United States Department of the Interior

FISH AND WILDLIFE SERVICE
Southeast Region

Standing Analysis
North Carolina Statewide Determination Key

Prepared by

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and

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1 INTRODUCTION

1.1 PURPOSE OF STANDING ANALYSIS

This Standing Analysis provides an optional, streamlined alternative consultation process for federal action agencies to address potential effects of future actions, pursuant to section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.; Act), to the species and critical habitats listed in Table 1. The U.S. Fish and Wildlife Service (Service) developed this standing analysis to streamline the process of reviewing actions that would result in a "may affect, not likely to adversely affect" (NLAA) determination for the subject species and critical habitat(s). This standing analysis also provides proactive technical assistance to federal action agencies in making a "no effect" (NE) determination.

This standing analysis provides an optional consultation process that is available to federal agencies for federal actions that meet the criteria described below as delivered through a Determination Key (DKey) in the Service's Information for Planning and Consultation (IPaC) application. To obtain consultation documents, including technical assistance for NE and concurrence with NLAA determinations, federal agencies must use the associated DKey in IPaC to answer questions about the proposed action. By screening the project through the DKey, all or part of the standing analysis is adopted by the federal action agency and used to submit a concurrence request to support their NLAA determination. It also provides technical information to help agencies determine whether an action will have no effect on the species or critical habitat. Formal consultation under ESA Section 7(a)(2) is required for actions that "may affect" (MA) a listed species and critical habitat, unless the Service concurs in writing that actions are not likely to adversely affect listed species and critical habitat. Actions which an action agency determines will have no effect on species or critical habitat do not require submittal to the Service.

With the IPaC DKey established for this standing analysis, the action agency may receive a letter of concurrence for eligible projects by providing specific information requested by the DKey. Throughout the remainder of this document, statements regarding this standing analysis refer to both the standing analysis and the associated DKey.

Species not included in this IPaC DKey and standing analysis may be included in other existing DKeys and standing analyses (e.g. northern long-eared bat). See section 3.1.3 for a list of species that are excluded from the North Carolina statewide DKey.

Table 1. Species included in the North Carolina statewide DKey. "ESA" indicates listing status; "T" = threatened, "E" = endangered. "CH" indicates whether Critical Habitat for that species is included in the DKey.

DKey group	common name	scientific name	ESA	CH
amphibians	Neuse River waterdog	*Necturus lewisi*	T	X
clams	Appalachian elktoe	*Alasmidonta raveneliana*	E	X
clams	Atlantic pigtoe	*Fusconaia masoni*	T	X
clams	Carolina heelsplitter	*Lasmigona decorata*	E	X
clams	dwarf wedgemussel	*Alasmidonta heterodon*	E	
clams	James spinymussel	*Parvaspina collina*	E	
clams	longsolid	*Fusconaia subrotunda*	T	
clams	purple bean	*Villosa perpurpurea*	E	

DKey group	common name	scientific name	ESA	CH
clams	Tar River spinymussel	*Parvaspina steinstansana*	E	
clams	yellow lance	*Elliptio lanceolata*	T	X
fishes	Cape Fear shiner	*Notropis mekistocholas*	E	X
fishes	Carolina madtom	*Noturus furiosus*	E	X
fishes	spotfin chub	*Erimonax monachus*	T	X
fishes	Waccamaw silverside	*Menidia extensa*	T	
birds	piping plover	*Charadrius melodus*	T	X
birds	rufa red knot	*Calidris canutus rufa*	T	
birds	roseate tern	*Sterna dougallii dougallii*	E	
birds	eastern black rail	*Laterallus jamaicensis jamaicensis*	T	
birds	red-cockaded woodpecker	*Picoides borealis*	T	
flowering plants	American chaffseed	*Schwalbea americana*	E	
flowering plants	Blue Ridge goldenrod	*Solidago spithamaea*	T	
flowering plants	bunched arrowhead	*Sagittaria fasciculata*	E	
flowering plants	Canby's dropwort	*Oxypolis canbyi*	E	
flowering plants	Cooley's meadowrue	*Thalictrum cooleyi*	E	
flowering plants	golden sedge	*Carex lutea*	E	X
flowering plants	green pitcher-plant	*Sarracenia oreophila*	E	
flowering plants	harperella	*Ptilimnium nodosum*	E	
flowering plants	Heller's blazingstar	*Liatris helleri*	T	
flowering plants	Michaux's sumac	*Rhus michauxii*	E	
flowering plants	mountain golden heather	*Hudsonia montana*	T	X
flowering plants	mountain sweet pitcher-plant	*Sarracenia rubra* ssp. *jonesii*	E	
flowering plants	pondberry	*Lindera melissifolia*	E	
flowering plants	Roan Mountain bluet	*Hedyotis purpurea* var. *montana*	E	
flowering plants	rough-leaved loosestrife	*Lysimachia asperulaefolia*	E	
flowering plants	Schweinitz's sunflower	*Helianthus schweinitzii*	E	
flowering plants	seabeach amaranth	*Amaranthus pumilus*	T	
flowering plants	sensitive joint-vetch	*Aeschynomene virginica*	T	
flowering plants	small whorled pogonia	*Isotria medeoloides*	T	
flowering plants	small-anthered bittercress	*Cardamine micranthera*	E	
flowering plants	smooth coneflower	*Echinacea laevigata*	T	
flowering plants	spreading avens	*Geum radiatum*	E	
flowering plants	swamp pink	*Helonias bullata*	T	
flowering plants	Virginia spiraea	*Spiraea virginiana*	T	
flowering plants	white irisette	*Sisyrinchium dichotomum*	E	
lichens	rock gnome lichen	*Gymnoderma lineare*	E	
insects	Saint Francis' satyr butterfly	*Neonympha mitchellii francisci*	E	
arachnids	spruce-fir moss spider	*Microhexura montivaga*	E	X
mammals	Carolina northern flying squirrel	*Glaucomys sabrinus coloratus*	E	
mammals	gray bat	*Myotis grisescens*	E	
mammals	Virginia big-eared bat	*Corynorhinus townsendii virginianus*	E	
mammals	West Indian manatee	*Trichechus manatus*	T	

DKey group	common name	scientific name	ESA	CH
reptiles	green sea turtle	*Chelonia mydas*	T	
reptiles	hawksbill sea turtle	*Eretmochelys imbricata*	E	
reptiles	Kemp's ridley sea turtle	*Lepidochelys kempii*	E	
reptiles	leatherback sea turtle	*Dermochelys coriacea*	E	
reptiles	loggerhead sea turtle	*Caretta caretta*	T	X
snails	magnificent ramshorn	*Planorbella magnifica*	E	
snails	noonday globe snail	*Mesodon clarki nantahala*	T	

1.2 Benefits of the Standing Analysis

For those federal actions that the Service has accumulated significant knowledge in analyzing previously, the Service is able to develop a standing analysis to streamline the consultation process for eligible federal actions. The streamlined process facilitated by this standing analysis will reduce the amount of Service staff time necessary to review actions requesting consultation and provide federal agencies, consultants, and other project proponents a predictable, consistent, and timely response for qualified actions. In addition, development of a standing analysis to assess the impacts of individual projects allows the Service to more efficiently track multiple independent actions on listed species and critical habitat.

1.3 Eligibility for use of the Standing Analysis

A standing analysis does not convey concurrence with NLAA determinations for individual projects. Rather, it serves as a streamlining tool. Action agencies may use it to develop their request for concurrence from the Service and support their finding that the action is not likely to adversely affect species and critical habitat. The standing analysis also allows the Service to quickly evaluate an action agency's analysis of effects to listed species and critical habitat. If the action agency's proposed action is consistent with covered[1] area and covered activities, including any required conservation measures in the standing analysis, the Service will concur that the action will have insignificant, discountable, or completely beneficial effects on the relevant listed species and critical habitat (i.e., NLAA).

The standing analysis may also provide technical information to help agencies identify actions that will have no effects to the listed species and critical habitat. For projects that do not qualify to use the standing analysis, action agencies/project proponents should coordinate directly with the local Ecological Services Field Office (ESFO) and address any consultation requirements, as appropriate.

1.4 Ensuring Accurate Determinations

As is true in all consultation procedures, the Service relies on complete and accurate information provided by federal action agencies during consultation. To apply this standing analysis to a project, it is

[1] The term "covered" is used throughout this document to define the limits of use of a standing analysis. However, although the area, activities, and species are "covered" by the standing analysis, the future activities themselves are not "covered" by the standing analysis; there are additional steps (with or without a DKey) that take place for an action agency to utilize the information in the standing analysis and to request FWS concurrence that their proposed action is NLAA for listed species and critical habitat.

the responsibility of the action agency/project proponent to provide information that is truthful and accurate and that fully represents the entire scope of the project in order to comply with the Act.

Utilize the Project Review / Consultation webpages for the Asheville and Raleigh Ecological Service Field Offices, to assist in collecting appropriate information and making determinations through the North Carolina statewide DKey or otherwise.

- Asheville Field Office Project Review Guide: https://www.fws.gov/office/asheville-ecological-services/asheville-field-office-online-review-process-overview
- Raleigh Field Office Project Planning and Consultation webpage: https://www.fws.gov/office/eastern-north-carolina-ecological-services/project-planning-and-consultation

1.4.1 Delineating the action area (i.e., project area)

Under the Endangered Species Act, the "action area" (also referred to as "project area" in this DKey) includes "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" (Figure 1). The action area is not limited to the "footprint" of the action nor is it limited by the Federal action agency's authority. A detailed account and analysis of all project activities is necessary to encompass all temporary and permanent changes to "land, water, and air" caused by activities that would not occur but for the proposed action and are reasonably certain to occur. The action area also includes areas that are used to help offset project impacts (e.g., areas where species are to be relocated, mitigation areas, etc.).

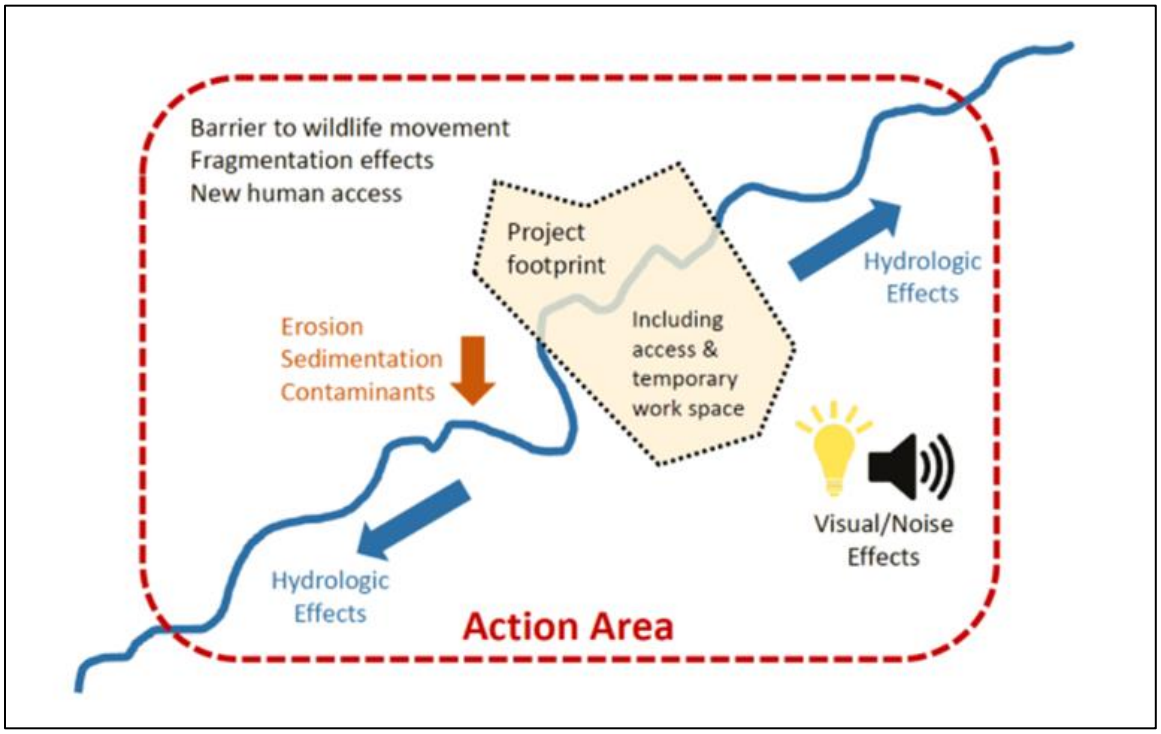


Figure 1. Diagram of a hypothetical action area in a riparian area and some of its potential impacts. The action area includes the project footprint and all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action.

1.4.2 Evaluating suitable habitat within the action area

Determine whether listed species may occur based on the habitat within the action area. For each species evaluated by this DKey, use the best available information to determine whether the action area contains suitable habitat. Habitat assessments or surveys must be conducted by a qualified professional during appropriate survey times (referred to in this document as "valid"). Survey reports and supporting documents should be uploaded through the DKey. Handling or research on endangered plants and animals is a regulated activity. State and federal permits may be required for certain species. The following steps should be taken to address issues of suitable habitat:

- If you can confirm suitable habitat is absent within the action area, document what source(s) of information you consulted and justification for this conclusion.
- If you determine that suitable habitat may be present or are uncertain whether habitat may support listed species, a detailed habitat assessment is recommended.
- If suitable habitat occurs within the action area, species surveys are recommended if the suitable habitat cannot be avoided. Document that suitable habitat is present along with the source(s) of information you consulted and justification for this conclusion. Upload any survey reports through the DKey.
- If suitable habitat occurs within the action area but surveys are not conducted, include this information in your project review package. It may be necessary to assume presence for species in these circumstances and consider implementing appropriate avoidance and minimization measures, accordingly.

1.4.3 Outcomes of the DKey process

Project details may not always be accurately captured through the questions included in this DKey. While this DKey is an effort to streamline consultations, we first and foremost want to help action agencies ensure accurate determinations:

- A "no effect" conclusion would be appropriate if the proposed action – or other activities that are caused by the proposed action – would have no consequences, positive or negative, to listed species or Critical Habitat. Concurrence from the Service is not required.
- A "may affect" determination would be appropriate if the proposed action – or other activities that are caused by the proposed action – may have consequences to listed species or Critical Habitat.
- A proposed action warrants a "may affect, not likely to be adversely affect" finding when its effects – and the effects of other activities that are caused by the proposed action – are wholly beneficial, insignificant, or discountable. Beneficial effects have contemporaneous positive effects without any adverse effects to the species or habitat. Insignificant effects relate to the size of the impact and include those effects that are undetectable, not measurable, or cannot be evaluated. Discountable effects are those extremely unlikely to occur. These determinations require informal consultation and written concurrence from the Service.

An action agency should always reach out to the appropriate Service personnel if there are questions or disagreements regarding the determinations reached using this DKey.

1.5 Updates to the Standing Analysis

This standing analysis will be reviewed annually and updated as needed to ensure the analysis contains the best scientific and commercial data available. This update process will include regular reviews to ensure that the analysis is accurate and valid, and that the standing analysis still meets the Act's requirements. All updates will also ensure that the logic is sound and determinations are appropriate for covered activities. Updates will be signed under an updated cover.

Projects reviewed under this standing analysis must rely on the version that is current on the date consultation is completed. For reference, both current and previous versions of the standing analysis will be maintained by the lead field office.

If we revise the standing analysis and determine reinitiation is required for any ongoing activities that used the previous standing analysis, notification of a change will be provided within IPaC.

For example, the North Carolina statewide DKey and standing analysis will be updated after listing of a new species that is intended to be covered, or if the Service intends to cover an activity not currently considered in the existing standing analysis.

2 Covered Area

This standing analysis applies within the entire state of North Carolina (Figure 2), unless otherwise excluded (Section 3.1). To qualify to use this standing analysis, a project's action area must fall completely within the covered area (i.e. the action area cannot overlap state lines).

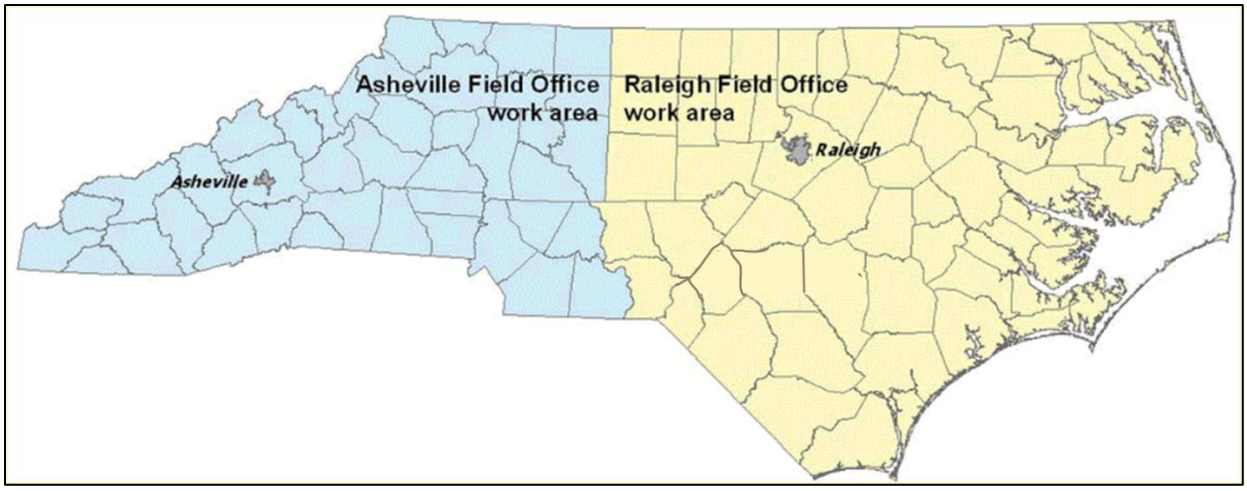


Figure 2. State of North Carolina boundaries and relevant USFWS Ecological Field Office work areas. DKey questions may differ between field offices.

3 Covered Activity Description

The activities described herein include all activities addressed in this standing analysis. The activity description, conservation measures, and covered area inform the standing analysis and describe which specific activities are appropriate for NE or NLAA outcomes under this analysis. The description of

activities and their inclusion in the standing analysis should not be construed to indicate that these activities will always result in effects to the species or its critical habitat, nor is it meant to cover activities that fall outside of the analysis as described below. Action agencies are not required to use this standing analysis; they continue to have the option to request individual consultation on a project; however, in most cases, we anticipate use of the standing analysis will substantially decrease consultation timeframes.

This standing analysis applies to activities that meet one of the following conditions: are conducted outside suitable habitat for federally listed species; do not modify suitable habitat and thus do not result in indirect effects to individuals; or in some cases when there is suitable habitat and it will be affected, but individuals are either not present or they are present and effects are so minor as to be insignificant or discountable. Conversely, activities occurring within suitable habitat and/or activities that degrade habitat or adversely affect individuals are excluded from this analysis due to their elevated risk to protected resources.

3.1 LIMITS/SIDEBOARDS

To assist action agencies/project proponents in determining whether their project meets the requirements of this standing analysis, the Service will provide a series of questions (Appendix A) to assess whether the action is not likely to adversely affect listed species or critical habitat because the impacts are either unable to be meaningfully measured, detected, or evaluated and, therefore, insignificant; or extremely unlikely to occur and, therefore, discountable. Any actions that are likely to adversely affect a listed species or critical habitat do not qualify under this standing analysis and require separate individual project review and consultation by the local ESFO.

Actions that include certain activities, occur in certain geographic areas, or meet one or more context-dependent conditions will not be eligible to use the standing analysis. For projects requiring consultation (i.e., that "may affect" listed species or critical habitats) that do not qualify due to one or more of these exclusions, action agencies/project proponents must contact the appropriate ESFO directly to complete their consultation requirements.

3.1.1 Activity-based limits/sideboards

To receive the Service's technical assistance acknowledgement of an action agency's NE determination or the Service's concurrence for a NLAA determination, based on this standing analysis, actions and activities may NOT include the following:

- Actions that are covered by the Clearance to Proceed with Federally-Insured Loan and Grant Project Requests Determination Key.
- Projects that include or will cause intentional take of listed species.
- Actions that are already covered by a biological opinion. Also, actions where the action agency is following all conservation measures, project design criteria, best management practices, and reasonable and prudent measures as outlined in a biological opinion.
- Permanent adverse effects to physical and biological features (PBFs) of Critical Habitat.

3.1.2 Location-based limits/sideboards

This standing analysis will apply to activities with action areas located entirely within the state of North Carolina, and the listed species and critical habitats that may overlap those action areas (Table 1, Figure 1).

3.1.3 Taxa-based limits/sideboards

Some species are excluded from this analysis. Table 1 lists the species and Critical Habitat that are covered by this key.

The following listed species are believed to be extirpated from North Carolina and are therefore not included in the DKey covered by this SA:

- Rusty-patched bumble bee (*Bombus affinis*)

The following listed species are covered by other DKeys, and are not included in the North Carolina Statewide DKey covered by this SA:

- Indiana bat (*Myotis sodalis*)
- Northern long-eared bat (*Myotis septentrionalis*)
- Tricolored bat (*Perimyotis subflavus*)

3.2 CONSERVATION MEASURES

This standing analysis applies conservation measures as design features to avoid adverse effects on an individual, population, or species. The Service has previously found that incorporation of certain conservation measures, while voluntarily adopted by action agencies, has reduced effects to the extent that the actions do not require formal consultation and the Service and the action agency have found that actions are not likely to adversely affect species and critical habitat. Projects using this standing analysis to support a determination of NE or NLAA must meet all the requirements of the standing analysis. The inability to voluntarily adopt certain conservation measures may result in a project not qualifying to use this standing analysis.

3.2.1 General conservation measures and other requisites

Habitat assessments and presence surveys: An important early step in designing a project is to evaluate the action area for the existence of listed species and their habitats. The IPaC online tool will determine whether the project is within the listed geographic area of a species and has the potential to impact species, but site-specific research is needed to determine whether the action area contains actual risks to species. Appropriate surveying can streamline consultation and permitting because demonstrated absence of species and habitats may allow for NE and NLAA determinations. Thorough knowledge of the action area also facilitates the development of effective conservation measures. Some general guidelines for gathering existing survey data and initiating new surveys include:

- Surveys must be conducted by qualified biologists who can clearly demonstrate the ability to identify species in the wild and recognize their suitable habitat.
    - Surveys must follow applicable guidelines, include a thorough search of suitable habitats within the action area, and occur during the appropriate seasonal window (e.g. during the breeding season). Surveys outside appropriate survey times may not be accepted as valid without prior approval from the appropriate Service biologist.
- Targeted botanical surveys should comply with seasonal timelines determined by the Service, available online at https://www.fws.gov/story/2022-03/north-carolinas-federally-threatened-endangered-and-risk-plant-species.
- Those surveying for listed animals must have a section 10(a)(1)(A) permit from the Service or be conducting surveys with a permitted individual or agency if there is a chance that animals will be captured and handled.

Habitat protection

- Avoid impacts to suitable habitat for listed species or their Critical Habitats.
- Minimize project creep by clearly delineating and maintaining project boundaries (including staging areas).
- Maximize use of disturbed land for all project activities (i.e., siting, lay-down areas, and construction).
- Restrict unauthorized access to natural areas adjacent to the project site by erecting a barrier and/or avoidance buffers (e.g., gate, fence, wall) to minimize foot traffic and off-road vehicle uses.
- Avoid soil disturbance, excavation, or other activities that could impact wetland hydrology adjacent to and within wetlands.

4 COVERED SPECIES AND CRITICAL HABITAT

The following section includes a summary of relevant background information on the species and critical habitat(s) used to develop this standing analysis. A complete description of the species can be found on ECOS (https://ecos.fws.gov). This overview is included to inform the reader of the species prior to the analysis of the effects of the action presented below. Species and critical habitats within a project's action area that may be affected by the proposed action, but are not covered by this standing analysis, will require individual consultation with the local ESFO.

4.1 AMPHIBIANS

4.1.1 Neuse River waterdog *Necturus lewisi*

The Neuse River waterdog is a permanently aquatic, medium-sized salamander measuring 6-11 inches long (USFWS 2021a). It is characterized by a reddish-brown body with bluish-black spots, a pale underside, a laterally compressed tail and feathery red gills. Compared to other members of the genus *Necturus*, the Neuse River waterdog is larger, more robust, and exhibits more extensive spotting. It is distinct from the dwarf waterdog (*N. punctatus*) due to its size, spotting pattern, and restricted geographic range. The species page is available at https://www.fws.gov/species/neuse-river-waterdog-necturus-lewisi.

The Neuse River waterdog is found only in the Neuse and Tar-Pamlico River basins of North Carolina. This species inhabits medium to large streams and rivers with moderate to fast currents, clean and well-oxygenated water, and cool temperatures. Individuals often shelter under rocks, logs, or root masses, and suitable habitats include rivers with sandy or gravelly bottoms and large woody debris. It prefers stable substrates such as large flat rocks, submerged logs, leaf packs, and root masses, typically in forested or semi-forested riparian zones with minimal sedimentation and pollution. Streams with heavy siltation or chemical contamination are avoided. The Neuse River Waterdog is carnivorous, feeding primarily at night on aquatic macroinvertebrates such as insect larvae (including caddisflies, stoneflies, and mayflies), snails, worms, and small crustaceans like crayfish.

The Neuse River waterdog was listed as Threatened in June 2021 (86 FR 30688). High-risk activities for this species include stream channelization, dredging, loss of riparian buffers, dam construction, and sedimentation from poorly maintained road crossings and urban stormwater discharge. These activities

can bury eggs, dislodge larvae, reduce prey availability, and displace adults by degrading or fragmenting habitat. Stream flow modifications from dams and culverts fragment habitats and increase sedimentation, while urban and agricultural runoff introduces pollutants such as heavy metals, nutrients, and pesticides.

4.1.1.1 Neuse River waterdog Critical Habitat

Critical habitat for the species was designated in June 2021, covering approximately 779 river miles across 18 counties in the Neuse and Tar-Pamlico River basins (86 FR 30688). These areas provide flowing, cool, well-oxygenated water, clean substrates, and forested riparian buffers that help reduce sedimentation and pollutants. The physical or biological features essential to the conservation of the Neuse River Waterdog consist of:

1) geomorphically stable stream channels and banks that resist erosion and maintain their shape over time
2) stable riffle-run-pool habitats that offer flow refuges composed of silt-free gravel, small cobble, coarse sand, and leaf litter—essential for abundant cover and burrows used for nesting
3) water flow sufficient to preserve instream habitats and maintain connectivity between streams within the floodplain
4) water quality necessary to sustain natural physiological process for normal behavior
5) abundant prey including invertebrates and fish

4.2 CLAMS (FRESHWATER MUSSELS)

4.2.1 Overview

There are nine species of freshwater mussels included in this analysis. The following summary briefly describes the relevant biology of these species (e.g. USFWS 2021b) as well as general habitat requirements and common threats.

Freshwater mussels gather nutrients and food (e.g., detritus, plankton, other microorganisms) through filter feeding. Adult mussels are sedentary. During reproduction, males release sperm into the water column; females take sperm in through their siphons and use it to fertilize their eggs internally. Fertilized eggs develop into a larval stage (glochidia). When the glochidia are released from the female, they must attach to the gills or fins of a suitable fish host in order to survive and transform into juveniles. After transformation, juveniles drop off and settle into the substrate. The timing of reproduction varies by species. Mussel reproduction requires stable, undisturbed habitats and a sufficient population of fish hosts to complete a mussel's glochidial development.

The covered freshwater mussels require adequate water quality (defined by factors including temperature, turbidity, dissolved oxygen, and chemical constituents) that meets or exceeds the current aquatic life criteria established under the Clean Water Act, as amended (33 U.S.C. 1251 et seq.); permanently flowing water; and a geomorphically stable stream channel (a channel that maintains its lateral dimensions, longitudinal profile, and spatial pattern over time without a consistent aggrading or degrading bed elevation). Juvenile mussels may be particularly sensitive to water quality degradation or toxins, although all mussels are negatively impacted by pollution and degradation of the aquatic ecosystem. Juvenile mussels also require stable interstitial spaces in sand and gravel where they can settle safely after dropping from their fish hosts.

Major threats to mussel populations include habitat degradation, sedimentation, and water pollution. Sources of these threats include urban runoff, damming, poor riparian management, stream channelization, dredging, impoundment, wastewater discharge, road construction, livestock access, all-terrain vehicle crossings, and stream bank erosion. Invasive species may compete with or prey upon juvenile mussels. Barriers to fish movement, including dams and improperly designed culverts, limit mussels' access to host fish. Water quality degradation affects both mussels and host fish, reducing survival and reproduction. Mussel recruitment depends on host fish presence and accessibility, so impacts to host fish directly threaten mussel viability.

4.2.2 Appalachian elktoe *Alasmidonta raveneliana*

The Appalachian elktoe has a thin shell reaching a length of approximately 4 inches (USFWS 2022a). The outer surface is smooth and yellowish-green to brown with variable greenish rays. Fertilization occurs in late summer or fall, and females brood glochidia in their gills through winter until release in spring. The known host fish includes the banded sculpin (*Cottus carolinae*). The species page is available at https://www.fws.gov/carp/species/appalachian-elktoe-alasmidonta-raveneliana.

The Appalachian elktoe was listed as Endangered in November 1994 (59 FR 60324). This species occurs in North Carolina and Tennessee. In North Carolina, it is found in the Cheoah, Tuckasegee, and Little Tennessee rivers of the Little Tennessee River basin; the Pigeon, Little, Mills, and French Broad rivers of the French Broad River system; and the North Toe, South Toe, Toe, Cane, and Nolichucky rivers of the upper Nolichucky River system. The ecological region is the Blue Ridge. The species lives in relatively shallow and medium-sized creeks and rivers with cool, clean, well-oxygenated, moderate- to fast-flowing water. Substrates typically include stable mixtures of sand, gravel, and cobble.

4.2.2.1 Appalachian elktoe Critical Habitat

Critical Habitat for Appalachian elktoe was designated in September 2002 (67 FR 61016). The physical or biological features essential to the conservation of the Appalachian elktoe consist of:

1) cool, swift flowing perennial streams with high oxygen levels
2) geomorphically stable stream channels and banks that maintain structural integrity and resist erosion
3) pool, riffle, and run sequences within the channel
4) stable substrates, including sand, gravel, cobble, boulders, or bedrock, with only minimal fine sediment accumulation
5) moderate to high stream gradient
6) periodic natural flooding
7) fish hosts, with adequate living, foraging, and spawning areas for them

4.2.3 Atlantic pigtoe *Fusconaia masoni*

The Atlantic pigtoe is a small- to medium-sized freshwater mussel that rarely exceeds a length of 2 inches (USFWS 2021b). Distinguishing features include its small size; thick, wedge-shaped shell; yellowish-brown or greenish-brown outer surface, and white nacre. Identified fish hosts include bluegill (*Lepomis macrochirus*), common shiner (*Luxilus cornutus*), satinfin shiner (*Cyprinella analostana*), and mountain redbelly dace (*Chrosomus oreas*). Gravid females have been recorded from late June through early July. The species page is available at https://www.fws.gov/species/atlantic-pigtoe-fusconaia-masoni.

The Atlantic pigtoe was listed as Threatened in November2021 (86 FR 64000). The species occurs in North Carolina and Virginia. The species inhabits medium to large streams and rivers with moderate to fast flows and stable substrates composed of sand, gravel, and cobble. It occurs in clean, well-oxygenated water in riffle-run habitats and is often found near the downstream ends of riffles or in shallow runs. Habitat requirements include clean, flowing waters with high dissolved oxygen concentrations and gravel beds or coarse sand habitats downstream of riffles.

4.2.3.1 Atlantic pigtoe Critical Habitat

Critical habitat for the Atlantic pigtoe was designated in November 2021 in 17 units totaling approximately 563 river miles in North Carolina and Virginia (86 FR 64000). The physical or biological features essential to the conservation of the Atlantic pigtoe consist of:

1) geomorphically stable stream channels and banks
2) stable riffle-run-pool habitats that provide flow refuges consisting of silt-free gravel and coarse sand substrates
3) water flow adequate to maintain instream habitats and maintain connectivity of streams within the floodplain
4) water and sediment quality necessary to sustain natural physiological process for normal behavior, growth and viability of all life stages
5) the presence and abundance of fish hosts necessary for Atlantic pigtoe recruitment

4.2.4 Carolina heelsplitter *Lasmigona decorata*

The Carolina heelsplitter is a medium-sized mussel with a thin, elliptical shell reaching a length of up to 4.5 inches (USFWS 2025a). Known fish hosts include bluehead chub (*Nocomis leptocephalus*), creek chub (*Semotilus atromaculatus*), highfin shiner (*Notropis procne*) and tessellated darter (*Etheostoma olmstedi*). The species page is available at https://www.fws.gov/species/carolina-heelsplitter-lasmigona-decorata.

The Carolina heelsplitter was listed as Endangered in June 1993 (58 FR 34926). The species is endemic to the slate belt geologic province in North and South Carolina. Once more numerous and widely distributed, there are only eleven known surviving populations, one in North Carolina and ten in South Carolina. The North Carolina population is contained in the Pee Dee River and Catawba River basins. The Carolina heelsplitter is found in small to medium-sized streams and rivers with stable banks, well-vegetated riparian zones, and substrates composed of mud, sand, or gravel. It avoids impounded waters and prefers flowing streams with relatively good water quality.

4.2.4.1 Carolina heelsplitter Critical Habitat

Critical Habitat for the Carolina heelsplitter was designated in July 2002 (67 FR 44502). The physical or biological features essential to the conservation of Carolina heelsplitter consist of:

1) cool, swift flowing perennial streams with high oxygen levels
2) geomorphically stable stream and river channels and banks
3) pool, riffle, and run sequences within the channel
4) stable substrates with no more than low amounts of fine sediment
5) moderate stream gradient
6) periodic natural flooding
7) fish hosts, with adequate living, foraging, and spawning areas for them

4.2.5 dwarf wedgemussel *Alasmidonta heterodon*

The dwarf wedgemussel is a small freshwater mussel, rarely exceeding a length of 1.8 inches (USFWS 2019a). It has a relatively thin oval shell, yellowish-brown or dark brown in color. The presence of two lateral teeth in the left valve and only one in the right valve distinguishes the dwarf wedgemussel from all other species of freshwater mussels in North America. Fish hosts vary: slimy sculpin (*Cottus cognatus*) and Atlantic salmon (*Salmo salar*) parr in northern populations and tessellated and Johnny (*Etheostoma nigrum*) darters in southern waters, including North Carolina. The species page is available at https://www.fws.gov/species/dwarf-wedge-mussel-alasmidonta-heterodon.

The dwarf wedgemussel was listed as Endangered in March 1990 (55 FR 9447). This species inhabits a wide range of freshwater systems along the Atlantic seaboard, from small creeks to large rivers. In North Carolina, the dwarf wedgemussel occurs in the Neuse and Tar River systems, in piedmont and mountain streams with cobble and gravel riffles. Suitable habitat for the dwarf wedgemussel includes (1) shallow, slow flowing sites; (2) penetrable silt, coarse sand and gravel with wood and vegetation substrates; (3) within or downstream of areas of substantial focused groundwater discharge to the river; and (4) pools with stable sand/gravel substrates to provide refuge during periods of high flow.

4.2.6 James spinymussel *Parvaspina collina*

The James spinymussel is a small to medium-sized freshwater mussel with a length of less than 2.4 inches (USFWS 2022b). Its thick shell ranges in color from yellow to dark brown and is distinguishable from other unionids by the presence of lateral spines, which are unique within its native range. The species is a long-term brooder: eggs develop within females' marsupial gills after fertilization, are retained there over winter, and glochidia are released in spring. Confirmed fish hosts include the rosefin shiner (*Lythrurus ardens*), mountain redbelly dace, and western blacknose dace (*Rhinichthys obtusus*). The species page is available at https://www.fws.gov/species/james-spinymussel-pleurobema-collina.

The James spinymussel was listed as Endangered in July 1988 (53 FR 27689). The species occurs in the United States in North Carolina, Virginia, and West Virginia. In North Carolina, the James spinymussel is restricted to the Dan River drainage within the Roanoke River basin. Suitable habitat for the James spinymussel includes free flowing streams with a variety of flow regimes and a variety of substrates with limited silt.

4.2.7 longsolid *Fusconaia subrotunda*

The longsolid is a large freshwater mussel that grows up to 5.2 inches (USFWS 2019b). The shape of its shell ranges from nearly circular to oblong and elongate, with older individuals typically more elongate. The shell is thick and solid, with a prominent posterior ridge. Shell color ranges from brown to black and may have greenish rays in younger individuals, with white nacre. Fish hosts for the longsolid include the central stoneroller (*Campostoma anomalum*), common shiner, golden shiner (*Notemigonus crysoleucas*), mountain redbelly dace, satinfin shiner, white shiner (*Luxilus albeolus*), and fantail darter (*Etheostoma flabellare*). The species page is available at https://www.fws.gov/species/long-solid-fusconaia-subrotunda.

The longsolid was listed as threatened in March 2023 (88 FR 14794). The species occurs in the United States in Alabama, Indiana, Kentucky, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia. In North Carolina, the longsolid is historically known from the upper French Broad River and the Hiwassee River. Suitable habitat for the longsolid includes (1) geomorphically stable stream channels and banks; (2) stable riffle-run-pool habitats that provide flow refuges consisting of silt-free gravel and

coarse sand substrates); (3) water flows adequate to maintain benthic habitats where the species is found and to maintain connectivity of streams with the floodplain; (4) water and sediment quality necessary to sustain natural physiological processes for normal behavior, growth, and viability of all life stages; (5) the presence and abundance of fish hosts necessary for longsolid recruitment. Critical Habitat has been designated for longsolid, but there is none located in North Carolina.

4.2.8 purple bean *Villosa perpurpurea*

The purple bean is a small to medium-sized freshwater mussel that reaches a length of up to 2.8 inches (USFWS 2020a). The moderately thick shell is elongate and somewhat rectangular, with a smooth surface and a purple to reddish-brown coloration. The interior of the shell is typically deep purple. The purple bean is a long-lived species with individuals surviving for several decades. Known host fishes include the fantail darter, riverweed darter (*Etheostoma podostemone*), and gilt darter (*Percina evides*). The species page is available at https://www.fws.gov/species/purple-bean-villosa-perpurpurea.

Purple bean was listed as Endangered in January 1997 (62 FR 1647). This species occurs primarily in Virginia and Tennessee; its occurrence in North Carolina is limited to waters at the very western edge of Cherokee County in the southwest corner of the state. This species inhabits small to medium-sized streams and rivers with moderate to fast currents. Suitable habitat for the purple bean includes (1) permanent, flowing stream reaches with a flow regime necessary for normal behavior, growth, and survival of all life stages of the purple bean and their host fish; (2) geomorphically stable stream and river channels and banks; (3) stable substrates consisting of mud, sand, gravel, and/or cobble/ boulder, with low amounts of fine sediments or attached filamentous algae; (4) water quality necessary for the normal behavior, growth, and survival of all life stages of the purple bean and their host fish; (5) fish hosts with adequate living, foraging, and spawning areas.

4.2.9 Tar River spinymussel *Parvaspina steinstansana*

The Tar River spinymussel is a small- to medium-sized freshwater mussel that reaches a length of approximately 4 inches (USFWS 2020b). Its moderately thick shell is yellow to brown and may have green rays that fade with age. The species is named for the spines found on the posterior ridge, which are more prominent in younger individuals and tend to erode over time. Fish hosts include white shiner and bluehead chub. The species page is available at https://www.fws.gov/species/tar-river-spinymussel-elliptio-steinstansana.

The Tar River spinymussel was listed as Endangered in June 1985 (50 FR 26572). The species is endemic to North Carolina and occurs only in the Tar and Neuse River basins. Extant populations have been documented in Fishing Creek, Sandy/Swift Creek, and the upper Tar River system. Agreements between the North Carolina Wildlife Resources Commission and the Service support reintroduction of the species into historic habitats. These agreements apply to Franklin, Edgecombe, Nash, Granville, and Halifax Counties. Suitable habitat for the Tar River spinymussel includes (1) silt-free unconsolidated beds of coarse sand and gravel; (2) relatively fast flowing, well oxygenated stream reaches but may persist in partially compacted sand and slow water velocity; and (3) small patches of transitional benthic habitat, where cobble/pebble meets sand/gravel substrates.

4.2.10 yellow lance *Elliptio lanceolata*

The yellow lance is a medium-sized mussel typically not exceeding a length of 3.5 inches (USFWS 2019c). The shell is elongate and bright yellow with a bluish-white, iridescent nacre. It is a short-term brooder,

spawning in spring and releasing glochidia shortly thereafter. Known fish hosts include white shiner, satinfin shiner, and pinewoods shiner (*Lythrurus matutinus*). Laboratory studies have confirmed additional hosts within the Cyprinidae family. The species page is available at https://www.fws.gov/species/yellow-lance-elliptio-lanceolata.

Yellow lance was listed as Threatened in April 2018 (83 FR 14189). The species currently occurs in the upper Tar and Neuse River basins in North Carolina, the Nottoway River basin in Virginia, and the Rappahannock and James River basins in Virginia and Maryland. It has been extirpated from the Appomattox and Pamunkey River systems. Historically, it occurred in 13 sub-basins within four major watersheds but is now known from only seven, with most populations isolated and showing signs of decline. The species is listed as state Endangered and is considered a high conservation priority. It is also recognized as a Species of Greatest Conservation Need. Conservation planning efforts have emphasized sediment control, riparian buffer restoration, and propagation research.

4.2.10.1 yellow lance Critical Habitat

Critical Habitat for yellow lance was designated in April 2021 (86 FR 18189). The physical or biological features essential to the conservation of yellow lance consist of:

1) suitable substrates and connected instream habitats, characterized by geomorphically stable stream channels and banks with habitats 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 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 host's habitat, food availability, spawning habitat for native fishes, and the ability of newly transformed juveniles to settle and become established in their habitats
3) water and sediment quality 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 yellow lance recruitment

4.3 FISHES

4.3.1 Cape Fear shiner *Notropis mekistocholas*

The Cape Fear shiner is a small minnow characterized by a semi-translucent body, golden-yellow coloration, and a distinct black mid-lateral stripe (USFWS 2022c). Males develop deep golden-yellow coloration with bright orange fins during the breeding season. The species reaches sexual maturity in about one year and may live 2-3 years. Reproduction occurs from late spring into summer when warming temperatures induce spawning. The species broadcasts non-adhesive eggs over rocky shoals, allowing eggs to settle into interstitial spaces within coarse substrate. Eggs develop quickly, and juveniles appear within weeks. Cape Fear shiners feed on filamentous algae, diatoms, and detritus, relying on well-lit, productive shoal habitats to support this diet. The species page is available at https://www.fws.gov/species/cape-fear-shiner-notropis-mekistocholas.

The Cape Fear shiner is restricted to central North Carolina within Chatham, Lee, Moore, Randolph, and Harnett counties. It occupies portions of the Deep and Haw River systems, including the Rocky River, Bear Creek, the Deep River, and the confluence of the Deep and Haw Rivers. Subpopulations are small,

isolated, and separated by dams and fragmented habitat. Population estimates indicate fewer than 3,000 individuals per occupied site, with reduced connectivity among basins.

The Cape Fear shiner was listed as Endangered in September 1987 (52 FR 36034). Threats include habitat fragmentation from dams, impoundments, and culverts that isolate populations and restrict movement. Additional stressors include water quality degradation from sedimentation, nutrient enrichment, and stormwater runoff. Gravel mining, riparian clearing, and improperly designed road crossings increase turbidity and siltation, reducing the availability and quality of spawning substrate and lowering juvenile survival. Altered flow regimes from drought or water withdrawals further degrade habitat and limit recruitment.

4.3.1.1 Cape Fear shiner Critical Habitat

Critical Habitat for Cape Fear shiner was designated in September 1987, concurrent with the listing of the species as Endangered (52 FR 36034). The physical or biological features essential to the conservation of the Cape Fear shiner consist of:

1) stream sections that contain gravel, cobble, and boulder substrates
2) pools, riffles, and shallow runs with large rock outcrops, side channels, and pools
3) good water quality with relatively low silt loads.

4.3.2 Carolina madtom *Noturus furiosus*

The Carolina madtom is a small, stocky-bodied catfish that reaches lengths of up to 5.1 inches (USFWS 2021c). The species has venomous pectoral spines and a bold pattern that distinguishes it from other madtoms. Carolina madtoms reach maturity by age one and typically live for three to four years. They spawn in late spring and summer when water temperatures increase. Spawning occurs beneath submerged cover, including rocks, wood, or artificial structures. Males excavate or select cavities and guard eggs and early larvae until dispersal. Eggs adhere to the ceiling or walls of the cavity and hatch in 7–10 days depending on temperature. Larvae remain in the nest until yolk sacs are absorbed. Clutch sizes range from approximately 30 to 120 eggs. The species page is available at https://www.fws.gov/species/carolina-madtom-noturus-furiosus.

The Carolina madtom occurs only within the Tar-Pamlico and Neuse River drainages in North Carolina. Extant populations are limited to Nash, Edgecombe, Franklin, and Wake Counties. Persistent occupancy has been documented in Fishing Creek and the upper Tar River system. The species is listed as Threatened at the state level.

The Carolina madtom was listed as Endangered in June 2021 (86 FR 30688). The species faces threats from dam construction, channelization, and urban stormwater runoff, which alter flow regimes, increase sedimentation, and degrade breeding habitat. Riparian clearing contributes to bank erosion and reduces in-stream cover. Pesticide runoff and high nutrient loads promote algal blooms and reduce dissolved oxygen, disproportionately affecting larvae and juveniles. Additional threats include habitat fragmentation, turbidity increases, and the loss of undisturbed stream segments required for spawning and cover.

4.3.2.1 Carolina madtom Critical Habitat

Critical Habitat for the Carolina madtom was designated in June 2021 (86 FR 30688). The physical or biological features essential to the conservation of the Carolina madtom consist of:

1) suitable substrates and connected instream habitats, characterized by geomorphically stable stream channels and banks with habitats such as stable riffle-run-pool habitats that provide flow refuges consisting of silt-free gravel, small cobble, coarse sand, and leaf litter substrates as well as abundant cover used for nesting
2) adequate flows necessary to maintain instream habitats where the species is found and to maintain connectivity of streams with the floodplain, allowing the exchange of nutrients and sediment for maintenance of the fish's habitat, food availability, and ample oxygenated flow for spawning and nesting habitat
3) water quality necessary to sustain natural physiological processes for normal behavior, growth, and viability of all life stages
4) aquatic macroinvertebrate prey items, which are typically dominated by larval midges, mayflies, caddisflies, dragonflies, and beetle larvae

4.3.3 spotfin chub *Erimonax monachus*

The spotfin chub is a small, streamlined minnow that reaches a maximum length of approximately 5 inches (USFWS 2024a). It has a blunt nose, large eyes, a compressed body, and a relatively large mouth. Breeding males develop a distinctive light spot on the dorsal fin, which gives the species its common name. Spotfin chubs feed on aquatic insect larvae, including midges and mayflies, collected from coarse substrates. Foraging success is linked to habitat structure that supports diverse benthic macroinvertebrate communities. This species spawns from late May through July over clean gravel shoals. Males select and defend spawning sites, and eggs settle among gravel interstices with no parental care. Larvae depend on the clean, well-oxygenated interstitial spaces within gravel beds for successful development. The species matures in its second summer and may live up to four years. The species page is available at https://www.fws.gov/species/spotfin-chub-erimonax-monachus.

The spotfin chub occurs in Tennessee, North Carolina, Virginia and Alabama. In North Carolina, the species is found in the Little Tennessee and Cheoah Rivers in the western portion of the state. Repatriation efforts in the Cheoah River have established a self-sustaining population derived from propagated individuals. Long-term monitoring in the Little Tennessee River between 2007 and 2016 shows that the species is distributed throughout the entire monitored reach, with data indicating a robust and stable population. These rivers provide clean gravel substrates, coarse structure, and high water quality needed for foraging and reproduction.

Spotfin chub were listed as Threatened in September 1977 (42 FR 45526). Threats to the species include habitat degradation and destruction (e.g., sedimentation, pollution, channelization, impoundments, temperature alterations). Sedimentation from poor land-use practices embeds gravel substrates and reduces spawning success. Impoundments fragment habitat and alter flow regimes. Water quality degradation from stormwater runoff and point-source discharges continue to affect portions of the species' range. These stressors contribute to habitat fragmentation, reduced prey availability, and diminished reproductive success.

4.3.3.1 spotfin chub Critical Habitat

Critical Habitat for spotfin chub was designated in September 1977, concurrent with the listing of the species as Threatened (42 FR 45526). The physical or biological features essential to the conservation of the spotfin chub consist of:

1) moderate to high velocity current

2) silt free boulder and bedrock substrates
3) shallow runs
4) aquatic invertebrates such as midge, blackfly, caddisfly, and other insect larvae

4.3.4 Waccamaw silverside *Menidia extensa*

The Waccamaw silverside is a small, thin fish that is largely translucent with a silver lateral stripe (USFWS 2025b). It has large eyes for its size and an upward-angled jaw. Its coloration is silvery-white, and black melanophores surround each scale on the dorsal two-thirds of the body. The species is a short-lived fish that reaches maturity in one year and spawns in the spring and early summer. It is visually oriented and requires high water clarity for feeding and reproduction. Feeding behavior includes visual foraging on plankton and small aquatic insects. The species is generally found in open water within the upper water column. During the breeding season, individuals concentrate nearshore. Spawning occurs over sandy or gravel substrates in shallow nearshore waters, typically at night, and eggs adhere to submerged vegetation or other available substrates. Embryos develop rapidly and hatch within a few days depending on water temperature. The species page is available at https://www.fws.gov/species/waccamaw-silverside-menidia-extensa.

This species occurs only in Lake Waccamaw in Columbus County, North Carolina and is not known from any other water body. It is visually oriented and requires high water clarity for feeding and reproduction.

Waccamaw silverside was listed as Threatened in January 1987 (52 FR 11277). The species is vulnerable to threats to water quality and habitat degradation from human-made land-use activities, drought, physical constraints of its habitat, and natural and introduced predators. Because it completes its life cycle in one year, it is susceptible to sudden extinction if its habitat deteriorates. Degradation of water quality in Lake Waccamaw, its only known habitat, is identified as the most significant threat to the species' continued survival.

4.4 BIRDS

4.4.1 piping plover *Charadrius melodus*

The piping plover is a small sand-colored shorebird with a wingspan up to 17 inches (USFWS 2024b). The breeding adult is distinguished from other small plovers by the presence of a single breast band and single forehead band; the coloration of the legs, bill, and back; and its relatively small size. Juveniles and adults use open beaches, sandbars, alkali playas, and dredge spoil islands where vegetation remains sparse. These areas support foraging on small crustaceans, marine worms, beetles, and insect larvae, which are collected along wrack lines and within the high intertidal zone. The species breeds from late March through late July, with breeding seasons varying across populations. Males establish territories and pairs typically form monogamous bonds for the breeding season. Eggs are laid in a shallow scrape, and both adults incubate for about 27 days. Chicks are precocial, leaving the nest within hours of hatching and capable of short flights at approximately 25–30 days of age. Sexual maturity is typically reached by one year of age, individuals may live 5–10 years in the wild, and the generation time is approximately 3–4 years. The species page is available at https://www.fws.gov/apps/species/piping-plover-charadrius-melodus.

There are three populations of piping plover: subspecies *C. m. circumcinctus* which has one population that occurs on the shorelines of the Great Lakes and another population that occurs along the rivers and lakes in the Northern Great Plains, as well as subspecies *C. m. melodus* that occurs along the Atlantic

Coast. All 3 populations were listed as Threatened in December 1985 (50 FR 50726), and the Great Lakes population was later reclassified as Endangered. North Carolina is one of the only states where piping plovers' breeding and wintering ranges overlap, and the birds are present year-round. Piping plovers in the state may include individuals from all three breeding populations. Piping plovers spend up to 10 months of their life cycle on their migration and winter grounds, generally July 15 through as late as May 15. Piping plover migration routes and habitats overlap breeding and wintering habitats, and, unless banded, migrants passing through a site usually are indistinguishable from breeding or wintering piping plovers.

Currently in North Carolina, piping plovers from the Atlantic breeding population mainly nest along the Outer Banks, particularly on Cape Hatteras and Cape Lookout. Breeding has been documented on the ocean shorelines in Dare, Hyde, Carteret, Onslow, and New Hanover Counties. These locations offer wide sandy shorelines, inlet shoulders, and sparsely vegetated beaches that provide nesting and brood-rearing habitat. Migrating and wintering habitat in the state overlaps with areas included in the designated critical habitat units, and generally includes sparsely vegetated barrier beaches, inlet shoulders, spits, sandbars, and bayside flats that supply foraging and resting opportunities for wintering birds. Several inlet and barrier island segments along the North Carolina coast contain the open sandy and muddy substrates, coupled with relatively low disturbance, that are characteristic of important wintering areas for this species.

Piping plovers face a variety of threats throughout their breeding and wintering range. Habitat loss and degradation on winter and migration grounds from shoreline and inlet stabilization efforts, both within and outside of designated critical habitat, remain a serious threat to all piping plover populations. Human disturbance is a major cause of nest failure, as recreation on beaches can flush adults from nests, expose eggs to predators or temperature stress, and in some cases crush eggs or chicks underfoot or by vehicles. Coastal development reduces the availability of suitable nesting and foraging habitat and contributes to habitat fragmentation. Beach nourishment can bury active nests and change substrate characteristics in ways that reduce suitability for breeding or foraging. Mechanical beach cleaning removes wrack lines that support prey populations and provide cover for chicks. Additional disturbances include fireworks and large gatherings near nesting areas, which may cause adults to abandon nests or prevent them from incubating. Unleashed dogs and heavy foot traffic can flush incubating adults and separate broods. Habitat loss from storm overwash and sea-level rise also contributes to ongoing declines. Threats on the wintering grounds may impact piping plovers' breeding success if they start migration or arrive at the breeding grounds with a poor body condition.

4.4.1.1 piping plover Critical Habitat

Critical habitat for piping plovers in North Carolina was designated in July 2001 (66 FR 36038) and revised in October 2008 (73 FR 62816). The physical and biological features of piping plover Critical Habitat include:

1) intertidal sand beaches (including sand flats) or mud flats (between annual low tide and annual high tide) with no or very sparse emergent vegetation for feeding. In some cases, these flats may be covered or partially covered by a mat of blue-green algae
2) unvegetated or sparsely vegetated sand, mud, or algal flats above annual high tide for roosting; such sites may have debris or detritus and may have micro-topographic relief (<20 inches above the substrate surface) offering refuge from high winds and cold weather
3) surf-cast algae for feeding

4) sparsely vegetated backbeach, which is the beach area above mean high tide seaward of the dune line, or in cases where no dunes exist, seaward of a delineating feature such as a vegetation line, structure, or road. Backbeach is used by plovers for roosting and refuge during storms
5) spits, especially sand, running into water for foraging and roosting
6) salterns, or bare sand flats in the center of mangrove ecosystems that are found above mean high water and are only irregularly flushed with sea water
7) unvegetated washover areas with little or no topographic relief for feeding and roosting. Washover areas are formed and maintained by the action of hurricanes, storm surges, or other extreme wave actions
8) natural conditions of sparse vegetation and little or no topographic relief mimicked in artificial habitat types (e.g., dredge spoil sites)

4.4.2 rufa red knot *Calidris canutus rufa*

The rufa red knot is a medium sized shorebird with a stocky, thick-chested body and a wingspan of approximately 19.5 inches (USFWS 2020c). The species breeds in the Canadian Arctic and migrates through much of the eastern and central United States. It winters in the southeast United States from Alabama (particularly Florida's central Gulf coast) to North Carolina, northern South America, and the southern tip of Argentina and Chile (USFWS 2023a). The species feeds on horseshoe crab eggs during spring migration in Delaware Bay. It also feeds on bivalves, gastropods, polychaetes, insects, and crustaceans. Pair bonds form after arrival on the breeding grounds. Nests are shallow scrapes lined with lichens or leaves. Four eggs are typical and both sexes incubate. Chicks leave the nest within a day and feed themselves with parental tending. Fledging occurs at eighteen to twenty days. Adults reach sexual maturity at two years. Maximum age is at least twenty years. The species page is available at https://www.fws.gov/species/rufa-red-knot-calidris-canutus-rufa.

Rufa red knots migrate through and overwinter in North Carolina. The term "winter" is used to refer to the nonbreeding period of the rufa red knot life cycle when the birds are not undertaking migratory movements. Rufa red knots are most common in North Carolina during the migration seasons (mid-April through May and July to mid-October) and may be present in the state throughout the year (Fussell 1994; Potter et al. 1980). Regular sites include Cape Lookout National Seashore, Cape Hatteras National Seashore, Shackleford Banks, and other barrier islands. These sites support hundreds to low thousands of birds each year. Birds feed on mollusks and rest on intertidal flats with limited disturbance.

Critical Habitat was proposed in 2021 but has not been finalized (86 FR 37410). Proposed Critical Habitat in North Carolina includes portions of the ocean shoreline in Dare, Hyde, Carteret, Onslow, Pender, New Hanover, and Brunswick Counties. The proposed physical and biological features of rufa red knot Critical Habitat include:

1) Beaches and tidal flats used for foraging;
2) Upper beach areas used for roosting, preening, resting, or sheltering;
3) Ephemeral and/or dynamic coastal features used for foraging or roosting;
4) Ocean vegetation deposits or surfcast wrack used for foraging and roosting;
5) Intertidal peat banks used for foraging and roosting;
6) Features landward of the beach that support foraging or roosting; and,
7) Artificial habitat mimicking natural conditions or maintaining the physical or biological features 1 to 6 (above).

The species was listed as Threatened in December 2014 (79 FR 73705). Threats include habitat loss from shoreline development such as beach stabilization; impacts to food availability including reduced availability of horseshoe crab eggs due to overharvest by humans; disturbance from recreation; oil spills; and effects of climate change such as sea level rise, increased storm frequency, and ocean acidification (which may impact prey).

4.4.3 roseate tern *Sterna dougallii dougallii*

The roseate tern is large seabird with a wingspan of up to 30 inches and light gray wings and back (USFWS 2020d). It breeds in colonies on sandy or rocky islands, often alongside other tern species. Roseate Terns have specialized foraging habits and are concentrated into a small number of foraging areas near nesting colonies. Most foraging occurs within 20 kilometers of nesting islands. Juveniles and adults feed on small schooling fish, primarily sand lance, herring, and anchovies. Diet varies geographically and seasonally depending on prey availability. Foraging occurs over shallow coastal waters, estuaries, and tidal inlets. The species is long-lived with low reproductive output. Roseate terns display colonial nesting behavior and close association with other tern species. Both parents feed and tend the young. Fledglings remain dependent on adults for food for up to one month after fledging. The species page is available at https://www.fws.gov/species/roseate-tern-sterna-dougallii.

Only one roseate tern nest has been documented in North Carolina and it is considered a very rare summer visitor and transient along the coast. Occurrence is primarily within the coastal plain. Roseate terns nest primarily on small islands, barrier beaches, or salt marsh islands with minimal human disturbance and suitable nesting substrates such as sand, gravel, shell, or vegetation. Nesting habitat typically includes cover or shelter, including rocks, vegetation, or artificial structures, which provide concealment from predators and weather. Nesting sites are often shared with other tern species.

The roseate tern was listed as Endangered in November 1987 (52 FR 42064). Threats to the North Atlantic population include habitat loss due to coastal development and human disturbance at nesting sites. Predation by gulls and other predators negatively affects colony persistence and productivity. Environmental contamination, including oil spills, poses additional risks. Climate change and sea-level rise may reduce available nesting habitat. Competition with more aggressive species, such as herring gulls, negatively impacts reproductive success. Historical threats included egging, recreational disturbance, and shooting. Currently, mammalian and avian predation remain among the most significant threats.

4.4.4 eastern black rail *Laterallus jamaicensis jamaicensis*

The eastern black rail is a small marsh bird with a wingspan of 8.7-11 inches (USFWS 2019d). Its plumage is blackish-gray with a darker crown, a chestnut nape, and white speckling on the back and wings. It is the smallest rail in North America, and its secretive behavior and crepuscular activity make the bird difficult to detect. The diet consists of small arthropods, seeds, and snails. Foraging occurs primarily at dawn and dusk, and birds pick prey from the substrate or the water surface. Breeding occurs from April through August. Both adults participate in nest building, incubation, and chick rearing, and the species may raise one or two broods depending on environmental conditions. Chicks are precocial, leaving the nest within a day of hatching while remaining with adults for several weeks. Sexual maturity occurs at approximately 1 year and individuals have a lifespan of 5 to 9 years in the wild. The species page is available at https://www.fws.gov/species/eastern-black-rail-laterallus-jamaicensis-jamaicensis.

Historically the subspecies occurred widely along the Atlantic Coast and throughout the Gulf States, but its current range has contracted, and it is now absent from many northern states. In North Carolina, the Eastern Black Rail occurs primarily within the Outer Coastal Plain, including Pamlico and Albemarle sounds. Documented counties of occurrence include Carteret, Dare, Hyde, and Tyrrell. Suitable habitat for eastern black rail consists of consistently shallow wetlands (moist soil to 1-inch-deep pools) with dense emergent herbaceous plant cover, hydric soil, and/or wetland & upland transition zones with dense herbaceous plant cover adjacent to the wetlands.

The eastern black rail was listed as Threatened in October 2020 (85 FR 63764). The greatest threats to the species include habitat loss resulting from sea level rise, urban development, agriculture, and altered hydrology. Marshes used by the subspecies are vulnerable to tidal flooding and saltwater intrusion, and invasive plant species and increasing storm frequency may further reduce habitat suitability. Predation by raccoons, foxes, and feral cats contributes to nest failure, and human disturbance and mosquito control practices may negatively affect reproductive success. Chicks are unable to fly for several weeks after hatching. Adults undergo a complete post breeding molt each year between July and September on the breeding grounds (Pyle 2008; Hand 2017) and are temporarily unable to fly for approximately 3 weeks (Flores and Eddleman 1991; Eddleman et al. 1994). Black rails are particularly vulnerable to threats during this period of flightlessness (Flores and Eddleman 1991).

4.4.5 red-cockaded woodpecker *Picoides borealis*

The red-cockaded woodpecker (RCW) is a small- to medium-sized woodpecker a wingspan of 13.8-16.1 inches (USFWS 2019e). The species is named for a small streak of red feathers, called a cockade, located on each side of the black cap of males. These feathers are usually concealed and are visible primarily when the bird is agitated. The RCW forages on the trunks, branches, and foliage of pine trees and probes for insects beneath bark or within crevices. Primary prey includes ants, beetles, wood roaches, spiders, and caterpillars. Cavities are usually constructed in trees infected with red heart fungus, which softens the heartwood and facilitates excavation. Birds actively maintain sap flow around cavity entrances, which may deter predators such as snakes. The species page is available at https://www.fws.gov/species/red-cockaded-woodpecker-dryobates-borealis.

In North Carolina, the RCW is known or believed to occur in 39 counties in the Sandhills and the Northeast and Southeast Coastal Plain regions. Large populations are present on Fort Bragg and within the Croatan National Forest. Nesting groups also occur on other federal lands, state parks and game lands, and on private lands. Suitable habitat for RCWs varies by location. In the Sandhills and Southeastern Coastal Plain, many nesting groups occur on private lands, which may or may not be subject to conservation agreements. In the Sandhills, the RCW inhabits mature pine forests, primarily longleaf pine ecosystems. It requires open, park-like stands with low or absent midstory vegetation and a well-developed herbaceous groundcover that is maintained by frequent fire. Cavity trees are almost always living pine trees that are ≥ 60 years old. Preferred foraging habitat consists of pine trees with a diameter at breast height (dbh) ≥ 10 inches and a relatively open canopy. Daily foraging ranges average 60-125 acres per family group, depending on habitat quality. Suitable habitat for this species includes pine or pine/hardwood stands in which 50% or more of the dominant trees are pines and the dominant pine trees are ≥ 30 years old or ≥ 8 inches dbh. In the sandhills and piedmont regions, suitable habitat includes pine or pine/hardwood stands that contain pines ≥ 60 years old or ≥ 10 inches dbh.

Within southeastern and northeastern North Carolina, RCWs use a diversity of habitat types that may not conform with forest conditions known to support the species through most of its range. In southeastern North Carolina, RCWs forage and nest in both xeric and pocosin communities with low site productivity. In the southern coastal plain, pines used for foraging and nesting may be smaller and shorter than in other populations. Groups will use wet pine flatwoods, pond pine woodland, and high pocosin for foraging and nesting. Several RCW subpopulations reside in northeast North Carolina, especially in the Albemarle-Pamlico Peninsula, despite the absence of open pine forest and savannahs typical of the species range. In some areas RCWs use forest communities that may not feature pines as the dominant species, including pond pine woodland, high pocosin, nonriverine swamp forest (gum-cypress and mixed subtypes), peatland Atlantic white cedar forest, coastal fringe evergreen forest, wet successional pine/pine-hardwood forest, and pine plantations (pine plantations may be used for foraging habitat once trees approach 30 years of age).

The red-cockaded woodpecker was originally listed as Endangered in October 1970 (35 FR 16047); the listing was downgraded to Threatened in October 2024 (85 FR 63474). Habitat loss, degradation, and fragmentation due to fire suppression, agriculture, and urban development have been the primary causes of the species' historical decline. The red-cockaded woodpecker requires open pine savannas maintained by frequent fire. Without fire, hardwood encroachment reduces habitat suitability for nesting and foraging. Loss of old-growth pine stands and insufficient recruitment of future cavity trees further threaten population persistence.

4.5 Flowering Plants

4.5.1 American chaffseed *Schwalbea americana*

The American chaffseed is a perennial herb that stands erect and is typically 12-18 inches tall (USFWS 2025c). It requires a high fire-return interval or a fire surrogate to persist across the landscape. The species is hemiparasitic: it photosynthesizes and also acquires photosynthates through modified roots or stems called haustoria, which connect to the vascular systems of host species. The species page is available at https://www.fws.gov/species/american-chaffseed-schwalbea-americana.

In North Carolina, American chaffseed occurs in the sandhills and the southeastern coastal plain. Seventeen of the known global populations occur on Fort Bragg. American chaffseed occurs in sandy (sandy peat, sandy loam), acidic, seasonally moist to dry soils. The species is generally found in habitats described as pine flatwoods, fire-maintained savannas, ecotonal areas between peaty wetlands and xeric sandy soils, and other open grass-sedge systems.

The American chaffseed was listed as Endangered in October 1992 (57 FR 44703). Direct threats include habitat loss from development, road widening, and conversion of habitat to pine plantations. Indirect threats include urbanization and total fire suppression, which result in the loss of open ecosystems required by the species. Existing populations are threatened by continued fire suppression, development, and potential mismanagement of habitat.

4.5.2 Blue Ridge goldenrod *Solidago spithamaea*

The Blue Ridge goldenrod is a small, hairy perennial herb typically reaching a height of 4-8 inches (USFWS 2019f). The flower heads form compact, flat-topped clusters composed of approximately 20 to 30 yellow flowers that appear from late July through September. Due to its small size and extreme habitat on high-elevation exposed rocks, the species is unlikely to be misidentified, except possibly as

dwarfed individuals of other species. The species is an early pioneer plant. Individuals spread vegetatively from short, stout rhizomes and occasionally reproduce by seed. Fruits are present from July through October. Blue Ridge goldenrod is part of a distinctive pseudo-alpine plant community found on high-elevation rocky summits. Associated species include *Liatris helleri*, *Huperzia appressa*, *Geum radiatum*, *Trichophorum cespitosum*, *Sibbaldiopsis tridentata*, *Polypodium appalachianum*, *Paronychia argyrocoma*, *Kalmia buxifolia*, *Stenanthium leimanthoides*, *Heuchera villosa* var. *villosa*, *Micranthes petiolaris*, *Solidago glomerata*, *Hedyotis purpurea* var. *montana*, *Carex misera*, and *Carex brunnescens*. The species page is available at https://www.fws.gov/species/blue-ridge-goldenrod-solidago-spithamaea.

In North Carolina, Blue Ridge goldenrod is found in Avery, Mitchell, and Watauga counties. The species is endemic to three locations, two of which are in North Carolina and one on the North Carolina–Tennessee border. Currently, only three populations are known to exist on Hanging Rock, Grandfather, and Roan Mountains. Suitable habitat for Blue Ridge goldenrod is rugged high-elevation (4,500 to 6,000 feet) rock outcrops and vertical to near-vertical cliffs.

The Blue Ridge goldenrod was listed as Threatened in March 1985 (50 FR 12306). The species is threatened by trampling and habitat disturbance caused by heavy recreational use of occupied sites by hikers, climbers, and sightseers. Construction of new trails and other recreational improvements at any of the three known sites poses an additional threat. The species is extremely vulnerable due to the rarity of its populations, small numbers of individuals, and confinement to isolated areas on a few rocky summits. Erosion at occupied sites is often exacerbated by recreational overuse.

4.5.3 bunched arrowhead *Sagittaria fasciculata*

The bunched arrowhead is a small herbaceous perennial that grows in wetland areas (USFWS 2025d). Plants grow to a height of approximately 16 inches and are monoecious. Flowering begins in mid-May and continues through July. Fruits are achenes with a reticulate surface that can float downstream or attach to the hair of mammals. However, the species disperses primarily through clonal fragmentation, with rhizome fragments drifting downstream and colonizing new areas. The species page is available at https://www.fws.gov/species/bunched-arrowhead-sagittaria-fasciculata.

The bunched arrowhead occurs in both Carolinas. In North Carolina, there are six known extant populations located in Henderson County. The historical North Carolina range includes Henderson county, with all records originating from the French Broad River Valley. Suitable habitat for bunched arrowhead generally consists of undisturbed sites in mountain bogs, in partially shaded seeps with constant but moderate water flow.

The bunched arrowhead was listed as Endangered in August 1979 (44 FR 43700). Hydrologic changes resulting from land use conversion and urbanization threaten the species across its range. Development of lands for pasture and residential homes have destroyed seepage areas and colonies, particularly in South Carolina. Invasive plant species including *Microstegium vimineum* and *Murdannia keisak* are present at multiple sites and can outcompete bunched arrowhead. Many North Carolina populations occur in highly degraded habitats that represent ditched and channelized remnants of former wetland or stream systems.

4.5.4 Canby's dropwort *Oxypolis canbyi*

Canby's dropwort is a perennial herb that forms colonies through long, thin underground stems called rhizomes (USFWS 2022d). Stems are slender, erect, smooth, and grow up to approximately 59 inches high. Flowers are arranged in flat-topped clusters known as umbels. It can be distinguished from similar species by the tendency for lower leaves to drop by flowering time and by having fewer rays per umbel, typically 5 to 9 rays per umbel. The species page is available at https://www.fws.gov/species/canbys-dropwort-oxypolis-canbyi.

The species currently occurs in Maryland, South Carolina, and Georgia. In North Carolina, Canby's dropwort is known only from a single bay in Scotland County in the upper coastal plain. Population counts at this site have declined over time. Approximately 10,000 plants were reported in 1980 and 1986, declining to an estimated 2,000-3,000 plants in 1987, more than 100 plants in 1992, and two stems reported in 2004. Canby's dropwort can be found in a variety of coastal plain habitats, including natural ponds dominated by pond cypress, grass-sedge-dominated Carolina bays, wet pine savannas, shallow pineland ponds and cypress-pine swamps or sloughs. The largest and most vigorous populations have been found in open bays or ponds that are wet throughout most of the year, but which have little or no canopy cover. Soils are sandy loams or acidic peat mucks underlain by clay layers.

Canby's dropwort was listed as Endangered in February 1986 (51 FR 6690). Canby's dropwort is threatened by loss or degradation of wetland habitats. Documented threats include ditching and draining of wetlands for agriculture and forestry, dredging to create livestock watering ponds, and highway construction and maintenance. Because of its small population sizes, the species is vulnerable to localized environmental degradation.

4.5.5 Cooley's meadowrue *Thalictrum cooleyi*

Cooley's meadowrue is a perennial herb with slender, erect stems 12-24 inches tall (USFWS 2020e). The species is dioecious with achene fruits. It is wind-pollinated and reproduces by seed; it flowers from May to July and fruits from June to August. The species page is available at https://www.fws.gov/species/cooleys-meadowrue-thalictrum-cooleyi.

Cooley's meadowrue is endemic to the southeastern coastal plain of the United States. In North Carolina, the species is known from 11 locations. The species occurs in two small areas in the state. One area is centered around Maple Hill in Pender and Onslow counties. The other area is centered around Old Dock in Columbus and Brunswick counties. Cooley's meadowrue can be found in circumneutral (soils with a near-neutral pH level) wet pine savannahs and savannah-like areas, including grass-sedge bogs, often at the border of intermittent drainages or swamp forests.

The Cooley's meadowrue was listed as Endangered in February 1989 (54 FR 5935). Fire suppression has resulted in extirpation of 25 percent of the known North Carolina populations since discovery. Habitat loss and degradation due to development, agriculture, and fire suppression are identified as primary threats. Inappropriate mowing or herbicide use can negatively impact populations. The species is vulnerable to changes in hydrology and competition from invasive species.

4.5.6 golden sedge *Carex lutea*

Golden sedge is a perennial, rhizomatous, graminoid plant in the sedge family Cyperaceae (USFWS 2022e). The species was first described in 1994 from populations in Pender and Onslow Counties, North Carolina. It is distinguished from other sedges in the region by its golden perigynia and its occurrence in

calcareous wet savannas. Golden sedge reproduces vegetatively from rhizomes and sexually through seed production. Flowering occurs in April and May. Fruits mature in June. The species is pollinated by wind. Seeds are dispersed by gravity, and germination occurs in open, moist soils following disturbance. The species page is available at https://www.fws.gov/species/golden-sedge-carex-lutea.

Golden sedge occurs in North Carolina, South Carolina, and Florida. The North Carolina populations occur within a small area near Maple Hill in Pender and Onslow Counties, in the northeast Cape Fear River watershed. At the time of listing, only eight populations were known. Subsequent surveys documented 11 extant populations. Golden sedge can be found in acidic, sandy soils that are very wet to periodically shallowly flooded. This species prefers zones between pine savanna and adjacent wet hardwood or hardwood/conifer forest.

Golden sedge was listed as Endangered in January 2002 (67 FR 3120). Threats to golden sedge include habitat destruction from conversion of savannas to pine plantations, residential development, ditching and draining of wetlands, and fire suppression. Additional threats include activities that alter hydrology, including groundwater withdrawals and ditching that lower the water table. Ground disturbance is associated with silviculture practices, road construction or widening, utility line installation and maintenance, mining, off-road vehicle activity, dispersed recreation, and herbicide application. Plow lines for fire suppression, herbicide spraying in utility rights-of-way, and road widening projects have been documented as affecting populations.

4.5.6.1 golden sedge Critical Habitat

Critical Habitat for golden sedge was designated in March 2011 (16 FR 11086). The physical or biological features essential to the conservation of golden sedge include:

1) moist to completely saturated loamy fine sands, fine sands, fine sandy loams, and loamy sands soils with a pH of 5.5-7.2
2) open to relatively open canopy that allows full to partial sunlight to penetrate to the herbaceous layer between savannas and hardwood forests
3) areas of bare soil immediately adjacent (within 30 cm) to mature golden sedge plants where seeds may fall and germinate or existing plants may expand in size)

4.5.7 green pitcher-plant *Sarracenia oreophila*

The green pitcher-plant is a perennial, herbaceous, insectivorous plant that produces tubular, hollow, upright leaves modified into pitfall traps (USFWS 2025e). These pitchers arise in early spring and are typically 7.8-29.5 inches tall. The inner surface below the opening is slippery and has downward-pointing structures that prevent prey from escaping. Insects are attracted by nectar secretions on the rim, fall into the tube, and are digested by enzymes and bacteria. In late spring, solitary flowers are borne on erect stalks up to 70 centimeters tall. The flowers are showy, pendulous, and yellow. Flowers bloom before or as the first pitchers mature. By midsummer, the spring pitchers die back and are replaced by flat, blade-like leaves that persist through autumn and winter and continue photosynthesis until the following spring. Associated plant species include *Carex* sedge species, *Andropogon* grass species, and other bog plants including sundews and bladderworts. When fire is excluded, woody species including red maple and loblolly pine invade these habitats and shade populations of the green pitcher plant. The species page is available at https://www.fws.gov/species/green-pitcher-plant-sarracenia-oreophila.

Historically, the green pitcher-plant occurred in Alabama, Georgia, North Carolina, and Tennessee, but has been extirpated from the latter. In North Carolina, one population remains in Clay County, and one

previously reported population has been extirpated. Suitable habitat for green pitcher-plant varies, with some populations found in moist upland areas and others along boggy, sandy streambanks. Soils are generally acidic, and in upland areas are sandy clays or loams while those along streambanks are almost pure sand.

The green pitcher-plant was listed as Endangered in September 1979 (44 FR 54922). Threats to the species include habitat destruction through draining or filling of wetlands, fire suppression that leads to woody encroachment, trampling by livestock, and collection for horticultural trade.

4.5.8 Harperella *Ptilimnium nodosum*

Harperella is a perennial herb that grows to a height of 6-39 inches (USFWS 2024c). The leaves are reduced to hollow, quill-like structures. The small, white flowers occur in heads, or umbels, that resemble a small Queen Anne's lace flower head. Flowers have five regular parts and are bisexual or unisexual, with each umbel containing both perfect and male florets. The species page is available at https://www.fws.gov/species/harperella-ptilimnium-nodosum.

Taxonomic note: Recent genetic and morphological data suggest the existence of three distinct species from what was all formerly considered *Ptilimnium nodosum* sensu stricto: *Ptilimnium fluviatile* (Gulf River Harperella) occurs on rocky riverbeds in the mountains of Alabama and Arkansas. *Ptilimnium nodosum* (Pond Harperella) occurs in upland depression ponds and in seepage on granite outcrops in the coastal plain of Georgia and South Carolina. *Ptilimnium viviparum* (Atlantic River Harperella) occurs in rocky riverbeds in the Piedmont and Mountains of North Carolina, Virginia, Maryland and West Virginia. The U.S. Fish and Wildlife Service has not published a formal rulemaking adopting this nomenclature, so all 3 species are protected under the listing of the original species.

Historically, North Carolina had two populations of harperella, located in the Tar River and the Deep River. The Tar River population is very small and no plants were found during a 2022 survey (one site has not been surveyed since 2012); however the area of potential habitat at this site is large and difficult to sample, making a single survey event insufficient to determine whether the species is still present. Efforts to reintroduce harperella to historical habitat in the Deep River and to suitable habitat in the Rocky River are ongoing as of 2024. Harperella distribution in North Carolina is limited to known sites along rivers in the lower Piedmont, specifically the Tar River in Granville County and the Deep River in Chatham and Lee counties. Suitable habitat for harperella generally consists of rocky or gravel shoals and sandbars and along the margins of clear, swift-flowing stream sections.

Harperella was listed as Endangered in September 1988 (53 FR 37978). The primary threats to harperella include changes in water flow and water quality. Because harperella occupies a narrow range of water depths, changes in flow can destroy suitable habitat by inundation or persistent desiccation. Dams, reservoirs, and other water impoundments or diversions can threaten nearby harperella populations. Siltation caused by heavy construction, residential development, and agriculture has been cited as detrimental to the species. Competition from other plant species, particularly nonnative invasive species, has been observed in Arkansas, Maryland, North Carolina, Oklahoma, and West Virginia. Harperella reintroduced to the Deep River in North Carolina persisted for 10 years before it was overcome by *Zizaniopsis miliacea*. Direct physical disturbance has been observed from development, trampling, equipment use, placement of fill, land conversion, and vehicle access points such as stream crossings.

4.5.9 Heller's blazingstar *Liatris helleri*

Heller's blazing star is an insect-pollinated perennial herb in the sunflower family (USFWS 2025f). It has erect, unbranched stems arising from a corm-like base. Stems are 16-31 inches tall. Leaves are narrow; flower heads are 0.4-0.8 inches wide and contained in a dense terminal spike. Flowering occurs from July through mid-September, and fruiting from August to October. The species' main pollinators remain unknown. Fruits are small achenes and seed dispersal is primarily by wind. Seed germination requires cold stratification. The species page is available at https://www.fws.gov/species/hellers-blazing-star-liatris-helleri.

Heller's blazing star is endemic to northwestern North Carolina, where all of the eleven known populations in the world occur. As of 2025, populations are located in Ashe, Avery, Buncombe, Haywood, Jackson, McDowell, Mitchell, Watauga, and Yancey Counties. Populations occur on lands managed by the Pisgah National Forest and the Blue Ridge Parkway, and on some private lands under conservation agreements. Heller's blazingstar can be found in shallow, acidic soils at mid- to high elevations (3,500 to 6,000 feet), typically associated with sparsely vegetated rock formations located on outcrops, cliffs, or ledges.

Heller's blazing star was listed as Threatened in November 1987 (52 FR 44397). Trampling by hikers, climbers, and sightseers is identified as a threat. Collection for ornamental or medicinal purposes is identified as a threat. Because the species relies on periodic fire to maintain optimal habitat, fire suppression is an additional threat.

4.5.10 Michaux's sumac *Rhus michauxii*

Michaux's sumac is a rhizomatous, densely hairy shrub in the cashew family (USFWS 2021e). It has erect stems with heights ranging 12-39 inches. Michaux's sumac can be distinguished from similar species by its small stature, dense hairiness, and leaflet characteristics. The species is dioecious, with documented monoecious and hermaphroditic individuals. Flowers are small, greenish yellow to white, with four to five tiny petals, and are borne in dense, tightly branched terminal clusters at the top of the stem. Flowering usually occurs from June through July. Fruits are small (<60mm) and are produced from August through October. The species reproduces by seed and also spreads through rhizomes. Bees in the genus *Megachile* were identified as the most important pollen vectors, with *Bombus* and *Apis* species also observed visiting flowers, but inter-plant pollen movement is uncommon due to the typically large distance between male and female plants. Where Michaux's sumac occurs with smooth sumac (*Rhus glabra*), the two species may hybridize. The species page is available at https://www.fws.gov/species/michauxs-sumac-rhus-michauxii.

Michaux's sumac currently occurs in the United States in Virginia, North Carolina, and Georgia. Historic occurrences are documented in South Carolina and Florida, and the species is extirpated from Florida. There are 31 extant populations and one reintroduced population in North Carolina. Suitable habitat for Michaux's sumac can be found in sandy or rocky open woods in association with basic soils. The species typically survives best in areas where some form of disturbance (i.e., fire) has provided an open area.

Michaux's sumac was listed as Endangered in September 1989 (73 FR 43947). Perhaps the most crucial factor endangering Michaux's sumac is its low reproductive capacity. A low percentage of remaining populations contain both male and female plants. Fire suppression and ecological succession result in competition and shading by woody vegetation. Michaux's sumac populations have been destroyed by residential and commercial development, conversion of sites to pine plantations, and construction of

infrastructure. Forested populations are threatened by timber operations that can crush plants and compact soil. Sites within utility rights-of-way are threatened by herbicide use, mowing during critical growth periods, and ground-disturbing activities.

4.5.11 mountain golden heather *Hudsonia montana*

Mountain golden heather is a tiny, needle-leaved perennial shrub in the rockrose family (USFWS 2019g). Stems are 4-20 inches tall with many repeatedly dividing branches, forming compact tufts or mats that give the plant a moss-like appearance. It is diecious but also reproduces vegetatively by layering of stems that root when in contact with soil. Vegetative reproduction occurs when lower stems become buried in soil or litter and develop roots, producing clonal mats. Flowers are bright yellow and occur from June to early July. Flowers are insect-pollinated and fruiting continues through September. Seeds fall near the parent plant or are carried short distances by wind. Seedlings require open, sunny microsites free of leaf litter and competition for establishment. The species page is available at https://www.fws.gov/species/mountain-golden-heather-hudsonia-montana.

Mountain golden heather was discovered by Thomas Nuttall in 1816 on the summit of Table Rock in Burke County, North Carolina. As of the 2024 five-year review, five natural populations are known from Burke and McDowell Counties, North Carolina, all within Pisgah National Forest. Mountain golden heather can be found in proximity to Table Rock, NC, generally limited to quartzite ledges and rock outcrops exposed to direct sunlight. The species does not tolerate shading long-term and requires open conditions.

Mountain golden heather was listed as Threatened in January 1980 (45 FR 69360). It is threatened by fire suppression, trampling by hikers and climbers, and encroachment of woody vegetation. Recreational use of cliffs and ledges directly damages plants. Small numbers cause this species to be in greater danger of extinction.

4.5.11.1 mountain golden heather Critical Habitat

Critical habitat for mountain golden heather was designated in October 1980 (45 FR 69360). The physical or biological features essential to the conservation of the mountain golden heather consists of all known populations of this species in North Carolina. Adjacent suitable habitat is also included.

4.5.12 mountain sweet pitcher-plant *Sarracenia rubra* ssp. *jonesii*

Mountain sweet pitcher-plant is a stemless herbaceous perennial and carnivorous plant in the pitcher plant family (USFWS 2021f). The pitchers are modified leaves that form erect, hollow tubes 7.9-29.5 inches tall. Each red flower is borne singly on a stalk that may reach up to 31.5 inches. Flowering occurs in late spring and flowers are pollinated by insects, primarily bees. The species relies on carnivory to obtain nutrients in nutrient-poor soils. Insects fall into the hollow pitchers, where they are digested by enzymes and bacteria to provide nutrients for the plant. The species page is available at https://www.fws.gov/species/mountain-sweet-pitcherplant-sarracenia-rubra-ssp-jonesii.

Mountain sweet pitcher-plant occurs in the United States in North Carolina and South Carolina. In North Carolina, there are 15 extant populations in four North Carolina counties (Buncombe, Henderson, Macon, and Transylvania). Mountain sweet pitcher-plant can be found in mountain bogs and cataract fens, usually in soils that are deep, poorly drained combinations of loam, sand, and silt, with a high organic matter content and highly acidic pH level. Most sites occur in level depressions associated with floodplains.

The species was listed as Endangered in September 1988 (53 FR 38470). It is threatened by drainage of bogs for agriculture and development. Trampling negatively affects occupied sites. Poaching by collectors has occurred. Shading resulting from fire suppression and woody encroachment reduces habitat suitability. Hydrologic alteration has eliminated suitable habitat at some sites. Hybridization with *Sarracenia purpurea* var. *montana* has been documented in the wild and may result in reduced seed viability. Introgression poses a genetic threat to small populations.

4.5.13 pondberry *Lindera melissifolia*

Pondberry is a shrub in the laurel family that can reach a height of up to 72 inches (USFWS 2021g). The species spreads by horizontal stems at or near the soil surface and is also rhizomatous, spreading by underground running stems that produce new shoots and form clonal colonies. The leaves and stems are aromatic and emit a spicy odor when crushed. Pondberry also reproduces by seed, although seedling establishment has been observed infrequently. The species produces small greenish-yellow flowers in early spring before leaves emerge. Pondberry is dioecious with a bright-red fruit that matures in late summer or fall. The species page is available at https://www.fws.gov/species/pondberry-lindera-melissifolia.

Pondberry occurs in the United States in Alabama, Arkansas, Georgia, Mississippi, Missouri, and North and South Carolina. North Carolina has two extant pondberry populations. The Sampson County population is located at Pondberry Bay Plant Conservation Preserve. The Cumberland County population occurs at Big Pond Bay Plant Conservation Preserve. Both sites are owned and managed by the North Carolina Plant Conservation Program. Suitable habitat for pondberry generally includes pond margins, swampy depressions, sandy sinks, and seasonally flooded wetlands.

Pondberry was listed as Endangered in July 1986 (51 FR 27495). The most significant threats to pondberry include drainage activities such as ditching, stream channelization, and the creation of impoundments. Domestic hogs, cattle grazing, and timber harvesting have also impacted pondberry plants. Laurel wilt disease is an emerging threat to pondberry. The disease is highly lethal to infected plants and poses a serious risk to existing populations.

4.5.14 Roan Mountain bluet *Hedyotis purpurea* var. *montana*

Roan Mountain bluet is an herbaceous perennial in the coffee family distinguished by large reddish-purple flowers, small oval leaves, and a low, compact growth form (USFWS 2023b). The species is cespitose, growing in tufts or clumps. Roan Mountain bluet is pollinated by insects and reproduces sexually by seed. Flowering occurs from late May through August and into September. Although abundant flowering has been observed, fruit and seed production is limited. The species page is available at https://www.fws.gov/species/roan-mountain-bluet-hedyotis-purpurea-var-montana.

Roan Mountain bluet occurs in the United States in North Carolina, Tennessee, and Virginia. In North Carolina, known Roan Mountain bluet populations are located on Roan, Grandfather, and Bluff Mountains (all in the Blue Ridge mountain range) at high elevations. Suitable habitat for Roan Mountain bluet is generally rocky summits and cliffs in the southern Appalachian Mountains of western North Carolina. These summits and cliffs usually appear as smaller-scale, patchy habitats embedded within a larger forested landscape consisting of spruce-fir, northern hardwood, or occasional red oak forests. The species may also appear on smaller outcrops or over talus or scree embedded within a grassy or heath bald habitat.

Roan Mountain bluet was listed as Endangered in April 1990 (55 FR 12793). Threats to the species include trampling from recreational use, collection of plants by visitors, competition from encroaching woody vegetation, and habitat alteration. Recreational trails and overlooks pose direct risks to populations.

4.5.15 rough-leaved loosestrife *Lysimachia asperulaefolia*

Rough-leaved loosestrife is a perennial herb with yellow flowers that grows 12-24 inches tall (USFWS 2021h). Plants die back to the ground in winter and resprout the following spring from underground stems. The species reproduces both sexually and asexually. Sexual reproduction is rare, while asexual reproduction through rhizomes (underground running stems that produce new shoots and form clonal colonies) is common, and populations are often dominated by clonal growth. Rough-leaved loosestrife may persist vegetatively for years when conditions are unfavorable for flowering. Flowers are visited by a variety of bees and other insects, indicating insect pollination. Seed dispersal is limited, contributing to the species' occurrence in small, localized populations. The species page is available at https://www.fws.gov/species/rough-leaved-loosestrife-lysimachia-asperulaefolia.

Rough-leaved loosestrife is endemic to the coastal plain of North Carolina and South Carolina. In North Carolina, it has been reported from the sandhills and coastal plain physiographic regions, primarily in pocosin and savanna habitats. Rough-leaved loosestrife generally occurs in the edges between longleaf pine uplands and pond pine pocosins (areas of dense shrub and vine growth on wet, peaty poorly drained soils) on moist to seasonally saturated sands and on shallow organic soils overlaying sands. The species has also been found on deep peat in the low shrub community of large Carolina bays.

Rough-leaved loosestrife was listed as Endangered in July 1987 (52 FR 22585). Major threats to rough-leaved loosestrife include fire suppression, ditching and draining of pocosins, peat mining, residential, commercial, and industrial development, highway and utility construction, and silvicultural activities that alter hydrology or canopy structure. Fire suppression results in shrub and tree encroachment that shades the herbaceous layer and eliminates habitat conditions required by the species.

4.5.16 Schweinitz's sunflower *Helianthus schweinitzii*

Schweinitz's sunflower is a long-lived, perennial, herbaceous species in the aster family (USFWS 2024d). Plants are generally about 72 inches tall. Compared to most sunflowers in eastern North America, Schweinitz's sunflower has relatively small flower heads measuring 0.2-0.6 inches across, with a bright yellow coloration. Schweinitz's sunflower blooms from late August into fall. Plants that flower are usually associated with well-established rhizomes (underground running stems that produce new shoots and form clonal colonies), whereas plants that produce only leaves are generally seedlings or young individuals one to two years old. Seeds readily germinate without a dormant period, and seedlings can grow rapidly after germination. Schweinitz's sunflower is pollinated by insects. Documented pollinators include honeybees (*Apis mellifera*), native sweat bees (family Halictidae), mining bees (family Andrenidae), and butterflies. Reduced seed set has been documented in populations with limited pollinator visitation. The species page is available at https://www.fws.gov/apps/species/schweinitzs-sunflower-helianthus-schweinitzii.

Schweinitz's sunflower has a narrow geographic distribution centered in the Piedmont of North Carolina and South Carolina. Suitable habitat for Schweinitz's sunflower is generally upland flats and gentle slopes where plants are in full to partial sun. The species is found in shallow and clay soils with slaty rock fragments. Most remaining populations occur along roadsides as well.

Schweinitz's sunflower was listed as Endangered in May 1991 (56 FR 21087). The principal threats to this species include habitat loss and degradation resulting from development, highway construction and improvement, and changes in roadside and utility right-of-way management practices. Fire suppression and reduced consistent disturbance lead to shading and increased competition from woody and invasive vegetation. Additional threats include inappropriate mowing regimes (i.e. during the growing season), accidental herbicide application, and deer browsing. Herbivory has been reported at some sites, including at transplanted or managed populations.

4.5.17 seabeach amaranth *Amaranthus pumilus*

Seabeach amaranth is a low-growing annual plant in the amaranth family (USFWS 2023c). The species has pinkish-red, fleshy stems that trail along the ground and typically grow to 4-24 inches long. The species reproduces exclusively by seed, and flowers and fruits from July through October. Seeds may germinate the following season, while some remain dormant in the sand, forming a persistent seed bank. Dormant seeds may remain viable for many years. The species must recruit annually either from an existing seed bank or from seeds dispersed by wind, water, or anthropogenic factors such as dredging and beach nourishment. The species functions as a pioneer or fugitive species, continually occupying suitable habitat as it becomes available across the landscape. Population presence at a given site may vary widely from year to year depending on recruitment success and habitat availability. The species page is available at https://www.fws.gov/carp/species/seabeach-amaranth-amaranthus-pumilus.

The species occurs on Atlantic Coast beaches from Massachusetts to South Carolina. In North Carolina, seabeach amaranth has been reported historically from barrier island beaches in every county. Suitable habitat for seabeach amaranth includes lower foredunes and upper beach strands on the ocean side of the primary sand dunes and overwash flats at accreting spits or ends of barrier islands.

Seabeach amaranth was listed as Threatened in April 1993 (58 FR 18035). Threats to the species include beachfront development, beach stabilization activities, and intensive recreational use of beaches, including off-road vehicle traffic. These activities may destroy plants directly or alter the natural processes that create and maintain suitable habitat. Hurricanes and severe storms may also result in both losses and gains of habitat depending on storm impacts. Over the past 14 years, the numbers of seabeach amaranth have declined dramatically across the state. It is unclear what is causing the decline in numbers of plants.

4.5.18 sensitive joint-vetch *Aeschynomene virginica*

Sensitive joint-vetch is an annual plant in the pea family, native to the eastern United States (USFWS 2025g). Plants typically grow 36-72 inches tall within a single growing season. Stems are single and sometimes branch near the top. Flowers occur in elongated clusters with stalked flowers. The fruit is a segmented pod that breaks apart at maturity, with four to ten one-seeded segments. Fruits are 1.2–2.8 in long and turn dark brown when ripe. Flowers of sensitive joint-vetch are pollinated by insects, including bumblebees, leaf-cutter bees (family Megachilidae), and the least skipper butterfly (*Ancyloxypha numitor*). Seeds are dispersed over short distances, and secondary dispersal by water has been documented. Seedlings have been observed germinating in flotsam deposited along riverbanks. Seed germination is reduced in submerged or waterlogged soils. High salinity significantly reduces germination and seed viability. The species page is available at https://www.fws.gov/carp/species/sensitive-joint-vetch-aeschynomene-virginica.

In North Carolina, sensitive joint-vetch occurs in the coastal plain and has been documented in Beaufort, Craven, Hyde, and Lenoir counties. The North Carolina Natural Heritage Program records indicate 13 element occurrences, of which seven are considered historic. Extant populations include one occurrence in Beaufort County and six occurrences in Hyde County. Suitable habitat for sensitive joint-vetch includes freshwater marsh and roadside ditches that may be subject to tides (specifically the intertidal zone of coastal marshes where plants are flooded twice daily, mucky, sandy or gravelly soils).

The species was listed as Threatened in May 1992 (57 FR 21569). Habitat alteration is the primary threat to sensitive joint-vetch. Major threats include dredging, filling, stabilization of riverbanks, marsh conversion, and other activities that eliminate or degrade tidal marsh habitats. Saltwater intrusion can increase salinity levels and alter tidal marsh conditions. The invasive plant *Phragmites australis* represents a significant threat by forming dense monotypic stands that displace diverse marsh vegetation. Additional threats include agricultural activities, mining, commercial and residential development, pollution and sedimentation, impoundments, water withdrawal projects, bank erosion from motorboat traffic, mowing, herbicide application, grazing pressure, and introduced insect pests.

4.5.19 small whorled pogonia *Isotria medeoloides*

The small whorled pogonia is a member of the orchid family (USFWS 2022f). The stem of the small whorled pogonia grows about 10 inches tall when in flower, 14 inches when bearing fruit. A single or paired green-yellow flower may be visible in May or June. In contrast to other pogonias that form colonies, small whorled pogonia grows as individual plants. All life stages of the small whorled pogonia require mycorrhizal fungi. The specific mycorrhiza detected with small whorled pogonia is in the family Russulaceae. Studies comparing soil adjacent to plants that emerged from dormancy and soil adjacent to plants that emerged following the death of a canopy tree documented increased abundance of Russulaceae orchid mycorrhiza DNA following canopy tree death. The species page is available at https://www.fws.gov/species/small-whorled-pogonia-isotria-medeoloides.

The small whorled pogonia is found in many states in the U.S. In the southern portion of its range, the species is associated with the Blue Ridge and Southwestern Appalachian ecoregions, though one occurrence in North Carolina is in the piedmont (Guilford County). It prefers acidic soils and is often found on slopes near small streams. In North Carolina, the species is typically found in open, dry deciduous woods and is often associated with pine, white pine, and rhododendron.

The species was originally listed as Endangered in September 1982 (47 FR 39827) and reclassified as Threatened in October 1994 (59 FR 50852). The primary threat to the small whorled pogonia throughout its range is habitat destruction for residential or commercial development. Development may also increase local deer populations, which increases the risk of deer browsing on the species. Logging is a documented threat. Additional threats include conversion of habitat to pine plantations, mechanical clearing, digging by feral hogs, and invasion by exotic pest plants.

4.5.20 small-anthered bittercress *Cardamine micranthera*

Small-anthered bittercress is a species of the mustard family (USFWS 2023d). The species may occur near the related American watercress (*Cardamine rotundifolia*) but does not form mixed populations, indicating ecological separation even within similar streambank habitats. Very little is known of the life history of this species, including the identity of its pollinators; however, ants have been observed visiting the flowers. Investigations of the plant's biology remain needed for habitat management guidelines to

be established. The species page is available at https://www.fws.gov/rivers/species/streambank-bittercress-cardamine-micranthera.

Small-anthered bittercress is restricted to a few populations in the Dan River watershed of North Carolina. These populations occur within the upper Dan River sub-basin of the Roanoke River Basin and are situated in the Piedmont ecoregion. Small-anthered bittercress suitable habitat generally consists of seepages, wet rock crevices, streambanks, sandbars, and wet woods along small streams. The species occur on soils with a 25-60 percent slope, and in fully to partially shaded areas typical of moist soils of the upper piedmont.

The species was listed as Endangered in May 1983 (54 FR 38947). The primary threat to small-anthered bittercress is habitat destruction and alteration. Specific threats include road construction, residential development, agricultural activities, and timber harvesting near streambanks and seepage areas. Hydrological modifications such as ditching, channelization, or diversion of seepage flows threaten existing populations by altering the saturated soil conditions required for germination and growth. Additional threats include sedimentation, invasive exotic plants, degradation of water quality, trampling during recreation, and other forms of human disturbance. Small population sizes make the species vulnerable to stochastic events.

4.5.21 smooth coneflower *Echinacea laevigata*

The smooth coneflower is a perennial herb in the aster family (USFWS 2011). It grows up to 59 inches tall from a stout, black, vertical rootstock; flower heads are large and showy. Flowering occurs from May through July. Pollinators include native bees and butterflies. Reproduction is sexual via seeds; no vegetative spread has been documented. Smooth coneflower populations are maintained by disturbance that reduces shading and competition from woody plants. Without disturbance, populations decline due to encroachment by hardwoods and aggressive native or exotic grasses. Fire or mowing reduces shading and competition and helps maintain suitable conditions. The species page is available at https://www.fws.gov/species/smooth-coneflower-echinacea-laevigata.

In North Carolina, smooth coneflower occurs in the Piedmont ecoregion. The species is state-ranked as S1 (critically imperiled) due to its rarity and vulnerability. Coneflower suitable habitat includes open woods, glades, cedar barrens, roadsides, clearcuts, dry limestone bluffs, and power line ROW. The species occurs in plant communities described as very dry hardpan forests, diabase glades or dolomite woodlands, with optimal sites characterized by abundant sunlight and little competition in the herbaceous layer.

Smooth coneflower was listed as Endangered in October 1992 (57 FR 46430) and downlisted to Threatened in July 2022 based on recovery progress (87 FR 40100). Threats to the species include habitat loss from development as well as fire suppression and the resulting canopy closure and increased shading. Encroachment of invasive species is also a threat. Road maintenance practices can damage plants. Herbicide spraying along road margins has destroyed plants in some North Carolina populations. Off-road vehicle use, trampling, and collection for horticultural or medicinal purposes are additional threats.

4.5.22 spreading avens *Geum radiatum*

Spreading avens is a tall perennial herb in the rose family (USFWS 2025h). Plants grow 7.9-19.7 inches tall with distinctive bright yellow flowers. Flowering occurs from June through September. Fruits form

and ripen from August through October. Spreading avens is low-growing and arises from a buried horizontal rhizome. The species reproduces both sexually and vegetatively (via rhizomes). Population clusters along cracks in underlying rock suggest some individuals may originate from rhizomes through asexual reproduction. While the majority of populations are highly fragmented, the species exhibits surprisingly moderate levels of gene flow and genetic diversity within and among populations. Spreading avens is likely pollinated by insects, though detailed pollinator studies are limited. The species page is available at https://www.fws.gov/species/spreading-avens-geum-radiatum.

In North Carolina, spreading avens occurs in 14 extant populations in the northern and central Mountains. This species is generally found in pioneer perennial herb communities at high-elevation rocky sites. Occupied sites at higher elevations are surrounded by spruce-fir or northern hardwoods containing scattered spruce. The species prefers conditions of direct sunlight for at least part of the day and shallow acidic soils of high-elevation cliffs, rocky outcrops, steep slopes, and gravelly talus.

The species was listed as Endangered in April 1990 (55 FR 12793). Threats to spreading avens include trampling and vegetation succession. Herbaceous perennial communities at occupied sites are vulnerable to disturbance from recreational use. Trampling by hikers and rock climbers can damage plants and disturb soil. Vegetation succession threatens habitat by altering open conditions required by the species.

4.5.23 swamp pink *Helonias bullata*

Swamp pink is a long-lived, perennial wildflower (USFWS 2021i). It has smooth, oblong, dark green leaves that form an evergreen rosette. From March to May, the plant produces a flowering stalk 12-35 inches tall topped with a dense cluster of small, pink flowers. Swamp pink flowers attract a variety of insect visitors, including butterflies, bumblebees, and sweat bees, and insect visitation likely facilitates cross-pollination. The species page is available at https://www.fws.gov/species/swamp-pink-helonias-bullata.

In North Carolina, swamp pink is found primarily in the southwestern portion of the Mountains, from Henderson County west to Macon County. The species is also known from a single site in the northern Mountains in Ashe County. The largest population in North Carolina occurs in the Pisgah National Forest in an area known as the Pink Beds. Swamp pink habitat includes swampy forested wetlands bordering meandering streams; headwater wetlands; sphagnous, hummocky, dense Atlantic white cedar swamps; Blue Ridge swamps; meadows; bogs; and spring seepage areas.

Swamp pink was listed as Threatened in September 1988 (53 FR 35076). The primary threat to swamp pink is loss and degradation of wetland habitat. Habitat loss and degradation result from wetland draining, logging, development, and road construction. Hydrologic alterations, siltation, and trampling can damage plants and reduce suitable habitat.

4.5.24 Virginia spiraea *Spiraea virginiana*

Virginia spiraea is a shrub that forms dense colonies along riverbanks and gravel bars (USFWS 2021j). Mature plants reach a height of 39-118 inches. The species has a modular growth form and spreads clonally through vegetative growth, which allows it to persist in dynamic riparian habitats where periodic flooding and disturbance limit the establishment of forest canopies. Sexual reproduction from seed is rare and infrequent due to low seed viability. Pollination occurs through multiple types of insects rather than a single specialized pollinator. This species is an important food source for beavers in some

locations. Beaver browsing stimulates rhizome growth and may promote vegetative dispersal when freshly cut twigs are transported downstream. The species page is available at https://www.fws.gov/species/virginia-spiraea-spiraea-virginiana.

In North Carolina, Virginia spiraea is known from the Mountain province. Documented occurrences are from Ashe, Buncombe, Graham, Macon, Mitchell, Swain, Transylvania, and Yancey counties. Virginia spiraea habitat includes banks of high gradient sections of second and third order streams, or meander scrolls and point bars, natural levees, and other braided features of lower reaches, and roadside ditches connected to these features.

Virginia spiraea was listed as Threatened in June 1990 (55 FR 24241). Threats include dam construction, channelization, gravel mining, bridge and road construction, recreational use of river bars, and competition from invasive plants. Alteration of stream flow by damming or road construction also threatens the species. Off-road vehicle use, severe flooding, invasive exotic plants, low genetic diversity, lack of sexual reproduction, deer browsing, and climate change pose additional risks. Small, isolated colonies are vulnerable to extirpation from a single catastrophic flood or human alteration of river hydrology.

4.5.25 white irisette *Sisyrinchium dichotomum*

The white irisette is a member of the iris family (USFWS 2019h). It is a perennial herb with dichotomously branching stems 4.3-7.9 inches tall. Flowers occur in clusters of four to six at the tops of winged stems. This species is insect-pollinated, but the specific pollinators are unknown. There is no data on seed vectors. The species reproduces by seed and is not known to spread vegetatively. Individual plants consist of clusters of stems arising from fibrous roots. The species appears to be a poor competitor and is often found in areas where disturbance has reduced competition from other vegetation. The species page is available at https://www.fws.gov/species/white-irisette-sisyrinchium-dichotomum.

In North Carolina, white irisette has been reported in Henderson, Polk, and Rutherford counties. Very rare occurrences consisting of only a few individuals have been noted in the Piedmont foothills of southern McDowell and Burke counties. In NC, there are 13 populations remaining across the species' range, consisting of approximately 1,800 individuals. White irisette suitable habitat consists of areas with circumneutral (pH level near 7) soils of middle-elevation slopes in dry to mesic, open oak-hickory forests, most often in partial shade.

White irisette was listed as Endangered in September 1991 (56 FR 48752). It is endangered primarily by suppression of natural disturbance, alteration of habitat for industrial and residential development, trampling, and highway construction and improvements. Encroachment by non-native species such as kudzu and Japanese honeysuckle has resulted in the loss of populations and degradation of suitable habitat throughout the species' range.

4.6 LICHENS

4.6.1 rock gnome lichen *Gymnoderma lineare*

The rock gnome lichen is a member of the reindeer moss family (USFWS 2020f). Lichens are two organisms, a fungus and alga or cyanobacterium that exist so closely in a symbiotic relationship they are functionally a single organism. The alga or cyanobacterium provides nutrients to the fungus and the

fungus in turn provides a protected and secure environment for the alga or cyanobacterium to live. Rock gnome lichen is a rare endemic lichen of the southern Appalachian Mountains. The species forms small dense colonies that are often tightly appressed to rock substrates. The primary means of propagation appears to be asexual, with colonies spreading clonally. The species is slow-growing, long-lived, and extremely sensitive to changes in microclimate. Successful growth and establishment depends strongly on sustained moisture, shade, and the presence of moss mats. The species page is available at https://www.fws.gov/rivers/species/rock-gnome-lichen-gymnoderma-lineare.

Fifty-eight of the 67 known occurrences of rock gnome lichen are located in North Carolina, where the species occurs at elevations above 1,000 meters in cool, moist, shaded habitats. These occurrences are primarily found in the Balsam Mountains, Black Mountains, and the Roan Highlands. Sites are concentrated within the Pisgah National Forest and Nantahala National Forest. Suitable habitat for the rock gnome lichen includes: (1) vertical rock faces; (2) environments with high humidity including foggy high elevation areas or deep gorges; (3) northern exposure or partial canopy cover; and (4) infrequently flooded boulders in streams with moderate or low light.

Rock gnome lichen was listed as Endangered in January 1995 (60 FR 3557). The primary threats to this species are habitat alteration and degradation, including increased sunlight resulting from canopy thinning, desiccation caused by altered hydrology, and deposition of airborne pollutants. Even minor changes to air quality and moisture levels can result in rapid population declines. The species is especially sensitive to disturbance because of its reliance on stable, undisturbed microclimates. Activities such as trail construction, logging, recreational overuse, rock climbing, trail widening, and canopy removal for scenic views have led to degradation or extirpation of some known colonies. Additional threats include road construction, utility line construction, forest management activities, and other actions that result in destruction or adverse modification of habitat.

4.7 INSECTS

4.7.1 Saint Francis' satyr butterfly *Neonympha mitchellii francisci*

The Saint Francis' satyr is a small, brown butterfly with eyespots on its wings and a wingspan of 1.25-1.5 inches (USFWS 2025i). The Saint Francis' satyr is a subspecies of Mitchell's satyr (*Neonympha mitchellii*) and was first described in 1989 by Parshall and Kral. Abundant graminoid vegetation is necessary to support larval development. Patches of *Carex* sedges located in open, saturated soils are critical for egg-laying and larval survival. Where shrubs and trees close the canopy, host plant abundance declines and larval survival is reduced, leading to population declines. The species page is available at https://www.fws.gov/carp/species/saint-francis-satyr-butterfly-neonympha-mitchellii-francisci.

The Saint Francis' satyr occurs only in the sandhills ecoregion of southern North Carolina. The species' entire known range is confined to wetland complexes within the Cape Fear River basin. It is known from a few populations in Cumberland and Hoke counties, entirely within Fort Bragg. No additional populations have been confirmed outside this area. It is a wetland specialist inhabiting open, sedge-dominated wetlands along small streams. These habitats consist of graminoid-dominated openings within forested landscapes and are associated with streams and impoundments in peat or mineral soils. Historically, these wetlands were maintained by natural disturbance processes including beaver activity, fire, and flooding. The species uses areas recently disturbed by beaver flooding and fire, and individuals are most abundant in habitats that were burned or flooded within the previous two years.

The Saint Francis' satyr was listed as Endangered in January 1995 (60 FR 5264). The primary threat to the species is the loss of natural disturbance regimes, particularly beaver activity and fire, which leads to habitat closure and degradation. Additional threats include changes in hydrology resulting from ditching, road construction, or military activity, as well as fire suppression and potential pesticide drift. These threats reduce host plant abundance, degrade wetland habitat, and lead to population isolation. Although habitat restoration that mimics natural disturbance has improved habitat quality, the species remains extremely vulnerable because of its small population size, limited range, and susceptibility to stochastic events.

4.8 ARACHNIDS

4.8.1 spruce-fir moss spider *Microhexura montivaga*

The spruce-fir moss spider is a very small spider, with adults measuring only 0.12-0.16 inches long (USFWS 2021k). There are only two described species in the genus *Microhexura*. *M. montivaga* is geographically and ecologically restricted to the high-elevation spruce-fir forests of the southern Appalachian Mountains, whereas *M. idahoana* occurs in the Pacific Northwest. The spruce-fir moss spider has book lungs, specialized internal respiratory organs found in some arachnids, consisting of stacked tissue layers that allow efficient gas exchange, particularly in cool, moist environments. The species builds tube-shaped webs within moss mats that overlie rock outcrops. It is adapted to a highly specialized microhabitat characterized by high humidity and cool, stable temperatures. The spruce-fir moss spider is thought to feed primarily on minute arthropods that inhabit moss mats, particularly springtails (Collembola; small soil- and moss-dwelling insects). These prey species are highly sensitive to moisture conditions. Persistent canopy cover is necessary to prevent drying. All life stages depend on intact bryophyte mats that support adequate prey populations. The spider's survival is closely tied to the condition of the bryophyte substrate and the persistence of the cool, moist microclimate required by both the spider and its prey. The species page is available at https://www.fws.gov/species/spruce-fir-moss-spider-microhexura-montivaga.

In North Carolina, the spruce-fir moss spider occurs only at the highest elevations of the Black Mountains, Grandfather Mountain, Roan Mountain, Plott Balsams, Great Smoky Mountains. Suitable habitat for the spruce fir moss spider includes cool, high-elevation Southern Appalachian forests, specifically within damp, well-drained bryophyte (moss and liverwort) mats on shaded rocks, and often under Fraser firs. Its habitat is limited to specific high-elevation areas (sky islands), at altitudes typically above 5,300 feet.

The spruce-fir moss spider was listed as Endangered in February 1995 (60 FR 6968). The primary threat to the spruce-fir moss spider is the decline of Fraser fir–red spruce forests caused by destructive logging in the late 1800s/early 1900s, infestation from the non-native balsam woolly adelgid, air pollution and associated acid deposition, and climate change. As canopy trees die, bryophyte mats dry out and no longer provide suitable habitat. The species is highly sensitive to changes in temperature and humidity. Climate change contributes to habitat degradation by altering the cool, moist microclimatic conditions of high-elevation spruce–fir forests, leading to drying of bryophyte mats and loss of suitable habitat for the species. Airborne pollutants, including ozone and acid deposition, further stress forest ecosystems on which the spider depends. Habitat fragmentation and small population size increase the risk of extinction.

4.8.1.1 spruce-fir moss spider Critical Habitat

Critical Habitat for the spruce-fir moss spider was designated in July 2001 (66 FR 35547). The physical or biological features essential to the conservation of the spruce-fir moss spider consist of:

1) Fraser fir or fir-dominated spruce-fir forests at and above 5,400 feet elevation
2) moderately thick and humid, but not wet, moss (species in the genus *Dicranodontium*, and possibly *Polytrichum*) and/or liverwort mats on rock surfaces that are adequately sheltered from the sun and rain (by overhang and aspect) and include a thin layer of humid soil and/or humus between the moss and rock surface

4.9 MAMMALS

4.9.1 Carolina northern flying squirrel *Glaucomys sabrinus coloratus*

The Carolina northern flying squirrel is one of 25 subspecies of the northern flying squirrel (USFWS 2022g). It is a nocturnal, arboreal mammal with a total length of 10-12 inches. Flying squirrels do not fly but glide using a furred membrane extending from the wrists to the ankles. The glide facilitates movement between foraging and denning sites in continuous forest canopies. This species is capable of long-distance gliding, with recorded glides of up to 148 feet. It is active year-round and does not hibernate. The Carolina northern flying squirrel feeds heavily on fungi and lichens, including truffles, but also consumes seeds, buds, fruits, tree sap, and insects, reflecting an omnivorous foraging strategy associated with mature, high-elevation forest ecosystems. It breeds once per year and produces small litters, typically consisting of two to four young, which are reared in tree cavities or dreys. The species page is available at https://www.fws.gov/species/carolina-northern-flying-squirrel-glaucomys-sabrinus-coloratus.

In North Carolina, the Carolina northern flying squirrel has been documented in high-elevation spruce–fir forests within the Black Mountains, Great Balsam Mountains, Great Smoky Mountains, Roan Mountain, Grandfather Mountain, Unaka Mountain, Unicoi Mountains, Long Hope Valley and the Plott Balsams. Suitable habitat for Carolina northern flying squirrel includes cool, wet boreal and deciduous forests over 4,000 feet. It prefers a mix of conifers (red spruce, Fraser fir, Eastern hemlock) and northern hardwood trees (yellow birch, buck - eye, sugar maple).

The subspecies was listed as Endangered in September 1985 (50 FR 26999). Primary threats to the Carolina northern flying squirrel include loss and degradation of high-elevation habitat resulting from logging, air pollution, acid deposition, and infestation by the non-native balsam woolly adelgid (*Adelges piceae*), which has caused extensive mortality of Fraser fir. Habitat fragmentation further restricts movement among isolated populations. Climate change contributes to habitat degradation by reducing the extent of suitable spruce–fir forests and altering the cool, moist conditions required by the subspecies. Additional threats include road construction, ski resort development, and recreational infrastructure, which fragment forest cover and create edge effects that limit gliding and dispersal.

4.9.2 gray bat *Myotis grisescens*

The gray bat is a member of the vesper bat family (USFWS 2025j). It is a medium-sized insectivorous bat with an overall length of about 3.5 inches and a wingspan of 10-11 inches. The species is monotypic and occurs across a limited geographic range in limestone karst areas of the southeastern United States. Gray bats roost in caves year-round. They feed on aquatic and terrestrial flying insects, foraging at night over open water and along forested riparian corridors and floodplain forests. Summer colonies are

located near rivers, reservoirs, or forested streams that provide suitable foraging habitat; individuals may travel up to 20 km from roosts to foraging areas. In summer, pregnant females form maternity colonies in warm caves that support clustering behavior and pup development, while males and first-year females use separate caves or cooler portions of maternity caves as bachelor roosts. In winter, gray bats roost in caves that function as hibernacula with cold but stable temperatures suitable for hibernation. Adult females emerge from hibernation in late March through mid-April, followed by juveniles and adult males. The species page is available at https://www.fws.gov/species/gray-bat-myotis-grisescens.

Gray bats have been documented in North Carolina in the Blue Ridge and western Piedmont ecoregions with karst topography. They roost in caves and on human-built structures (e.g., bridges, culverts, buildings) and forage along the French Broad and Nolichucky River systems in Buncombe, Madison, and Yancey counties. Suitable habitat for gray bat includes (1) caves, cave-like structures, dams, mines, quarries, culverts, bridges, and buildings or (2) streams, rivers, open water, lakes, large wetlands, and wooded areas within 250 m of these water features.

The gray bat was listed as Endangered in April 1976 (41 FR 17736). Suspected factors leading to decline include impoundment of waterways, cave commercialization, natural flooding, pesticides, water pollution, and siltation. Gray bats in maternity colonies have been found dead with lethal levels of dieldrin in their brains. Persistent organochlorine contaminants accumulate in guano-rich caves. Human visitation to maternity caves may cause mothers to abandon or drop young. Disturbance during hibernation can cause arousal that uses fat reserves equivalent to 10-30 days of energy. White-nose syndrome fungus has been detected within the gray bat's range, but gray bats appear largely resistant and no mass die-offs have been documented. Projected climate change may alter cave temperatures and disrupt the internal roost environment, triggering premature emergence and depleted energy stores. Increased risk of floods imperils roosting sites near water (e.g., on bridges or in culverts).

4.9.3 Virginia big-eared bat *Corynorhinus townsendii virginianus*

The Virginia big-eared bat is a member of the vesper bat family (USFWS 2019i). It is a medium-sized bat with a body length of approximately 4 inches. The Virginia big-eared bat is distinguished from other bats by its large ears and facial gland structures. Rafinesque's big-eared bat also occurs in western North Carolina and is distinguished from this species by fur color. Populations are associated with a limited number of cave systems, and the range is highly fragmented due to geographic isolation and limited roost availability. The primary diet consists of moths in the order Lepidoptera. Moths are gleaned from surfaces or captured in flight. Foraging typically begins shortly after sunset, continues throughout the night, and occurs within 2 km of cave roosts. Hibernation and maternity roosts occur exclusively in caves. Hibernation occurs in cool, well-ventilated caves with high humidity and minimal disturbance. Preferred hibernation temperatures range from 3 to 9 degrees Celsius. The species page is available at https://www.fws.gov/carp/species/virginia-big-eared-bat-corynorhinus-townsendii-virginianus.

In North Carolina, the Virginia big-eared bat is limited to the western mountain region. Occurrences are restricted to a small number of caves located in Avery, Watauga, and Caldwell counties. Maternity caves and hibernacula have been documented in North Carolina. The species has also been documented using human-built structures such as barns and houses. Suitable habitat for Virginia big-eared bat includes (1) caves, cave-like structures, and rock shelters for roosting (2) open pastures, fields, large and small forested lands for foraging.

The Virginia big-eared bat was listed as Endangered in November 1979 (44 FR 69206). Human disturbance at caves is a primary threat. The subspecies is especially vulnerable during hibernation and maternity periods. Entry into hibernacula during winter can cause arousal, energy depletion, and mortality. Additional threats include habitat fragmentation, forest conversion, and pesticide use. Forest clearing and construction near cave entrances can alter cave microclimates or disrupt commuting corridors.

4.9.4 West Indian manatee *Trichechus manatus*

The West Indian manatee is a sirenian, an order of large aquatic herbivores (USFWS 2001). It is a large, gray mammal with a body that tapers to a flat, paddle-shaped tail. Adults average about 10 feet long and weigh 790-1,200 pounds. Manatees are herbivorous mammals that feed on a wide variety of submerged, emergent, and floating aquatic vegetation, with diet composition varying by habitat type and location. Because manatees must consume large quantities of vegetation daily to meet energetic requirements, the availability, diversity, and productivity of aquatic plant communities are primary biological factors influencing habitat suitability, distribution, and persistence. Feeding occurs both day and night and can occupy up to eight hours per day. Manatees have low metabolic rates and relatively little insulating fat, which contributes to their low tolerance for cold water and reliance on warm-water refuges. The species page is available at https://www.fws.gov/species/west-indian-manatee-trichechus-manatus.

Manatees are considered seasonal visitors to North Carolina's coastal waters, with most observations occurring between June and September. They have been sighted in the Cape Fear River, Pamlico Sound, Bogue Sound, and Albemarle Sound. North Carolina does not host a resident population, but the repeated use of estuarine habitats indicates their biological importance. These occurrences are believed to represent exploratory movements or extensions of normal summer migration behavior. Manatees inhabit freshwater, brackish, and marine environments, including rivers, estuaries, canals, springs, and coastal areas. Preferred habitats are typically shallow and slow-moving waters. Manatees require warm-water habitats during colder months and can die from prolonged exposure to temperatures below 68°F. Access to warm-water refuges, such as natural springs and industrial outfalls, is essential to winter survival.

The West Indian manatee was listed as Endangered in 1967 (32 FR 4001) and reclassified as Threatened in 2017 (82 FR 16668). High-risk activities include recreational and commercial boating, dredging, and coastal development. These activities can result in direct mortality from propeller strikes or degrade essential feeding and resting habitats. Manatees are vulnerable to cold stress during winter months and depend on access to warm-water refuges for survival. Loss or degradation of warm-water refuges, including natural springs and industrial outfalls, is a significant threat to manatee populations. Habitat degradation, including the loss of seagrass beds, further threatens survival by reducing food availability. Climate change and increased algal blooms can degrade water quality and aquatic vegetation and exacerbate existing threats.

4.10 Reptiles

4.10.1 green sea turtle *Chelonia mydas*

The green sea turtle is a large sea turtle with a wide, smooth carapace and inhabits tropical and subtropical coastal waters worldwide (Seminoff et al. 2015). The species is named for the greenish color

of its cartilage and fat rather than the color of its shell. Unlike most sea turtles, adult green sea turtles are herbivorous and feed primarily on seagrasses and algae. Green sea turtles occupy three distinct habitat types during their life cycle. Hatchlings and early juveniles use oceanic habitat. Growing juveniles occupy shallow coastal developmental habitats. Adults forage in calm, shallow, benthic habitats dominated by seagrass beds or algae-rich reef flats. Green sea turtle nesting occurs on tropical and subtropical beaches. Open beaches with a sloping platform and minimal disturbance are required for nesting. Nests typically contain 75 to 200 eggs, and incubation lasts approximately 45 to 70 days. Incubation temperature influences sex determination, with higher temperatures producing more females. Hatchlings emerge at night and orient toward the sea using visual cues from moonlight and surf. The species page is available at https://www.fws.gov/species/green-sea-turtle-chelonia-mydas. Green sea turtles are present in North Carolina waters during warmer months. Green sea turtles are the second most common nesting sea turtle in North Carolina. Since 2015, between 19 (2018) and 96 (2023) green sea turtle nests have been laid annually in the state (seaturtle.org, accessed February 18, 2026). Nest site selection is influenced by sediment grain size and beach slope. Nests are located on elevated beach ridges with fine to medium sand grain composition.

Green sea turtle populations were originally listed as either Threatened or Endangered in July 1978 (43 FR 32800). In April 2016, NOAA Fisheries and the Service revised the species' listing by recognizing 11 distinct population segments (DPS). The Northwest Atlantic DPS, which includes North Carolina, is listed as Threatened (81 FR 20058). Green sea turtles face multiple threats across nesting, migratory, and foraging habitats. Loss of nesting beaches due to coastal development can reduce nesting habitat availability. Beach nourishment and armoring projects may render nesting sites unsuitable. Increased human activity on beaches can interfere with nesting and hatchling emergence. Artificial lighting on beaches can disorient hatchlings. Vessel strikes and incidental capture in trawl and gillnet fisheries are sources of mortality for juveniles and adults. Marine debris ingestion also poses a risk. Climate change can threaten green sea turtles by contributing to sea level rise, beach erosion, and shifts in nesting habitat. Changes in temperature can influence incubation conditions and sex ratios. Climate-related habitat shifts may alter the distribution of nesting and foraging areas.

4.10.2 hawksbill sea turtle *Eretmochelys imbricata*

The hawksbill turtle is one of the smaller sea turtles, with adults weighing 95-165 pounds (USFWS 2013). They are easily distinguished from other species of sea turtles by their sharp, curving beak and the saw-like appearance of their shell margins. Hawksbills prefer healthy reef ecosystems that support the growth of sponges, which make up a large portion of their diet, and display high fidelity to their foraging sites. Sexual maturity is reached between 20-35 years of age. Mating generally occurs every 2 to 4 years in shallow waters off nesting beaches. Females return to nesting beaches, often the same beach where they were born, to lay up to 5 clutches of eggs in a nesting season. They use their rear flippers to dig nests in the sand and typically lay 130–160 eggs per nest. After about 2 months hatchlings emerge and immediately enter the ocean where they enter a pelagic life stage, feeding on plankton and floating debris until they recruit to coastal areas as juveniles. The species page is available at https://www.fws.gov/species/hawksbill-sea-turtle-eretmochelys-imbricata.

Hawksbill turtles occur throughout the world's tropical oceans but are rare in North Carolina waters. Two hawksbill nests were identified by DNA analysis in 2015 at Cape Hatteras National Seashore south of Hatteras; the first records of hawksbill sea turtle nests in the state of North Carolina, and the first outside the state of Florida. Both nests were laid by the same female. Hawksbill tracks are difficult to

differentiate from those of loggerheads and may not be recognized by surveyors. Although surveys may underestimate actual hawksbill nesting numbers due to similarities with loggerhead sea turtles (Meylan et al. 1995), it is likely that these nests are very rare in the state.

The hawksbill turtle was listed as Endangered in 1970 (35 FR 8491). Major threats to the species include loss of nesting and foraging habitats, poaching for their shells (used to make tortoiseshell), accidental capture in fishing gear, and marine debris. Coral reef degradation and climate change also pose serious long-term threats.

4.10.3 Kemp's ridley sea turtle *Lepidochelys kempii*

The Kemp's ridley sea turtle is the smallest sea turtle in the world, with adults weighing 79-99 pounds (NMFS and USFWS 2015). They are easily identified by their circular, high, rounded carapace that is almost as wide as it is long and their grayish-green dorsal coloration. Kemp's ridley turtles primarily feed on crabs, particularly portunid crabs such as blue crabs. Other prey items include shrimp, clams, fish, and jellyfish. Juveniles in oceanic zones associate with floating sargassum mats, which provide food and cover. Kemp's ridley turtles show repeated use of nearshore areas adjacent to nesting beaches during the inter-nesting period. The species page is available at https://www.fws.gov/species/kemps-ridley-sea-turtle-lepidochelys-kempii.

Kemp's ridley sea turtles nest nearly every year in North Carolina, typically in numbers fewer than 15 nests per year. Nests have been recorded along the North Carolina coast, particularly on Cape Lookout National Seashore and Cape Hatteras National Seashore, as well as Bogue Banks and other barrier islands. The species prefers sandy beaches with a relatively steep slope and coarse sand, often backed by dunes. Nests are typically dug 30–50 cm deep above the high tide line.

The Kemp's ridley sea turtle has been continuously listed as Endangered throughout its range since 1970 (35 FR 18320). The primary threats to the species include incidental capture in fishing gear, especially shrimp trawls, loss of nesting habitat due to coastal development, climate change affecting sand temperatures and sex ratios, and pollution. Kemp's ridleys are threatened by disorientation of hatchlings due to artificial lighting, poaching of eggs, and human disturbance of nesting beaches. Beachfront development, construction, and vehicular traffic on nesting beaches can crush nests, compact sand, and deter females from nesting. Artificial lighting disorients both adults and hatchlings. Oil spills like the 2010 Deepwater Horizon event have caused significant mortality to Kemp's ridley turtles in the Gulf of Mexico.

4.10.4 leatherback sea turtle *Dermochelys coriacea*

The leatherback sea turtle is taxonomically distinct from all other sea turtles (NMFS and USFWS 2020). This distinction is based on fundamental differences in shell structure and skeletal morphology. Unlike other sea turtles, which have a hard, bony carapace covered by keratinous scutes, this species has a shell consisting of a mosaic of small bones covered by firm, leathery skin. The leatherback sea turtle is the largest, deepest-diving, most migratory, and most wide-ranging of all sea turtles. Adults reach a length of 47-94 inches. The leatherback sea turtle feeds primarily on sea jellies and other soft-bodied gelatinous organisms. The inside of the mouth and throat is lined with backward-pointing spines that aid in capturing and swallowing prey. Seasonal upwelling along the U.S. West Coast supports blooms of sea jellies that attract leatherbacks during spring and summer months. The species page is available at https://www.fws.gov/species/leatherback-sea-turtle-dermochelys-coriacea.

The leatherback sea turtle regularly occurs off the coast of North Carolina, with the highest number of observations recorded in spring and early summer during northward migrations to foraging grounds off New England and Atlantic Canada. Leatherback nesting has been recorded in low numbers across coastal North Carolina, primarily near Cape Hatteras, Cape Lookout, and Bald Head Island. Leatherback sea turtles nest on tropical and subtropical beaches that are wide, sandy, and typically close to deep water. Nesting beaches are generally open, sandy, and elevated enough to avoid inundation by high tides.

The leatherback sea turtle has been continuously listed as Endangered since June 1970 (35 FR 8491). The primary source of mortality for leatherback sea turtles is incidental capture as bycatch in commercial and recreational fisheries, which can result in drowning, injury, or death. Additional threats include coastal development, beachfront construction, and artificial lighting on nesting beaches. Artificial lighting can deter nesting females and disorient hatchlings as they attempt to reach the ocean. Marine debris poses further threats through ingestion and entanglement, while pollution events, including oil spills, have caused mortality across multiple life stages. Climate change also threatens leatherback sea turtles by affecting nesting beaches and reproductive success. Changes in temperature can influence incubation conditions and hatchling development, and sea level rise, increased storm frequency, and coastal erosion can reduce the availability and suitability of nesting habitat. Climate-driven changes in oceanographic conditions may also affect the distribution and availability of prey species.

4.10.5 loggerhead sea turtle *Caretta caretta*

The loggerhead sea turtle is a large-headed marine turtle with powerful jaws and a reddish-brown carapace (NMFS and USFWS 2023). Adult loggerhead sea turtles typically measure approximately 29-41 inches long. The species is named for its large head, which supports strong jaw muscles that enable it to feed on hard-shelled prey such as whelks and conch. Individuals can live over 80 years, with females not reaching sexual maturity until approximately age 35. Every 2-3 years, females migrate to breed in the general area where they hatched. Mating occurs from late March to early June, and females lay eggs between late April and early September. Nests may hatch through the middle or end of November. During a single nesting season, adult females typically lay three to five nests at intervals of approximately two weeks. Each nest contains about 100 eggs. The sex of hatchlings is determined by the temperature of the sand during incubation, with cooler temperatures producing males and warmer temperatures producing females. After approximately two months of incubation, hatchlings emerge and rapidly disperse offshore where they enter a pelagic juvenile stage for several years before occupying neritic foraging habitats. The species page is available at https://www.fws.gov/species/loggerhead-sea-turtle-caretta-caretta.

North Carolina is one of the primary nesting areas for the Northwest Atlantic Ocean distinct population segment (DPS) of the loggerhead sea turtle. Loggerheads nest along the Atlantic coast of North Carolina and use adjacent nearshore waters during the nesting season. North Carolina waters support wintering aggregations of juveniles and adults and serve as an important migratory corridor linking nesting beaches with offshore foraging and developmental habitats. Cape Hatteras and Cape Lookout National Seashores contain extensive nesting habitat and support the highest annual numbers of loggerhead sea turtle nests in North Carolina. Outside of the National Seashores, barrier island beaches in Carteret, Onslow, Pender, and Brunswick Counties typically support large numbers of loggerhead sea turtle nests.

The loggerhead prefers to nest on high-energy, relatively narrow, steeply sloped beaches with coarse-grained sand.

The loggerhead sea turtle was first listed as Threatened in 1978 (43 FR 32800). In 2011, it was determined that the species is composed of nine DPSs that qualify as species under the Endangered Species Act. The Northwest Atlantic Ocean DPS, which includes North Carolina, is listed as Threatened (76 FR 58868). Loggerhead sea turtles face multiple threats across all life stages. They are at risk of bycatch in fishing gear such as trawls, gillnets, and longlines, and this remains a primary threat despite the use of turtle excluder devices and other gear modifications. Other major threats include changing environmental conditions, direct harvest of turtles and eggs, loss and degradation of nesting habitat, ocean pollution and marine debris, non-native predators affecting eggs and hatchlings, and vessel strikes. Artificial lighting on nesting beaches disorients hatchlings and nesting females. Eggs and hatchlings are vulnerable to tidal inundation, erosion, flooding, storms, and predation. In pelagic *Sargassum* habitats, young loggerheads are exposed to threats including ingestion of marine debris and exposure to petroleum.

4.10.5.1 loggerhead sea turtle Critical Habitat

Critical Habitat for the loggerhead sea turtle was designated in July 2014 (79 FR 39756, 79 FR 39855). The physical or biological features essential to the conservation of the Loggerhead Sea Turtle consist of extratidal or dry sandy beaches from the mean high-water line to the toe of the secondary dune, with 4 components:

1) suitable nesting beach habitat that has relatively unimpeded nearshore access from the ocean to the beach for nesting females and from the beach to the ocean for both post-nesting females and hatchlings and is located above mean high water to avoid being inundated frequently by high tides
2) sand that allows for suitable nest construction, is suitable for facilitating gas diffusion conducive to embryo development, and is able to develop and maintain temperatures and a moisture content conducive to embryo development
3) suitable nesting beach habitat with sufficient darkness to ensure that nesting turtles are not deterred from emerging onto the beach and hatchlings and post-nesting females orient to the sea
4) natural coastal processes or artificially created or maintained habitat mimicking natural conditions

4.11 SNAILS

4.11.1 magnificent ramshorn *Planorbella magnifica*

The magnificent ramshorn is an air-breathing freshwater gastropod mollusk (USFWS 2019j). It has a thin, fragile, coiled shell in the shape of a ram's horn. Adult shells grow to approximately 0.6-1.0 inches wide. Individuals lose their eyesight over time as eyes become covered by a thickened cuticle. The magnificent ramshorn requires dense submerged aquatic vegetation for egg-laying and protection. The species is sensitive to drying, rapid salinity changes, and low dissolved oxygen. In captive conditions, individuals graze on algae, periphyton, and detritus, and aquatic vegetation provides shelter, food, and surfaces for egg deposition. The species page is available at https://www.fws.gov/species/magnificent-rams-horn-planorbella-magnifica.

The magnificent ramshorn is endemic to the lower Cape Fear River Basin in southeastern North Carolina and occurs nowhere else in the world. The species was listed as Endangered in September 2023 due to the loss of all known natural populations and the destruction or alteration of its historical habitat (88 FR 56471). Although the species had not been observed in the wild for decades and was believed extirpated from its natural habitat, captive populations were maintained for conservation purposes. In late 2023, captive-propagated individuals were released into a prepared pond within the species' historical range, representing an initial reintroduction effort intended to support recovery of the species in the wild. Reintroduced wild individuals of the magnificent ramshorn are not designated as an experimental population; they are managed as part of the listed endangered species under the standard protections associated with the final listing rule. Suitable habitat for the magnificent ramshorn includes 1.) Natural freshwater ponds and lakes, deep enough to sustain large-leaf emergent aquatic vegetation; 2.) relatively high water quality, to sustain natural physiological process for normal behavior.

The primary threats to the magnificent ramshorn include habitat destruction resulting from development and the draining of ponds, pollution, water quality degradation, stormwater runoff, and the removal of aquatic vegetation. Activities that alter pond hydrology, remove aquatic vegetation, or reduce dissolved oxygen levels are detrimental. Herbicide use in aquatic systems may also threaten individuals or hinder reintroduction efforts. Secondary threats include predation by predatory insects, fishes, and turtles. Catastrophic events, such as severe storms, disease, or predator infestations affecting captive populations, could result in the near extinction of the species.

4.11.2 noonday snail *Mesodon clarki nantahala*

The noonday globe snail has a rounded, reddish shell with a diameter of approximately 0.75 inches (Clench and Banks 1932). The species is active only under moist conditions and is believed to feed on decaying plant material and fungi, as is typical of other polygyrid snails. The species page is available at https://www.fws.gov/carp/species/noonday-globe-patera-clarki-nantahala.

The noonday globe snail is known to occur only in Swain County, North Carolina, within the Nantahala National Forest (USFWS 2026). All known occurrences are limited to a single, small area along the southeast-facing slope of the Nantahala Gorge. Suitable habitat for noonday globe snail includes steep, north-facing slopes of the gorge, characterized by a mix of hardwood and hemlock forests, a rich understory, and underlying calcareous rock.

The noonday globe snail was listed as Threatened in July 1978, due to a proposal to widen U.S. Route 19 through the Nantahala Gorge (43 FR 28932). Threats to the noonday globe snail include logging, recreational development, trail construction, and other activities that disturb talus slope habitat. Because the species depends on moist, shaded conditions, activities that increase sunlight exposure or reduce forest cover can reduce habitat suitability. Drought and climate variability also pose threats by reducing surface moisture and leaf litter, which decreases available microhabitats. Rockslides and soil erosion may also degrade or destroy occupied habitat.

5 Effects of Covered Activities

This section covers the effects of the anticipated activities covered in this standing analysis to the covered species and critical habitat. Where appropriate in our analysis, we make note of which activities are expected to have no effect on a species and critical habitat. This information is provided as helpful

technical assistance to those agencies and project proponents who may be unfamiliar with the species and activities and can be incorporated by reference by action agencies when they make a NE determination.

The effects of the action are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action but that are not part of the action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (50 CFR 402.02).

A project's action area must include all areas affected (i.e., modifications to land, air, or water) by the proposed action, and not merely the immediate area involved in the action. If the activities satisfy the two-part test for causation ("but for" and "reasonably certain to occur"), they should be considered as part of the action. To qualify for use of this standing analysis, a project's action area must be wholly encompassed by the coverage area for this standing analysis as described above and all activities within the proposed action must fit within the scope of the standing analysis.

Qualifying actions typically involve one or more of the stressors addressed below.

5.1 ACTIVITIES THAT "MAY AFFECT, NOT LIKELY TO ADVERSELY AFFECT" LISTED SPECIES/CRITICAL HABITATS

Species/ Group or Critical Habitat	Activity Description	Potential Stressor-Exposure-Response Pathway	Rationale for NLAA Determination
Neuse River waterdog, dwarf wedgemussel, Tar River spinymussel, yellow lance, Atlantic pigtoe, James spinymussel, Carolina madtom	Any activity with an action area that includes suitable habitat for the listed aquatic species and where: 1) the activity's proposed area of impact and the reach of stream 330 feet (100 m) upstream and 1313 feet (400 m) downstream have been properly surveyed for the presence of the species, and no members of this species were observed.	Stressors: impacts to habitat quality due to human presence and noise; degradation of aquatic habitat from sediment runoff, increases in turbidity, changes in substrates, and reductions in stable stream and river channels and banks from sedimentation Exposure path: Exposure of these species is limited as they have not been found to be present in the action area. Response: No response is expected of these species as they have not been found to occur in the action area.	A valid survey has been conducted by a qualified biologist and none of the listed aquatic species have been observed within the action area, so potential impacts to the species are discountable and the activity is not likely to adversely affect these species. Because the action area intersects the species range and contains suitable habitat, we cannot rule out the possibility of an undetected occurrence and a determination of "no effect" is inappropriate.

Species/ Group or Critical Habitat	Activity Description	Potential Stressor-Exposure-Response Pathway	Rationale for NLAA Determination
Neuse River waterdog, dwarf wedgemussel, Tar River spinymussel, yellow lance, Atlantic pigtoe, James spinymussel, Carolina madtom	Any activity with an action area that includes suitable habitat for the listed aquatic species and where: 1) the activity's proposed area of impact and the reach of stream 330 feet (100 m) upstream and 1313 feet (400 m) downstream have not been properly surveyed for the presence of the species; but 2) the USFWS Raleigh Field Office has agreed that no survey was necessary, and that the species is not likely to be adversely affected.	Stressors: impacts to habitat quality due to human presence and noise; degradation of aquatic habitat from sediment runoff, increases in turbidity, changes in substrates, and reductions in stable stream and river channels and banks from sedimentation Exposure path: The field office determination of not likely to adversely affect indicates that exposure will be limited for these species. Response: The field office determination of not likely to adversely affect indicates that response will be limited for these species.	Written documentation is provided of coordination between the Action Agency and the Raleigh Field Office confirming that no species survey is required and that the species is not likely to be adversely affected.
Appalachian elktoe, Carolina heelsplitter, longsolid, purple bean, spotfin chub	Any activity where: 1) the activity's proposed area of impact and the reach of stream 330 feet (100 m) upstream and 1313 feet (400 m) downstream contain suitable habitat for the listed clam species; and 2) it has been properly surveyed for the presence of these species but no members of those species were observed.	Stressors: impacts to habitat quality due to human presence and noise; degradation of aquatic habitat from sediment runoff, increases in turbidity, changes in substrates, and reductions in stable stream and river channels and banks from sedimentation Exposure path: Exposure of the species is limited as it has not been found to be present in the action area Response: No response is expected of the species as it has not been found to occur in the action area.	A valid survey has been conducted by a qualified biologist and the species has not been observed within the action area, so potential impacts to the species are discountable and the activity is not likely to adversely affect this species. Because the action area intersects the species range and contains suitable habitat, we cannot rule out the possibility of an undetected occurrence and a determination of “no effect” is inappropriate.

Species/ Group or Critical Habitat	Activity Description	Potential Stressor-Exposure-Response Pathway	Rationale for NLAA Determination
piping plover	Any activity that will impact or alter suitable habitat for piping plover but where: 1) the activity has a written piping plover management plan assuring implementation of post-project beach management in accordance with the Guidelines for Managing Recreational Activities in Piping Plover Breeding Habitat on the U.S. Atlantic Coast to Avoid Take Under Section 9 of the Endangered Species Act; 2) the management plan has been approved by the state wildlife agency or the USFWS; and 3) the entity with authority over the newly created habitat has provided a written commitment to implement the management plan.	Stressors: disturbance, nest burial, soil/sand compaction (direct); changes in vegetation (indirect) Exposure path: Exposure is limited if the approved piping plover management plan is implemented. Response: decreased nesting success, decreased foraging success, decreased predator avoidance	If the project implements the approved piping plover management plan, effects are expected to be insignificant and the project will not adversely affect piping plover.
rufa red knot	Any activity that intersects the rufa red knot range but does not include activities or structures that may pose a collision risk to birds or that will result in long-term impacts to rufa red knot foraging or roosting habitat.	Stressors: disturbance, soil/sand compaction (direct); changes in vegetation (indirect) Exposure path: Exposure is limited if the activity does not pose a collision risk to birds and does not impact suitable habitat. Response: decreased nesting success, decreased foraging success, decreased predator avoidance	Because the activity does not pose a collision risk to rufa red knot and will not cause long-term damage to their habitat, risks to this species are insignificant and the activity is not likely to adversely affect this species.

Species/ Group or Critical Habitat	Activity Description	Potential Stressor-Exposure-Response Pathway	Rationale for NLAA Determination
eastern black rail	Any activity that intersects the eastern black rail range and impacts suitable habitat for this species, but: 1) does not include fire management, grazing, haying, mowing and/or other mechanical treatment activities; 2) does not involve ground disturbance; and will not be conducted during the breeding season or the adult molting period.	Stressors: disturbance (direct); changes in vegetation, alteration of food resources (indirect) Exposure path: Exposure is limited if the activity does not involve direct habitat disturbance and will occur outside the sensitive seasons for the species. Response: decreased nesting success, decreased predator avoidance, decreased survival	Because the activity does not involve ground or vegetation disturbance and will occur outside of sensitive seasons, impacts to suitable habitat will be insignificant and the activity is not likely to adversely affect the species.
red-cockaded woodpecker	Any activity that intersects the red-cockaded woodpecker range and where: 1) the action area is located in the northeastern coastal plain (NECP) and in forested habitat with pine trees greater than 30 years of age; but 2) the action area has no pine trees with a dbh equal to or greater than the indicated minimum and the activity does not involve a disturbance within 200 feet of a cavity tree.	Stressors: disturbance (direct); changes in vegetation, alteration of food resources (indirect) Exposure path: Exposure is limited if the action area has no pine trees with a dbh equal to or greater than the indicated minimum and the activity will not involve a disturbance within 200 feet of a cavity tree. Response: decreased nesting success, decreased foraging success, decreased survival	Although the project occurs within suitable habitat for this species, if there are no suitable trees for nesting, roosting, or foraging in the action area and there will be no disturbance near a tree suitable for nesting and roosting, then impacts are likely to be insignificant and the activity is not likely to adversely affect the species.

Species/ Group or Critical Habitat	Activity Description	Potential Stressor-Exposure-Response Pathway	Rationale for NLAA Determination
red-cockaded woodpecker	Any activity that intersects the red-cockaded woodpecker range and where: 1) the action area is located in areas of North Carolina outside the northeast coastal plain (NECP) and within suitable red-cockaded woodpecker foraging or nesting habitat; but 3) the activity will not remove trees equal to or greater than 8 inches dbh or involve a disturbance within 200 feet of a cavity tree.	Stressors: disturbance (direct); changes in vegetation, alteration of food resources (indirect) Exposure path: Exposure is limited if the activity does not remove trees equal to or greater than 8 inches dbh or involve a disturbance within 200 feet of a cavity tree. Response: decreased nesting success, decreased foraging success, decreased survival	Although the project occurs within suitable habitat for this species, if the activity does not remove trees that are suitable for nesting, roosting, or foraging and will not occur near a tree suitable for nesting and roosting, then impacts are likely to be insignificant and the activity is not likely to adversely affect the species.
red-cockaded woodpecker	Any activity that intersects the red-cockaded woodpecker range and where: 1) the action area is located in areas of North Carolina outside the NECP and within suitable red-cockaded woodpecker foraging habitat; 2) the activity will remove trees equal to or greater than 8 inches dbh or involve a disturbance within 200 feet of a cavity tree; but 3) the action area is not located within suitable red-cockaded woodpecker nesting habitat and does not occur within 0.5 miles of suitable nesting habitat.	Stressors: disturbance (direct); changes in vegetation (indirect) Exposure path: Exposure is limited if the activity is not located within suitable red-cockaded woodpecker nesting habitat and does not occur with 0.5 miles of suitable nesting habitat. Response: decreased nesting success	Although the project occurs within suitable habitat for this species and may remove trees that provide suitable habitat, if the action area is not within or near suitable nesting habitat then impacts are likely to be insignificant and the activity is not likely to adversely affect the species.

Species/ Group or Critical Habitat	Activity Description	Potential Stressor-Exposure-Response Pathway	Rationale for NLAA Determination
red-cockaded woodpecker	Any activity that intersects the red-cockaded woodpecker range and where: 1) the action area is located in areas of North Carolina outside the northeast coastal plain and within suitable red-cockaded woodpecker foraging habitat; 2) the activity will remove trees equal to or greater than 8 inches dbh or involve a disturbance within 200 feet of a cavity tree; 3) the action area is either located within suitable red-cockaded woodpecker nesting habitat or within 0.5 miles of such habitat; but a survey has been performed according to USFWS protocol by a qualified biologist for the presence of red-cockaded woodpecker cavity trees within 0.5 miles of the action area and no cavity trees were observed.	Stressors: disturbance (direct); changes in vegetation (indirect) Exposure path: Exposure is limited if no red-cockaded woodpecker cavity trees occur within 0.5 miles of the action area. Response: decreased nesting success	Although the project occurs within or near suitable nesting habitat and has the potential to remove trees that provide suitable nesting habitat, if no such trees were observed within or near the action area after a valid survey, then impacts are likely to be insignificant and the activity is not likely to adversely affect the species.
all flowering plants except seabeach amaranth	Any activity that intersects the range for one or more of the listed plant species and where: 1) project activities are located in undisturbed/undeveloped areas or areas that represent potential habitat for federally protected species; 2) the project does not involve an existing structure; 3) suitable habitat for a listed plant species will be impacted by the project; but 4) a valid presence survey has been conducted and none of the listed plant species were observed in the action area.	Stressors: soil compaction, vegetation management activities, introduction of invasive plant species Exposure path: Exposure of these species is limited because none of the species have been observed within the project's action area. Response: No response is expected of the protected plants because none of the species have been observed within the project's action area.	Although the project's action area includes suitable habitat for a listed plant species that will be impacted by the project, a valid survey demonstrated that none of these species were present and potential impacts to the species are discountable. Because the action area intersects the species range and contains suitable habitat, we cannot rule out the possibility of an undetected occurrence and a determination of "no effect" is inappropriate.

Species/ Group or Critical Habitat	Activity Description	Potential Stressor-Exposure-Response Pathway	Rationale for NLAA Determination
seabeach amaranth	Any activity that intersects the seabeach amaranth range and where suitable habitat for this species is present in the action area, but where the project will occur outside the growing season for this species.	Stressors: direct impact, soil compaction, vegetation management activities, introduction of invasive plant species Exposure path: Exposure of this species is expected to be limited because the activity will take place outside of its growing season. Response: Response is expected to be limited since the activity will take place outside the growing season.	Because the activity will not occur during the seabeach amaranth growing season, impacts are likely to be insignificant and discountable, and the project is not likely to adversely affect this species.
rock gnome lichen	Any activity where suitable habitat for rock gnome lichen is present in the action area and the activity will impact that habitat, but where a valid survey for the presence of the species was conducted and no members of the species were observed.	Stressors: direct impact, tree canopy thinning, altered hydrology, pollutants Exposure path: Exposure of the species is limited because none of the species have been observed within the project's action area. Response: No response is expected of the species because it has not been observed within the project's action area.	If no rock gnome lichen was observed in the action area, effects of the activity are discountable and it is not likely to adversely affect the species.

Species/ Group or Critical Habitat	Activity Description	Potential Stressor-Exposure-Response Pathway	Rationale for NLAA Determination
West Indian manatee	Any activity that intersects the West Indian manatee range and will occur in tidal waters accessible to manatees, but: 1) will not require in-water blasting or other detonation activity; 2) will not require modification or construction of warm or freshwater discharges from industrial sites, power plants, water treatment facilities, etc., or natural springs or artesian wells; and 3) does not involve in-water construction.	Stressors: impacts to habitat quality due to human presence and noise Exposure path: displacement and avoidance due to human presence and noise Response: avoidance	Although the activity will occur in areas where manatees may be present, it does not involve activities that will impact individuals or suitable habitat, and noise and other mild disturbances will be temporary and insignificant, so the activity is not likely to adversely affect the species.
West Indian manatee	Any activity that intersects the West Indian manatee range and will occur in tidal waters accessible to manatees, and: 1) will not require in-water blasting or other detonation activity, or modification or construction of warm or fresh-water discharges from industrial sites, power plants, water treatment facilities, etc., or natural springs or artesian wells; or 2) does involve in-water construction but will be required to comply with the USFWS Guidelines for Avoiding Impacts to the West Indian Manatee.	Stressors: impacts to habitat quality due to human presence and noise; incidental mortality or injury due to boat usage; entanglement Exposure path: displacement and avoidance due to human presence and noise; incidental mortality and injury Response: Avoidance, injury or death	Although the activity will occur in areas where manatees may be present and does involve in-water construction, because it will follow all USFWS Guidelines for Avoiding Impacts to the West Indian Manatee, potential impacts to manatees are discountable and the activity is not likely to adversely affect this species.

Species/ Group or Critical Habitat	Activity Description	Potential Stressor-Exposure-Response Pathway	Rationale for NLAA Determination
green sea turtle, Hawksbill sea turtle, Kemp's Ridley sea turtle, leatherback sea turtle, loggerhead sea turtle	Any activity that intersects the range for any of the sea turtle species and where the action area is located on a sandy beach above the mean high-water line, but the activity: 1) will not result in changes to beach dynamics that may modify formation of habitat over time; 2) will not involve beach nourishment, sand scraping, or other activities requiring heavy equipment on the beach; 3) will not result in new permanent impacts (e.g., effects lasting 6 months or more), including new lighting or impacts to open sandy beaches above mean high water line; and 4) will not have the potential to occur between May 1 and November 15 (nesting and hatching season).	Stressors: alteration of nesting habitat due to soil compaction, temporary beach alteration, temporary lighting, noise and human presence Exposure path: Exposure is limited because disturbance from the project is temporary and it will occur outside the nesting and hatching season. Response: No disruption of nesting or hatching behaviors is expected because impacts are temporary and will occur outside of the relevant season.	Although the project is located in potential sea turtle nesting habitat, because it will not result in permanent alteration or destruction of that habitat and will occur outside of the nesting and hatching season, impacts to these species will be insignificant and the activity is not likely to adversely affect these species.
see Table 1 for species with listed Critical Habitat	Any activity that intersects Critical Habitat for a listed species but where the project will not have any effect on the physical and biological features (PBFs) essential to the conservation of the species.	Stressors: alteration or destruction of PBFs Exposure path: Exposure is expected to be limited since the activity will not affect PBFs. Response: Response will be limited because the activity will not affect PBFs.	Although there may be PBFs of at least one of the listed species' Critical Habitat present in the action area, the activity will not affect those PBFs and potential impacts to the Critical Habitat are discountable, so the activity is not likely to adversely affect these species.

5.2 ACTIVITIES CONSISTENT WITH "NO EFFECT" DETERMINATIONS FOR LISTED SPECIES/CRITICAL HABITATS

Species/ Group or Critical Habitat	Activity Description	Rationale for NE Determination
amphibians, clams, fishes (except Waccamaw silverside), magnificent ramshorn	Any activity that intersects the range for the listed aquatic species, but will not: 1) impact wetlands directly or indirectly 2) alter surface water flow, water velocity, water depth, or water quality in streams or other waterways either permanently or temporarily 3) alter groundwater flow, velocity, direction, quality, or discharge to streams, wetlands, or other bodies of water either permanently or temporarily 4) involve earth moving or ground disturbance that could cause erosion and sedimentation, and/or contamination within 300 feet of a freshwater wetland or along a stream or tributary of a stream 5) involve streambed disturbance 6) result in any effect to a riparian area.	The proposed activity will not degrade aquatic habitats, so no effects to these species are expected.
amphibians, clams, Carolina madtom, spotfin chub	Any activity where the proposed area of impact and the reach of stream 330 feet (100 m) upstream and 1313 feet (400 m) downstream have undergone a valid habitat assessment and do not include suitable habitat for the listed aquatic species.	When suitable habitat for the species is not present in the action area, no effects to the species are expected.
amphibians, clams, Carolina madtom,	Any activity where no suitable habitat is present in the project footprint, but the action area includes suitable habitat for the listed aquatic species; where the activity's lead federal action agency is the Army Corps of Engineers; that requires Nationwide Permit number 3, 5, 6, 13, 14, 18, 57 or 58; that will meet and comply with all General and Regional Conditions as described in such permits and result in the need to submit a pre-construction notification as described in the Notification Section and Regional Conditions of the permit(s); but will not require an impact to a second order or higher stream.	Because the project will be governed by a Nationwide permit and will not require an impact to a second order or higher stream, and no direct impacts are expected to suitable habitat, no effects on these species are expected.
piping plover and rufa red knot	Any activity that does not intersect the range for piping plover or rufa red knot and does not contain suitable foraging, breeding, and roosting habitat for the two species.	When the activity does not intersect the species range and suitable habitat for the species is not present in the action area, no effects to the species are expected.
piping plover	Any activity that intersects the piping plover range or piping plover Critical Habitat, but where the project is an existing structure requiring maintenance, repair, or replacement and the entire project will take place within the existing structure's footprint.	Because the project will not have any impacts outside the footprint of an existing structure, it will cause no additional effects to Critical Habitat for this species.

Species/ Group or Critical Habitat	Activity Description	Rationale for NE Determination
roseate tern	Any activity that intersects the roseate tern range but is not located in offshore or marine areas.	The activity will not occur in areas where roseate tern are present, so no effects to the species are expected.
roseate tern	Any activity that intersects the roseate tern range and is located in an offshore or marine area but does not include activities or structures that may pose a collision risk to birds.	The activity may occur in areas where roseate tern are present, but does not pose a collision risk to birds and will not affect this species.
eastern black rail	Any activity that intersects the eastern black rail range but does not impact suitable habitat for this species.	Because the activity will not impact suitable habitat, no effects to the species are expected.
red-cockaded woodpecker	Any activity that intersects the red-cockaded woodpecker range and is located in the northeastern coastal plain (NECP), but where the action area is either: 1) not located in forested habitat with pine trees 2) located in forested habitat with pine trees but none of those trees are greater than 30 years of age	Because there are no pine trees in the action area of sufficient size to be suitable habitat and the activity does not involve a disturbance within 200 feet of a cavity tree, no effects on the species are expected.
red-cockaded woodpecker	Any activity that intersects the red-cockaded woodpecker range but is located outside of both the NECP and non-NECP areas of North Carolina.	Because the activity does not occur in the areas of North Carolina known to contain suitable habitat for woodpeckers, no effects on the species are expected.
red-cockaded woodpecker	Any activity that intersects the red-cockaded woodpecker range and is located in the non-NECP areas of North Carolina, but where the action area is not located within suitable red-cockaded woodpecker foraging or nesting habitat.	Because the activity occurs outside suitable habitat, no effects to the species are expected.
all flowering plants except seabeach amaranth	Any activity that intersects the range for one or more of the listed plant species but where either: 1) all project activities are located entirely within previously disturbed, urbanized or developed areas or areas that are not suitable habitat for federally protected species 2) project activities will occur in undisturbed/undeveloped areas or areas that are suitable habitat for federally protected species, but the project involves an existing structure that requires maintenance, repair, or replacement and will take place within that structure's footprint. 3) project activities will occur in undisturbed/undeveloped areas, but a valid habitat assessment has been conducted and there is no suitable habitat for any of the listed plant species in the action area.	Although the activity intersects the range for one or more of the listed plant species, because it will not impact undisturbed suitable habitat, no effects to these species are expected.

Species/ Group or Critical Habitat	Activity Description	Rationale for NE Determination
all flowering plants except seabeach amaranth	Any activity that intersects the range for one or more of the listed plant species and where: 1) project activities are located in undisturbed/undeveloped areas or areas that represent potential habitat for federally protected species; 2) the project does not involve an existing structure; 3) a valid assessment showed that there is suitable habitat for one or more of the listed plant species in the action area; but 4) the project will not impact such habitat.	Although the project's action area includes suitable habitat for a listed plant species, the project will not impact such habitat so no effects to these species are expected.
seabeach amaranth and rock gnome lichen	Any activity that intersects the species range and where a valid habitat assessment has demonstrated that no suitable habitat for this species is present in the action area.	Because a valid survey demonstrated that no suitable habitat for seabeach amaranth/rock gnome lichen located in the action area, no effects to this species are expected.
rock gnome lichen	Any activity that intersects the rock gnome lichen range and that is either: 1) located entirely within previously disturbed, urbanized or developed areas or within areas that do not represent suitable habitat for federally protected species or 2) involves an existing structure requiring maintenance, repair, or replacement and will entirely take place within the existing structure's footprint; and that will not have any of the following effects: 1) impact wetlands 2) alter either surface-or groundwater flow, velocity, direction, quality, or discharge to streams, wetlands, or other bodies of water 3) involve earth moving or ground disturbance that could cause erosion and sedimentation, and/or contamination within 300 feet of a freshwater wetland or along a stream or tributary of a stream 4) include application of pesticides or herbicides 5) impact cliffs, rock outcrops, or rocks laying adjacent to rock outcrops.	Because the project will not intersect undisturbed suitable habitat for rock gnome lichen and will not involve activities that impact such habitats, no effects on this species are expected.
rock gnome lichen	Any activity where suitable habitat for rock gnome lichen is present in the action area, but the activity will not impact that habitat.	If the activity will not impact suitable habitat for rock gnome lichen, no effects of the activity on the species are expected.

Species/ Group or Critical Habitat	Activity Description	Rationale for NE Determination
spruce-fir moss spider	Any activity that intersects the spruce-fir moss spider range and that is either: 1) located entirely within previously disturbed, urbanized or developed areas or within areas that do not represent suitable habitat for federally protected species or 2) involves an existing structure requiring maintenance, repair, or replacement and will entirely take place within the existing structure's footprint; and where either: 1) the project will not involve ground disturbance, application of pesticides or herbicides, or impact to cliffs, rock outcrops, or rocks laying adjacent to rock outcrops 2) will involve such disturbance but no suitable habitat for spruce-fir moss spider is present in the action area.	Because the project will not cause disturbance to suitable habitat for spruce-fir moss spider, no effects on this species are expected.
Carolina northern flying squirrel	Any activity that intersects the Carolina northern flying squirrel range and that either: 1) is located entirely within previously disturbed, urbanized or developed areas or within areas that are not suitable habitat for federally protected species 2) involves an existing structure requiring maintenance, repair, or replacement and will entirely take place within the existing structure's footprint 3) a valid habitat assessment has demonstrated that there is no suitable habitat for Carolina northern flying squirrel present in the action area.	Because the project will not impact undisturbed suitable habitat for Carolina northern flying squirrel, no effects on this species are expected.
gray bat and Virginia big-eared bat	Any activity that intersects the range for the two bat species, but where the action area has undergone a suitable habitat assessment and does not include suitable habitat for the bat species.	When suitable habitat for these species is not present in the action area, no effects to the species are expected.
West Indian manatee	Any activity that intersects the West Indian manatee range but will not occur in tidal waters accessible to manatees.	Because the project will not occur in tidal waters accessible to manatees, no effects on this species are expected.
green sea turtle, Hawksbill sea turtle, Kemp's Ridley sea turtle, leatherback sea turtle, loggerhead sea turtle	Any activity that intersects the range for any of the sea turtle species, but where the action area is not located on a sandy beach above the mean high-water line.	Because the activity is not located in suitable nesting habitat for the sea turtle species, no effects on these species are expected.

Species/ Group or Critical Habitat	Activity Description	Rationale for NE Determination
magnificent ramshorn	Any activity that intersects the magnificent ramshorn range and may: 1) impact wetlands directly or indirectly 2) alter surface water flow, water velocity, water depth, or water quality in streams or other waterways either permanently or temporarily 3) alter groundwater flow, velocity, direction, quality, or discharge to streams, wetlands, or other bodies of water either permanently or temporarily 4) involve earth moving or ground disturbance that could cause erosion and sedimentation, and/or contamination within 300 feet of a freshwater wetland or along a stream or tributary of a stream 5) involve streambed disturbance 6) result in any effect to a riparian area <u>but</u> where no suitable habitat is located within the action area.	Although the project includes activities that may impact suitable habitat for magnificent ramshorn, a valid survey demonstrated that no such habitat is located in the action areas so no effects to this species are expected.
noonday globe snail	Any activity that intersects the noonday globe snail range and that either: 1) is located entirely within previously disturbed, urbanized or developed areas or within areas that are not suitable habitat for federally protected species 2) involves an existing structure requiring maintenance, repair, or replacement and will entirely take place within the existing structure's footprint 3) a valid habitat assessment has demonstrated that there is no suitable habitat for noonday globe snail present in the action area	Because the project will not impact undisturbed suitable habitat for noonday globe snail, no effects on this species are expected.
Critical Habitat for Appalachian elktoe, Carolina heelsplitter, spotfin chub, golden sedge, mountain golden heather, spruce-fir moss spider	Any activity that intersects critical habitat for a listed species but where a valid habitat assessment was conducted in the action area and no physical and biological features (PBFs) essential to the conservation of the species were observed.	If no PBFs of the listed species' critical habitat are present in the action area, the activity will not affect such habitat.

6 SUMMARY AND CONCLUSION

After considering the relevant information pertaining to the species and critical habitat, reviewing the covered activities and associated required conservation measures, and evaluating their anticipated effects), we conclude that the actions subject to this standing analysis will support a federal action agency determination of "No Effect" or support a section 7(a)(2) determination pursuant to the Act of "may affect, not likely to adversely affect," appropriate, for the subject species and critical habitat as described above. This standing analysis is based on the consultation provisions of section 7(a)(2) of the Act and the information cited and will undergo review and revision, as needed, if any of the following conditions have been met: 1) If new information reveals the effects of the covered action(s) to the covered species or critical habitat are occurring in a manner or to an extent not considered in this standing analysis based on applied use; or 2) If the species or critical habitat covered by the standing analysis has a change in status.

This standing analysis will be through IPaC via a link within the DKey output letter.

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U.S. Fish and Wildlife Service. 2021f. Mountain sweet pitcher-plant (*Sarracenia rubra jonesii*) 5-Year Review: Summary and Evaluation. Asheville, NC. 51 pp.

U.S. Fish and Wildlife Service. 2021g. Pondberry (*Lindera melissifolia*) 5-Year Review: Summary and Evaluation. Jackson, MS. 24 pp.

U.S. Fish and Wildlife Service. 2021h. Rough-leaved Loosestrife (*Lysimachia asperulaefolia*) 5-Year Review: Summary and Evaluation. Raleigh, NC. 42 pp.

U.S. Fish and Wildlife Service. 2021i. Swamp Pink (*Helonias bullata*) 5-Year Review: Summary and Evaluation. Galloway, NJ. 57 pp.

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U.S. Fish and Wildlife Service. 2022d. Canby's dropwort (*Oxypolis canbyi*) 5-Year Status Review: Summary and Evaluation. Charleston, SC. 13 pp.

U.S. Fish and Wildlife Service. 2022e. Golden Sedge (*Carex lutea*) Status Review: Summary and Evaluation. Raleigh, NC. 12 pp.

U.S. Fish and Wildlife Service. 2022f. Small Whorled Pogonia (*Isotria medeoloides*) 5-Year Review: Summary and Evaluation. Annapolis, MD. 39 pp.

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U.S. Fish and Wildlife Service. 2023c. Seabeach Amaranth (*Amaranthus pumilus*) 5-Year Review: Summary and Evaluation. Raleigh, NC. 14 pp.

U.S. Fish and Wildlife Service. 2023d. Small –anthered bittercress (*Cardamine micranthera*) 5-Year Review: Summary and Evaluation. Asheville, NC. 15 pp.

U.S. Fish and Wildlife Service. 2024a. Spotfin Chub (*Erimonax monachus*) 5-Year Review: Summary and Evaluation. Asheville, NC. 17 pp.

U.S. Fish and Wildlife Service. 2024b. Piping Plover (*Charadrius melodus*) 5-Year Review: Summary and Evaluation. 170 pp.

U.S. Fish and Wildlife Service. 2024c. Harperella (*Ptilimnium nodosum*) 5-Year Review: Summary and Evaluation. Davis, WV. 34 pp.

U.S. Fish and Wildlife Service. 2024d. Schweinitz's Sunflower (*Helianthus schweinitzii*) 5-Year Review: Summary and Evaluation. Asheville, NC. 17 pp.

U.S. Fish and Wildlife Service. 2025a. Carolina Heelsplitter (*Lasmigona decorata*) 5-Year Review: Summary and Evaluation. Charleston, SC. 12 pp.

U.S. Fish and Wildlife Service. 2025b. Waccamaw Silverside (*Menidia extensa*) 5-Year Review: Summary and Evaluation. Raleigh, NC. 11 pp.

U.S. Fish and Wildlife Service. 2025c. American Chaffseed (*Schwalbea americana*) 5-Year Review: Summary and Evaluation. Charleston, SC. 14 pp.

U.S. Fish and Wildlife Service. 2025d. Bunched Arrowhead (*Sagittaria fasciculata*) 5-Year Status Review: Summary and Evaluation. Asheville, NC.

U.S. Fish and Wildlife Service. 2025e. Green Pitcher Plant (*Sarracenia oreophila*) 5-Year Status Review: Summary and Evaluation. Jackson, MS. 11 pp.

U.S. Fish and Wildlife Service. 2025f. Heller's Blazingstar (*Liatris helleri*) 5-Year Review: Summary and Evaluation. Asheville, NC. 13 pp.

U.S. Fish and Wildlife Service. 2025g. Sensitive Joint-Vetch (*Aeschynomene virginica*) 5-Year Review: Summary and Evaluation. Gloucester, VA. 76 pp.

U.S. Fish and Wildlife Service. 2025h. Spreading Avens (*Geum radiatum*) 5-Year Review: Summary and Evaluation. Asheville, NC. 12 pp.

U.S. Fish and Wildlife Service. 2025i. Saint Francis' Satyr (*Neonympha mitchellii francisci*) 5-Year Review: Summary and Evaluation. Raleigh, NC. 14 pp.

U.S. Fish and Wildlife Service. 2025j. Gray Bat (*Myotis grisescens*) 5-Year Review: Summary and Evaluation. Columbia, MO.152 pp.

U.S. Fish and Wildlife Service. 2026. Noonday Globe *Patera nantahala* (=*Mesodon clarki nantahala*) 5-Year Review: Summary and Evaluation. Asheville, NC. 8 pp.

Appendix A – Structured Questions for screening a project via a DKey to determine whether it is applicable for use under this standing analysis [*Only applicable for standing analyses that use a DKey – this appendix will be automatically generated for you from IPaC once the DKey is ready]*