



# United States Department of the Interior



FISH AND WILDLIFE SERVICE  
New Jersey Field Office  
4 East Jimmie Leeds Road, Suite 4  
Galloway, New Jersey 08205  
(609) 646-9310

## **Narratives and Best Practices for Federally Listed, Proposed, and Candidate Species in New Jersey**

Prepared by U.S. Fish and Wildlife Service, New Jersey Field Office

### **INTRODUCTION**

This document presents the biology, threats, recovery information, and recommended best practices for federally listed, proposed, and candidate species within New Jersey. The best practices discussed present typical conservation measures frequently recommended by the U.S. Fish and Wildlife Service's (Service) New Jersey Field Office (NJFO) during consultation or technical assistance. These practices are designed to avoid or minimize adverse effects to listed species as related to projects in New Jersey. Please be aware that, under [Section 7 of the Endangered Species Act](#) (ESA), Federal action agencies are required to consult with the Service for any proposed action that may affect listed species. Both Federal and non-Federal project proponents can find complete information and instructions on when and how to request project review from NJFO—see our online [Project Review Guide](#).

The best practices included in this document may not be inclusive of all the conservation measures necessary for project proponents to implement, as developed/discussed through ESA consultation/technical assistance with the Service. To avoid delays, we recommend initiating ESA consultation/technical assistance early in project planning. Through the consultation/technical assistance processes of the ESA, the Service will provide project-specific recommendations to avoid or minimize adverse effects to listed species.

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**AMERICAN CHAFFSEED (*SCHWALBEA AMERICANA*)**

Biology, Presence, and Threats

American chaffseed was federally listed as an endangered species in 1992. It is a perennial member of the figwort family and grows 12 to 24 inches high. The stems are unbranched or branched only at the base. The large, purplish-yellow, tubular flowers are 1 to 1.5 inches long and form a spike-like cluster (raceme). Flowering occurs from June to mid-July in the northern part of the species' range.

American chaffseed occurs in sandy (sandy peat, sandy loam), acidic, seasonally-moist to dry soils. It is generally found in early successional ecosystems described as open, moist pine flatwoods, fire-maintained savannas, ecotonal areas between peaty wetlands and xeric (dry) sandy soils, bog borders, and other open grass-sedge systems. American chaffseed is dependent on factors such as fire, mowing, or fluctuating water tables to maintain the crucial open to partly open conditions that it requires. The species appears to be shade intolerant. American chaffseed occurs in species rich plant communities where grasses, sedges, and savanna dicots are numerous.

Threats to the American chaffseed include collecting, excessive disturbance, and loss of open habitat due to development and natural vegetational succession.

For more information visit:

<https://www.fws.gov/species/american-chaffseed-schwalbea-americana>.

Best Practices

The following best practices are examples of typical Conservation Measures frequently recommended by the U.S. Fish and Wildlife Service's (Service) New Jersey Field Office during consultation or technical assistance.

For actions within the range of American chaffseed in New Jersey, the Service recommends the following:

- Avoid direct and indirect effects to suitable American chaffseed habitat.
- If work that will impact suitable American chaffseed habitat is proposed, the Service may recommend conducting a survey within that area to determine if the species is present. Surveys should be conducted from June 1 to August 15 when plants are in flower or fruiting. Surveys strictly for suitable habitat may be permitted to occur outside of this window when conditions permit. Please contact the Service to discuss survey protocols and necessary next steps to confirm that a survey is required. Surveys for American chaffseed should not be conducted without prior approval from the Service.

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- If American chaffseed plants have been document in the action area, or if the project proponent wishes to presume presence, consider the following measures to minimize impacts to plants, seed, and habitat:
  - Mark the edge of the suitable habitat and include a protective buffer (usually around 500 feet).
    - Examples may include signs or rebar posts.
    - Ensure removal of all materials after activities are completed.
    - Restrict entry into marked habitat areas to the maximum extent practicable.
  - Limit vehicle and heavy equipment use in suitable habitat to the minimum number of passes needed to accomplish the work to minimize disturbance to plants and topographic alterations.
  - Designate access points, staging areas, waste collection areas, and travel corridors away from known populations and optimal habitat.
    - Keep vehicle and foot traffic away from the plant populations or from optimal habitat features.
    - Keep all personnel, vehicles, and equipment within the designated work area/project footprint and access corridors.
  - Maintain a clean worksite. Remove all trash and work-related debris daily.
  - Develop and implement a Service-approved erosion and sediment control plan. Implement erosion and sedimentation control measures (*e.g.*, silt fencing, hay bales, soil stabilization matting) where appropriate to avoid increased erosion that could directly or indirectly impact plants. Erosion and sediment control measures must strictly adhere to State and Federal guidance that has been provided for your project area and project type. Inspect erosion and sediment control devices regularly during construction to ensure efficacy and prevent failure of devices. Inspect devices prior to expected high rainfall occurrences. Ensure removal of all materials after the construction activity ends.
  - Ensure materials used (*e.g.*, soil, gravel, rock) at project site are free of invasive species before placement on-site. Implement invasive species control measures to reduce the presence of invasive species on site. Ensure all vehicles, machinery, and equipment, including technical gear and personal protective equipment, are clean and free of invasive species before use at the project site.
  - Avoid use of pesticides (*e.g.*, herbicides, insecticides) and surfactants at a location where application or runoff would result in these chemicals contacting plants or their habitat.

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- If necessary, only apply herbicide locally on other plant species, to ensure that American chaffseed is not impacted directly or indirectly. However, consider hand-pulling instead.
- Avoid permanent, direct modification of suitable habitat.
- Minimize and remediate temporary habitat modification.
  - Submit a post-construction restoration plan to the Service.
  - Restore the project area to original or ecologically improved condition using native, non-invasive plant mixes.
  - Plant with native, non-invasive seed mixes. Ensure new plantings will not outcompete or adversely affect American chaffseed.
- Avoid or remediate project features that may increase post-project human intrusion into areas of suitable habitat (*e.g.*, access roads, parking areas, entry points).
- Contact the Service for site-specific recommendations.
- Landowners seeking to benefit sensitive American chaffseed can contact the Service for technical assistance. Examples of beneficial actions include:
  - Place suitable habitat and adjacent areas with known American chaffseed occurrence in permanent conservation ownership or easement.

Procedures for when an American chaffseed occurrence has been located:

- Report the observation to the Service’s New Jersey Field Office and the New Jersey Department of Environmental Protection’s Natural Heritage Program located at:  
*[https://www.nj.gov/dep/parksandforests/natural/docs/NHRPSR\\_Form.pdf](https://www.nj.gov/dep/parksandforests/natural/docs/NHRPSR_Form.pdf)*.

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**BOG TURTLE (*GLYPTEMYS MUHLENBERGII*)**

Biology, Presence, and Threats

The bog turtle was federally listed as a threatened species in 1997. At approximately 4 inches long, it is one of North America's smallest turtles. This species typically shows a bright yellow, orange, or red blotch on each side of the head. The nearly parallel sides of the carapace (upper shell) give bog turtles an oblong appearance when viewed from above. These small, semi-aquatic turtles have a varied diet including insects, snails, worms, seeds, and carrion.

Bog turtles usually occur in small, discrete populations, generally occupying open-canopy, herbaceous sedge meadows and fens bordered by wooded areas. These wetlands are a mosaic of micro-habitats that include dry pockets, saturated areas, and areas that are periodically flooded. Bog turtles depend upon this diversity of micro-habitats for foraging, nesting, basking, hibernating, and sheltering. Unfragmented riparian (river) systems that are sufficiently dynamic to allow the natural creation of open habitat are needed to compensate for ecological succession. Beaver (*Castor canadensis*), white-tailed deer (*Odocoileus virginianus*), and cattle (*Bos taurus*) may be instrumental in maintaining the open-canopy wetlands essential for this species' survival.

Bog turtles inhabit open, unpolluted emergent and scrub/shrub wetlands such as shallow spring-fed fens, sphagnum bogs, swamps, marshy meadows, and wet pastures. These habitats are characterized by soft, muddy (often "mucky") bottoms, interspersed wet and dry pockets, vegetation dominated by low grasses and sedges, and a low volume of standing or slow-moving water which often forms a network of shallow pools and rivulets. Bog turtles prefer areas with ample sunlight, high evaporation rates, high humidity in the near-ground microclimate, and perennial saturation of portions of the ground. Eggs are often laid in elevated areas, such as the tops of tussocks. Bog turtles generally retreat into more densely vegetated areas to hibernate from mid-September through mid-April.

The greatest threats to the bog turtle are the loss, degradation, and fragmentation of its habitat from wetland alteration, development, pollution, invasive species, and natural vegetational succession. The species is also threatened by collection for illegal wildlife trade.

For more information visit:

<https://www.fws.gov/species/bog-turtle-glyptemys-muhlenbergii>.

Best Practices

The following best practices are examples of typical Conservation Measures frequently recommended by the U.S. Fish and Wildlife Service's (Service) New Jersey Field Office during consultation or technical assistance.

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For actions within the range of bog turtle in New Jersey, the Service recommends the following:

- Avoid direct modifications to wetlands that may support bog turtles (*e.g.*, clearing, flooding, filling, draining, ditching, tiling, excavating), and to streams that flow to bog turtle habitat (*e.g.*, channelizing, diverting, stabilizing, impounding, dredging).
- Provide adequate upland buffers around wetlands that may support bog turtles, often at least 300 feet of native vegetation. A site-specific buffer design is often necessary.
- Provide at least 150-foot buffers of native vegetation along streams that flow to wetlands that may support bog turtles.
- For activities throughout the watershed, avoid permanent changes to the hydrology or sedimentation rates of wetlands that may support bog turtles. For example:
  - minimize net increases in impervious surface;
  - minimize soil compaction;
  - design storm water management plans to minimize long-term hydrologic changes to bog turtle habitat (often by maximizing infiltration);
  - avoid storm and wastewater discharges in or upgradient of bog turtle habitat; ensure adequate recharge of groundwater; and
  - evaluate proposed surface or groundwater withdrawals to ensure bog turtle habitat is not affected.

See Low Impact Design Techniques in the New Jersey Stormwater Best Management Practices Manual located at: [https://www.nj.gov/dep/stormwater/bmp\\_manual2.htm](https://www.nj.gov/dep/stormwater/bmp_manual2.htm).

- For activities within 500 feet of suitable bog turtle habitat, take particular care to avoid permanent changes to the hydrology or sedimentation rates. For example:
  - Implement all the measures listed above for activities throughout the watershed.
  - Use Appendix A of the New Jersey Stormwater Best Management Practices Manual to complete a thorough alternatives analysis of nonstructural stormwater management measures.
  - Seek to mimic the pre-development 2 and 10-year hydrographs.
  - Seek to recharge 100% of the site's pre-development annual average recharge amount.
  - Seek a score of 100% or greater in the Nonstructural Stormwater Strategies Point System regardless of Planning Area or project size.
  - Grade lawn and landscaped areas with lightweight equipment (maximum equipment load of 8 PSI).
- Avoid temporary changes to the hydrology or sedimentation rates of wetlands that may support bog turtles from ground disturbances within 500 feet of bog turtle habitat, or within 150 feet of streams that flow to that habitat. For example:

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- locate temporary work areas and access routes outside of wetlands;
  - construct storm water management infrastructure prior to all other components of a development project to control storm water and sediment during the remaining construction;
  - install two rows of silt fencing around work areas, with daily inspection and maintenance;
  - minimize the duration of exposed soils;
  - use jute matting or other erosion control blankets on disturbed areas immediately after project completion to minimize sedimentation; and
  - promptly re-vegetate areas of temporary disturbance with native species.
- Avoid injuring or disturbing bog turtles during construction. For example:
    - Survey work areas to determine if bog turtles or their habitat is present before construction begins. [A recognized, qualified bog turtle surveyor](#) should be utilized (list maintained by the Service's New Jersey Field Office). Phase 1 surveys may be conducted during any month of the year (except when snow, ice cover, drought and/or flooding conditions are present). Phase 2 and 3 surveys must be conducted from April 15 to June 15. Please contact the Service for necessary next steps to confirm that a survey is required, survey protocols, and an active list of surveyors. Surveys for bog turtle should not be conducted without prior approval of the survey plan and surveyor qualifications from the Service. Contact the Service immediately if a bog turtle is found - do not move the animal except to avoid imminent injury.
    - Conduct inspections of active construction sites that have bog turtles present. A recognized, qualified bog turtle surveyor is necessary to conduct inspections for any such work between April 1 and October 15
    - Seasonally restrict certain activities. The need and specific dates for seasonal restrictions depend on the nature and location of the activities.
  - Avoid introductions of invasive species to wetlands that may support bog turtles. For example:
    - thoroughly wash construction equipment offsite before use within 500 feet of bog turtle habitat; and
    - use only native plant species and weed-free mulches and soils for landscaping within 500 feet of bog turtle habitat.
  - Avoid or remediate project features that may increase post-project human intrusion into areas of suitable habitat (*e.g.*, access roads, parking areas, entry points).
  - Place wetlands supporting bog turtles and associated upland buffers in permanent conservation ownership or easement.



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Procedures for when a bog turtle occurrence has been located:

- Report the observation to the Service's NJ Field Office and the New Jersey Department of Environmental Protection's Wildlife Tracker (located at:  
*<https://dep.nj.gov/njfw/conservation/reporting-rare-wildlife-sightings/>*)

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**DWARF WEDGEMUSSEL (*ALASMIDONTA HETERODON*)**

Biology, Presence, and Threats

The dwarf wedgemussel was federally listed as an endangered species in 1990. It is a small, freshwater mussel that rarely exceeds 1.5 inches in length. It is the only Atlantic Slope freshwater bivalve (two-shelled) mussel in North America that has two lateral teeth on the right valve, but only one tooth on the left. The outer shell is dark brown or yellowish brown and often exhibits greenish rays in young mussels. The shell also has a well-defined posterior ridge. The inner shell is bluish or silvery white. Dwarf wedgemussels feed by filtering small particles from the water.

Within New Jersey, the dwarf wedgemussel is mostly found in streams and rivers of various sizes that contain sand as a predominant substrate. However, it may also be found in substrates consisting of mixed sand, pebble, gravel, cobble, and boulder or in areas of mud or silt mixed with firmer substrates, such as sand or gravel (Galbraith et al. 2016). In parts of its range, it has also been found embedded in clay banks, which is not commonly observed in New Jersey. The species requires substrate suitable for digging into and watercourse velocities that won't sweep it away. As such, watercourses that contain substrates that are purely bedrock or other hard surfaces are not suitable. The species requires areas with a slow to moderate current, little silt deposition, and well-oxygenated, unpolluted water. Its life expectancy is estimated at 10 to 12 years (Michaelson and Neves 1995).

Like other freshwater mussels, dwarf wedgemussel eggs are fertilized in the female as sperm passes over the gills. They are long term brooders with fertilization typically occurring in mid-summer and fall and release of larvae (glochidia) occurring in the following spring and summer (Michaelson and Neves 1993). Upon release, the glochidia attach to a fish host to encyst and metamorphose, later dropping to the streambed as juvenile mussels. Studies have shown the tessellated darter (*Etheostoma olmstedi*), slimy sculpin (*Cottus cognatus*), and mottled sculpin (*Cottus bairdi*) to be glochidial host fishes for the dwarf wedgemussel. Others such as brown trout (*Salmo trutta*), banded killifish (*Fundulus diaphanus*), striped bass (*Morone saxatilis*), and shield darter (*Fundulus diaphanus*) are also possible host fishes (St. John White et al. 2017).

Threats to the dwarf wedgemussel include direct habitat destruction from damming and river channelization, and indirect habitat degradation due to pollution, sedimentation, invasion by exotic species, and fluctuations in water level or temperature. Freshwater mussels, including the dwarf wedgemussel, are sensitive to potassium, zinc, copper, cadmium, and other elements associated with industrial pollution. Industrial, agricultural, and domestic pollution are largely responsible for the disappearance of the dwarf wedgemussel from much of the species' historic range.

For more information visit:

<https://www.fws.gov/species/dwarf-wedge-mussel-alsmidonta-heterodon>

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Best Practices

The following best practices are examples of typical Conservation Measures frequently recommended by the U.S. Fish and Wildlife Service's (Service) New Jersey Field Office during consultation or technical assistance.

For actions within the range of dwarf wedgemussel in New Jersey, the Service recommends the following:

- As possible, avoid activities that will directly or indirectly impact watercourses that contain suitable dwarf wedgemussel habitat. This includes activities such as:
  - Permanent and temporary disturbances or modifications to watercourses (*e.g.*, channelizing, diverting, stabilizing, impounding, dredging, new fill or structures, construction access within streams, changes in hydrology, erosion and sediment causing activities, wastewater and stormwater discharges). While dwarf wedgemussels are only found in perennially flowing watercourses, activities that impact ephemeral or intermittent streams (*e.g.*, erosion and sedimentation, potential spill of contaminants, water diversions, reduction in water quality) may also impact those areas. Watercourse activities that inhibit or adversely affect passage of host fishes should also be avoided.
  - Activities on land within the riparian zone and greater watershed area if they cause activities such as, but not limited to, reduction in water quality, turbidity/sedimentation increases, and increased pollution. For example, large increases in impervious surfaces for new developments, stormwater changes, clearing of riparian zones, fertilizer usage or pesticide application that may eventually enter a watercourse, and new sources of potential contaminants (*e.g.*, gas stations, construction projects that use/store chemicals) into watercourses.
- Freshwater Mussel Survey Information:

Actions that impact watercourses where dwarf wedgemussel are or may be present will likely require a freshwater mussel survey. A [recognized, qualified dwarf wedgemussel surveyor](#) should be employed to conduct the survey. Please contact the Service for necessary next steps to confirm that a survey is required, survey protocols, and an active list of surveyors. Surveys for dwarf wedgemussel should not be conducted without prior approval of the survey plan and surveyor qualifications from the Service.

Species surveys are generally conducted from May 1 to September 30. Water temperatures must be above 55°F. Actions within watercourses that are intermittent, ephemeral, very narrow/shallow or are severely degraded may not require a survey. The stream conditions are important to describe when the Service is determining if a survey is necessary. Depending on the watercourse conditions, a habitat assessment may determine that a freshwater mussel survey is not required.

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Generally, the Service's New Jersey Field Office refers project proponents to the [2022 West Virginia Mussel Survey Guidelines](#) for freshwater mussel surveys, but additional information may be required depending on the project. The Group 2 or Group 4 stream guidance (which depends on stream size) within the West Virginia Guidelines must be used for surveying watercourses for federally listed species. As described in the guidelines, please be aware that all streams less than or equal to 20 meters wide are required to use cells for surveying federally listed species. Cells may be requested by the Service for streams larger than that width as well. If federally listed species are found during the survey, additional quantitative freshwater mussel surveys (not described in the West Virginia Guidelines) of the defined survey areas and any proposed relocation site will likely be required. Please refer to [Smith et al. 2001](#) for quantitative survey guidelines.

Please be aware that surveys are (generally) valid for 5 years. However, if changes have occurred that would make the habitat more suitable for dwarf wedgemussel (*e.g.*, bedload, flow changes), that could warrant another survey sooner. Contact the Service immediately if a dwarf wedgemussel is found - do not move the animal except to avoid imminent injury.

- Initiate early coordination with the Service if existing road or utility crossings must be replaced or constructed near or upstream of dwarf wedgemussel habitat and consider the following recommendations:
  - Design replacement bridges to span the stream.
  - Eliminate deck drains on new bridges if possible. Work with the Service in the design and location of bridge drainage outlets.
  - Cut piles or footings at the stream bed or natural ground elevation.
  - Use granular material in all fill areas immediately adjacent to the bridge to reduce sediment reaching the stream.
  - Minimize the number of utility crossings and design them perpendicular to the stream.
  - As possible, avoid debris from falling into the water
  - For activities such as pipelines, waterlines, and other utility line crossings: horizontal directional drilling (HDD) or trenchless methods are generally preferred. If HDD is proposed, the risk level of discharge of drilling materials (inadvertent returns) to the watercourse should be assessed.
- Provide adequate upland buffers on stream segments supporting dwarf wedgemussels and within 1 mile upstream, including tributaries. Preserve and restore at least 300-foot native hardwood or mixed forest riparian zones. A site-specific buffer design is often necessary. Provide at least 150-foot upland buffers of native, woody vegetation greater than 1 mile upstream of dwarf wedgemussel populations, including tributaries.

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- As possible, place riparian buffers around dwarf wedgemussel populations in permanent conservation ownership or easement.
- Avoid creation of surface or groundwater withdrawals upstream or up-gradient of dwarf wedgemussel populations. As possible, avoid withdrawals that impact the watercourse bottom.
- Implement the strictest standards for storage, transport, and handling of hazardous materials and other potential pollutants within watersheds that support dwarf wedgemussel habitat to prevent contact with watercourses. As possible, keep motor fuels, lubricants, and other potential pollutants at least 500 feet away from watercourses. Use secondary containment structures around chemical/fuel storage tanks and buildings that may leak contaminants into watercourses.
- For pesticides and fertilizers:
  - Avoid using, storing, or mixing them and other potential pollutants within 500 feet of watercourses.
  - Avoid the use of broad-spectrum pesticides within 1 mile upstream of dwarf wedgemussel habitat or within 1,000 feet from the top of the top of the watercourse bank.
  - Always adhere to label restrictions for use near aquatic habitats.
  - Minimize usage within watersheds that may contain dwarf wedgemussel habitats and implement the highest standards for controlling agricultural runoff.
- Do not allow raw concrete to encounter watercourses and cover exposed fill materials when not in use or when rain is forecasted.
- Implement the strictest erosion and sediment control standards upstream and up-gradient of dwarf wedgemussel habitat, including but not limited to:
  - constructing storm water management infrastructure prior to all other components of a development project to control storm water and sediment during the remaining construction;
  - minimizing the duration of exposed soil by delaying vegetation removal and ground disturbance until immediately before the start of other work in the area;
  - installing silt fencing (or silt fencing in combination with hay bales) around work areas, with daily inspection and maintenance;
  - using jute matting or other erosion control blankets on disturbed areas immediately after project completion to minimize sedimentation; and
  - promptly re-vegetating areas of temporary disturbance with native species.
  - Use turbidity curtains or other appropriate in-water sediment control measures.
- Avoid introductions of invasive or non-native species to dwarf wedgemussel streams and riparian corridors, for example through:

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- Thoroughly washing construction equipment offsite before use in watercourses or on land within 500 feet from the top of the watercourse bank.
  - Using only native plant species and weed-free mulches and soils for landscaping within 500 feet of the top of the watercourse bank.
  - For individual work crew members that will be entering the watercourse: follow the New Jersey Water Monitoring Council’s Decontamination Protocols to minimize the risk of introducing or spreading aquatic invasive species (available at: <https://www.nj.gov/dep/wms/docs/NJWMC-DecontaminationProtocol-March2024.pdf>).
- Avoid or remediate project features that may increase post-project human intrusion into areas of suitable habitat (e.g., access roads, parking areas, entry points).

Procedures for when a dwarf wedgemussel occurrence has been located:

- Report the observation to the Service’s NJ Field Office and the New Jersey Department of Environmental Protection’s Wildlife Tracker (located at: <https://dep.nj.gov/njfw/conservation/reporting-rare-wildlife-sightings/>)

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**EASTERN BLACK RAIL (*LATERALLUS JAMAICENSIS JAMAICENSIS*)**

Biology, Presence, and Threats

The eastern black rail was federally listed as threatened on November 9, 2020. The eastern black rail is a sparrow-sized, secretive marsh bird that is the smallest and rarest rail species in North America. Males and females are similar in size and appearance. Adults are 4-6 inches long and generally pale to blackish gray, with small white spots on the back, a small blackish bill, and bright red eyes.

Eastern black rails occur in fresh, brackish, and saltwater marshes with clumping grass, rushes, or sedges. The dense vegetation creates an over-arching canopy that is somewhat more open at the base of the clumps where the birds can move around on foot under the overhead cover. Vegetative structure is more important than specific plant species in providing suitable habitat (Flores and Eddleman 1995, as cited in USFWS 2019). In New Jersey tidal marshes, Eastern black rail habitat is typically dominated by native cordgrasses (*Spartina* spp.) but may also include the invasive common reed (*Phragmites australis*). Eastern black rails tolerate a few shrubs but are absent from areas dominated by shrubs or trees. This species often occurs in the transition zone between wetter marsh and higher ground, or in a matrix of wetlands across the broader landscape (USFWS 2019).

Eastern black rails forage by gleaning or pecking small (less than 0.5 inch) insects, spiders, snails, crustaceans, and seeds. They breed in tidal or non-tidal wetlands with suitable hydrology, including human-made impoundments, and they usually occur in areas with sheet flow or other moving water. A key feature of eastern black rail habitat is moist to saturated substrates (occasionally dry) interspersed with or adjacent to very shallow water (typically no deeper than 1.2 inches). Eastern black rails prefer areas with varied micro-topography, which allows for the different habitat needs of chicks versus adults. This species also requires adjacent areas of higher elevation (*i.e.*, the wetland-upland transition zone) with dense cover as a refuge during high-water events. Flooding is a frequent cause of nest failure. For nests to be successful, water levels must be below the nests during egg-laying and incubation, which occurs from approximately May through the end of August. In New Jersey tidal wetlands, Eastern black rail typically nest in high marsh (above the mean high-water line) to avoid flooding and forage in the adjacent low marsh (below mean high-water line). After hatching, the mobile chicks receive parental care for about 42 days before learning to fly (fledge) (USFWS 2019).

Eastern black rails fly little during the breeding and wintering seasons and will typically flush only for a short distance when pursued (Bent 1926, as cited in USFWS 2019). Instead, the birds typically remain on the ground, running quickly through dense vegetation and likely using paths created by small mammals (Taylor and van Perlo 1998, Armistead 2001, as cited in USFWS 2019). Because of this behavior, eastern black rails are considered highly secretive and are difficult to detect.

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Although little information is available regarding migration, eastern black rails occurring in New Jersey are presumed to be breeding birds because it is currently the northern-most State with confirmed nesting. However, birds are occasionally detected as far north as New Jersey during winter on the Atlantic coast (USFWS 2019). The life-history periods of greatest concern for eastern black rails in New Jersey include territory establishment, courtship, nesting, chick-rearing, and a post-breeding molt when adults are flightless. Based on the best available information these times of year are:

- April 1 to April 30: territory establishment/courtship
- May 1 to August 31: nesting/chick rearing
- August 15 to September 15: post-breeding molt

For more information visit:

<https://www.fws.gov/species/eastern-black-rail-laterallus-jamaicensis-jamaicensis>

### Best Practices

The following best practices are examples of typical Conservation Measures frequently recommended by the NJFO during consultation or technical assistance.

For actions within the range of eastern black rail in New Jersey, the Service recommends the best practices listed below. The eastern black rail range in New Jersey is generally limited to tidal marsh but does include some non-tidal wetlands. Conservation measures recommended by the Service are generally the same in non-tidal areas but may need to be adapted based on site-specific factors; the Service may be contacted for technical assistance.

- Within the range of the eastern black rail, avoid permanent changes to tidal marsh that may reduce its suitability as habitat for this species. This includes changes to marsh hydrology, substrates, and vegetation. Avoid activities such as filling, draining, ditching, impounding, clearing, or erecting new structures in the marsh, and offsite activities such as new stormwater or wastewater discharges into the marsh. Avoid new upland development immediately adjacent to the marsh.
- Avoid work within high and adjacent low marsh areas within the range of the eastern black rail.
- If work in known or potential eastern black rail habitat cannot be avoided, seasonally restrict activities within high and adjacent low marsh areas from April 1 to September 15. Eastern black rail's typically nest in high marsh areas (areas above the mean high-water line) to avoid tidal flooding and forage in the adjacent low marsh areas (areas below mean high-water line).
- If a seasonal restriction cannot be implemented, conduct an assessment of marshes within the action area to determine their suitability as eastern black rail habitat. The results of the habitat assessment should be confirmed with a Service biologist during consultation.



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Impacts to suitable habitat should be avoided or usage of the time of year restriction should be utilized. Habitat assessments should be completed by qualified individuals familiar with the species. Presence/absence surveys for eastern black rail are generally not recommended at this time due the low probability of detection resulting from the birds' very secretive behavior.

- Submit the results of the habitat assessment to the Service for review and concurrence.
- Seasonally restrict activities within suitable habitat from April 1 to September 15, particularly activities involving vehicles, heavy equipment, or large numbers of personnel.
- For projects with minimal activity within suitable habitat (*e.g.*, small pedestrian teams in the marsh) that cannot be seasonally restricted, the risk of injuring or disturbing the birds may be minimized with the following conservation measures from April 1 to September 15.
  - Minimize entry into high marsh and densely vegetated areas to the extent practicable.
  - Avoid usage of mechanized equipment in high marsh.
  - Utilize the minimum number of people necessary.
  - Avoid excessive noise when operating in the marsh.
  - Utilize limited and consistent travel pathways to minimize disturbance.
  - Minimize overall time spent in the marsh.
  - Limit the number of workdays during this period (preferably no more than 5).
  - Ensure that all team members walk cautiously and watch out for nest structures or areas of dense or clumped vegetation.
  - Ensure that teams are guided by a team member who has been trained on eastern black rail nest microhabitat, nesting structures, species vocalization, and other evidence of species presence. This guiding member will cautiously lead the rest of the team through the marsh, avoiding areas where there is evidence of eastern black rail nesting.
  - Carefully move away from any area where eastern black rails are detected. Report the detection to the Service as soon as possible (*i.e.*, within 24 hours).
  - Avoid all usage of vehicles or heavy equipment in high marsh.
- For unavoidable, temporary impacts to marsh vegetation occurring outside the restricted season (*i.e.*, September 15 to March 31), the Service recommends the following to avoid and minimize habitat impacts:
  - Use the smallest and lightest equipment practicable, as well as wetland mats or other measures to minimize impact to the marsh substrate; and
  - Follow a soil erosion and sediment control plan and use best practices to limit indirect impacts to marsh habitat.

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- Provide the Service with a monitoring and contingency plan to ensure full recovery of the native marsh vegetation within 2 years.
- To avoid the unintended introduction or spread of invasive plants, thoroughly clean construction equipment before use in suitable habitat.
- Follow the State's [decontamination protocols](#) for activities in and around New Jersey Waters to minimize the risk of introducing or spreading aquatic invasive species.
- Avoid or remediate project features that may increase post-project human intrusion into areas of suitable habitat (e.g., access roads, parking areas, entry points).
- Landowners seeking to benefit eastern black rails can contact the Service for technical assistance. Examples of beneficial actions include:
  - Place suitable marsh habitat and adjacent areas with known eastern black rail presence in permanent conservation ownership or easement.
  - Partner with the Service and/or other conservation entities in efforts to maintain suitable tidal marsh habitat in light of sea level rise.

Procedures for when an Eastern black rail occurrence has been located:

- Report the observation to the NJFO and the New Jersey Department of Environmental Protection's Wildlife Tracker (located at: <https://dep.nj.gov/njfw/conservation/reporting-rare-wildlife-sightings/>)
- Report the observation to eBird via smartphone application or online at: <https://ebird.org/>. Identification tips are available from the [Cornell Lab of Ornithology](#). Reports are most helpful when they include specific locations, as well as comments about the kinds of habitats the birds were using.

References

U.S. Fish and Wildlife Service (USFWS). 2019. Species Status Assessment Report for the Eastern Black Rail (*Laterallus jamaicensis jamaicensis*). Version 1.3. August 2019. Atlanta, Georgia. <https://www.fws.gov/node/70342>

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**GREEN FLOATER (*LASMIGONA SUBVIRIDIS*)**

Biology, Presence, and Threats

On July 26, 2023, the Service published a proposal in the *Federal Register* to list the green floater as threatened with a proposed 4(d) rule under the Endangered Species Act. A final determination to either list the green floater under the Endangered Species Act or to withdraw the proposal is anticipated in the future.

The green floater is a small (up to 2.8 inches), greenish brown freshwater mussel historically native to the District of Columbia and 10 states including Alabama, Georgia, Maryland, New Jersey, New York, North Carolina, Pennsylvania, Tennessee, Virginia, and West Virginia. In New Jersey, the green floater was previously known to occur in the Stony Brook and within/tributaries to the Raritan, Delaware, and Pequest rivers, but the species has not recently been documented in the state. It is unknown if the species is extirpated within New Jersey.

Green floaters are typically found in small streams to large rivers with stable sand and gravel substrate. They prefer areas with slow to moderate flows (not flashy or high currents) that provide flow refugia (*i.e.*, eddies and ponded areas in streams), good water quality, and appropriate temperatures for survival. Areas with strong currents are not likely to contain habitat for the species. Connectivity between populations (free flowing streams and rivers without barriers) is necessary for periodic genetic exchange.

Green floaters are relatively short lived with variable annual recruitment, suggesting they maximize population growth during periods of favorable conditions. Green floaters are hermaphroditic and can self-fertilize which increases the probability of fertilization. Spawning and reproduction likely occur during the late summer or early fall. Over the winter months, they have the fairly unique ability to directly metamorphose larvae (called glochidia), releasing juveniles into the water column during the spring without requiring an intermediate host. Like most freshwater mussels, green floaters can also use fish hosts such as mottled sculpin (*Cottus bairdii*), rock bass (*Ambloplites rupestris*), central stoneroller (*Campostoma anomalum*), blacknose dace (*Rhinichthys atratulus*), and margined madtom (*Noturus insignis*). In these cases, after being expelled into the water, glochidia attach to gills or fins of these fish where they undergo metamorphosis to the juvenile life stage. Like all freshwater mussels, the green floater is an omnivore that presumably feeds on a wide variety of microscopic particulate matter (*i.e.*, bacteria and algae).

The green floater needs multiple resilient populations distributed widely across its range. Several factors influence whether green floater populations are healthy enough to withstand stochastic events such as flooding and drought conditions. These factors include good water quality, temperature, and flows; stable substrates; food availability; chemistry of interstitial spaces; and some presence of fish hosts. There are multiple factors (positive and negative) affecting the current status of green floater populations (*i.e.*, affecting the ability of green floater populations to meet their needs). The primary stressors are habitat loss or fragmentation, changes in water flows, and degraded water quality. These stressors are assumed to be caused by multiple sources,

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such as development, energy production, and agriculture, with development appearing to be the primary source.

For more information visit: <https://www.fws.gov/species/green-floater-lasmigona-subviridis>.

Best Practices

The following best practices are examples of typical Conservation Measures frequently recommended by the U.S. Fish and Wildlife Service's (Service) New Jersey Field Office during consultation or technical assistance.

- As possible, avoid activities that will directly or indirectly impact watercourses that contain suitable green floater habitat. This includes activities such as:
  - Permanent and temporary disturbances or modifications to watercourses (*e.g.*, channelizing, diverting, stabilizing, impounding, dredging, new fill or structures, construction access within streams, changes in hydrology, erosion and sediment causing activities). While green floaters are only found in perennially flowing watercourses, activities that impact ephemeral or intermittent streams (*e.g.*, erosion and sedimentation, potential spill of contaminants, water diversions, reduction in water quality) may also impact those areas.
  - Activities on land within the riparian zone and greater watershed area if they cause activities such as, but not limited to, reduction in water quality, turbidity/sedimentation increases, and increased pollution. For example, large increases in impervious surfaces for new developments, stormwater outflow changes, clearing of riparian zones, herbicide or pesticide spraying that may eventually enter a watercourse, and new sources of potential contaminants (*e.g.*, gas stations, construction projects that use/store chemicals) into watercourses.
- Freshwater Mussel Survey Information:

A freshwater mussel survey will likely be recommended for actions that impact watercourses where green floaters are or may be present. Please contact the Service for necessary next steps to confirm that a survey is required, survey protocols, and an active list of surveyors. Surveys for green floater should not be conducted without prior approval of the survey plan and surveyor qualifications from the Service.

Species surveys are generally conducted from May 1 to September 30. Water temperatures must be above 55°F. Actions within watercourses that are intermittent, ephemeral, very narrow/shallow or are severely degraded may not require a survey. The stream conditions are important to describe when the Service is determining if a survey is necessary. Depending on the watercourse conditions, a habitat assessment may determine that a freshwater mussel survey is not required.

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Generally, the Service's New Jersey Field Office refers project proponents to the [2022 West Virginia Mussel Survey Guidelines](#) for freshwater mussel surveys, but additional information may be required depending on the project. The Group 2 or Group 4 stream guidance (which depends on stream size) within the West Virginia Guidelines must be used for surveying watercourses for federally listed species. As described in the guidelines, please be aware that all streams less than or equal to 20 meters wide are required to use cells for surveying federally listed species. Cells may be requested by the Service for streams larger than that width as well. If federally listed species are found during the survey, additional quantitative freshwater mussel surveys (not described in the West Virginia Guidelines) of the defined survey areas and any proposed relocation site will likely be required. Please refer to [Smith et al. 2001](#) for quantitative survey guidelines.

Please be aware that surveys are (generally) valid for 5 years. However, if changes have occurred that would make the habitat more suitable for green floater (*e.g.*, bedload, flow changes), that could warrant another survey sooner. Contact the Service immediately if a green floater is found - do not move the animal except to avoid imminent injury.

- Initiate early coordination with the Service if existing road or utility crossings must be replaced or constructed near or upstream of green floater habitat and consider the following recommendations:
  - Design replacement bridges to span the stream.
  - Eliminate deck drains on new bridges if possible. Work with the Service in the design and location of bridge drainage outlets.
  - Cut piles or footings at the stream bed or natural ground elevation.
  - Use granular material in all fill areas immediately adjacent to the bridge to reduce sediment reaching the stream.
  - Minimize the number of utility crossings and design them perpendicular to the stream.
  - As possible, avoid debris from falling into the water
  - For activities such as pipelines, waterlines, and other utility line crossings: horizontal directional drilling (HDD) or trenchless methods are generally preferred. If HDD is proposed, the risk level of discharge of drilling materials (inadvertent returns) to the watercourse should be assessed.
- Provide adequate upland buffers on stream segments supporting green floater and within 1 mile upstream, including tributaries. Preserve and restore at least 300-foot native hardwood or mixed forest riparian zones. A site-specific buffer design is often necessary. Provide at least 150-foot upland buffers of native, woody vegetation greater than 1 mile upstream of green floater populations, including tributaries.
- As possible, place riparian buffers around green floater populations in permanent conservation ownership or easement.

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- Avoid creation of surface or groundwater withdrawals upstream or up-gradient of green floater populations. As possible, avoid withdrawals that impact the watercourse bottom.
- Implement the strictest standards for storage, transport, and handling of hazardous materials and other potential pollutants within watersheds that support green floater habitat to prevent contact with watercourses. As possible, keep motor fuels, lubricants, and other potential pollutants at least 500 feet away from watercourses. Use secondary containment structures around chemical/fuel storage tanks and buildings that may leak contaminants into watercourses.
- For pesticides and fertilizers:
  - Avoid using, storing, or mixing them and other potential pollutants within 500 feet of watercourses.
  - Avoid the use of broad-spectrum pesticides within 1 mile upstream of green floater habitat or within 1,000 feet from the top of the watercourse bank.
  - Always adhere to label restrictions for use near aquatic habitats.
  - Minimize usage within watersheds that may contain green floater habitats and implement the highest standards for controlling agricultural runoff.
- Do not allow raw concrete to encounter watercourses and cover exposed fill materials when not in use or when rain is forecasted.
- Implement the strictest erosion and sediment control standards upstream and up-gradient of green floater habitat, including but not limited to:
  - constructing storm water management infrastructure prior to all other components of a development project to control storm water and sediment during the remaining construction;
  - minimizing the duration of exposed soil by delaying vegetation removal and ground disturbance until immediately before the start of other work in the area;
  - installing silt fencing (or silt fencing in combination with hay bales) around work areas, with daily inspection and maintenance;
  - using jute matting or other erosion control blankets on disturbed areas immediately after project completion to minimize sedimentation; and
  - promptly re-vegetating areas of temporary disturbance with native species.
  - Use turbidity curtains or other appropriate in-water sediment control measures.
- Avoid introductions of invasive or non-native species to green floater streams and riparian corridors, for example through:
  - Thoroughly washing construction equipment offsite before use in watercourses or on land within 500 feet from the top of the watercourse bank.
  - Using only native plant species and weed-free mulches and soils for landscaping within 500 feet from the top of the watercourse bank.

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- For individuals entering the watercourse: follow the New Jersey Water Monitoring Council’s Decontamination Protocols to minimize the risk of introducing or spreading aquatic invasive species (available at: <https://www.nj.gov/dep/wms/docs/NJWMC-DecontaminationProtocol-March2024.pdf>).
- Avoid or remediate project features that may increase post-project human intrusion into areas of suitable habitat (e.g., access roads, parking areas, entry points).

Procedures for when a green floater occurrence has been located:

- Report the observation to the Service’s NJ Field Office and the New Jersey Department of Environmental Protection’s Wildlife Tracker (located at: <https://dep.nj.gov/njfw/conservation/reporting-rare-wildlife-sightings/>)

References

- Smith, D.R., R.F. Vilella, and D.P. Lemarie. 2001. Survey Protocols for Assessment of Endangered Freshwater Mussels in the Allegheny River, Pennsylvania. *Journal of the the North American Benthological Society* 20(1): 118-132. Available at: <https://www.fws.gov/sites/default/files/documents/Mussel%20Survey%20Guidelines%20Smith%20et%20al%202001.pdf>.
- US Fish and Wildlife Service. 2021. Species Status Assessment Report for the Green Floater (*Lasmigona subviridis*). Version 1.1. New York Field Office, U.S. Fish and Wildlife Service, Cortland, New York. 111 pp + Appendices. Available at: <https://ecos.fws.gov/ServCat/DownloadFile/233888>.

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**INDIANA BAT (*MYOTIS SODALIS*)**

Biology, Presence, and Threats

The Indiana bat was federally listed in 1967 and classified as an endangered species in 1973. The Indiana bat is a small, brown mammal about 1.5 to 2 inches long. This species closely resembles the little brown bat (*Myotis lucifugus*), from which it can be distinguished by small differences in fur coloration and the structure of the feet. As with all eastern U.S. bat species, Indiana bats feed almost exclusively on insects (USFWS 2007).

From April to September, Indiana bats inhabit their summer habitats. Suitable summer habitat consists of a wide variety of forested ecosystems where they roost, forage, and travel and may also include some adjacent and interspersed non-forested areas such as emergent wetlands and adjacent edges of agricultural fields, old fields and pastures. This includes forests and woodlots containing potential roosts (*i.e.*, live trees and/or snags greater than or equal to 5 inches diameter at breast height (DBH) that have exfoliating bark, cracks, crevices, and/or hollows), as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Individual trees may be considered suitable habitat when they exhibit the characteristics of a potential roost tree and are located within 1,000 feet of other forested/wooded areas. Indiana bats have also been observed roosting in human-made structures, such as bridges and bat houses (USFWS 2024).

During the summer months, numerous female bats roost together in maternity colonies. Maternity colonies use multiple roosts in both living and dead trees. Female Indiana bats raise a single offspring each year. Adult males usually roost in trees near maternity roosts, but some males remain near the hibernaculum and use caves and mines during the summer (USFWS 2007).

Each fall from late August through mid-November, Indiana bats migrate from their summer habitats to congregate in the vicinity of their hibernation sites, which include caves and abandoned mine shafts. During this time, the bats “swarm” in the vicinity of their hibernacula, mating and accumulating final fat reserves for hibernation. The bats then hibernate from late October to April, the precise timing is dependent on climatic conditions. After emerging from hibernation, Indiana bats forage in the vicinity of the hibernation site before migrating to summer habitats. Studies indicate that Indiana bats typically forage within 10 miles of hibernacula before and after hibernation (USFWS 2007).

Protection to Indiana bats during all phases of their annual life cycle is essential to preserving this species. Threats to Indiana bats include disturbance or killing of hibernating and maternity colonies; vandalism and improper closure of hibernacula; fragmentation, degradation, and destruction of summer habitats; and use of pesticides and other environmental contaminants. Additionally, white-nose syndrome due to the fungus *Pseudogymnoascus destructans* is a major threat to the Indiana bat and many other bat species (USFWS 2007).

For more information visit: <https://www.fws.gov/species/indiana-bat-myotis-sodalis>.



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Best Practices

The following best practices are examples of typical Conservation Measures frequently recommended by the U.S. Fish and Wildlife Service's (Service) New Jersey Field Office during consultation or technical assistance.

For actions within the range of Indiana bat in New Jersey, the Service recommends the following:

- Avoid cutting or other means of knocking down, bringing down, or trimming of trees that are greater than or equal to 5 inches diameter at breast height (DBH) from April 1 to September 30 within the geographic summer range of the Indiana bat.
- Avoid cutting or other means of knocking down, bringing down, or trimming of trees that are greater than or equal to 5 inches DBH from April 1 to November 15 if the action is within a municipality with a known Indiana bat hibernaculum. Refer to the [list of New Jersey municipalities](#) with hibernation or maternity occurrence of Indiana bat or northern long-eared bat for locations.
- If clearing is required during the time of year restriction described above, a presence/absence survey may be requested by the Service. Acoustic and mist net surveys should be completed from May 15 to August 15. Please contact the Service for survey protocols and necessary next steps to confirm that a survey is required. Surveys for Indiana bats should not be conducted without prior approval from the Service. Additionally, a [recognized and qualified bat surveyor](#) (which the Service's New Jersey Field Office keeps a record of) must conduct the survey.
- Avoid removal or modifications to bridges, culverts larger than 5 feet wide, and other structures that could potentially harm roosting bats from April 1 to September 30 within the geographic summer range of the Indiana bat. Alternatively, a survey or visual inspection of these structures may be possible for bats before construction begins. Bridge surveys should be completed from May 1 to October 31, but may occur outside of this window with permission from the Service. Please contact the Service for more information and protocols for structure surveys/visible inspections.
- Minimize tree clearing of highly suitable roost trees, including snags (dead trees), shagbark hickories (*Carya ovata*), other trees with shaggy or exfoliating bark, and trees of any species over 26 inches DBH.
- Avoid impacts to known roosts during any time of year.
- Avoid or minimize impacts to known roosting/foraging areas any time of year.
- Permanently protect known roosting/foraging habitat.

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- Maintain forested connections (*e.g.*, hedgerows) between known foraging/roosting areas.
- Minimize forest fragmentation (*i.e.*, consider the landscape when laying out a project).
- Avoid disturbance to riparian areas. Within areas of known fall foraging, summer maternity, and migration route habitats, preserve and restore wooded upland buffers at least 150-foot-wide on wetlands and open waters, and at least 300-foot-wide where possible and/or required by State regulation.
- Use bright flagging/fencing to demarcate trees that will be protected vs. cleared.
- Replant areas where trees have been disturbed for temporary activities or workspace.
- Preferentially replant suitable roost tree species.
- Minimize access to areas of known roost sites to prevent disturbance.
- Minimize discharges of pesticides and other environmental contaminants in areas of known Indiana bat habitat. Avoid large-scale use of insecticides throughout the species' geographic range.
- Avoid use of chemicals (*e.g.*, copper sulfate) in stormwater basins.
- Coordinate with the Service early in planning for any proposed wind power facilities within the geographic range of the Indiana bat.
- Minimize potential lighting impacts (*e.g.* downward facing lights, shields, timers).
- Please be aware that additional surveys, conservation measures, and Endangered Species Act consultation requirements may be needed depending on the following:
  - If the action is proposed within the vicinity of a known maternity roost or maternity capture site.
  - Amount of knocking down, bringing down or trimming of trees proposed.
  - Project distance from a hibernaculum.
- Avoid or remediate project features that may increase post-project human intrusion into areas of suitable habitat (*e.g.*, access roads, parking areas, entry points).

Procedures for when an Indiana bat occurrence has been located:

- Report the observation to the Service's NJ Field Office and the New Jersey Department of Environmental Protection's Wildlife Tracker (located at: <https://dep.nj.gov/njfw/conservation/reporting-rare-wildlife-sightings/>)

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**KNIESKERN'S BEAKED-RUSH (*RHYNCHOSPORA KNIESKERNII*)**

Biology, Presence, and Threats

Knieskern's beaked-rush was federally listed as a threatened species in 1991. It is a grass-like semi-perennial member of the sedge family that grows 0.6 to 24 inches tall and is distinguished from other species by its fruit (achene). Fruiting typically occurs from July to September.

Knieskern's beaked-rush is found only in (endemic to) New Jersey. An obligate wetland species, Knieskern's beaked-rush occurs in early successional wetland habitats, often on bog-iron substrates adjacent to slow-moving streams in the Pinelands region. In the past, fire may have played an important role in creating and maintaining suitable habitat for Knieskern's beaked-rush. This species is also found in human-disturbed wet areas that exhibit similar early successional stages due to water fluctuation or periodic disturbance from vehicles, mowing, or fire. These human-influenced habitats include abandoned borrow pits, clay pits, ditches, rights-of-way, and unimproved roads. Knieskern's beaked-rush is often associated with other sedge and grass species. However, it is intolerant of shade and competition, especially from woody species, and is sometimes found on relatively bare substrates.

Threats to Knieskern's beaked-rush include habitat loss from development, agriculture, hydrologic modification, and other wetland alterations; excessive disturbance from vehicle-use, trash dumping, and other activities; and natural vegetative succession of the open, sparsely vegetated substrate preferred by this species.

For more information visit: <https://www.fws.gov/species/knieskerns-beaked-rush-rhynchospora-knieskernii>

Best Practices

The following best practices are examples of typical Conservation Measures frequently recommended by the U.S. Fish and Wildlife Service's (Service) New Jersey Field Office during consultation or technical assistance.

For actions within the range of Knieskern's beaked-rush in New Jersey, the Service recommends the following:

- Avoid direct modifications to wetlands supporting Knieskern's beaked-rush (*e.g.*, clearing, flooding, filling, draining, ditching, tiling, excavating), and to waterbodies with hydrologic connection to Knieskern's beaked-rush habitat (*e.g.*, channelizing, diverting, stabilizing, impounding).
- If work that will impact suitable Knieskern's beaked-rush habitat is proposed, the Service may recommend conducting a survey within that area to determine if the species is present. Surveys should be conducted from June 1 to September 30 when achenes are mature. Surveys strictly for suitable habitat may be permitted to occur outside of this

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window when conditions permit. Please contact the Service for survey protocols and necessary next steps to confirm that a survey is required. Surveys for Knieskern's beaked-rush should not be conducted without prior approval from the Service.

- If Knieskern's beaked-rush is found during the survey, effects to it should be avoided or minimized as much as possible. The Service will also work with organizations through Endangered Species Act consultation to provide conservation measures for avoiding effects.
- Provide adequate upland buffers around wetlands supporting Knieskern's beaked-rush, often at least 300 feet of native vegetation. A site-specific buffer design is often necessary.
- Provide at least 150-foot buffers of native vegetation along waterbodies with hydrologic connection to wetlands supporting Knieskern's beaked-rush.
- Implement Low Impact Design Techniques in the New Jersey Stormwater Best Management Practices Manual located at:  
*[https://www.nj.gov/dep/stormwater/bmp\\_manual2.htm](https://www.nj.gov/dep/stormwater/bmp_manual2.htm)*.
- Avoid reforestation or landscaping within 150 feet that would increase shading of Knieskern's beaked-rush habitat.
- Avoid planting of native vegetative competitors within 150 feet of Knieskern's habitat. Where possible (*e.g.*, where erosion is not a concern), allow natural re-vegetation of bare mineral wet soils within 300 feet of Knieskern's sites.
- Avoid temporary impacts to wetlands supporting Knieskern's beaked-rush, for example through:
  - locating temporary work areas and access routes outside of wetlands;
  - constructing storm water management infrastructure prior to all other components of a development project to control storm water and sediment during the remaining construction;
  - installing two rows of silt fencing around work areas, with daily inspection and maintenance;
  - using jute matting or other erosion control blankets on disturbed areas immediately after project completion to minimize sedimentation; and
  - controlling invasive vegetation following temporary disturbance.
- Avoid introductions of invasive species to wetlands supporting Knieskern's beaked-rush , for example through:
  - thoroughly washing construction equipment offsite before use within 500 feet of Knieskern's beaked-rush habitat; and

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- using only native plant species and weed-free mulches and soils for landscaping within 500 feet of Knieskern's beaked-rush habitat.
- Avoid public access or other human activities in and around wetlands supporting Knieskern's beaked-rush.
- Place wetlands supporting Knieskern's beaked-rush and associated upland buffers in permanent conservation ownership or easement.
- Work with the Service to design and implement a management plan that will maintain early successional vegetative conditions.
- Avoid or remediate project features that may increase post-project human intrusion into areas of suitable habitat (*e.g.*, access roads, parking areas, entry points).

Procedures for when a Knieskern's beaked-rush occurrence has been located:

- Report the observation to the Service's NJ Field Office and the New Jersey Department of Environmental Protection's Natural Heritage Program located at:  
*[https://www.nj.gov/dep/parksandforests/natural/docs/NHRPSR\\_Form.pdf](https://www.nj.gov/dep/parksandforests/natural/docs/NHRPSR_Form.pdf)*.

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**MONARCH BUTTERFLY (*DANAUS PLEXIPPUS*)**

Biology, Presence, and Threats

On December 12, 2024, the Service published a proposal in the *Federal Register* to list the monarch butterfly as threatened under the Endangered Species Act (ESA). A final determination to either list the monarch butterfly under the ESA or to withdraw the proposal is anticipated in the future.

Adult monarch butterflies are large and conspicuous, with bright orange wings surrounded by a black border and covered with black veins. The black border has a double row of white spots, present on the upper side of the wings. Adult monarch butterflies are sexually dimorphic, with males having narrower wing venation and scent patches. Each spring, monarch butterflies disperse from overwintering grounds to areas across the United States, including New Jersey. During the breeding season, monarch butterflies lay eggs on their obligate milkweed host plant (primarily *Asclepias spp.*), and larvae emerge after 2 to 5 days. Larvae develop through five larval instars (intervals between molts) over a period of 9 to 18 days, feeding on milkweed and sequestering toxic chemicals (cardenolides) as a defense against predators. The larva then pupates into a chrysalis before emerging 6 to 14 days later as an adult butterfly. There are multiple generations of monarch butterflies produced during the breeding season, with most adult butterflies living approximately 2 to 5 weeks; overwintering adults enter reproductive diapause (suspended reproduction) and live 6 to 9 months.

Monarch butterflies are likely present during migration and breeding in New Jersey from April 1 to October 31 or May 1 to September 30 (depending on location in New Jersey; Monarch Joint Venture 2019). Monarch butterfly habitat requires suitable shelter from poor weather such as fallen logs and leaf litter; food from plants such as milkweed and other nectar plants to support them throughout the breeding season; and water within brief flying range (New Jersey Department of Environmental Protection 2017). Suitable breeding habitat requires all the same conditions but also their obligate milkweed host plant. In the fall, surviving monarch butterflies migrate from and through New Jersey to their respective overwintering sites which is generally in the mountains of central Mexico.

The primary drivers affecting the health of the two North American migratory populations are: habitat loss and degradation (from conversion of grasslands to agriculture, widespread herbicide use, logging/thinning at overwintering sites in Mexico, senescence, and incompatible management of overwintering sites in California, urban development, and drought), continued exposure to insecticides, and effects of climate change.

For more information visit: <https://www.fws.gov/species/monarch-danaus-plexippus>.

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Best Practices

The following best practices are examples of typical Conservation Measures frequently recommended by the U.S. Fish and Wildlife Service's (Service) New Jersey Field Office during consultation or technical assistance.

For actions within the range of monarch butterfly in New Jersey, the Service recommends the following:

- Identifying and avoiding impacts to suitable monarch butterfly habitat. If avoiding impacts to suitable monarch habitat is not possible, avoid impacts during times of year monarch butterflies may be present from April 1 to October 31 or May 1 to September 30. Review the "Mowing and Management: Best Practices for Monarch's" handout at: <https://monarchjointventure.org/blog/revised-handout-mowing-and-management-best-practices-for-monarchs> to see if any other conservation measures are applicable to future projects/can be implemented.
- Review the Services website at: <https://www.fws.gov/initiative/pollinators/monarchs>, New Jersey Department of Environmental Protection's (NJDEP) (2017) Monarch Butterfly Conservation Guide, and the Monarch Joint Venture website at: <https://monarchjointventure.org/mjvprograms/science/roadside-habitat-for-monarchs/best-management-practices-resources> for possible conservation measures to implement for future projects.
- The following actions developed in the United States Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) monarch butterfly Landowner Guide (May 2020) and referenced at the link below:
  - Provide Habitat Restoration such as:
    - Converting agricultural land to spring blooming shrubs and trees
    - Enhancing native meadows or native warm season grass plantings with forbs
    - Enhancing suitable nectar or larval habitat with spring-blooming trees and shrubs
  - Maintain existing monarch habitat through actions such as mowing in the winter and applying herbicides in spot or stump treatments.
- The following actions developed in the NJDEP's New Jersey monarch butterfly Conservation Guide (2017):
  - Plant native milkweed (*Asclepias* spp.) plants that are native to the area. The United States Department of Agriculture's (USDA) Natural Resource Conservation Service (NCRS) PLANTS Database at <https://plants.usda.gov/home> can be used to find milkweed plants that are native within New Jersey.



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- Plant nectar plants to supplement native milkweed during the breeding season. The Pollinator Partnership has developed a *Selecting Plants for Pollinators Guide* (located at: <https://www.pollinator.org/PDFs/EasternBroadleaf.Oceanic.rx18.pdf>) that can be used to help determine what species to plant.

More information about habitat restoration, conservation, and maintenance of habitat for the monarch butterfly can be found at the USDA's NRCS monarch butterfly Landowner Guide at: <https://www.fws.gov/sites/default/files/documents/Monarch%20Butterfly%20Landowner%20Version-Final.pdf>.

Procedures for when a monarch butterfly occurrence has been located:

- Since the monarch butterfly is not currently listed pursuant to the ESA and is also not a New Jersey state listed species, the Service recommends reporting to iNaturalist via smartphone application or online at: <https://www.inaturalist.org/>.

References:

Monarch Joint Venture. 2019. Mowing and Management: Best Practices for Monarchs. Available at: <https://monarchjointventure.org/blog/revise-handout-mowing-and-management-best-practices-for-monarchs>.

New Jersey Department of Environmental Protection. 2017. New Jersey Monarch Butterfly Conservation Guide. Available at: <https://www.nj.gov/dep/docs/monarch-guide.pdf>.

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**NORTHEASTERN BEACH TIGER BEETLE (*HABROSCELIMORPHA DORSALIS DORSALIS*)**

Biology, Presence, and Threats

The northeastern beach tiger beetle was federally listed as threatened in 1990. At about 0.5 inch long, the northeastern beach tiger beetle has a bronze-green head and thorax, and white to light tan wing coverings (elytra) often with dark lines. Tiger beetles are often the dominant invertebrate predators in habitats where they occur. Adults use their long mandibles to capture small amphipods, flies, and other invertebrates along the water's edge. Adults have also been observed scavenging on dead amphipods, crabs, and fish. Larvae are "sit and wait" predators that feed mainly on amphipods.

In New Jersey, northeastern beach tiger beetles inhabit wide, sandy, ocean beaches from the intertidal zone to the upper beach. Eggs are deposited in the mid- to above-high tide drift zone. Larval beetles occur in a relatively narrow band of the upper intertidal to high drift zone, where they can be regularly inundated by high tides. Larvae dig vertical burrows in the sand and wait at the burrow mouth to capture passing prey. Northeastern beach tiger beetle larvae pass through three developmental stages (instars) over 2 years, over-wintering twice as larvae, pupating at the bottom of their burrows, and emerging as winged adults during their third summer.

The northeastern beach tiger beetle was found historically along New Jersey's undeveloped Atlantic coastal beaches from Sandy Hook to Holgate, but was eliminated (extirpated) from the State. In 1994, a population of the northeastern beach tiger beetle was re-established at the Gateway National Recreation Area, Sandy Hook Unit (Sandy Hook) and persisted until the early 2000s. A second reintroduction effort at Sandy Hook began in 2020 and is in progress.

The primary threat to the northeastern beach tiger beetle is habitat disturbance and destruction from development, beach stabilization activities, and recreational beach uses including pedestrian and vehicle traffic, all of which affect the larvae. Other threats include spills of oil or other contaminants, pesticide use, natural or human-induced beach erosion, predation, and climate-driven changes such as accelerating sea level rise and increasing storm intensity.

For more information visit:

<https://www.fws.gov/species/northeastern-beach-tiger-beetle-cicindela-dorsalis-dorsalis>

Best Practices

The following best practices are examples of typical Conservation Measures frequently recommended by the U.S. Fish and Wildlife Service's (Service) New Jersey Field Office during consultation or technical assistance.

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For actions within the range of northeastern beach tiger beetle in New Jersey, the Service recommends the following:

- Avoid direct and indirect modifications to suitable northeastern beach tiger beetle habitat, as well as activities within suitable habitat that may injure or kill beetles (*e.g.*, driving, use of heavy equipment, sand moving or grading).
- If work within suitable northeastern beach tiger beetle habitat is proposed, the Service recommends conducting a survey within that area to determine if the species is present.
  - Contact the Service for survey protocols and necessary next steps to confirm that a survey is required. Surveys for northeastern beach tiger beetle should not be conducted without prior approval from the Service.
  - If found during the survey, effects to northeastern beach tiger beetles and their habitat should be avoided or minimized to the extent practicable. The Service will provide project-specific recommendations.
- Avoid or remediate project features that may increase post-project human intrusion into areas of suitable habitat (*e.g.*, access roads, parking areas, entry points).

Procedures for when a Northeastern beach tiger beetle occurrence has been located:

- Report the observation to the NJFO and the New Jersey Department of Environmental Protection's Wildlife Tracker (located at: <https://dep.nj.gov/njfw/conservation/reporting-rare-wildlife-sightings/>)

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**NORTHERN LONG-EARED BAT (*MYOTIS SEPTENTRIONALIS*)**

Biology, Presence, and Threats

The northern long-eared bat was federally listed as endangered (previously listed as threatened) in March 2023. The northern long-eared bat is a medium-sized bat weighing approximately five to eight grams with females slightly larger than males. It is distinguished from other *Myotis* species by its long ears.

Northern long-eared bats utilize summer habitats in New Jersey from April to September. Suitable summer habitat for the NLEB consists of a wide variety of forested/wooded habitats where they roost, forage, and travel. Although they may also traverse habitat adjacent and interspersed with forest habitat, such as emergent wetlands and field edges, they are predominately found in forest/wooded habitat. This includes forests and woodlots containing potential roosts (*i.e.*, live trees and/or snags greater than or equal to 3 inches diameter at breast height (DBH) that have exfoliating bark, cracks, crevices, and/or cavities), as well as linear features such as fencerows, riparian forests, and other wooded corridors. NLEB often prefer intact mixed-type forests with small gaps (*i.e.*, forest trails, small roads, or forest-covered creeks) in forest with sparse or medium vegetation for foraging and commuting rather than fragmented habitat or areas that have been clear cut. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Individual trees may be considered suitable habitat when they exhibit characteristics of suitable roost trees and are within 1,000 feet of other forested areas. The bats have also been observed roosting (although to a lesser degree than forested habitat) in human-made structures, such as buildings, barns, bridges, and bat houses; therefore, these structures should also be considered potential summer habitat.

Northern long-eared bats congregate in the vicinity of their hibernacula (caves and abandoned mine portals) in August or September and enter hibernation from October to November. The bats engage in swarming activities within 5 miles of their hibernaculum. In April, the bats emerge from hibernation and migrate to summer habitat. Migratory movements are short compared to the Indiana bat, with movement typically between 35 and 55 miles.

Threats to the northern long-eared bat include disturbance or killing of hibernating and maternity colonies; vandalism and improper closure of hibernacula; fragmentation, degradation, and destruction of forested summer habitats; and use of pesticides and other environmental contaminants. White-nose syndrome (*Pseudogymnoascus destructans*) is also a major threat to this and other bat species.

For more information visit: <https://www.fws.gov/species/northern-long-eared-bat-myotis-septentrionalis>.

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Best Practices

The following best practices are examples of typical Conservation Measures frequently recommended by the U.S. Fish and Wildlife Service's (Service) New Jersey Field Office during consultation or technical assistance.

For actions within the range of Northern long-eared bat in New Jersey, the Service recommends the following:

- Avoid cutting or other means of knocking down, bringing down, or trimming of trees that are greater than or equal to 3 inches diameter at breast height (DBH) from April 1 to September 30 within the geographic summer range of the northern long-eared bat.
- Avoid cutting or other means of knocking down, bringing down, or trimming of trees that are greater than or equal to 3 inches DBH from April 1 to November 15 if the action is within a municipality with a known northern long-eared bat hibernaculum. Refer to the [list of New Jersey municipalities](#) with hibernation or maternity occurrence of Indiana bat or Northern long-eared bat for locations.
- If clearing is required during the time of year restriction described above, a presence/absence survey may be requested by the Service. Acoustic and mist net surveys should be completed between May 15 to August 15. Please contact the Service for survey protocols and necessary next steps to confirm that a survey is required. Surveys for northern long-eared bats should not be conducted without prior approval from the Service. Additionally, [a recognized and qualified bat surveyor](#) (which the Service's NJ Field Office keeps a record of) must conduct the survey.
- Avoid removal or modifications to bridges, culverts greater than or equal to 27 feet in length and 3 feet high, and other structures that could potentially harm roosting bats from April 1 to September 30 within the geographic summer range of the northern long-eared bat. Alternatively, a survey or visual inspection of these structures may be possible for bats before construction begins. Bridge surveys should be completed between May 1 and October 31, but may occur outside of this window with permission from the Service. Please contact the Service for more information and protocols for structure surveys/visual inspections.
- Minimize tree clearing, especially of highly suitable roost trees including snags (dead trees), shagbark hickories (*Carya ovata*), other trees with shaggy or exfoliating bark, and trees of any species over 26 inches DBH.
- Avoid impacts to known roosts during any time of year.
- Avoid or minimize impacts to known roosting/foraging areas any time of year.
- Permanently protect known roosting/foraging habitat.

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- Maintain forested connections (*e.g.* hedgerows) between known foraging/roosting areas.
- Minimize forest fragmentation (*i.e.* consider the landscape when laying out a project).
- Avoid disturbance to riparian areas. Within areas of known fall foraging, summer maternity, and migration route habitats, preserve and restore wooded upland buffers at least 150-foot-wide on wetlands and open waters, and at least 300-foot-wide where possible and/or required by State regulation.
- Use bright flagging/fencing to demarcate trees that will be protected vs. cleared.
- Replant areas where trees have been disturbed for temporary activities or workspace.
- Preferentially replant suitable roost tree species.
- Minimize access to areas of known roost sites to prevent disturbance.
- Minimize discharges of pesticides and other environmental contaminants in areas of known northern long-eared bat habitat. Avoid large-scale use of insecticides throughout the species' geographic range.
- Avoid use of chemicals (*e.g.*, copper sulfate) in stormwater basins.
- Coordinate with the Service early in planning for any proposed wind power facilities within the geographic range of the northern long-eared bat.
- Minimize potential lighting impacts (*e.g.* downward facing lights, shields, timers).
- Please be aware that additional surveys, conservation measures, and Endangered Species Act consultation requirements may be needed depending on the following:
  - If the action is proposed within 1.5 miles of a known maternity roost or 3 miles of a known maternity capture site.
  - Amount of knocking down, bringing down or trimming of trees proposed.
  - Project distance from a hibernaculum.
- Avoid or remediate project features that may increase post-project human intrusion into areas of suitable habitat (*e.g.*, access roads, parking areas, entry points).

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Procedures for when a northern long-eared bat occurrence has been located

- Report the observation to the Service's NJ Field Office and the New Jersey Department of Environmental Protection's Wildlife Tracker (located at:  
*<https://dep.nj.gov/njfw/conservation/reporting-rare-wildlife-sightings/>*)

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**PIPING PLOVER (*CHARADRIUS MELODUS*)**

Biology, Presence, and Threats

Within its Atlantic Coast breeding range, the piping plover was federally listed as threatened in 1986. It is a small shorebird, approximately 7 inches long and with a wingspan of about 15 inches. Piping plovers have white underparts with a light beige back and crown. Breeding adults have a single black breast band, which is often incomplete, and a black bar across the forehead. The legs and bill are orange in summer, with a black tip on the bill. In winter, the birds lose the breast bands, the legs fade from orange to pale yellow, and the bill becomes mostly black. Piping plover adults and chicks feed on marine macroinvertebrates such as worms, fly larvae, beetles, and crustaceans.

Piping plovers are present on the New Jersey shore during the breeding season, generally between March 1 and August 31. These territorial birds nest above the high tide line, usually on sandy ocean beaches and barrier islands, but also on gently sloping foredunes, blowout areas behind primary dunes, washover areas cut into or between dunes, the ends of sandspits, and deposits of suitable dredged or pumped sand. Piping plover nests consist of a shallow scrape in the sand, frequently lined with shell fragments and often located near small clumps of vegetation. Females lay 4 eggs that hatch in about 25 days, and surviving chicks learn to fly (fledge) after about 25 to 35 days. The flightless chicks follow their parents to feeding areas, which include the intertidal zone of ocean beaches, ocean washover areas, mudflats, sandflats, wrack lines (organic ocean material left by high tide), and the shorelines of coastal ponds, lagoons, and salt marshes. A few of New Jersey's natural beaches are also known to support concentrations of migrating piping plovers, where adults and fledged chicks may be present into September and October.

Threats to the piping plover include habitat loss, human disturbance of nesting birds, predation, and oil spills and other contaminants. Habitat loss results from development, as well as from beach stabilization, beach nourishment, and other physical alterations to the beach ecosystem. Human disturbance of nesting birds includes foot traffic, sunbathing, use of kites/kiteboards/kitebuggies, pets, fireworks, mechanical beach raking, construction, and vehicle use. These disturbances can result in crushing of eggs, failure of eggs to hatch, and death of chicks. Predation on piping plover chicks and eggs is intensified by development because predators such as foxes (*Vulpes vulpes*), rats (*Rattus norvegicus*), raccoons (*Procyon lotor*), skunks (*Mephitis mephitis*), crows (*Corvus spp.*), and gulls (*Larus spp.*) thrive in developed areas and are attracted to beaches by food scraps and trash. Unleashed and feral dogs (*Canis familiaris*) and cats (*Felis domesticus*) also disturb courtship and incubation and prey on chicks and adults. Climate-driven changes are also a threat, including accelerating sea level rise, increasing storm intensity, and changing seasonal timing of coastal storms.

For more information visit:

<https://www.fws.gov/species/piping-plover-charadrius-melodus>



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Best Practices

The following best practices are examples of typical Conservation Measures frequently recommended by the U.S. Fish and Wildlife Service's (Service) New Jersey Field Office during consultation or technical assistance.

For actions within the range of piping plover in New Jersey, the Service recommends the following:

- Avoid permanent or temporary modification of suitable piping plover nesting habitat including but not limited to creation or expansion of new stabilizing structures (*e.g.*, jetties, groins, sea walls, sand fencing, stabilized dunes) and adverse changes in elevation such as through sand removal, deposition, or transfers.
- Avoid or remediate project features that may increase post-project human intrusion into areas of suitable habitat (*e.g.*, access roads, parking areas, entry points).
- Avoid the introduction or spread of dense or invasive vegetation at suitable piping plover habitat. Thoroughly clean construction equipment before use on a beach to avoid unintended spread of invasive plants. Contact the Service prior to any beach plantings.
- Avoid noise and disturbance during the nesting season. Seasonally restrict work that might disturb piping plovers during the nesting season of March 1 through August 31, particularly work involving use of motorized vehicles.
  - With careful monitoring and other safeguard, limited activities (*e.g.*, involving pedestrian teams on the beach), may be conducted during March.
  - In breeding areas where no nesting has occurred by July 15, or where all chicks have fledged before August 31, the seasonal restriction may be lifted early.
  - Any work between March 1 through August 31 should be conducted only in close coordination with the Service.
- Avoid mechanical beach raking during the nesting season of March 1 through August 31 to protect birds and habitat characteristics such as wrack materials and shell fragments.
- Limit the abundance of predators on the beach by minimizing food scraps and fitting trash cans with predator-resistant lids.
- Minimize disturbance from pets by promoting the *Cats Indoors* program and seasonally prohibiting dog walking from March 1 through August 31. See this [\*Cats and Dogs and Birds on the Beach\*](#) fact sheet.
- Manage recreational activities in accordance with the Service's [\*Guidelines for Managing Recreational Activities in Piping Plover Breeding Habitat on the U.S. Atlantic Coast to\*](#)

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[Avoid Take Under Section 9 of the Endangered Species Act.](#) (Note there is a [2015 addendum](#) to these guidelines).

- Plan and carry out fireworks displays in accordance with the Service's [Guidelines for Managing Fireworks in the Vicinity of Piping Plovers and Seabeach Amaranth on the U.S. Atlantic Coast.](#)
- Work with the Service and the New Jersey Department of Environmental Protection's Endangered and Nongame Species Program to prepare a [Beach Management Plan](#) or keep an existing plan up to date. Plan and carry out projects, events, and habitat management in accordance with the provisions of approved plans.
- Avoid or remediate project features that may increase post-project human intrusion into areas of suitable habitat (e.g., access roads, parking areas, entry points).

Procedures for when a piping plover occurrence has been located:

- Report the observation to the NJFO and the New Jersey Department of Environmental Protection's Wildlife Tracker (located at: <https://dep.nj.gov/njfw/conservation/reporting-rare-wildlife-sightings/>)
- Report piping plovers with colored leg bands using the information on this web page: <https://www.fws.gov/story/congratulations-spotting-banded-piping-plover-now-what>

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**RUFA RED KNOT (*CALIDRIS CANUTUS RUFA*)**

Biology, Presence, and Threats

The rufa red knot was federally listed as threatened in January 2015. The Service proposed designating [critical habitat](#) for the rufa red knot in 2021 and revised the proposal in 2023. The proposed rule includes nine critical habitat units in New Jersey, distributed along the State's southern Atlantic Coast and Delaware Bayshore. See this [FAQ](#) for more information about proposed critical habitat.

At 9 to 10 inches long, the rufa red knot is a large, bulky sandpiper with a short, straight, black bill. During the breeding season, the legs are dark brown to black, and the breast and belly are a characteristic russet color that ranges from salmon-red to brick-red. Males are generally brighter shades of red, with a more distinct line through the eye. When not breeding, both sexes look alike—plain gray above and dirty white below with faint, dark streaking. As with most shorebirds, the long-winged, strong-flying knots fly in groups, sometimes with other species. Rufa red knots feed on invertebrates, especially small clams, mussels, and snails, but also crustaceans, marine worms, and horseshoe crab eggs. On the breeding grounds knots mainly eat insects.

Small numbers of rufa red knots may occur in New Jersey year-round, while larger numbers rely on Delaware Bay and Atlantic Coast stopover habitats during the spring (May 1 to June 10) and fall (July 15 to November 30) migration periods. Rufa red knots have also been observed in small numbers during migration along the shores of the Raritan Bay in New Jersey, and small numbers of knots may spend all or part of the winter in southern New Jersey. These robin-sized shorebirds may fly up to 9,300 miles from south to north every spring and reverse the trip every fall, making the rufa red knot of the longest distance migrating animals.

The primary wintering areas for the rufa red knot include the southern tip of South America, northern Brazil, the Caribbean, and the southeastern and Gulf coasts of the U.S. The rufa red knot breeds in the tundra of the central Canadian Arctic. Migrating rufa red knots can complete non-stop flights of 1,500 miles or more, converging on critical stopover areas to rest and refuel along the way. Large flocks of rufa red knots arrive at stopover areas along the Delaware Bay and New Jersey's Atlantic Coast each spring, with many of the birds having flown directly from northern Brazil. The spring migration is timed to coincide with the spawning season for the horseshoe crab (*Limulus polyphemus*). Horseshoe crab eggs provide a rich, easily digestible food source for migrating birds. Mussel beds on New Jersey's southern Atlantic Coast are also an important food source for migrating rufa red knots. Birds arrive at stopover areas with depleted energy reserves and must quickly rebuild their body fat to complete their migration to Arctic breeding areas. During their brief 10 to 14-day spring stay in the mid-Atlantic, rufa red knots can nearly double their body weight. New Jersey's Atlantic Coast is also an important stopover for southbound birds in the fall.

Migration habitats in New Jersey include high-energy ocean (*e.g.*, beaches) or bayfront beaches; tidal sand or mud flats in more sheltered bays and lagoon; unimproved tidal inlets; and sparsely

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vegetated intertidal areas. Dynamic and ephemeral intertidal features such as sand spits, islets, shoals, tidal marsh blowouts/pans, peat banks, sandbars, and features often associated with inlets are important rufa red knot habitats.

Threats to the rufa red knot include accelerating rates of sea level rise; coastal development; shoreline stabilization; dredging; reduced food availability at stopover areas; disturbance by vehicles, people, dogs, aircraft, and boats; and climate change.

For more information visit:

<https://www.fws.gov/species/rufa-red-knot-calidris-canutus-rufa>

### Best Practices

The following best practices are examples of typical Conservation Measures frequently recommended by the U.S. Fish and Wildlife Service's (Service) New Jersey Field Office during consultation or technical assistance.

For actions within the range of rufa red knot in New Jersey, the Service recommends the following:

- Avoid noise and disturbances to foraging or roosting rufa red knots that may be present during the following times of year:\*
  - Spring migration period from May 1 to June 10. Use a time period of April 15 to June 10 if there will be habitat modification.
  - Fall migration period from July 15 to November 30.
  - Wintering period from December 1 to March 15.

\*Not all suitable habitats are used by rufa red knots in all of the seasons listed above. A general indication of seasonal occurrence can be determined through observations of the birds within the action area as recorded by *ebird.org*. Contact the Service for additional site-specific information and specific recommendations.

- If a time of year restriction cannot be utilized, prepare and implement a construction monitoring plan before the start of any work. Rufa red knot monitoring is typically conducted before and during project construction.
  - Contact the Service for necessary next steps to confirm that a monitor is appropriate and to review/establish protocols.
  - Rufa red knot monitors should be qualified individuals who are familiar with the species. Qualifications of the monitor and the monitoring plan should be reviewed by the Service before construction or monitoring begins.
- Avoid or remediate project features that may increase post-project human intrusion into areas of suitable habitat (*e.g.*, access roads, parking areas, entry points).

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- Avoid new coastal developments in and near rufa red knot habitats.
- Avoid hard or intensive shoreline stabilization in sparsely developed areas. Preferentially utilize living shorelines techniques. Design projects to incorporate wide, sparsely vegetated, minimally stabilized beaches and mudflats. Design projects to preserve natural coastal processes and inlet dynamics.
- Evaluate development setbacks to allow for habitat migration in response to sea level rise.
- Plan beach nourishments to minimize adverse effects to rufa red knots, their prey, and their habitats. Select clean sediment with a close grain size match to the native beach. To the extent practicable, schedule nourishment at times of year that minimize rufa red knot disturbance and depression of the prey base. (See [Rice 2009](#) for other best practices). Engage local communities in post-nourishment beach management, including maintaining suitable habitat, managing disturbance, and managing predators.
- Avoid or minimize vegetation planting in rufa red knot habitat. When planting is necessary, use only native, non-woody plant species. Use care to avoid accidental introductions of non-native plants (*e.g.*, clean construction equipment off-site before use).
- Avoid or minimize beach raking in rufa red knot habitats at those times of year when the birds are typically present.
- Minimize and monitor disturbance of rufa red knots from other human activities. Pedestrians should allow a buffer of at least 400 feet around rufa red knots, which can occur in single or mixed-species flocks and sometimes as individual birds. Larger buffers may be needed to avoid disturbance from construction activities, large gatherings, fireworks, vehicles, motorized boats, aircraft, and dogs.
- Minimize and monitor disturbance of rufa red knots from predators.
- Do not install any nesting structures for avian predators (*e.g.*, peregrine falcons (*Falco peregrinus*)) within 2 miles of important rufa red knot habitats. Coordinate with the Service before installing such structures within 4 miles of suitable habitat.
- Avoid activities likely to impact horseshoe crabs by potentially entrapping, entangling, or blocking adults; entraining larvae; interfering with spawning; or disturbing spawning habitat.
- Avoid deliberate introductions of non-native marine species (*e.g.*, avoid aquaculture of nonnative species). Use care to avoid accidental introductions of non-native marine species and marine diseases (*e.g.*, avoid ballast water discharges near rufa red knot habitat).

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- Site both terrestrial and offshore wind turbines away from important rufa red knot habitats and flight paths. Include rufa red knots in pre- and post-construction monitoring plans.
- Include rufa red knots and their habitats in response plans for oil or contaminant spills, storms, and harmful algal blooms, including provisions for [emergency consultation](#).
- Follow the State's [decontamination protocols](#) for activities in and around New Jersey Waters to minimize the risk of introducing or spreading aquatic invasive species.
- Work with the Service and the New Jersey Department of Environmental Protection's Endangered and Nongame Species Program to prepare a [Beach Management Plan](#) or keep an existing plan up to date. Plan and carry out projects, events, and habitat management in accordance with the provisions of approved plans.

Procedures for when a rufa red knot occurrence has been located:

- Report the observation to the New Jersey Department of Environmental Protection's Wildlife Tracker (located at: <https://dep.nj.gov/njfw/conservation/reporting-rare-wildlife-sightings/>)
- Report the observation to eBird via smartphone application or online at: <https://ebird.org/>. Identification tips are available from the [Cornell Lab of Ornithology](#). Reports are most helpful when they include specific locations, as well as comments about the kinds of habitats the birds were using.
- Report observations of leg-banded rufa red knots to [bandedbirds.org](http://bandedbirds.org).

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**ROSEATE TERN (*STERNA DOUGALLII DOUGALLII*)**

Biology, Presence, and Threats

Within its North Atlantic breeding range, the roseate tern was federally listed as endangered in 1987. The roseate tern is a dove-sized (about 15 inches long), light-colored seabird with a long, forked tail. This species is named for a faint rosy tint to its breast feathers. In summer, adults have a black cap, red legs, and a black bill with dark red at its base. In winter, adults have a black bill, brown legs, and a white forehead with a black mask. Roseate terns feed over open water by plunge-diving from the air to catch small fish.

Roseate terns may be present along the New Jersey coast from May 1 to September 30. Although roseate terns have not been documented breeding in New Jersey since the 1980s, this species has been reported to utilize certain NJ beaches and offshore waters during its spring and fall migrations. Small numbers of juveniles and non-breeding adults may also occur along the New Jersey coast during the breeding season. Most use of New Jersey habitats by this species is transient, but in some areas birds may persist longer at migration stopover or staging areas, often in mixed-species flocks. Roosting habitat for non-breeding roseate terns includes open beaches, coastal inlets, river mouths, sand spits, and tidal flats. Terns may also rest on the surface of open water, and on jetties or other artificial structures. Foraging areas range from near the shoreline to far offshore.

Threats to the roseate tern include habitat loss on or near coastal barrier islands from development and disturbance from human recreation and other activities in coastal areas. Predation by great black-backed (*Larus marinus*) and herring (*Larus argentatus*) gulls is a threat in areas where human garbage provides an abundant food supply to attract and support these predator species. Other threats include entanglement in marine debris, climate change, and reduced food supplies stemming from changes in abundance or distribution of prey fish species.

For more information visit:

<https://www.fws.gov/species/roseate-tern-sterna-dougallii-dougallii>

Best Practices

The following best practices are examples of typical Conservation Measures frequently recommended by the U.S. Fish and Wildlife Service's (Service) New Jersey Field Office during consultation or technical assistance.

For actions within the range of roseate tern in New Jersey, the Service recommends the following:

- Avoid disturbing flocks of terns, even if the exact species present is unknown. Afford roosting terns a 300-foot buffer for pedestrians, and larger buffers for vehicles to avoid flushing the birds. We anticipate most staging flocks of terns will occur from July through September.

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- Enforce any existing rules limiting dogs and cats on/near the beach.
- Ensure all debris is removed following any construction or other projects on the beach. Enforce rules and support education efforts to limit/reduce marine debris, including from fishing and aquaculture.
- Work with the NJFO to assess proposed projects involving more than 2 weeks of activity/disturbance on the beach between May 1 and September 30, or involving substantial habitat modification at any time of year.
- Additional conservation measures for effects to areas with known breeding terns are necessary and will require consultation with the Service.
- Work with the Service and the New Jersey Department of Environmental Protection's Endangered and Nongame Species Program to prepare a [Beach Management Plan](#) or keep an existing plan up to date. Plan and carry out projects, events, and habitat management in accordance with the provisions of approved plans.

Procedures for when a roseate tern occurrence has been located:

- Report the observation to the NJFO and the New Jersey Department of Environmental Protection's Wildlife Tracker (located at: <https://dep.nj.gov/njfw/conservation/reporting-rare-wildlife-sightings/>)
- Report the observation to eBird via smartphone application or online at: <https://ebird.org/>. Identification tips are available from the [Cornell Lab of Ornithology](#). Reports are most helpful when they include specific locations, as well as comments about the kinds of habitats the birds were using.
- Report observations of leg-banded roseate terns to the United States Geological Survey [Bird Banding Lab](#). Reports are most useful when they include a photo and the alpha-numeric code on the colored band.



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**SEABEACH AMARANTH (*AMARANTHUS PUMILUS*)**

Biology, Presence, and Threats

Seabeach amaranth was federally listed as a threatened species in 1993. It is an annual member of the amaranth family (Amaranthaceae) and has reddish stems and small, rounded, notched, spinach-green leaves. In New Jersey, these low-growing plants are typically about 4 inches across by late summer, but can occasionally reach 2 or 3 feet in diameter. The small white flowers and dark seeds are located in inconspicuous clusters along the stems. Germination begins in May and continues through the summer. Flowering begins as soon as plants reach sufficient size (June or July) and continues until the plants die between September and December. Some seeds are dispersed long distances by winds and water, while others remain at the site of the parent plant or within about 300 feet.

Seabeach amaranth is native (endemic) to Atlantic Coast beaches and barrier islands. The primary habitat of seabeach amaranth consists of overwash flats at accreting ends of islands, lower foredunes, and upper strands of non-eroding beaches (landward of the wrackline), although the species occasionally establishes small temporary populations in other habitats, including sound-side beaches, blowouts in foredunes, inter-dunal areas, and on sand and shell material deposited for beach replenishment or as dredge spoil. Seabeach amaranth usually grows on a nearly pure sand substrate, occasionally with shell fragments mixed in.

Seabeach amaranth occupies elevations from 8 inches to 5 feet above mean high tide. The plant grows in the upper beach zone above the high tide line, and is intolerant of even occasional flooding during its growing season (May 15 to November 30). The habitat of seabeach amaranth is sparsely vegetated with annual herbs and, less commonly, perennial herbs (mostly grasses) and scattered shrubs. Vegetative associates of seabeach amaranth include sea rocket (*Cakile edentula*), seabeach spurge (*Chamaesyce polygonifolia*), and other species that require open, sandy beach habitats. However, this species is intolerant of competition and does not occur on well-vegetated sites. Seabeach amaranth is often associated with beaches managed for the protection of beach nesting birds such as the piping plover (*Charadrius melodus*) and least tern (*Sterna antillarum*).

Threats to seabeach amaranth include beach stabilization (particularly the use of beach armoring, such as sea walls and riprap), intensive recreational use, mechanical beach raking, beach driving, and herbivory by insects. Plants and seeds can also be buried by beach nourishment, bulldozing, and other mechanized sand movements in the beach and dune environment.

For more information visit:

<https://www.fws.gov/species/seabeach-amaranth-amaranthus-pumilus>

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Best Practices

The following best practices are examples of typical Conservation Measures frequently recommended by the U.S. Fish and Wildlife Service's (Service) New Jersey Field Office during consultation or technical assistance.

As used in the Service recommendations listed below, "suitable habitat" is defined as dry, sandy, ocean beach between the mean high-water line and the landward limit of the beach.

- a. The landward limit of the beach may be a seawall, revetment, bulkhead, boardwalk, roadway, etc., or the toe of a densely vegetated dune.
- b. Suitable habitat includes the wrack line as well as low, sparse, unstabilized dunes and interdune areas.
- c. Suitable habitat excludes steep, stabilized dunes; densely vegetated areas; scarped areas, "wet sand" (intertidal) areas; and hard-packed unpaved roadways or beach entry points.

For actions within the range of seabeach amaranth in New Jersey, the Service recommends the following:

- Avoid permanent or temporary modification of seabeach amaranth habitat including but not limited to creation or expansion of new stabilizing structures (*e.g.*, jetties, groins, sea walls, sand fencing, stabilized dunes) and adverse changes in elevation such as through sand removal, deposition, or transfers.
- Avoid the introduction or spread of dense or invasive vegetation. Thoroughly clean construction equipment before use on a beach to avoid unintended spread of invasive plants. Contact the Service prior to any beach plantings.
- Seasonally restrict work that might damage seabeach amaranth plants during the growing season of May 15 to November 30, particularly work involving use of motorized vehicles, heavy equipment or large numbers of personnel. Alternatively, in consultation with the Service, fence and avoid any plants in the work area as follows.
  1. For any area of suitable habitat where disturbance will begin between May 15 and July 31, survey the area for seabeach amaranth no more than 1 week before the start of the disturbance.
    - a. The entire area should be thoroughly searched, not just transects. Survey by walking slowly and carefully in a zig-zag fashion from the high-water line to the landward limit of the beach, ensuring complete survey coverage of the area of disturbance.
    - b. Reference photos of mature plants are available at <https://www.fws.gov/species/seabeach-amaranth-amaranthus-pumilus> (under Information & Media).
    - c. Please note that seedlings can be quite small (less than 1 inch); photos are available from NJFO upon request.

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- d. Surveys may be conducted by any natural resource professional or other qualified person familiar with this species. We request a copy of the surveyor's qualifications before the start of the survey.
    - e. Provide survey results to the Service before the start of work.
  2. If disturbance will begin between August 1 and November 30, the Service may be contacted to inquire if plant locations are available from a coastwide survey effort carried out by NJDEP (if not, then the above survey protocol should be followed).
  3. If any plants are found to occur in the work footprint, use symbolic (string-and-post) fencing to encircle each plant or group of plants, allowing a 3-meter buffer on all sides.
    - a. DO NOT use sand/snow fencing for this purpose.
    - b. Mark the fencing with flagging and signs.
    - c. Instruct all work crews to avoid fenced areas (*e.g.*, do not enter on foot or via motor vehicle, do not stage or store materials or equipment in or near fencing, locate access routes away from fenced areas, do not stockpile or grade sand in or near fencing).
    - d. Remove symbolic fencing upon completion of work.
- Avoid mechanical beach raking during the growing season of May 15 to November 30 to protect plants and habitat characteristics such as wrack materials.
- Avoid or remediate project features that may increase post-project human intrusion into areas of suitable habitat (*e.g.*, access roads, parking areas, entry points).
- If applicable, plan and carry out fireworks displays in accordance with the Service's [\*Guidelines for Managing Fireworks in the Vicinity of Piping Plovers and Seabeach Amaranth on the U.S. Atlantic Coast.\*](#)
- Work with the Service and the New Jersey Department of Environmental Protection's Endangered and Nongame Species Program to prepare a [Beach Management Plan](#) or keep an existing plan up to date. Plan and carry out projects, events, and habitat management in accordance with the provisions of approved plans.

Procedures for when a seabeach amaranth occurrence has been located:

- Report the observation to the NJFO and the New Jersey Department of Environmental Protection's Natural Heritage Program located at:  
[https://www.nj.gov/dep/parksandforests/natural/docs/NHRPSR\\_Form.pdf](https://www.nj.gov/dep/parksandforests/natural/docs/NHRPSR_Form.pdf)

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**SENSITIVE JOINT-VETCH (*AESCHYNOMENE VIRGINICA*)**

Biology, Presence, and Threats

Sensitive joint-vetch was federally listed as a threatened species in 1992. It is an annual member of the pea (legume) family and can grow up to 6 feet tall. This species has yellow, pea-type flowers growing on clusters (racemes) on short, lateral branches. Germination takes place from late May to early June. Plants flower from July through September, and into October in some years.

Sensitive joint-vetch inhabits the intertidal zone of fresh to slightly salty (brackish) tidal river segments, typically in areas where sediments accumulate and extensive marshes are formed. These tidal marshes are subjected to a cycle of twice-daily flooding that most plants cannot tolerate. Such habitats occur only along stretches of river close enough to the coast to be influenced by the tides, yet far enough upstream that river water is fresh or only slightly brackish. Bare or sparsely vegetated substrate appears to be a habitat requirement for this species, which usually grows on river banks within 6 feet of the low water mark. The plant can also occur on accreting point bars and in sparsely vegetated microhabitats of tidal marsh interiors, such as low swales and areas of muskrat (*Ondatra zibethicus*) eat-out. This species is typically found in areas where plant diversity is high and annual species are prevalent.

Threats to sensitive joint-vetch include dredging and filling of marshes, dam construction, shoreline stabilization, commercial and residential development, sedimentation, impoundments, water withdrawal projects, invasive plants, introduced insect pests, pollution, recreational activities, agricultural activities, mining, timber harvest, saltwater intrusion due to sea level rise, and other climate-driven changes.

For more information visit: <https://www.fws.gov/species/sensitive-joint-vetch-aeschynomene-virginica>.

Best Practices

The following best practices are examples of typical Conservation Measures frequently recommended by the NJFO during consultation or technical assistance.

For actions within the range of sensitive joint-vetch in New Jersey, the Service recommends the following:

- Avoid effects to suitable sensitive joint-vetch habitat and maintain the integrity of the tidal system upon which it depends.
- If proposed work may impact suitable sensitive joint-vetch habitat is proposed, the Service may recommend conducting a survey within that area to determine if the species is present. Surveys for sensitive joint-vetch should be conducted between July 15 to September 15 when plants are in flower or fruiting. However, habitat assessments may

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occur outside of this window when conditions permit. Please contact the Service to discuss survey protocols and necessary next steps to confirm that a survey is required. Surveys for sensitive joint-vech should not be conducted without prior approval of the plan and review of surveyor qualifications from the Service.

- If sensitive joint-vech plants have been documented in the action area, or if the project proponent wishes to presume presence, consider the following measures to minimize impacts to plants, seeds, and habitat.
  - Mark the edge of the suitable habitat and include a protective buffer (usually around 500 feet).
    - Examples may include signs or rebar posts.
    - Ensure removal of all materials after activities are completed.
    - Restrict entry into marked habitat areas to the maximum extent practicable.
  - Ensure that potential seed banks surrounding the plants are not buried or adversely effected by the proposed action.
  - Limit vehicle and heavy equipment use in suitable habitat to the minimum number of passes needed to accomplish the work to minimize disturbance to plants and topographic alterations.
  - Designate access points, staging areas, waste collection areas, and travel corridors away from known populations and optimal habitat.
    - Keep vehicle and foot traffic away from the plant populations or from optimal habitat features.
    - Keep all personnel, vehicles, and equipment within the designated work area/project footprint and access corridors.
  - Maintain a clean worksite. Remove all trash and work-related debris daily.
  - Develop and implement a Service-approved erosion and sediment control plan. Implement erosion and sedimentation control measures (*e.g.*, silt fencing, hay bales, soil stabilization matting) where appropriate to avoid increased erosion that could directly or indirectly impact plants. Erosion and sediment control measures must strictly adhere to State and Federal guidance that has been provided for your project area and project type. Inspect erosion and sediment control devices regularly during construction to ensure efficacy and prevent failure of devices. Inspect devices prior to expected high rainfall occurrences. Ensure removal of all materials after the construction activity ends.
  - Ensure materials used (*e.g.*, soil, gravel, rock) at project site are free of invasive species before placement on-site. Implement invasive species control measures to reduce the presence of invasive species on site. Ensure all vehicles, machinery,

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and equipment, including technical gear and personal protective equipment, are clean and free of invasive species before use at the project site.

- Avoid use of pesticides (*e.g.*, herbicides, insecticides) and surfactants at a location where application or runoff would result in these chemicals contacting plants or their habitat.
- If necessary, only apply herbicide locally on other plant species, to ensure that sensitive joint-vetch is not impacted directly or indirectly. However, consider hand-pulling instead.
- Avoid permanent, direct modification of suitable habitat.
- Minimize indirect habitat modification (*e.g.*, from offsite changes to hydrology, sedimentation, development).
- Minimize and remediate temporary habitat modification.
  - Submit a post-construction restoration plan to the Service.
  - Restore the project area to original or ecologically improved condition using native, non-invasive plant mixes.
  - Plant with native, non-invasive seed mixes. Ensure new plantings will not outcompete or adversely affect sensitive joint-vetch.
- Avoid or remediate project features that may increase post-project human intrusion into areas of suitable habitat (*e.g.*, access roads, parking areas, entry points).
- Contact the Service for site-specific recommendations.
- Landowners seeking to benefit sensitive joint-vetch can contact the Service for technical assistance. Examples of beneficial actions include:
  - Place suitable habitat and adjacent areas with known sensitive joint-vetch occurrence in permanent conservation ownership or easement.
  - Partner with the Service and/or other conservation entities in efforts to maintain suitable habitat in light of sea level rise.

Procedures for when a sensitive joint-vetch occurrence has been located:

- Report the observation to the NJFO and the New Jersey Department of Environmental Protection's Natural Heritage Program located at:  
[https://www.nj.gov/dep/parksandforests/natural/docs/NHRPSR\\_Form.pdf](https://www.nj.gov/dep/parksandforests/natural/docs/NHRPSR_Form.pdf).

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**SMALL WHORLED POGONIA (*ISOTRIA MEDEOLOIDES*)**

Biology, Presence, and Threats

Small whorled pogonia was federally listed as an endangered species in 1982, and reclassified as a threatened species in 1993. It is a perennial member of the orchid family and produces a smooth, hollow stem from 2 to 14 inches tall and topped by five or six leaves in a circular arrangement (false whorl). One or two flowers stand in the center of the whorl of leaves. The leaves are milky green or grayish-green, and the flower is yellowish-green with a greenish-white lip. In the northern part of the species' range, plants with flowering buds emerge from the leaf litter in May and bloom in June.

Small whorled pogonia grows in a variety of upland, mid-successional, wooded ecosystems, usually mixed-deciduous or mixed-deciduous/coniferous forests that are in second or third-growth successional stages. Canopy trees are typically 40 to 75 years old and 8 to 18 inches in diameter.

Characteristics of this species' habitat include a sparse herb and shrub layer, a relatively open understory canopy, thick leaf litter on the forest floor, and gently sloping ground. Soils in which small whorled pogonia grows are generally acidic and dry during most of the growing season. Many sites where this plant occurs are underlain by soils with a hardpan layer that impedes the downward flow of water and leads to the formation of shallow braided channels on the ground surface. Small whorled pogonia is almost always found in proximity to features that create long persisting breaks in the forest canopy; light availability could be a limiting factor for this species.

Typical canopy species associated with small whorled pogonia include red maple (*Acer rubrum*), eastern hemlock (*Tsuga canadensis*), northern red oak (*Quercus rubra*), white oak (*Q. alba*), black oak (*Q. velutina*), scarlet oak (*Q. coccinea*), white pine (*Pinus strobus*), American beech (*Fagus grandifolia*), sweet-gum (*Liquidambar styraciflua*), and tulip poplar (*Liriodendron tulipifera*). Typical ground layer species associated with small whorled pogonia include: partridge berry (*Mitchella repens*), Indian cucumber root (*Medeola virginiana*), New York fern (*Thelypteris noveboracensis*), sweet lowbush blueberry (*Vaccinium pallidum*), rattlesnake plantain (*Goodyera pubescens*), red maple seedlings, oak seedlings, Canada mayflower (*Maianthemum canadense*), wintergreen (*Gaultheria procumbens*), starflower (*Trientalis borealis*), running cedar (*Lycopodium digitatum*), Virginia creeper (*Parthenocissus quinquefolia*), cat-brier (*Smilax glauca*), and Christmas fern (*Polystichum acrostichoides*).

Habitat destruction is the primary threat to the small whorled pogonia. Residential or commercial development, both directly and indirectly, is a primary factor in the destruction of habitat for this species. Other threats include recreational use of the habitat, herbivory, collection, and inadvertent damage from research activities.

For more information visit: <https://www.fws.gov/species/small-whorled-pogonia-isotria-medeoloides>.

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Best Practices

The following best practices are examples of typical Conservation Measures frequently recommended by the U.S. Fish and Wildlife Service's (Service) New Jersey Field Office during consultation or technical assistance.

For actions within the range of small whorled pogonia in New Jersey, the Service recommends the following:

- Avoid direct and indirect modifications to suitable small whorled pogonia habitat.
- If work that will impact suitable small whorled pogonia habitat is proposed, the Service may recommend conducting a survey within that area to determine if the species is present. Surveys should be conducted from May 15 to July 20 when plants are in flower or fruiting. Surveys strictly for suitable habitat may be permitted to occur outside of this window when conditions permit. Some types of projects may require multiple years of surveys for this species to demonstrate likely absence. Please contact the Service for survey protocols and necessary next steps to confirm that a survey is required. Surveys for small whorled pogonia should not be conducted without prior approval from the Service.
- If small whorled pogonia plants have been document in the action area, or if the project proponent wishes to presume presence, consider the following measures to minimize impacts to plants, seed, and habitat:
  - Mark the edge of the suitable habitat and include a protective buffer (usually around 500 feet).
    - Examples may include signs or rebar posts.
    - Ensure removal of all materials after activities are completed.
    - Restrict entry into marked habitat areas to the maximum extent practicable.
  - Limit vehicle and heavy equipment use in suitable habitat to the minimum number of passes needed to accomplish the work in order to minimize disturbance to plants and topographic alterations.
  - Designate access points, staging areas, waste collection areas, and travel corridors away from known populations and optimal habitat.
    - Keep vehicle and foot traffic away from the plant populations or from optimal habitat features.
    - Keep all personnel, vehicles, and equipment within the designated work area/project footprint and access corridors.
  - Maintain a clean worksite. Remove all trash and work-related debris daily.



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- Develop and implement a Service-approved erosion and sediment control plan. Implement erosion and sedimentation control measures (*e.g.*, silt fencing, hay bales, soil stabilization matting) where appropriate to avoid increased erosion that could directly or indirectly impact plants. Erosion and sediment control measures must strictly adhere to State and Federal guidance that has been provided for your project area and project type. Inspect erosion and sediment control devices regularly during construction to ensure efficacy and prevent failure of devices. Inspect devices prior to expected high rainfall occurrences. Ensure removal of all materials after the construction activity ends.
- Ensure materials used (*e.g.*, soil, gravel, rock) at project site are free of invasive species before placement on-site. Implement invasive species control measures to reduce the presence of invasive species on site. Ensure all vehicles, machinery, and equipment, including technical gear and personal protective equipment, are clean and free of invasive species before use at the project site.
- Avoid use of pesticides (*e.g.*, herbicides, insecticides) and surfactants at a location where application or runoff would result in these chemicals contacting plants or their habitat.
- If necessary, only apply herbicide locally on other plant species, to ensure that small whorled pogonia is not impacted directly or indirectly. However, consider hand-pulling instead.
- Avoid permanent, direct modification of suitable habitat.
- Minimize and remediate temporary habitat modification.
  - Submit a post-construction restoration plan to the Service.
  - Restore the project area to original or ecologically improved condition using native, non-invasive plant mixes.
  - Plant with native, non-invasive seed mixes. Ensure new plantings will not outcompete or adversely affect small whorled pogonia.
- Avoid or remediate project features that may increase post-project human intrusion into areas of suitable habitat (*e.g.*, access roads, parking areas, entry points).
- Contact the Service for site-specific recommendations.
- Landowners seeking to benefit sensitive small whorled pogonia can contact the Service for technical assistance. Examples of beneficial actions include:
  - Place suitable habitat and adjacent areas with known small whorled pogonia occurrence in permanent conservation ownership or easement.

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Procedures for when a small whorled pogonia occurrence has been located:

- Report the observation to the Service's New Jersey Field Office and the New Jersey Department of Environmental Protection's Natural Heritage Program located at:  
*[https://www.nj.gov/dep/parksandforests/natural/docs/NHRPSR\\_Form.pdf](https://www.nj.gov/dep/parksandforests/natural/docs/NHRPSR_Form.pdf)*.

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**SWAMP PINK (*HELONIAS BULLATA*)**

Biology, Presence, and Threats

Swamp pink was federally listed as a threatened species in 1988. It is a perennial member of the lily family and has smooth, oblong, dark green leaves that form an evergreen rosette. In spring, some rosettes produce a flowering stalk that can grow over 3 feet tall. The stalk is topped by a 1 to 3-inch-long cluster of 30 to 50 small, fragrant, pink flowers dotted with pale blue anthers. The evergreen leaves of swamp pink can be seen year round, and flowering occurs between March and May.

Supporting over half of the known populations, New Jersey is the stronghold for swamp pink. An obligate wetland species, swamp pink occurs in a variety of palustrine forested wetlands including swampy forested wetlands bordering meandering streamlets, headwater wetlands, sphagnum Atlantic white-cedar swamps, and spring seepage areas. Specific hydrologic requirements of swamp pink limit its occurrence within these wetlands to areas that are perennially saturated, but not inundated, by floodwater. The water table must be at or near the surface, fluctuating only slightly during spring and summer months. Groundwater seepage with lateral groundwater movement are common hydrologic characteristics of swamp pink habitat.

Swamp pink is a shade-tolerant plant and has been found in wetlands with canopy closure varying between 20-100%. Sites with minimal canopy closure are less vigorous due in part to competition from other species. Common vegetative associates of swamp pink include Atlantic white-cedar (*Chamaecyparis thyoides*), red maple (*Acer rubrum*), pitch pine (*Pinus rigida*), American larch (*Larix laricina*), black spruce (*Picea mariana*), red spruce (*P. rubens*), sweet pepperbush (*Clethra alnifolia*), sweetbay magnolia (*Magnolia virginiana*), sphagnum mosses (*Sphagnum* spp.), cinnamon fern (*Osmunda cinnamomea*), skunk cabbage (*Symplocarpus foetidus*), and laurels (*Kalmia* spp.). Swamp pink is often found growing on the hummocks formed by trees, shrubs, and sphagnum mosses, and these micro-topographic conditions may be an important component of swamp pink habitat.

The primary threats to swamp pink are the indirect effects of off-site activities and development, such as pollution, introduction of invasive species, and subtle changes in groundwater and surface water hydrology. Hydrologic changes include increased sedimentation from off-site construction, groundwater withdrawals or diversion of surface water, reduced infiltration (recharge) of groundwater, increases in erosion, increases in the frequency, duration, and volume of flooding caused by direct discharges to wetlands (such as stormwater outfalls), and increased runoff from upstream development. Other threats to this species include direct destruction of habitat from wetland clearing, draining, and filling; collection; trampling; and climate change.

For more information visit: <https://www.fws.gov/species/swamp-pink-helonias-bullata>.

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Best Practices

The following best practices are examples of typical Conservation Measures frequently recommended by the U.S. Fish and Wildlife Service's (Service) New Jersey Field Office during consultation or technical assistance.

For actions within the range of swamp pink in New Jersey, the Service recommends the following:

- Avoid direct modifications to wetlands that may support swamp pink (*e.g.*, clearing, flooding, filling, draining, ditching, tiling, excavating), and to streams that flow to swamp pink habitat (*e.g.*, channelizing, diverting, stabilizing, impounding, dredging).
- If work that will impact suitable swamp pink habitat is proposed, the Service may recommend conducting a survey within that area to determine if the species is present. Surveys should be conducted from April 15 to May 31 when plants are in flower or fruiting. Surveys from June 1 to April 14 may also be allowed when basal leaves are present and site conditions permit (no thick understory, extensive leaf litter, or snow/ice cover that would obscure plants). Surveys strictly for suitable habitat may be permitted to occur outside of this window when conditions permit. Please contact the Service for survey protocols and necessary next steps to confirm that a survey is required. Surveys for swamp pink should not be conducted without prior approval from the Service.
- Provide adequate upland buffers around wetlands that may support swamp pink, often at least 300 feet of native, woody vegetation. A site-specific buffer design is often necessary.
- Provide at least 150-foot buffers of native, woody vegetation along streams that flow to wetlands that may support swamp pink.
- For activities throughout the watershed, avoid permanent changes to the hydrology or sedimentation rates of wetlands that may support swamp pink. For example:
  - minimize net increases in impervious surface;
  - minimize soil compaction;
  - design storm water management plans to minimize long-term hydrologic changes to swamp pink habitat (often by maximizing infiltration);
  - avoid storm or wastewater discharges in or upgradient of swamp pink habitat;
  - ensure adequate recharge of groundwater; and
  - evaluate proposed surface or groundwater withdrawals to ensure swamp pink habitat is not affected.

See Low Impact Design Techniques in the New Jersey Stormwater Best Management Practices Manual located at: [https://www.nj.gov/dep/stormwater/bmp\\_manual2.htm](https://www.nj.gov/dep/stormwater/bmp_manual2.htm)

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- For activities within 500 feet of swamp pink habitat, take particular care to avoid permanent changes to the hydrology or sedimentation rates of wetlands supporting swamp pink. For example:
  - Implement all the measures listed above for activities throughout the watershed.
  - Use Appendix A of the New Jersey Stormwater BMP Manual to complete a thorough alternatives analysis of nonstructural stormwater management measures.
  - Seek to mimic the pre-development 2 and 10-year hydrographs.
  - Seek to recharge 100% of the site's pre-development annual average recharge amount.
  - Grade lawn and landscaped areas with lightweight equipment (maximum equipment load of 8 PSI).
  
- Avoid temporary changes to the hydrology or sedimentation rates of wetlands supporting swamp pink from ground disturbances within 500 feet of swamp pink habitat, or within 150 feet of streams that flow to swamp pink habitat. For example:
  - locate temporary work areas and access routes outside of wetlands;
  - construct storm water management infrastructure prior to all other components of a development project to control storm water and sediment during the remaining construction;
  - install two rows of silt fencing around work areas, with daily inspection and maintenance;
  - minimize the duration of exposed soils;
  - use jute matting or other erosion control blankets on disturbed areas immediately after project completion to minimize sedimentation; and
  - promptly re-vegetating areas of temporary disturbance with native species.
  
- Avoid introductions of invasive species to wetlands supporting swamp pink. For example:
  - thoroughly wash construction equipment offsite before use within 500 feet of swamp pink habitat; and
  - use only native plant species and weed-free mulches and soils for landscaping within 500 feet of swamp pink habitat.
  
- Avoid or remediate project features that may increase post-project human intrusion into areas of suitable habitat (*e.g.*, access roads, parking areas, entry points).
  
- Place wetlands supporting swamp pink and associated upland buffers in permanent conservation ownership or easement.

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Procedures for when a swamp pink occurrence has been located:

- Report the observation to the Service's New Jersey Field Office and the New Jersey Department of Environmental Protection's Natural Heritage Program located at:  
*[https://www.nj.gov/dep/parksandforests/natural/docs/NHRPSR\\_Form.pdf](https://www.nj.gov/dep/parksandforests/natural/docs/NHRPSR_Form.pdf)*.

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**TRICOLORED BAT (*PERIMYOTIS SUBFLAVUS*)**

Biology, Presence, and Threats

On September 14, 2022, the Service published a proposal in the *Federal Register* (FR) to list the tricolored bat as endangered under the Endangered Species Act (FR Vol. 87 (177): 56381-56393). A final determination to either list the tricolored bat under the Endangered Species Act or to withdraw the proposal is anticipated in the future.

The tricolored bat is a small insectivorous bat that typically overwinters in caves, abandoned mines and tunnels, and road-associated culverts (southern portion of the range). They spend the rest of the year in a wide variety of forested areas where they roost and forage, including adjacent and interspersed non-forested areas such as emergent wetlands and adjacent edges of agricultural fields, old fields, and pastures. This also includes forests and woodlots containing trees with potential roost substrate (*e.g.*, clusters of leaves in live and dead deciduous trees, Spanish moss [*Tillandsia usneoides*], beard lichen [*Usnea trichodea*], and clusters of dead pine needles of large live pines), as well as linear features such as fencerows, riparian forests, and other wooded corridors. Tricolored bats will roost in a variety of tree species, especially oaks, and often select roosts in tall, large diameter trees, but will roost in smaller diameter trees when potential roost substrate is present (*e.g.*, 4-inch [10-centimeter]; Leput 2004). They may also roost in human-made structures, such as bridges and culverts, and occasionally in barns or the underside of open-sided shelters (*e.g.*, porches, pavilions).

The Service determined this bat species faces extinction primarily due to the range-wide impacts of white-nose syndrome, a deadly fungal disease affecting cave dwelling bats across North America. Since tricolored bat populations have been greatly reduced due to white-nose syndrome, surviving bat populations are now more vulnerable to other stressors such as human disturbance and habitat loss.

For more information visit: <https://www.fws.gov/species/tricolored-bat-perimyotis-subflavus>.

Best Practices

The following best practices are examples of typical Conservation Measures frequently recommended by the U.S. Fish and Wildlife Service's (Service) New Jersey Field Office in the course of consultation or technical assistance.

For actions within the range of tricolored bat in New Jersey, the Service recommends the following:

- Avoid cutting or other means of knocking down, bringing down, or trimming of trees with potential roost substrate during the pup season from May 15 to July 31 at minimum (recommended from April 1 to September 30) within the geographic summer range of the tricolored bat. If clearing is required during this time period, a presence/absence survey may be requested by the Service. Please contact the Service for survey protocols and

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necessary next steps to confirm that a survey is required. Surveys for tricolored bats should not be conducted without prior approval from the Service. Additionally, a [recognized and qualified bat surveyor](#) (which the Service's NJ Field Office keeps a record of) must conduct the survey.

- If tricolored bat is found during the survey, effects to it should be avoided or minimized as much as possible. The Service will also work with organizations through Endangered Species Act consultation to provide conservation measures for avoiding effects.
- Please be aware that additional surveys, conservation measures, and Endangered Species Act consultation requirements may be required depending on the following:
  - If the action is proposed within the vicinity of a known maternity roost or maternity capture site.
  - Amount of knocking down, bringing down or trimming of trees proposed.
  - Project distance from a hibernaculum.
- Avoid removal or modifications to bridges, culverts greater than or equal to 27 feet in length and 3 feet high, and other structures that could potentially harm roosting bats during the pup season from May 15 to July 31 (recommended from April 1 to September 30) within the geographic summer range of the tricolored bat. Alternatively, survey or visibly inspect these structures for bats before construction begins. Please contact the Service for more information and protocols for structure surveys/visible inspections.
- Avoid impacts to known roosts during any time of year.
- Avoid or minimize impacts to known roosting/foraging areas any time of year.
- Permanently protect known roosting/foraging habitat.
- Maintain forested connections (*e.g.* hedgerows) between known foraging/roosting areas.
- Minimize forest fragmentation (*i.e.* consider the landscape when laying out a project).
- Avoid disturbance to riparian areas. Within areas of known fall foraging, summer maternity, and migration route habitats, preserve and restore wooded upland buffers at least 150-foot-wide on wetlands and open waters, and at least 300-foot-wide where possible and/or required by State regulation.
- Use bright flagging/fencing to demarcate trees that will be protected vs. cleared.
- Replant areas where trees have been disturbed for temporary activities or workspace.
- Preferentially replant suitable roost tree species.



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- Minimize access to areas of known roost sites to prevent disturbance.
- Minimize discharges of pesticides and other environmental contaminants in areas of known tricolored bat habitat. Avoid large-scale use of insecticides throughout the species' geographic range.
- Avoid use of chemicals (*e.g.*, copper sulfate) in stormwater basins.
- Coordinate with the Service early in planning for any proposed wind power facilities within the geographic range of the tricolored bat.
- Minimize potential lighting impacts (*e.g.* downward facing lights, shields, timers).
- Avoid or remediate project features that may increase post-project human intrusion into areas of suitable habitat (*e.g.*, access roads, parking areas, entry points).

Procedures for when a tricolored bat occurrence has been located:

- Report the observation to the Service's NJ Field Office and the New Jersey Department of Environmental Protection's Wildlife Tracker (located at:  
<https://dep.nj.gov/njfw/conservation/reporting-rare-wildlife-sightings/>)

References

Leput, D.W. 2004. Eastern red bat (*Lasiurus borealis*) and eastern pipistrelle (*Pipistrellus subflavus*) maternal roost selection: Implications for forest management. Master's Thesis Clemson University, Clemson, South Carolina.