Bog turtle (*Clemmys muhlenbergii*)

The bog turtle was federally listed as a threatened species in 1997.

At only about 4 inches long, the bog turtle 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 upper shell (carapace) give bog turtles an oblong appearance when viewed from above. These small, semi-aquatic turtles consume 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, deer, and cattle 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 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.

Piping plover (*Charadrius melodus*)

Within its Atlantic Coast breeding range, the piping plover was federally listed as threatened in 1986.

The piping plover is a small shorebird approximately 7 inches long 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 15 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 four 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.

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.

Red Knot (*Calidris canutus rufa*)

The red knot was added to the list of Federal candidate species in 2006. A final rule to list the rufa subspecies as threatened was published on December 11, 2014, with an effective date of January 12, 2015. Red knots are federally protected under the Migratory Bird Treaty Act, and are State-listed as endangered.

At 9 to 10 inches long, the 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. 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 red knots may occur in New Jersey year-round, while large numbers of birds rely on New Jersey's coastal stopover habitats during the spring (mid-May through early June) and fall (late-July through November) migration periods. Smaller numbers of knots may spend all or part of the winter in New Jersey.

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. Some of these robin-sized shorebirds fly more than 9,300 miles from south to north every spring and reverse the trip every autumn, making the rufa red knot one of the longest-distance migrating animals. Migrating 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 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 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, red knots can nearly double their body weight.

Threats to the red knot include 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.

Roseate tern (*Sterna dougallii*)

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 mainly on small fish, which they capture by plunging headfirst into the water.

Roseate terns have not nested in New Jersey since 1980, but migrating birds pass through in spring and fall and may stop here to rest and feed. By the end of May, most birds have paired and selected nesting sites, which have been limited to Long Island and southern New England in recent decades. Roseate terns usually nest among colonies of common terns (*Sterna hirundo*) and benefit from the aggressive defensive behaviors of the common tern. Roseate tern nests are little more than shallow scrapes on bare ground that are frequently concealed under beach vegetation, rock or driftwood. By early August, roseate terns have left the nesting areas and in September they head out to sea and back to their wintering grounds in South America.

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.

Indiana bat (*Myotis sodalis*)

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, 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.

Each fall from late August through October, 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 engage in mating activity and feed in the surrounding area to build the fat reserves needed during hibernation. The bats then hibernate from late October to April, the precise timing 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.

When not hibernating, Indiana bats roost under loose tree bark by day, and forage for flying insects in and around the tree canopy at night. A variety of upland and wetland habitats are used as foraging areas, including flood plain, riparian (along rivers), and upland forests; pastures; clearings with early successional vegetation; cropland borders; and wooded fencerows. Preferred foraging areas are streams, associated flood plain forests, and impounded bodies of water such as ponds and reservoirs.

During the summer months, numerous female bats roost together in maternity colonies under the loose bark of dead or dying trees within riparian, flood plain, and upland forests. 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 have been found in caves and mines during the summer.

Protection of Indiana bats during all phases of their annual life cycle is essential to preserving this species. Threats to the Indiana 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. In recent years, White Nose Syndrome has also emerged as a major threat to the Indiana bat and many other bat species.

Northern Long-Eared Bat (*Myotis septentrionalis*)

A final rule to list northern long-eared bat as threatened was published on April 2, 2015, with an effective date of May 4, 2015.

The northern long-eared bat (*Myotis septentrionalis*) is a medium sized bat weighing approximately 5 to 8 grams with females slightly larger than males. The northern long-eared bat is distinguished from other *Myotis* species by its long ears.

The northern long-eared bat overwinters in caves and abandoned mines. Hibernacula are typically large with constant temperatures, high humidity and no air currents. Within hibernacula, northern long-eared bats are found in tight crevices and cracks with only nose and ears visible. The northern long-eared bat congregates in the vicinity of their hibernacula in August or September and enters into hibernation in October and November. The bat shows a high degree of philopatry (using the same site multiple years) to hibernaculum, although they may not return to the same hibernaculum in successive years. Movement between hibernacula throughout the winter has also been observed. There are eight known hibernacula in Northern New Jersey.

In April northern long-eared bats emerge from hibernation and migrate to summer habitat. Migratory movements are short compared to the Indiana bat, with movement typically between 35 miles and 55 miles. Once at summer habitat, the northern long-eared bat is comparable to the Indiana bat in terms of summer roost selection, but appears to be more opportunistic. Northern long-eared bats roost singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees. Maternity colonies generally consist of 30 to 60 individuals. Males and non-reproductive females may roost in cooler places, like caves and mines. Roosting northern long-eared bats have also been observed in humanmade structures, such as buildings, barns, sheds, cabins, under eaves of buildings, and in bat houses. In southern New Jersey the northern long-eared bat is known to roost in Atlantic white cedar.

Preferred foraging areas are in forested habitats. The northern long-eared bat emerges at dusk and feeds on moths, flies, leafhoppers, caddisflies, and beetles approximately 3 to 10 feet above the ground. Gleaning arachnids and other insects from foliage is also a foraging technique used by northern long-eared bats.

The distribution of the northern long-eared bat includes the Midwest and Northeast of the United States, and all Canadian provinces west to the southern Yukon Territory and Eastern British Columbia. In New Jersey, the northern long-eared bat is found statewide.

Dwarf wedgemussel (*Alasmidonta heterodon*)

The dwarf wedgemussel was federally listed as an endangered species in 1990.

The dwarf wedgemussel 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 inner shell is bluish or silvery white. Dwarf wedgemussels feed by filtering small particles from the water.

The dwarf wedgemussel occurs on muddy sand, sand, and gravel bottoms in creeks and rivers of various sizes. In parts of the range, dwarf wedgemussels also occur in clay banks and small riffle areas. This species requires areas with a slow to moderate current, little silt deposition, and well-oxygenated, unpolluted water.

Like other freshwater mussels, dwarf wedgemussel eggs are fertilized in the female as sperm passes over the gills. Fertilization typically occurs in mid-summer and fall, and release of larvae (glochidia) occurs the following spring and summer. 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 tesselated darter (*Etheostoma olmstedi*), Johnny darter (*E. nigrum*), mottled sculpin (*Cottus bairdi*), and juvenile Atlantic salmon (*Salmo salar*) to be glochidial host fish for the dwarf wedgemussel.

Threats to the dwarf wedgemussel include direct habitat destruction from damming and channelizing of rivers, and indirect degradation of habitat 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.

Northeastern beach tiger beetle (*Cicindela dorsalis dorsalis*)

The northeastern beach tiger beetle was federally listed as threatened in 1990.

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.

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, and natural factors such as predation and storms.

Small whorled pogonia (*Isotria medeoloides*)

Small whorled pogonia was federally listed as an endangered species in 1982, and reclassified as a threatened species in 1993.

A perennial member of the orchid family, small whorled pogonia 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 habitats, 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.

Swamp pink (*Helonias bullata*)

Swamp pink was federally listed as a threatened species in 1988.

A perennial member of the lily family, swamp pink 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 this 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, sphagnous 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.

Knieskern's beaked-rush (*Rhynchospora knieskernii*)

Knieskern's beaked-rush was federally listed as a threatened species in 1991.

A semi-perennial member of the sedge family, Knieskern's beaked-rush is a grass-like plant 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.

American chaffseed (*Schwalbea americana*)

American chaffseed was federally listed as an endangered species in 1992.

A perennial member of the figwort family, American chaffseed grows from 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 habitats 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.

Sensitive joint-vetch (*Aeschynomene virginica*)

Sensitive joint-vetch was federally listed as a threatened species in 1992.

An annual member of the pea (legume) family, sensitive joint-vetch 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, and salt water intrusion due to sea level rise.

Seabeach amaranth (*Amaranthus pumilus*)

Seabeach amaranth was federally listed as a threatened species in 1993.

An annual member of the amaranth family, seabeach amaranth 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.

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. 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, and herbivory by insects.

U.S. FISH AND WILDLIFE SERVICE SPECIES NARRATIVES:
Biology and Threats of Federal Candidate Species in New Jersey

Candidate species are species that the U.S. Fish and Wildlife Service (Service) has determined warrant listing under the Endangered Species Act and await formal listing. Although these species receive no substantive or procedural protection under the Endangered Species Act until formal listing, the Service encourages consideration of candidate species in project planning.

Hirsts' panic grass (*Dichanthelium hirstii*)

Hirsts' panic grass was added to the list of Federal candidate species in 1998. The species is State-listed as endangered.

A perennial member of the grass family, Hirsts' panic grass produces upright (erect) leafy flowering stems (culms) from May to October. The clustered culms grow 8 to 23 inches high. The flower cluster (panicle) is 1 to 4 inches long and sparsely flowered with finely hairy spikelets. Panicles sometimes stay hidden among the densely branched stems. The narrow leaf blades are 1 to 5 inches long and variably smooth or hairy. Spring culms are produced in May and June, while autumnal culms grow from August through the first frost.

Named for two brothers who discovered the species in New Jersey, Hirsts' panic grass occurs in Coastal Plain intermittent ponds, usually in wet savanna or pine barren habitats. The species requires habitats that are at least intermittently wet, receiving full sun to light shade, and substrates that are organic but firm. Hirsts' panic grass occurs in flat-bottomed depressions with substantial water-level fluctuations dependent on rainfall. The species relies on periods of standing water to keep competing species at a minimum. Habitats supporting Hirsts' panic grass may have historically burned during dry cycles, which may also help maintain early successional conditions by preventing encroachment of trees. Individual populations can vary dramatically in size from year to year. In some years, plants may not appear.

Threats to Hirsts' panic grass include habitat loss, natural competition and succession, hydrologic alterations, and grazing by resident Canada geese (*Branta canadensis*).

U.S. FISH AND WILDLIFE SERVICE SPECIES NARRATIVES:
Biology and Threats of Federally Delisted Species in New Jersey

Bald eagle (*Haliaeetus leucocephalus*)

The bald eagle was federally listed in 1967, and classified as an endangered species in 1973. With increasing numbers, bald eagle populations in the coterminous 48 States were re-classified from endangered to threatened in 1995, and delisted on August 9, 2007. The bald eagle continues to be protected under Federal laws including the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. The bald eagle also remains a State-listed species under the New Jersey Endangered and Nongame Species Conservation Act, which carries protections under the State land use regulation program. These Federal and State laws prohibit unauthorized take of bald eagles. For the continued protection of bald eagles, and to ensure compliance with Federal and State laws, the U.S. Fish and Wildlife Service (Service) recommends managing bald eagles in accordance with the National Bald Eagle Management Guidelines and all applicable State regulations. The Service and its partners are monitoring the bald eagle for a 20 year period to ensure populations remain stable following delisting.

With a wingspan that can exceed 7 feet, the bald eagle is the second largest bird of prey in North America. The bald eagle is our National symbol and unmistakable in appearance, featuring a white head and tail that contrast with a dark body. Juvenile birds lack the white head and tail, and are mottled in appearance until their fifth year. Eagles are opportunistic feeders and will eat carrion or live prey, primarily fish, but also small mammals, reptiles, and waterfowl.

Bald eagles occur in New Jersey throughout the year. The breeding season in New Jersey begins in late December to early January. During this period, mating pairs will work diligently to build or repair their nest. First-year nests can measure 2 feet high and 5 feet across. Eagles may use the same nest year to year, adding sticks and other nesting material, making the nest larger and larger each year. By the middle of February, most bald eagles in New Jersey have begun to lay their clutch of one to three eggs. Young eagles learn to fly (fledge) 11 to 12 weeks after hatching. Adults continue to provide food for the juvenile eagles for as long as 3 months after they fledge. During this period, the fledglings learn to fly proficiently and begin to hunt for themselves.

Bald eagles prefer forested or open habitats with little human disturbance near large bodies of water, such as lakes, large rivers, reservoirs, and bays. Eagles are often attracted to a water body as they search for food, and frequently roost in dead or mature trees adjacent to water. In winter, bald eagles gather in large numbers near coasts and inland water bodies that remain ice-free, allowing access to fish and other prey.

Threats to the bald eagle include environmental contaminants, habitat destruction and degradation, and disturbance of nesting and feeding birds.

U.S. FISH AND WILDLIFE SERVICE SPECIES NARRATIVES:
Biology and Threats of Federally Delisted Species in New Jersey

Peregrine falcon (*Falco peregrinus*)

The peregrine falcon was federally listed in 1970, and classified as an endangered species in 1973. As numbers increased, peregrine falcon populations in the coterminous 48 States were delisted on August 25, 1999. The peregrine falcon continues to be protected under the Federal Migratory Bird Treaty Act, and as a State-listed species under the New Jersey Endangered and Nongame Species Conservation Act, which carries protections under the State land use regulation program. These Federal and State laws prohibit unauthorized take of peregrine falcons. The U.S. Fish and Wildlife Service and its partners are monitoring the peregrine falcon through 2015 to ensure populations remain stable following delisting.

Ranging from 14 to 23 inches long, adult peregrine falcons are blue-gray above and whitish below with dark barring on the chest and underwing. Like most falcon species, peregrines show a distinct sideburn or “moustache” mark each side of the face. Juveniles are dark slate-brown on the upperside, often with a contrasting blonde crown, and buff colored below with vertical streaks on the chest. Peregrine falcons feed on songbirds, gulls, terns, shorebirds, and wading birds. These agile hunters can attain speeds over 200 miles per hour as they dive on their prey.

Peregrine falcons are found along the rivers and seacoasts of New Jersey. The species typically nests on ledges and in small shallow caves located high on cliff walls, or on man-made platforms. Peregrine falcons also occur in urban areas, nesting on bridges and tall buildings. During the breeding season, a hunting range of 10 miles may be considered typical for this species.

Through the 1950s, peregrine falcons were hunted and collected, activities that are now prohibited or regulated. The most severe declines of peregrine populations were caused by environmental contaminants, chiefly pesticides like DDT that cause eggshell thinning. Although DDT was banned in the U.S. in 1972, the peregrine’s migratory prey may still encounter DDT in other countries. In addition, other contaminants like mercury and PCBs may threaten the falcon’s long-term recovery in some regions. The peregrine falcon is also being monitored for is susceptibility to West Nile Virus. Monitoring to date has shown populations to be stable in New Jersey and nationwide.