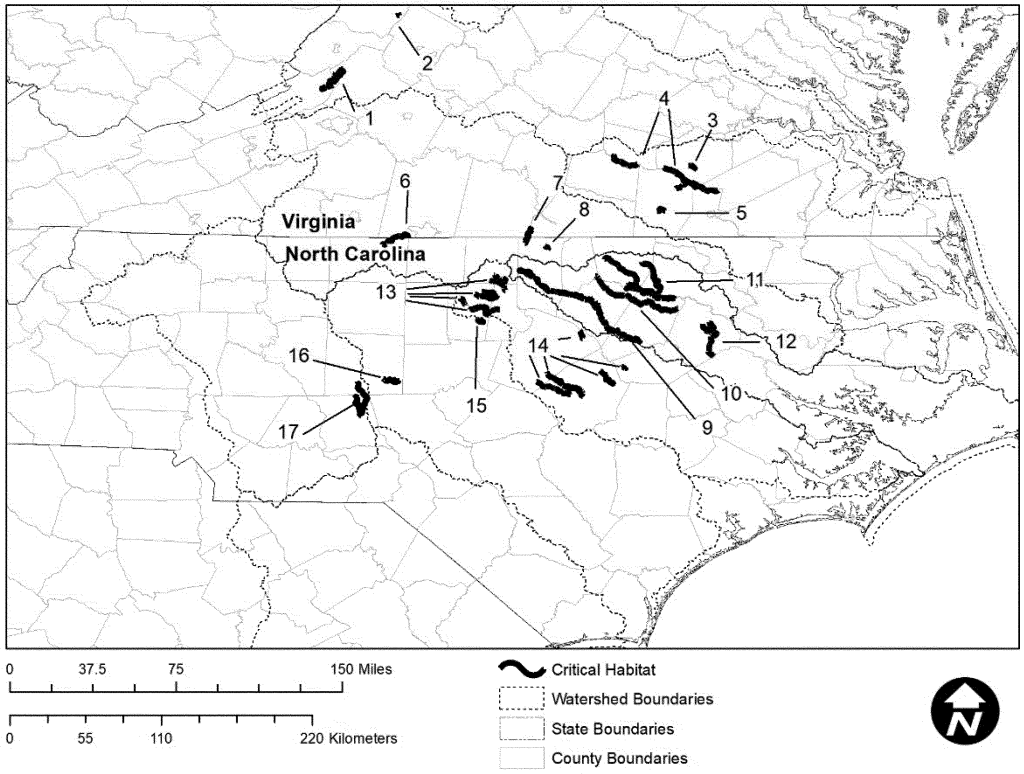
(3) Critical habitat does not include manmade structures (such as buildings, aqueducts, runways, roads, and other paved areas) and the land on which they are located existing within the legal boundaries on December 16, 2021.

(4) Data layers defining map units were created by overlaying Natural Heritage Element Occurrence data and U.S. Geological Survey (USGS) hydrologic data for stream reaches. The hydrologic data used in the critical habitat maps were extracted from the USGS 1:1M scale nationwide hydrologic layer (*https://nationalmap.gov/small_scale/mld/1nethyd.html)* with a projection of EPSG:4269–North American Datum of 1983 (NAD83) Geographic. The North Carolina and Virginia Natural Heritage program species presence data and the Virginia Department of Wildlife Resources species data were used to select specific stream segments for inclusion in the critical habitat layer. The maps in this entry, as modified by any accompanying regulatory text, establish the boundaries of the critical habitat designation. The coordinates or plot points on which each map is based are available to the public at *http://www.regulations.gov* under Docket No. FWS–R4–ES–2018–0046 and at the field office responsible for this designation. You may obtain field office location information by contacting one of the Service regional offices, the addresses of which are listed at 50 CFR 2.2.

(5) Note: Index map follows:

BILLING CODE 4333–15–P

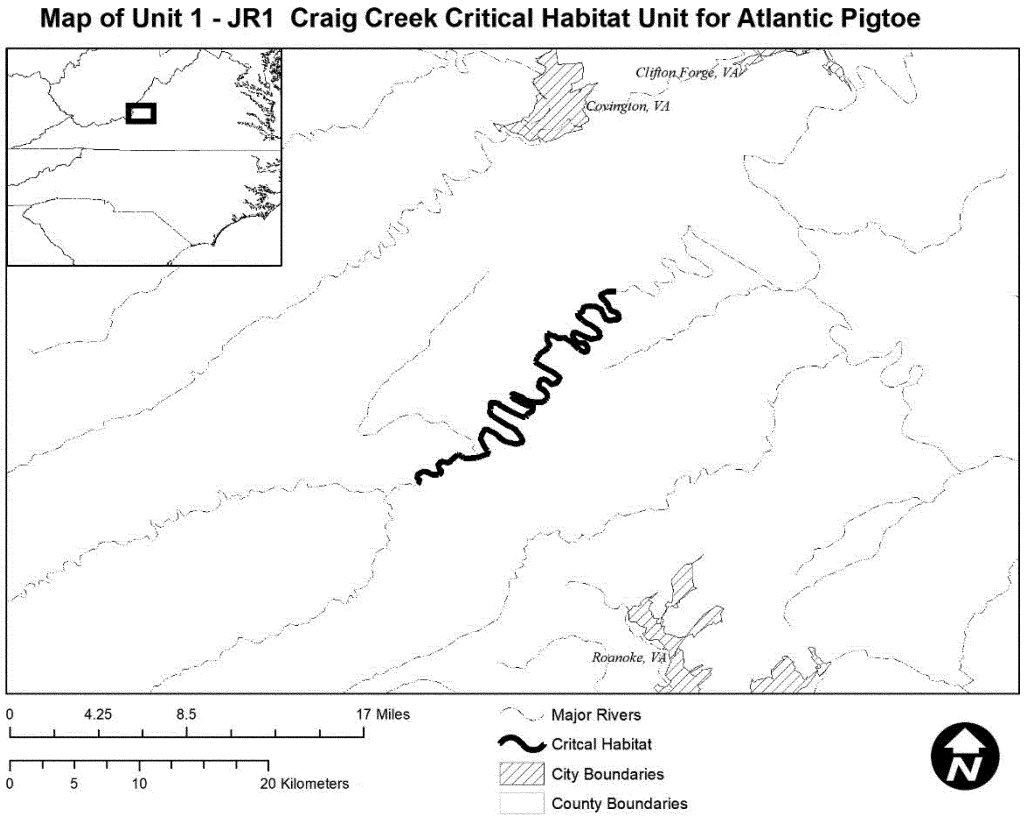
Index Map of Critical Habitat Units for Atlantic Pigtoe



(6) Unit 1: JR1—Craig Creek, Craig and Botetourt Counties, Virginia.

(i) This unit consists of 29 river miles (46.7 river kilometers (km)) of Craig Creek near VA Route 616 northeast of New Castle downstream to just below VA Route 817 crossing.

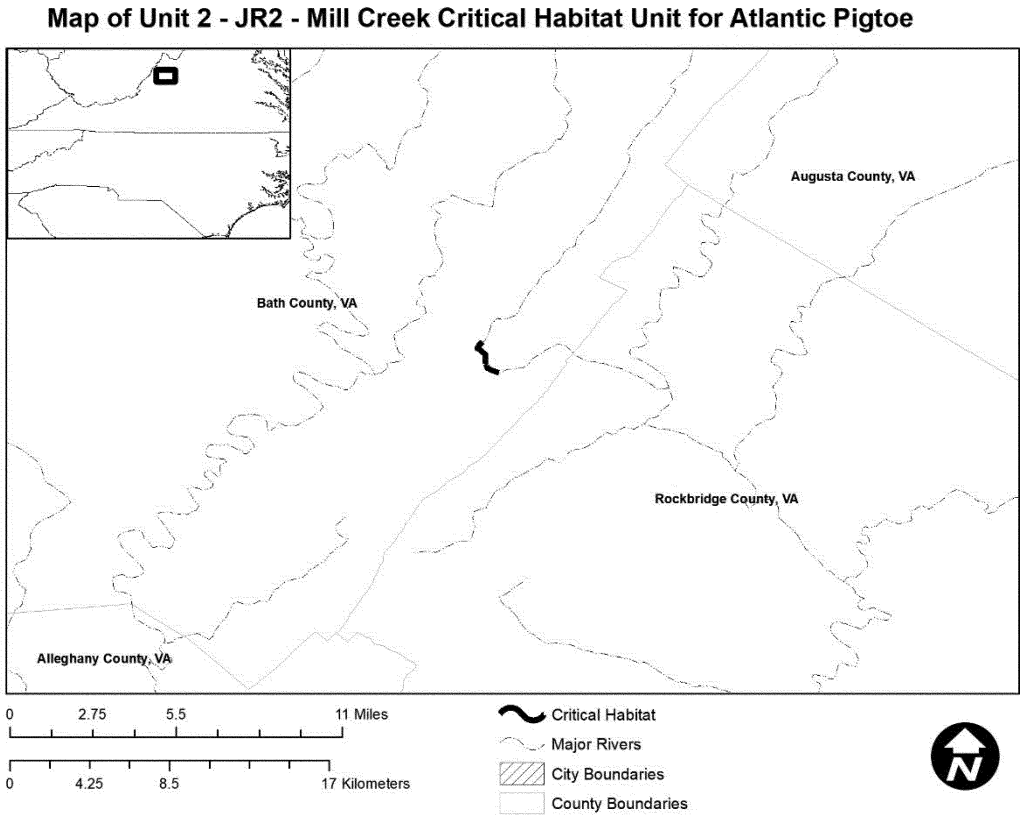
(ii) Map of Unit 1 (Craig Creek) follows:



(7) Unit 2: JR2—Mill Creek, Bath County, Virginia.

(i) This unit consists of a 1-mile (1.6-km) segment of Mill Creek at the VA39 (Mountain Valley Road) crossing.

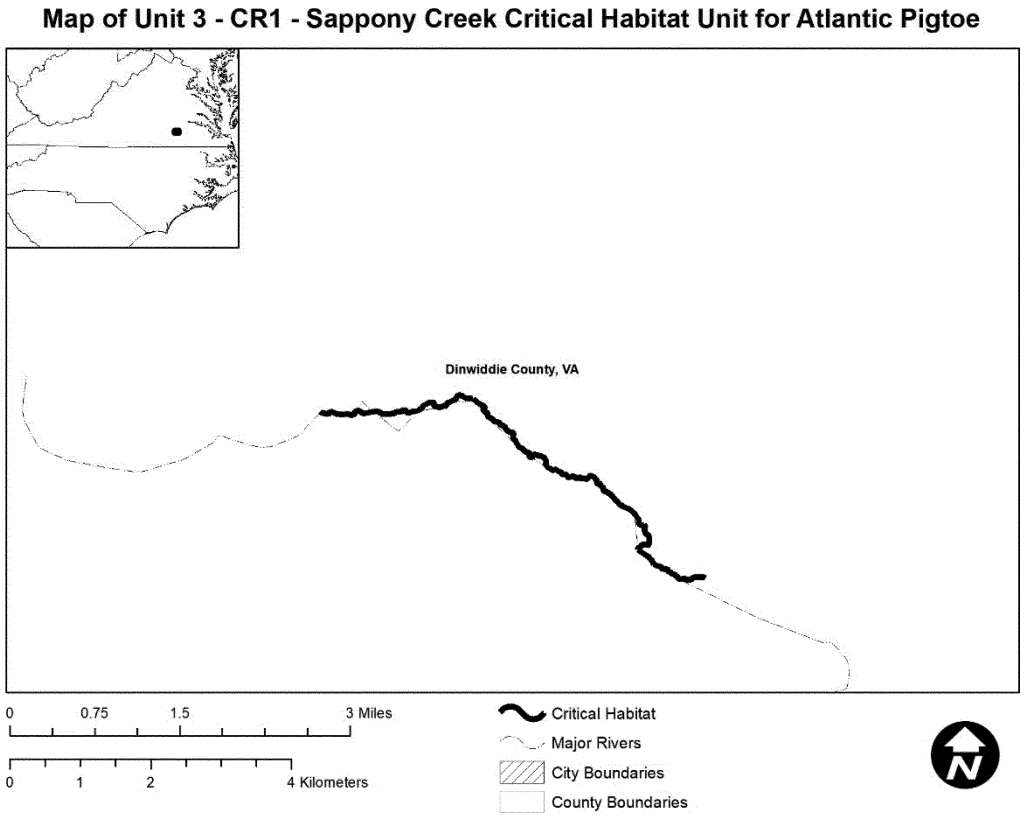
(ii) Map of Unit 2 (Mill Creek) follows:



(8) Unit 3: CR1—Sappony Creek, Dinwiddie County, Virginia.

(i) This unit consists of 4 river miles (6.6 river km) of Sappony Creek beginning just upstream of the Seaboard Railroad crossing and ending just downstream of the Shippings Road (SR709) crossing.

(ii) Map of Unit 3 (Sappony Creek) follows:

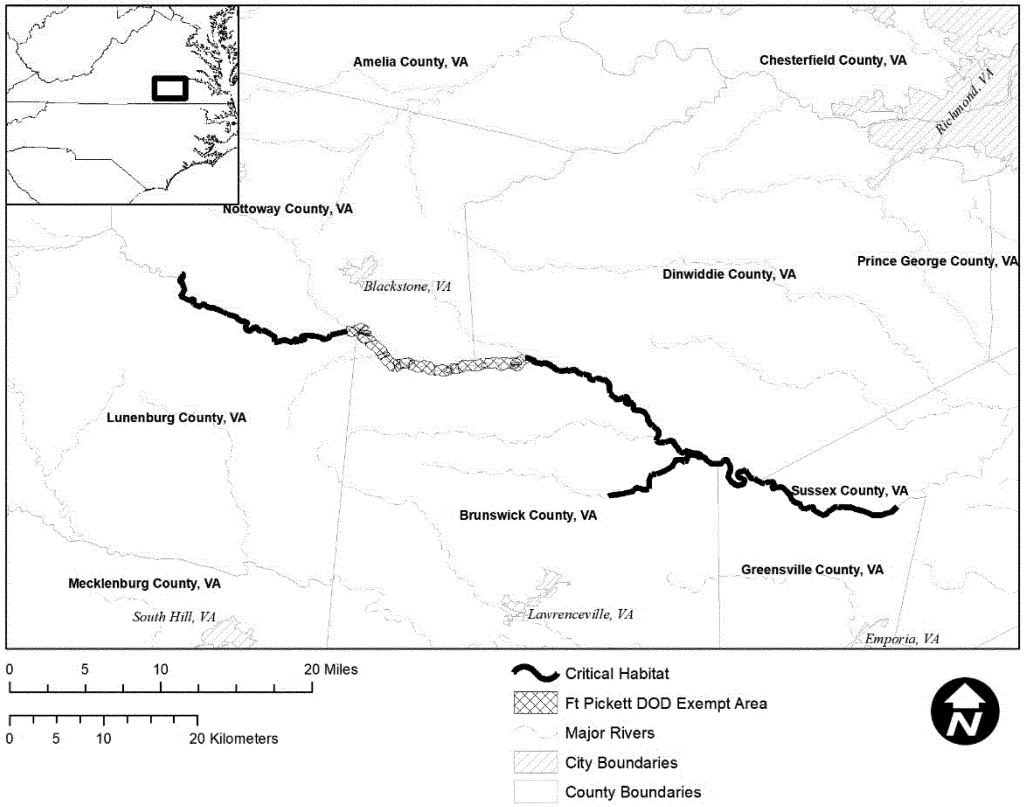


(9) Unit 4: CR2—Nottoway River Subbasin, Nottoway, Lunenburg, Brunswick, Dinwiddie, Greensville, and Sussex Counties, Virginia.

(i) This unit consists of 64 river miles (103 river km) of the Nottoway River, and a portion of Sturgeon Creek, beginning downstream of the Nottoway River's confluence with Dickerson Creek and ending just downstream of Little Mill Road, and includes Sturgeon Creek upstream of Old Stage Road. Land bordering the river is primarily privately owned, although some of the land along the river is part of the Fort Pickett National Guard Installation.

(ii) Map of Unit 4 (Nottoway River Subbasin) follows:

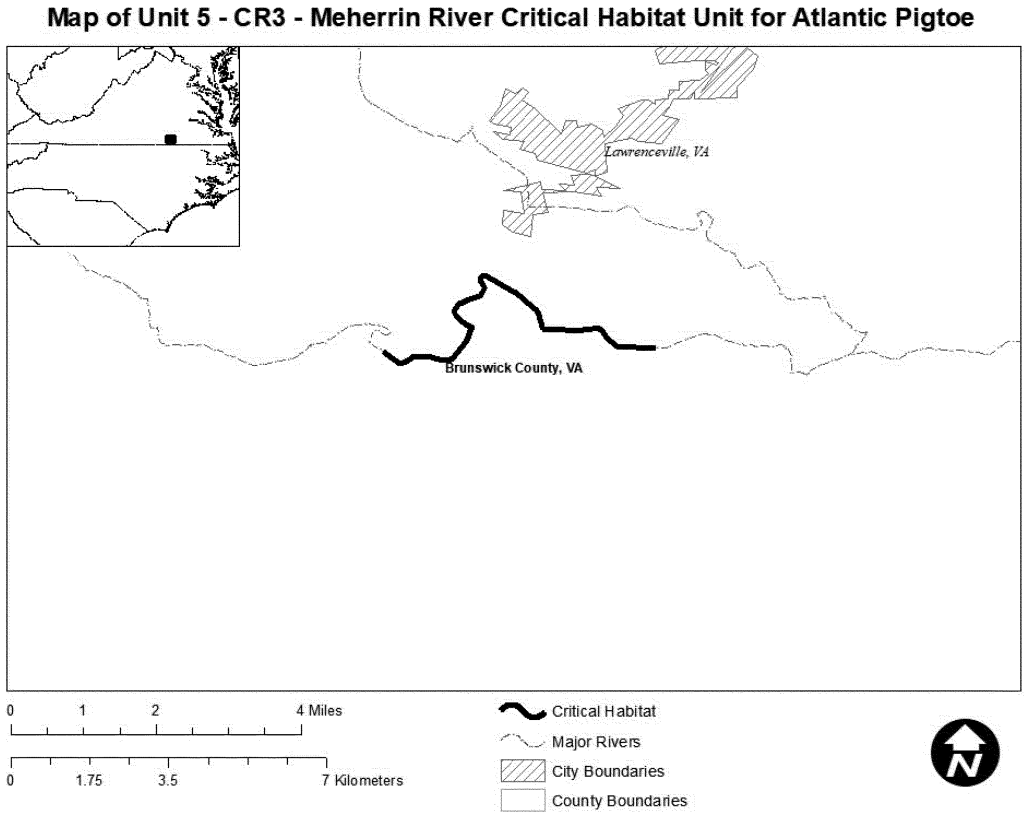
Map of Unit 4 - CR2 - Nottaway River Subbasin Critical Habitat Unit for Atlantic Pigtoe



(10) Unit 5: CR3—Meherrin River, Brunswick County, Virginia.

(i) This unit consists of 5 river miles (8 river km) of the Meherrin River from approximately 1.5 miles below the confluence with Saddletree Creek under VA Highway 46 (Christana Highway) to VA715 (Iron Bridge Road).

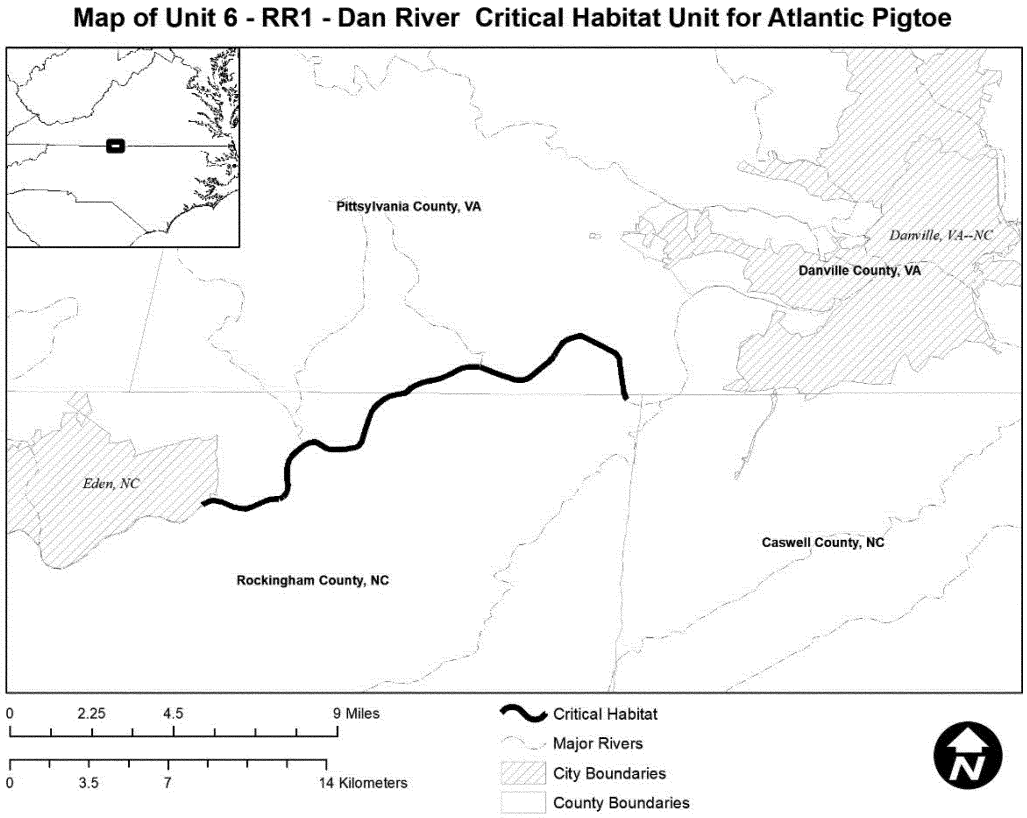
(ii) Map of Unit 5 (Meherrin River) follows:



(11) Unit 6: RR1—Dan River, Pittsylvania County, Virginia, and Rockingham County, North Carolina.

(i) This unit consists of 14 river miles (22.5 river km) of the Dan River along the border of Virginia and North Carolina from just upstream of NC Highway 700 near Eden, North Carolina, into Pittsylvania County, Virginia, and downstream to the confluence with Williamson Creek in Rockingham County, North Carolina.

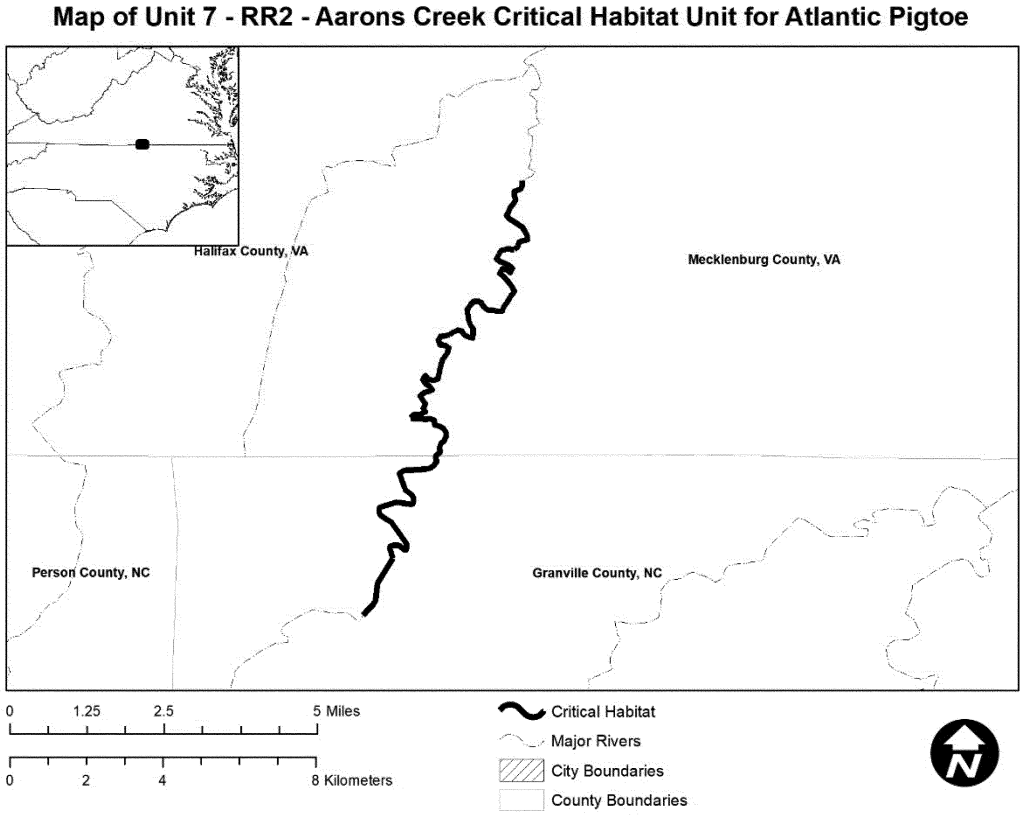
(ii) Map of Unit 6 (Dan River) follows:



(12) Unit 7: RR2—Aarons Creek, Granville County, North Carolina, and Mecklenburg and Halifax Counties, Virginia.

(i) This unit consists of 12 river miles (19.3 river km) of Aarons Creek, from NC96 in Granville County, North Carolina, downstream across the North Carolina-Virginia border to just upstream of VA602 (White House Road) along the Mecklenburg County-Halifax County line in Virginia.

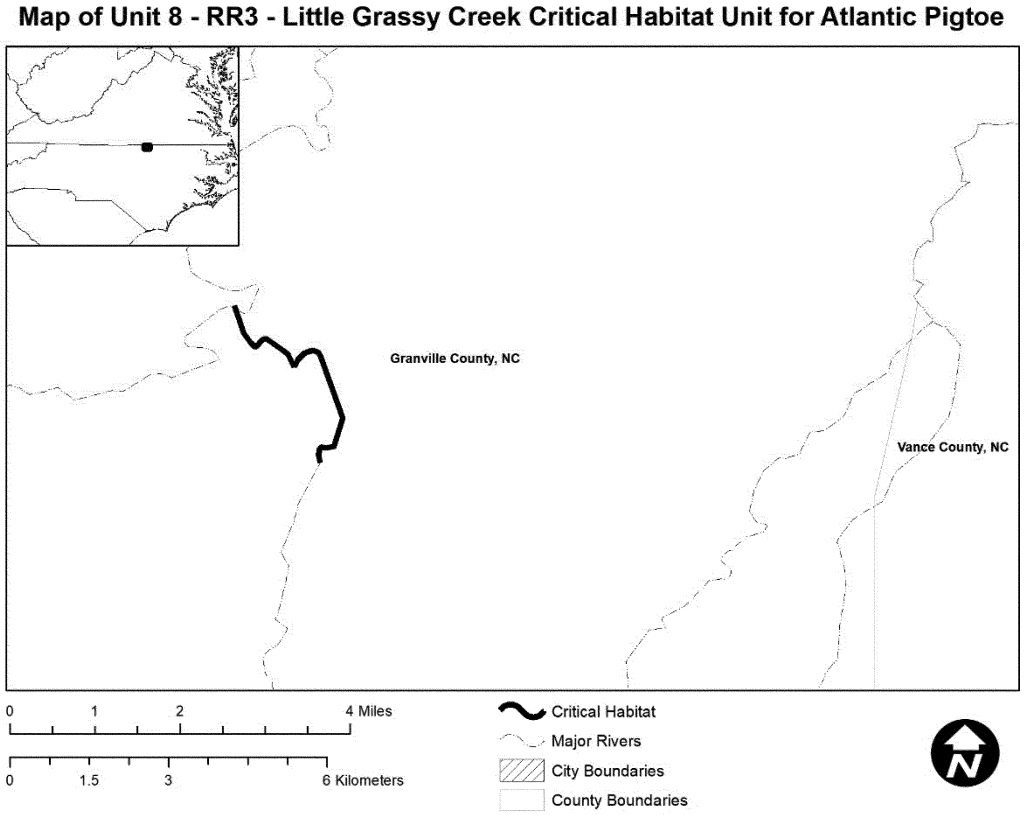
(ii) Map of Unit 7 (Aarons Creek) follows:



(13) Unit 8: RR3—Little Grassy Creek, Granville County, North Carolina.

(i) This unit consists of 3 river miles (4.8 river km) of Little Grassy Creek in Granville County, North Carolina, beginning at the Crawford Currin Road crossing and ending at the confluence with Grassy Creek.

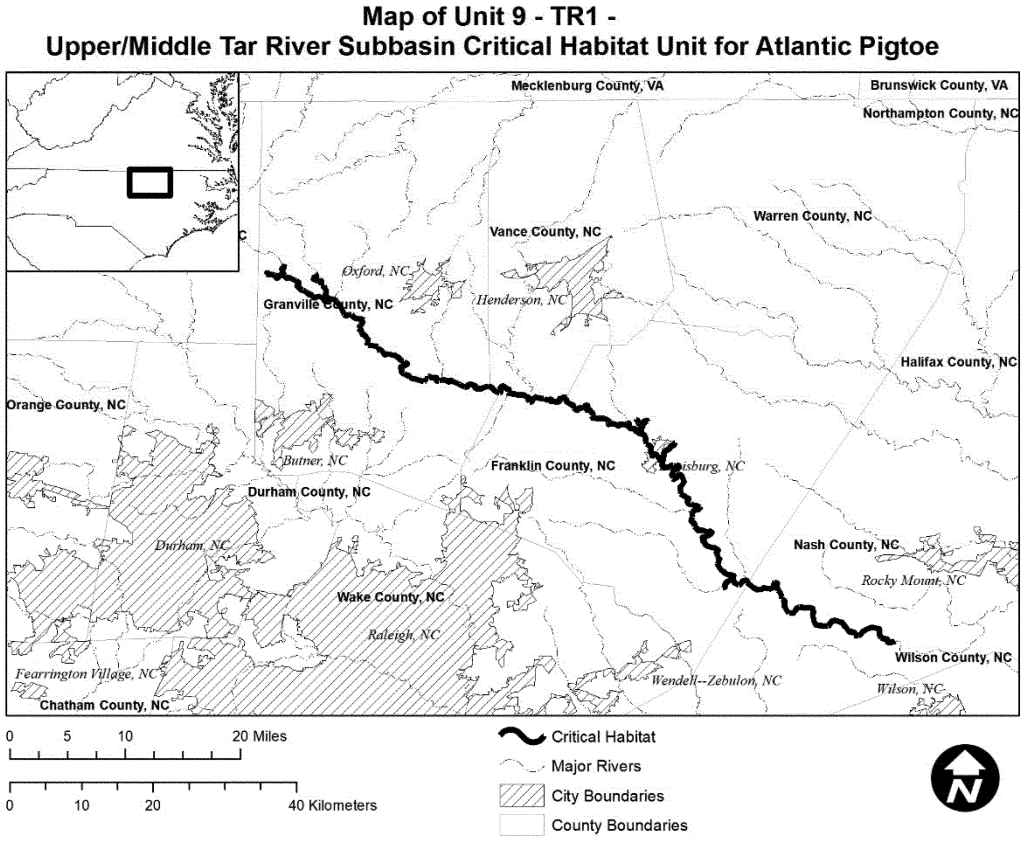
(ii) Map of Unit 8 (Little Grassy Creek) follows:



(14) Unit 9: TR1—Upper/Middle Tar River Subbasin, Granville, Vance, Franklin, and Nash Counties, North Carolina.

(i) This unit consists of 91 river miles (146.5 river km) of the mainstem of the upper and middle Tar River as well as several tributaries (Bear Swamp Creek, Fox Creek, Crooked Creek, Cub Creek, and Shelton Creek), all in North Carolina. The portion of Cub Creek starts near Hobgood Road and continues to the confluence with the Tar River; the Tar River portion starts just upstream of the NC158 bridge and goes downstream to the NC581 crossing; the Shelton Creek portion starts upstream of NC158 and goes downstream to the confluence with the Tar River; the Bear Swamp Creek portion begins upstream of Dyking Road and goes downstream to the confluence with the Tar River (and includes an unnamed tributary upstream of Beasley Road); the Fox Creek portion begins downstream of NC561 and goes to the confluence with the Tar River; and the Crooked Creek portion begins upstream of NC98 crossing and goes downstream to confluence with Tar River.

(ii) Map of Unit 9 (Upper/Middle Tar River Subbasin) follows:

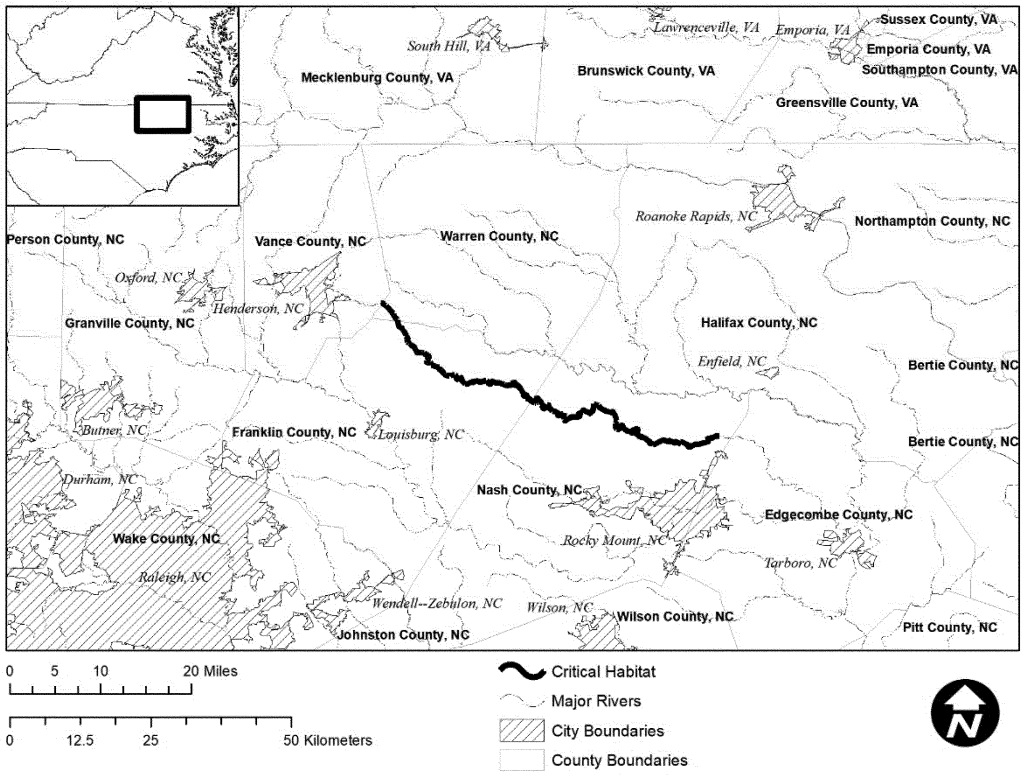


(15) Unit 10: TR2—Sandy/Swift Creek, Warren, Franklin, and Nash Counties, North Carolina.

(i) This unit consists of a 50-mile (80.5-km) segment of Sandy/Swift Creek beginning at Southerland Mill Road and continuing downstream to NC301.

(ii) Map of Unit 10 (Sandy/Swift Creek) follows:

Map of Unit 10 - TR2 - Sandy/Swift Creek Critical Habitat Unit for Atlantic Pigtoe

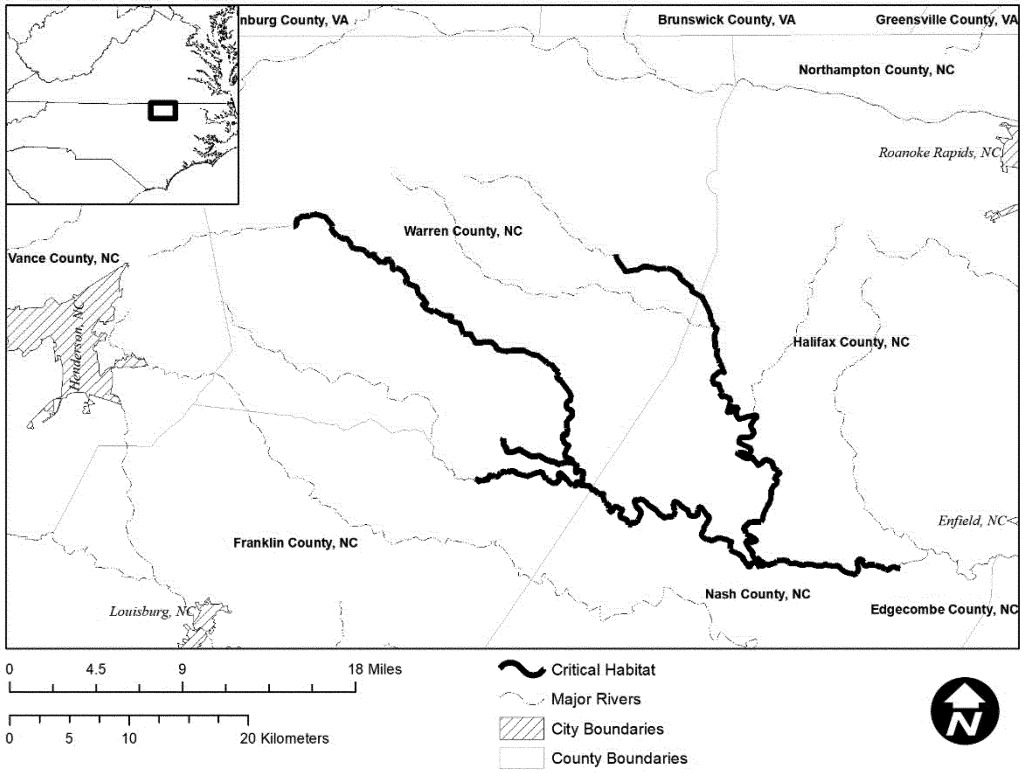


(16) Unit 11: TR3—Fishing Creek Subbasin, Warren, Halifax, Franklin, and Nash Counties, North Carolina.

(i) This unit consists of 85 river miles (136.8 river km) in Fishing Creek, Little Fishing Creek, Shocco Creek, and Maple Branch. The Shocco Creek portion begins downstream of the NC58 bridge and continues to the confluence with Fishing Creek; the entirety of Maple Branch is included, down to the confluence with Fishing Creek; Fishing Creek begins at Axtell Ridgeway Road (SR1112) and goes downstream to I–95; and Little Fishing Creek begins upstream of Briston Brown Road (SR1532) and goes downstream to the confluence with Fishing Creek.

(ii) Map of Unit 11 (Fishing Creek Subbasin) follows:

Map of Unit 11 - TR3 - Fishing Creek Subbasin Critical Habitat Unit for Atlantic Pigtoe

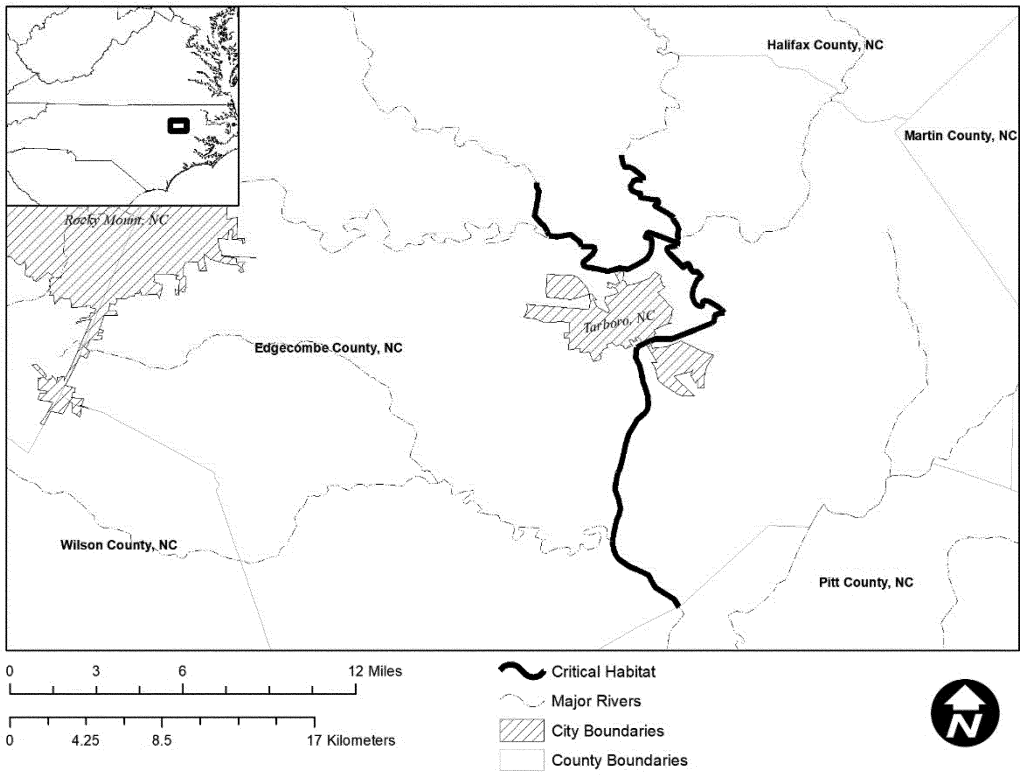


(17) Unit 12: TR4—Lower Tar River, Edgecombe and Pitt Counties, North Carolina.

(i) This unit consists of 30 river miles (48.3 river km) of the Lower Tar River, lower Swift Creek, and Fishing Creek in Edgecombe County, North Carolina, from NC97 near Leggett, North Carolina, to the Edgecombe County-Pitt County line near NC33.

(ii) Map of Unit 12 (Lower Tar River) follows:

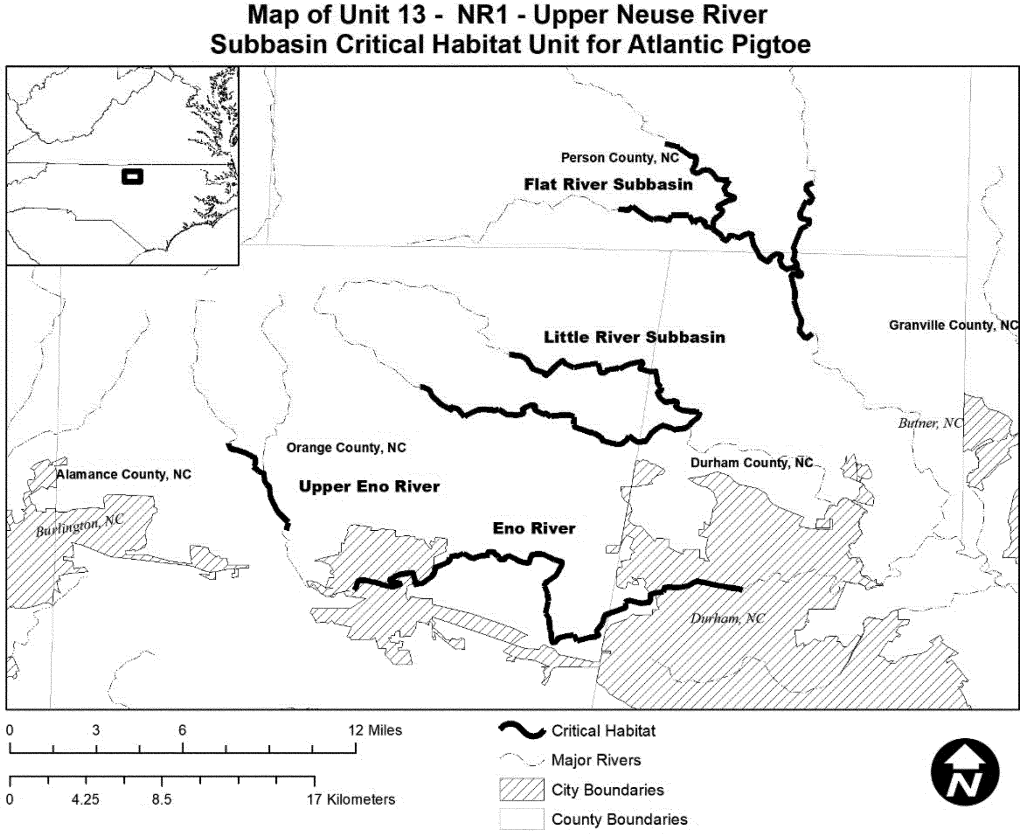
Map of Unit 12 - TR4 - Lower Tar River Critical Habitat Unit for Atlantic Pigtoe



(18) Unit 13: NR1—Upper Neuse River Subbasin, Person, Durham, and Orange Counties, North Carolina.

(i) This unit consists of 60 river miles (95 river km) in four reaches including Flat River, Little River, Eno River, and the Upper Eno River. The Flat River reach consists of 19 river miles (30.6 river km) in the Flat River Subbasin in Person and Durham Counties, North Carolina, including the South Flat River downstream of Dick Coleman Road, the North Flat River near Parsonage Road, and Deep Creek near Helena-Moriah Road downstream where each river converges into the Flat River downstream of State Forest Road. The Little River Subbasin includes 18 river miles (29 river km) of the North Fork and South Fork Little Rivers in Orange and Durham Counties, North Carolina. The Upper Eno River reach consists of 4 river miles (6.4 river km) in Orange County, North Carolina, including the West Fork Eno River upstream of Cedar Grove Road to the confluence with McGowan Creek. The Eno River reach consists of 18 river miles (29 river km) in Orange and Durham Counties, North Carolina, from below Eno Mountain Road to NC15–501.

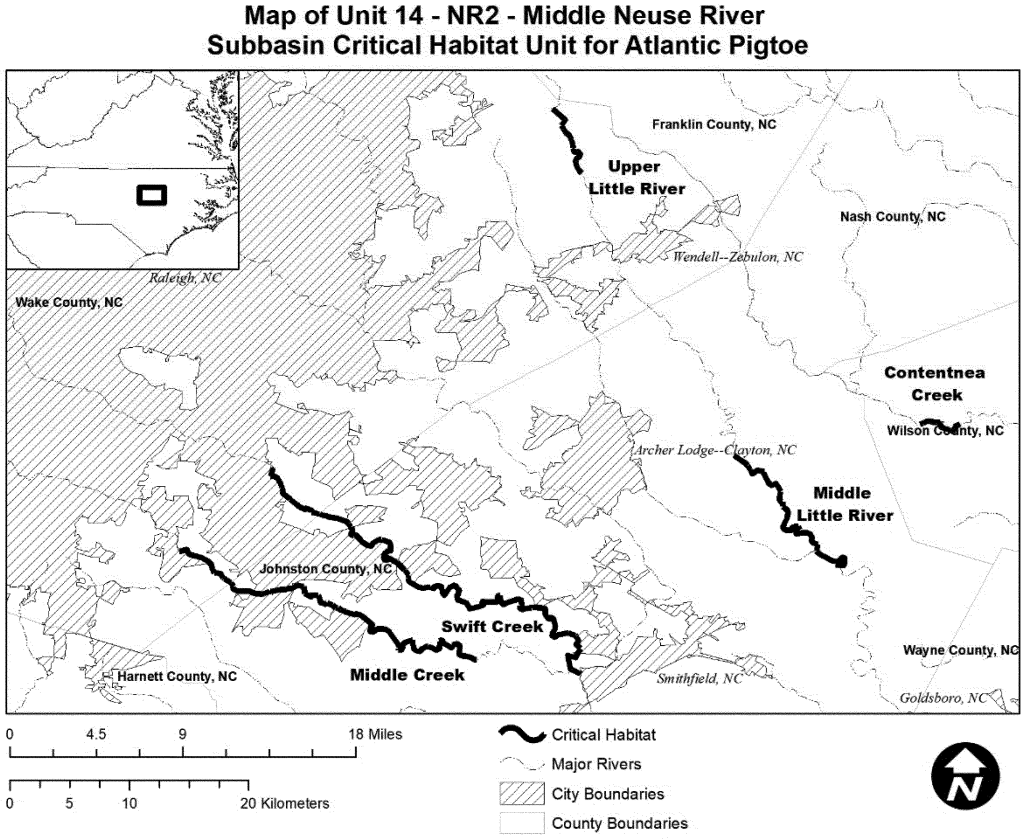
(ii) Map of Unit 13 (Upper Neuse River Subbasin) follows:



(19) Unit 14: NR2—Middle Neuse River Subbasin, Wake, Johnston, and Wilson Counties, North Carolina.

(i) This unit consists of 61 river miles (98.2 river km) in five reaches including Swift Creek, Middle Creek, Upper Little River, Middle Little River, and Contentnea Creek, all in North Carolina. The Middle Creek reach is 19 river miles (30.6 river km) below Old Stage Road downstream to below Crantock Road, and the Swift Creek reach is 25 river miles (40.2 river km) from Lake Benson downstream to its confluence with the Neuse, both in Wake and Johnston Counties. The Upper Little River reach includes 4 river miles (6.4 river km) of the Upper Little River from the confluence with Perry Creek to Fowler Road in Wake County, North Carolina. The Middle Little River reach includes 11 river miles (17.7 river km) from Atkinsons Mill downstream to NC301 in Johnston County, North Carolina. The Contentnea Creek reach consists of 2 river miles (3.2 river km) below Buckhorn Reservoir to just below Sadie Road near NC581 in Wilson County, North Carolina.

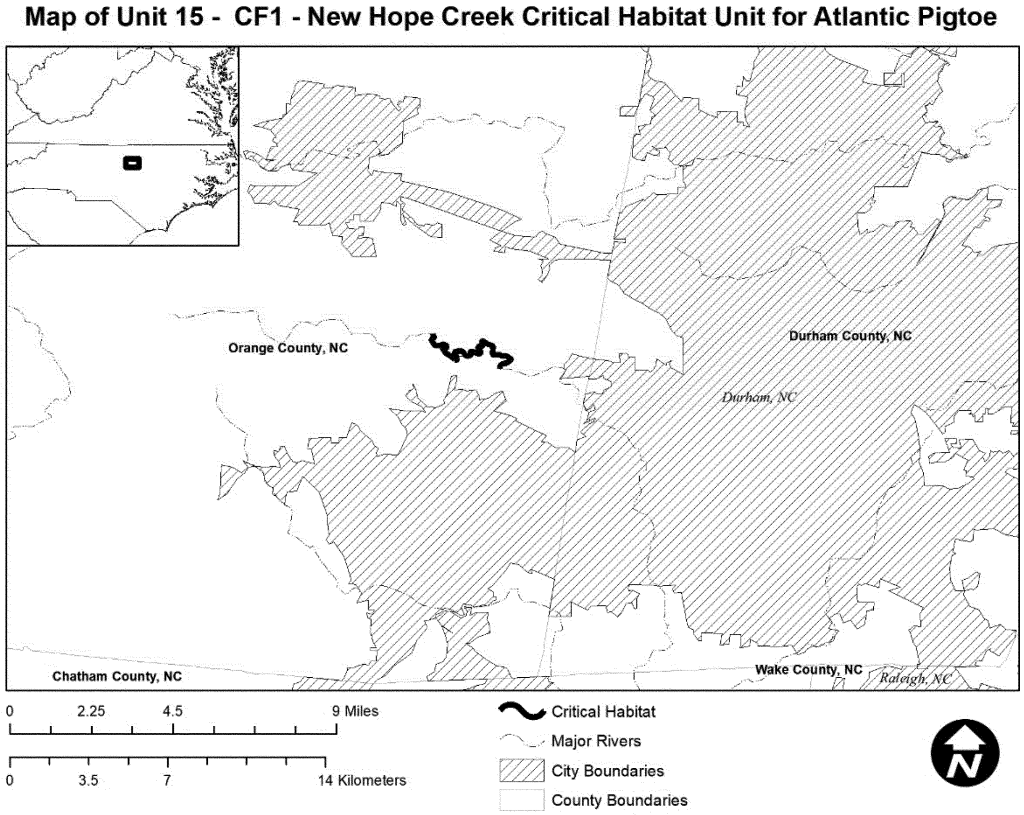
(ii) Map of Unit 14 (Middle Neuse River Subbasin) follows:



(20) Unit 15: CF1—New Hope Creek, Orange County, North Carolina.

(i) This unit consists of 4 river miles (6.4 river km) of habitat in the New Hope Creek from NC86 to Mimosa Road.

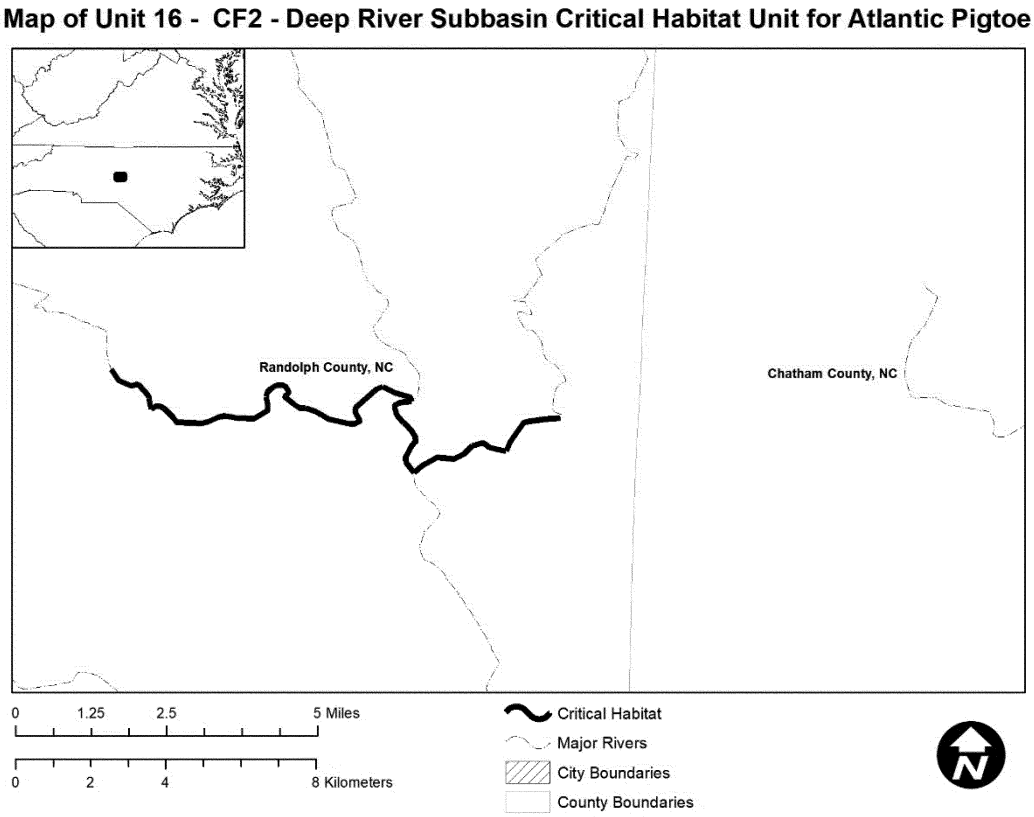
(ii) Map of Unit 15 (New Hope Creek) follows:



(21) Unit 16: CF2—Deep River Subbasin, Randolph County, North Carolina.

(i) The Deep River Subbasin unit consists of 10 river miles (16.1 river km), including the mainstem between Richland and Brush Creeks as well as Richland Creek from Little Beane Store Road to the confluence with the Deep River and Brush Creek from Brush Creek Road to the confluence with the Deep River.

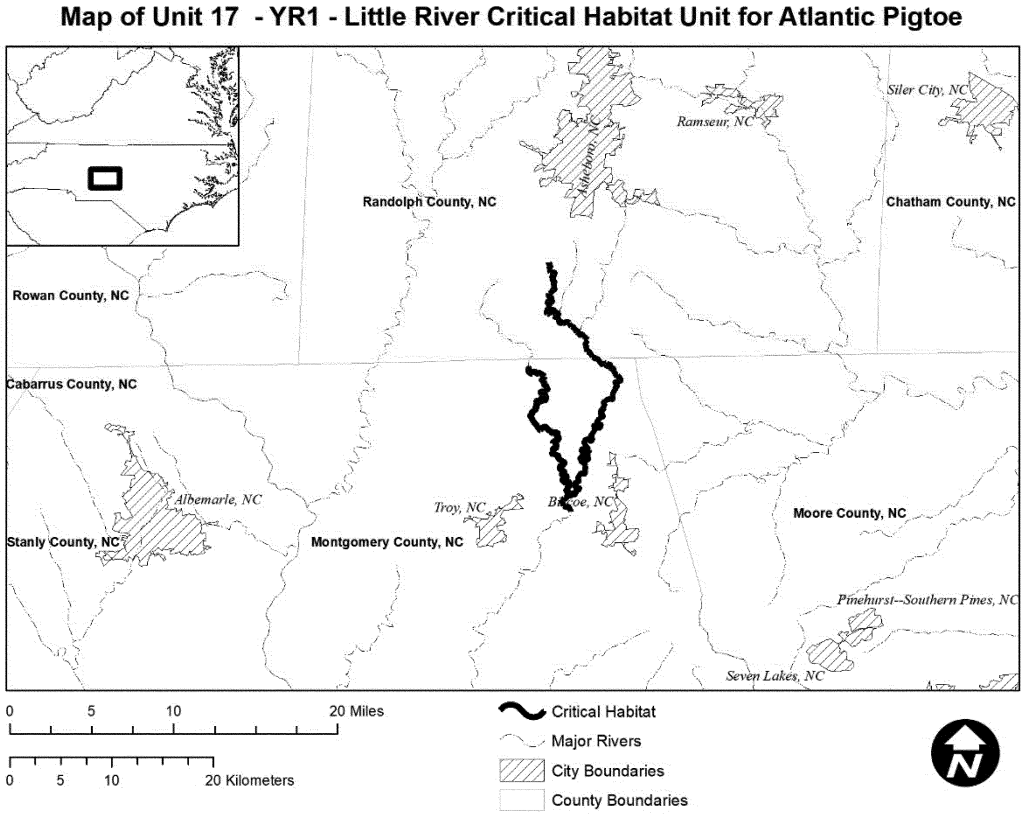
(ii) Map of Unit 16 (Deep River Subbasin) follows:



(22) Unit 17: YR1—Little River, Randolph and Montgomery Counties, North Carolina.

(i) This unit consists of 40 river miles (64.4 river km) of Little River from SR1114 downstream to Okeewemee Star Road, including the West Fork Little River from NC134 to the confluence with the Little River.

(ii) Map of Unit 17 (Little River) follows:



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Martha Williams

Principal Deputy Director, Exercising the Delegated Authority of the Director, U.S. Fish and Wildlife Service.

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