

**APPENDIX A**  
**PERTINENT CORRESPONDENCE**



REPLY TO  
ATTENTION OF

**DEPARTMENT OF THE ARMY**  
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS  
696 VIRGINIA ROAD  
CONCORD, MASSACHUSETTS 01742-2751

September 9, 2005

12/03/12/01/000000  
12/03/12/01/000000

Engineering/Planning Division  
Evaluation Branch

RC. 37905

Ms. Cara Metz, Executive Director and SHPO  
Massachusetts Historical Commission  
The Massachusetts State Archives Building  
220 Morrissey Boulevard  
Boston, Massachusetts 02125

Dear Ms. Metz:

The U.S. Army Corps of Engineers, New England District, is preparing an Environmental Assessment for a proposed Section 205 (Flood Control) project in the vicinity of the Blackwater River in Salisbury, Massachusetts (see enclosed study area map). We would like your formal comments on this undertaking.

The town of Salisbury is located in northeastern Massachusetts, about 45 miles north of Boston, Massachusetts. The project site is situated in a residential development that includes approximately 135 homes located on 9<sup>th</sup> Street, 10<sup>th</sup> Street, 11<sup>th</sup> Street, Berry Lane (mistakenly referred to as Bayberry Lane in reference documents), Lewis Avenue, Florence Avenue, and Carter Street.

The Blackwater River is a coastal river located in Seabrook, New Hampshire, and Salisbury, Massachusetts. Tidal waters from Hampton Harbor flow up the Blackwater River (south) to the salt marshes in Seabrook and Salisbury. There is a bridge located along Route 286 in Seabrook about two miles upstream from Hampton Harbor which crosses the marshes and river and has historically, through changes in its configuration, altered the hydrology of the Blackwater River tidal estuary.

The New Hampshire Department of Transportation (DOT) has twice replaced the Route 286 Bridge. The original bridge was constructed in the early 1900's with a clear width of 350 feet at mean tide level, having 35 pile-supported spans. This bridge was replaced in 1948 with a single span bridge in the same location with a bridge opening of 35 feet at mean tide level. The superstructure of the present bridge, constructed in 1991, consists of steel beams and a reinforced concrete slab and abutments with a bridge opening of 70 feet at mean tide level. With construction of the present bridge with a larger bridge opening, prior tidal restriction was somewhat lessened resulting in increased tidal heights

upstream of the bridge. Due to this increase in tidal conveyance, the Blackwater Marshes have increased in size approximately ten acres (into the historical range of the salt marsh) along its periphery. While there are widely acknowledged benefits to the restoration of salt marsh and estuarine habitat, increased tidal conveyance also affected well-established residential developments. Although flooding along the Blackwater River estuary has occurred to varying degrees over the years, the replacement of the Route 286 Bridge in 1991 in New Hampshire exacerbated the problem.

The proposed project provides limited flood protection to a residential neighborhood located adjacent to the Blackwater River tidal estuary in Salisbury, Massachusetts. It involves the construction of a floodwall with landside earthen berm to alleviate frequent low-level flooding experienced in this residential neighborhood in recent years. The flood barrier is designed to prevent flooding from a 20-year storm event over a 50-year project life. More comprehensive flood protection for the proposed project area is constrained by local topography and proximate location of the Atlantic Ocean as well as economic and environmental considerations. A more detailed description of the recommended plan is enclosed with this letter.

A review of the MHC's archaeological site files indicates that several historic and prehistoric archaeological sites are recorded in the project vicinity, though not within the proposed study area. These sites are located to the south and southwest of the area of potential effect. Two submerged historic archaeological resources are located just offshore of the Salisbury Beach State Reservation. The first is located due east of the southeast terminus of Beach Road and consists of the remains of the *Jennie M. Carter*, a late 19<sup>th</sup> Century 3-masted schooner sunk in 1894. The other site is located on the north side of North Jetty (offshore of the State recreation area) at the mouth of the Merrimack River. No further information is available in the State's files on this resource.

A total of five prehistoric archeological resources are recorded in the project vicinity. The closest to the project area is located about 1 mile from the north bank of the Merrimack River on Salisbury Beach and consists of Late Woodland Period (1000-450 years Before Present (BP)) shell "heaps" together with projectile points and grit tempered pottery. This site was recorded/collected in 1868 by Harvard University. The remaining sites are located south of Beach Road along the northern bank of the Merrimack River bordering the salt marsh. All of these sites are well to the south of the project area.

The construction of flood protection along the periphery of the salt marsh on the back side of 9<sup>th</sup> Street north to a point south of Florence Street should have no impact upon significant cultural resources due to the extensive development in the area as well as the inundated context of the backshore.

Construction of a floodwall and appurtenant structures is not expected to have an effect upon archaeological resources. Properties in the project vicinity were constructed during the 1960s and consist of primarily residential cottages and resort homes selected for their proximity to the views of the salt marsh on the west and access to Salisbury Beach and the ocean just to the east. Flood protection will not constitute an adverse visual or aesthetic impact in this area. We would appreciate your concurrence with this determination.

If you have any questions, please contact Mr. Marc Paiva of the Evaluation Branch at 978-318-8796.

CONCURRENCE: Brona Simon  
9/23/05  
BRONA SIMON  
DEPUTY STATE HISTORIC  
PRESERVATION OFFICER  
MASSACHUSETTS  
HISTORICAL COMMISSION

Sincerely,

  
John R. Kennelly  
Chief of Planning

Enclosures

Copies Furnished (w/encls)

Mr. Victor Mastone, Director  
Board of Underwater Archaeological Resources  
241 Causeway Street, Suite 900  
Boston, Massachusetts 02114-2136

Ms. Cheryl Andrews-Maltais, THPO  
Wampanoag Tribe of Aquinnah  
20 Black Brook Road  
Aquinnah, Massachusetts 02535



# Division of Fisheries & Wildlife

Wayne F. MacCallum, *Director*

1 February 1999

Anthony T. Mackos  
Dept. of the Army, New England District  
Corps of Engineers  
696 Virginia Road  
Concord, MA 01742-2751

Re: Floodwall along Saltmarsh  
Salisbury, MA  
NHESP File: 99-4752

Dear Mr. Mackos,

Thank you for contacting the Natural Heritage and Endangered Species Program for information regarding state-protected rare species in the vicinity of the above referenced site. I have reviewed the site and would like to offer the following comments.

Our database indicates that the portion of the project near Bayberry Lane is within Estimated Habitat WH2. This Estimated Habitat is delineated for the following species:

## WH 2

### Animal Species

	<u>Status</u>
Shortnose Sturgeon ( <i>Acipenser brevirostrum</i> )	Endangered
Atlantic Sturgeon ( <i>Acipenser oxyrinchus</i> )	Endangered
Bald Eagle ( <i>Haliaeetus leucocephalus</i> )	Endangered
Piping Plover ( <i>Charadrius melodus</i> )	Threatened
Spotted Turtle ( <i>Clemmys guttata</i> )	Special Concern
Common Tern ( <i>Sterna hirundo</i> )	Special Concern

### Plant Species

Saline Sedge ( <i>Carex recta</i> )	Endangered
Silverling ( <i>Paronychia argyrocoma</i> )	Endangered

These species are protected under the Massachusetts Endangered Species Act (M.G.L. c.131A) and its implementing regulations (321 CMR 10.00). All of the Animal Species are also protected under the Wetlands Protection Act (M.G.L. c.131, s.40) and its implementing regulations (310 CMR 10.00). I



## Natural Heritage & Endangered Species Program

Route 135, Westborough, MA 01581 Tel: (508) 792-7270 x 200 Fax: (508) 792-7275  
An Agency of the Department of Fisheries, Wildlife & Environmental Law Enforcement  
<http://www.state.ma.us/dfwele>



MNHESP File #99-4752

1 February 1999

Page 2

have enclosed fact sheets for your information. If you are required to file a Notice of Intent with the local conservation commission, you must also submit a copy for review by our program.

This evaluation is based on the most recent information available in the Natural Heritage database, which is constantly being expanded and updated through ongoing research and inventory. Should your site plans change, or new rare species information become available, this evaluation may be reconsidered.

Please do not hesitate to call me at (508)792-7270 x154 if you have any questions.

Sincerely,

A handwritten signature in black ink, appearing to read "Cindy L. Campbell". The signature is written in a cursive, flowing style.

Cindy L. Campbell  
Environmental Review Assistant

## MASSACHUSETTS ENDANGERED WILDLIFE

### Shortnose Sturgeon (Acipenser brevirostrum)

**DESCRIPTION:** The Shortnose Sturgeon is one of the smallest species of sturgeons, rarely exceeding 1 meter (3 feet) in length. It possesses a short, blunt, rounded snout (pointed in juveniles); a broad toothless mouth located on the underside of the head, with extendable lips that can act as a siphon for feeding; four barbels (appendages resembling tentacles in appearance) in front of the mouth that act as sensory mechanisms for detecting food; and four rows (two lateral, one dorsal, and one ventral) of separated bony plates (scutes). Modified armored scales on the head give it a skull-like appearance. The tail is shark-like with two unequal-sized lobes, and the dorsal fin is small and placed far back on the body. The Shortnose Sturgeon has a yellow-brown to blackish olive dorsal surface, pale-colored scutes, white barbels, and a white underside.

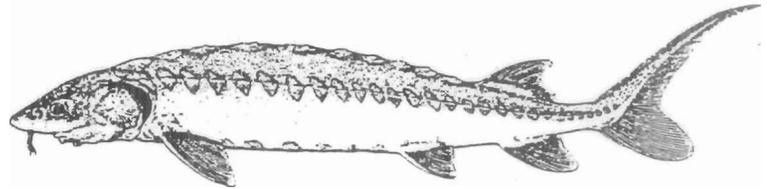


Illustration from Dadswell, M., Taubert, B., Squiers, T., Marchette, D., Buckley, J. Synopsis of Biological Data on Shortnose Sturgeon, *Acipenser brevirostrum*, NOAA Technical Report NMFS 14.

**SIMILAR SPECIES IN MASSACHUSETTS:** The Shortnose Sturgeon is often confused with the Atlantic Sturgeon (*Acipenser oxyrinchus*); both are listed as Endangered Species in Massachusetts. *A. oxyrinchus* is much larger than *A. brevirostrum*, growing to lengths of up to 13 feet. The Atlantic Sturgeon's snout is often up to twice as long as the Shortnose Sturgeon's, and is also less blunt and more pointed (in full-grown adults). However, younger Atlantic Sturgeons are similar in both size and appearance to adult Shortnose Sturgeons. The best way to distinguish between the two species is by comparing mouth widths. The Shortnose Sturgeon's mouth is much wider (relative to head width) than that of the Atlantic Sturgeon. The Atlantic Sturgeon also has several large bony plates along the base of the anal fin which are absent on the Shortnose Sturgeon.



RANGE: The Shortnose Sturgeon is endemic to the rivers and estuaries of the eastern United States and Canada, from the St. John's River in New Brunswick south to the St. John's River in Florida. However, populations are small, isolated, and sporadic in occurrence, with the exception of the New Brunswick population, which may consist of up to 100,000 individuals.

HABITAT IN MASSACHUSETTS: Shortnose Sturgeons utilize different habitats during the course of each year. Saline estuaries and even the open ocean may be used by the Shortnose Sturgeon during the winter months, but when spring arrives some Shortnose Sturgeons migrate upstream into freshwater rivers while others remain in the estuary.

Three populations of Shortnose Sturgeons exist in Massachusetts: in the Merrimack River, in the Connecticut River between Turners Falls Dam and Holyoke Dam, and in the Connecticut River below Holyoke Dam to Long Island Sound. The population located between the two dams is essentially landlocked. However, the other Connecticut River population migrates back and forth between the Holyoke Dam in Massachusetts and the lower river and its estuary in Connecticut, depending on the season. Presumably, the Merrimack River population also migrates, utilizing the river's estuaries during the winter and then traveling upstream to freshwater in spring to spawn.

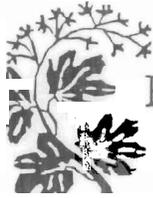
LIFE CYCLE / BEHAVIOR: Shortnose Sturgeon spawning runs occur every year, but individual Shortnoses may spawn only once every two to three years. In Massachusetts, the spawning run usually occurs in early May, when the water temperature is between 9 and 11 degrees Celsius (48 to 52 degrees Fahrenheit). Very little is known about the spawning behavior of this species, but fertilization of eggs is external as it is for other sturgeons.

Female Shortnose Sturgeons lay between 27,000 and 208,000 small, dark brown eggs in turbulent, fast-flowing water on gravel, rock or rubble substrate. Those eggs which become fertilized will hatch after approximately 13 days, and the newly-emerged larvae possess yolk-sacs which provide enough nourishment for an additional 13 days. The larvae initially hide under rocks or burrow into the substrate until they develop further; the growth rate of young Shortnose Sturgeons is rapid but later slows down substantially. Additional information on larval behavior and development is scanty.

Shortnose Sturgeons do not reach maturity until they are 5 to 10 years old, but spawning may be delayed further by as much as 2 years for males and up to 5 years for females. Shortnose Sturgeons may live up to 27 years or longer; the record is 67 years for females and 32 years for males.

Shortnose Sturgeons are primarily benthic (bottom) feeders, using their lips as a siphon or "vacuum cleaner" to suck up food. Young Shortnose Sturgeons eat insects and crustaceans, while adults also eat a variety of foods including small mollusks.

POPULATION STATUS IN MASSACHUSETTS: The Shortnose Sturgeon is listed as an Endangered Species at both the state and federal levels. In Massachusetts, only three current populations have been documented for this species. Some factors which may be deleterious to the Shortnose Sturgeon include water pollution and damming of rivers, as well as excessive predation (especially on eggs and young) by introduced fish species, such as channel catfish.



MASSACHUSETTS ENDANGERED WILDLIFE

Atlantic Sturgeon  
(Acipenser oxyrinchus)

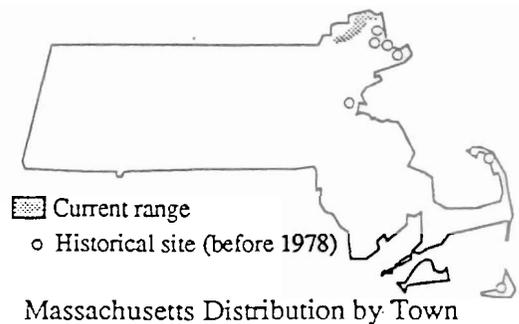
**DESCRIPTION:** The Atlantic Sturgeon is a very large anadromous fish, sometimes exceeding a length of 4 meters (13 feet) and a weight of 800 pounds. It has an olive-green to blue-gray dorsal surface with a white belly. The Atlantic Sturgeon's body is slender in cross section, with five rows (one dorsal, two upper lateral, two ventral) of well-developed, overlapping bony plates (scutes). Several large bony plates are also located at the base of the anal fin. The scutes are pale-colored and show up prominently on the dorsal surface. The Atlantic Sturgeon's head has a long, pointed snout and is covered with bony scales. Its mouth is narrow, with sucker-like lips, and is located on the undersurface of the head. A row of four barbels (appendages which resemble tentacles in appearance) is located in front of the mouth on the lower side of the snout; the barbels act as sensory mechanisms for detecting food.



Illustration from Bigelow, H.B. and Schroeder, W.C., Fishes of the Gulf of Maine, 1953

**SIMILAR SPECIES IN MASSACHUSETTS:** The species most likely to be confused with the Atlantic Sturgeon is the Shortnose Sturgeon (Acipenser brevirostrum); both are listed as Endangered species in Massachusetts. The Shortnose is quite small for a sturgeon, rarely exceeding three feet in length. The adult Shortnose Sturgeon's snout is much shorter and blunter than that of the adult Atlantic Sturgeon. The most reliable distinguishing feature between the two species is mouth width: the Atlantic Sturgeon has a much narrower mouth than the Shortnose Sturgeon.

(continued overleaf)



(Atlantic Sturgeon, continued)

RANGE: The Atlantic Sturgeon inhabits rivers, estuaries, and open ocean in scattered locations from Hamilton Inlet in Labrador south along the Atlantic Coast to the St. John's River in Florida.

HABITAT IN MASSACHUSETTS: The Atlantic Sturgeon is an anadromous fish: it hatches in fresh or brackish water, grows and matures in saltwater, then returns to fresh or brackish water to spawn. In Massachusetts, the Atlantic Sturgeon was at one time very abundant and spawned in the Merrimack River and other locations. In the last few years, only a small number of Atlantic Sturgeons have been documented in the Merrimack River and local marine waters.

LIFE CYCLE / BEHAVIOR: The Atlantic Sturgeon spends most of its adult life in the ocean, except during the spawning season, when it enters a river and slowly migrates upstream. In the New England area, spawning season usually occurs in May, June, and possibly as late as July, when water temperatures reach 42 to 43 degrees F (5.5 to 6 degrees C). Male Atlantic Sturgeons generally migrate upstream before the females. Spawning occurs in running water over sections of the river bottom abundantly strewn with rocks or rubble, just above the salt front (the border between fresh water and salt water). Atlantic Sturgeons travel downstream and upstream with the tide. Females appear to travel continuously during the spawning season, but males may occasionally stop moving for a few hours or possibly a day. Little is known of the Atlantic Sturgeon's spawning behavior, but egg fertilization is external as it is for other species of sturgeon. Females migrate back to the ocean soon after spawning, but males may remain in the rivers until colder weather arrives in September or October.

Each female may lay between 800,000 and 3,700,000 eggs. Egg-laying is accompanied by a good deal of splashing to discharge the eggs over a wide area. The eggs are gray, brown, or black in color, with a diameter of 2.5 to 3.0 millimeters (0.1 inches). The eggs are very adhesive and attach to rocks, rubble, plants, and other objects in small clusters or ribbons, and usually hatch within a week.

The newborn hatchlings possess yolksacs which provide enough nourishment for nine to ten days. Juvenile Atlantic Sturgeons are active swimmers and feed along the river bottom, using their lips as a siphon or "vacuum cleaner" to suck up worms, mayfly larvae, small mollusks, amphipods, and isopods, as well as a good deal of mud and plant material. Young Atlantic Sturgeons remain in their freshwater habitat for some time but gradually move seaward as they mature, migrating out to sea between their second and sixth year. Male Atlantic Sturgeons do not spawn until they are at least 12 years old; females spawn for the first time at the age of 18 or 19 years. Although spawning runs occur every year, individual sturgeons do not spawn annually; males spawn at intervals of 1 to 5 years, and females spawn at intervals of 3 to 5 years.

The adult sturgeons are also benthic (bottom) feeders, consuming amphipods, isopods, shrimps, polychaete worms, molluscs, and small fish, as well as large quantities of mud. However, they do not feed during spawning migrations. Atlantic Sturgeons have long life spans, reaching an age of up to 60 years.

POPULATION STATUS IN MASSACHUSETTS: The Atlantic Sturgeon was once abundant in the state but in recent years only a few immature specimens have been caught in the Merrimack River. No breeding adults have been observed and it is not known whether spawning still occurs in Massachusetts. The species is listed as Endangered in Massachusetts; however, Atlantic Sturgeons are only protected while in fresh water; they still can be legally caught in the ocean. The precipitous decline of the Atlantic Sturgeon population since the mid-1800's may have been caused by overfishing, dam construction and pollution.



MASSACHUSETTS THREATENED SPECIES

Piping Plover  
(Charadrius melodus)

**DESCRIPTION:** The Piping Plover is a small, stocky shorebird with pale brownish gray or sandy-colored plumage on its backside, with a white breast, forehead, cheeks, and throat, a black streak on the forecrown extending from eye to eye, and a black breastband which may not always form a complete circle. Its coloration gives it excellent camouflage in sandy areas. The average Piping Plover is 15 to 17 cm (6 to 7 in.) long, with a wingspan of 35 to 40 cm (14 to 16 in.). The tail is white at the base and tip, but dark in the middle. It has yellow-orange legs and its short bill is yellow-orange with a black tip in the summer, but turns completely black during the winter. In general, females have darker bills and lighter plumage than males. The Piping Plover runs in a pattern of brief starts and stops; in flight, it displays a pair of prominent white wing stripes. Its call is a series of piping whistles.

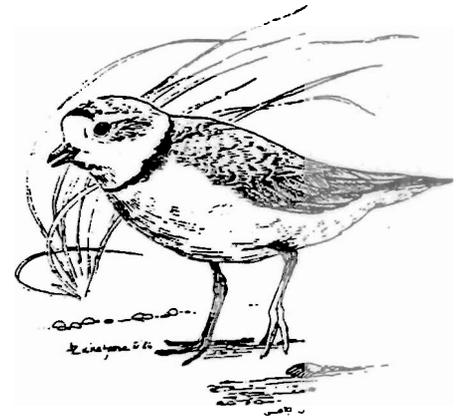


Illustration by J. Zickefoose, 1986

**SIMILAR SPECIES IN MASSACHUSETTS:** The Piping Plover is similar to the Semipalmated Plover (Charadrius semipalmatus) in size, shape, and coloration; both also share the same general habitat. However, the Semipalmated Plover is a darker brown in color, and has much more black on its head than the Piping Plover. The Semipalmated Plover does not breed in Massachusetts but passes through in large numbers from late July to early September during its southward migration.

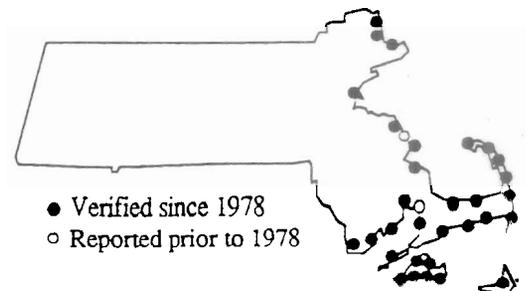
**RANGE:** During the summer, the Atlantic Coast population of Piping Plovers nests from the coast of Massachusetts north to Newfoundland, and south to Virginia and North Carolina. In winter they migrate farther south, from South Carolina to Florida, the Gulf of Mexico, and the West Indies. Other populations of Piping Plovers nest along rivers on the Northern Great Plains and along the shores of the Great Lakes, migrating to the Gulf of Mexico in the winter.

(continued overleaf)



Range of Piping Plover

- Winter range
- Summer (breeding) range



Massachusetts Distribution by Town

(Piping Plover, continued)

**HABITAT:** Piping Plovers in Massachusetts require sandy coastal beaches which are relatively flat and free of vegetation. They prefer the dry, light-colored sand found along the outer coastal shores. Piping Plovers often build their nests in a narrow area of land between the high tide line and the foot of the coastal dunes; they also nest in Least Tern colonies. **Water** is a critical necessity for Piping Plover habitat, since the birds feed exclusively on organisms which live along the shoreline.

**LIFE CYCLE / BEHAVIOR:** As soon as Piping Plovers return to their breeding grounds in Massachusetts in late March or April, the males begin to set up territories and attract mates. Territorial rivalry between males is very strong; adjacent male Piping Plovers mark off their territories by running side by side down to the waterline. Each bird takes turns, one running forward a few feet, then waiting for the other to do likewise. Nests are usually at least 200 feet apart; the nesting pair will confront any intruding Piping Plover which approaches the nest. Male Piping Plovers also defend feeding territories encompassing beach front adjacent to the nesting territory.

Courtship consists of a ritualized display by the male, who flies in ovals or figure-eights around a female, then displays on the ground by bowing his head, dropping his wings, and walking in circles around the female. The male also scrapes shallow depressions in the sand at potential nest sites. The female then chooses one of these nesting sites, usually in a flat, sandy area. The nest itself is a shallow depression which is often lined with shell fragments and small pebbles, which may aid in camouflaging the eggs. Female Piping Plovers typically lay four eggs per clutch, one egg every other day over a week's time. **The eggs are sandy gray in color with dark brown or black spots, and all hatch within 4 to 8 hours of each other.** Both parents take part in incubating the eggs until they hatch 3 to 4 weeks later.

The young chicks leave the nest within 2 to 3 hours after hatching and may wander several hundred meters before they become capable of flight. When threatened by predators or human intruders, the young run or lie motionless on the sand while their parents often pretend to have broken wings in an effort to attract the intruder's attention away from the chicks. Young Piping Plovers are brooded by their parents for 3 to 4 weeks and finally fledge 4 to 5 weeks after hatching, at which time they leave the nesting area.

Piping Plovers feed on marine worms, molluscs, insects, and crustaceans. They forage along the waterline, on mudflats at low tide, and in wrack along the beach. Foraging behavior consists of running a short distance, then staring at the ground with the head tilted to one side, often standing on one foot while vibrating the other foot on the ground, and finally pecking at the food item it has detected in the sand.

Piping Plovers begin to migrate southward between late July and early September, although occasional stragglers remain behind until late October. Adult birds often return to the same nesting area every spring, although they frequently change mates from year to year. Young birds may nest anywhere from a few hundred feet to many miles from where they were hatched.

**POPULATION STATUS IN MASSACHUSETTS:** The Atlantic Coast population of Piping Plovers is listed as Threatened at both the state and federal levels. In 1990, 139 breeding pairs from 58 sites in Massachusetts were documented. Massachusetts has the second largest population of Piping Plovers along the Atlantic Coast.

Habitat loss due to development of coastal areas and waterways has caused a catastrophic decline in the Piping Plover population over the last 50 years. Predation on eggs and young has also increased due to the growing number of foxes, skunks, raccoons, and other predators that thrive in suburban areas. Due to their cryptic coloration, the nearly invisible eggs and chicks are often unintentionally crushed by off-road vehicles (ORV's) and pedestrians on the beach. Continual disturbance of nest sites from recreational use of the state's beaches may lead some breeding pairs to abandon their nests. Severe storms can wash away and destroy eggs.

In recent years, the placement of wire enclosures surrounding Piping Plover nest sites has drastically reduced predation at many nest sites. Protection of essential habitat from development and restriction of ORV use in these areas is crucial in order to maintain a healthy population of Piping Plovers in Massachusetts.



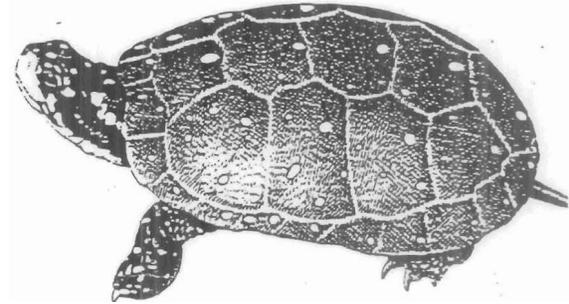
Natural Heritage &  
Endangered Species  
Program

Commonwealth of Massachusetts  
Division of Fisheries & Wildlife  
Route 135  
Westborough, MA 01581  
(508) 792-7270 ext. 200

MASSACHUSETTS SPECIES OF SPECIAL CONCERN

Spotted Turtle  
(*Clemmys guttata*)

**DESCRIPTION:** The Spotted Turtle (also known as the polka-dot turtle) is in the genus *Clemmys* (pond turtles) and is a member of the largest turtle family, *Emyidae*. It is a relatively small turtle 8.0 -12.5 cm (3-5 in), which gets its name from the bright yellow circular spots that dot its smooth, black carapace (upper shell). The number of spots varies considerably among individuals; and their uniqueness can be used to differentiate among individuals. Hatchlings usually have one spot per scute (one of the bony, external scales that comprise the carapace). The shells of adult turtles however, may have many spots per scute or may lack spots entirely. The hinged plastron (bottom shell) is creamy yellow with large black blotches along the border. In older individuals, these blotches cover the entire plastron. The skin is gray to black with occasional yellow or orange spotting on the head, neck, and limbs. The lower surfaces of the limbs and the fleshy parts are pale salmon.



DeGraaf, Richard M. and Rudis, Deborah D. *Amphibians and Reptiles of New England*. Amherst, MA: The University of Massachusetts, 1983.

Hatchlings are blue-black and, as noted above, usually have one yellow spot on each carapacial scute; some hatchlings, however, lack spots entirely. The yellow plastron has a black central figure. The head is spotted and in some individuals the neck is spotted as well.

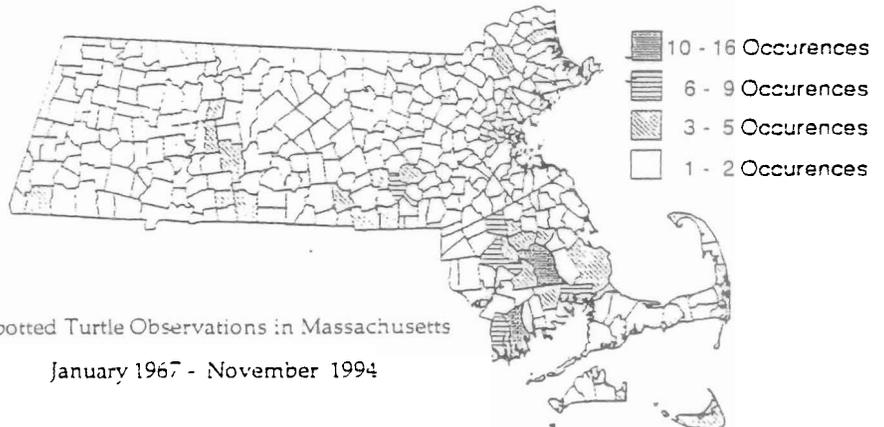
Sexual variation is similar to that of other turtle species, in that male characteristics include concave plastrons and longer, thicker tails. Spotted Turtle males have a black or dark-colored lower jaw and brown eyes while the females usually have a yellowish unmarked lower jaw and orange-red eyes

**SIMILAR SPECIES IN MASSACHUSETTS:** The Blanding's Turtle (*Emydoidea blandingi*) has, in contrast, small yellow flecks, not dots, on its carapace, is much larger (up to 10 inches), has a hinged plastron, and has a bright yellow throat and neck. Old, spotless Spotted Turtles may be confused with Bog Turtle (*Clemmys muhlenbergii*), but the latter has a slightly keeled carapace and a large orange blotch on each side of its face. Newly hatched Eastern Box Turtles (*Terrapene carolina*) have a single yellow spot on each scute on the carapace, but they have a granular shell texture and few markings on their face.

**RANGE:** Spotted Turtles are most commonly found in the Northeastern United States. Their range extends from Southern Maine and Quebec westward to Illinois and southeast to northern Florida.



Range of Spotted Turtle



**HABITAT:** Spotted Turtles inhabit a variety of wetland habitats in Massachusetts, including both forested and nonforested types. They dwell in marshy meadows, bogs, small ponds and brooks, ditches, and other shallow unpolluted bodies of water. They are also found in Red Maple and Atlantic White Cedar swamps and woodland vernal pools. This species requires a soft substrate and prefers

areas with aquatic vegetation. They often cryptically bask along the water's edge, in brush piles, overhanging vegetation and sphagnum mats, and hide in mud and detritus when disturbed.

**LIFECYCLE / BEHAVIOR:** In the early spring, both males and females spend a great deal of time basking. This is done both singly or in groups and takes place either on partially submerged logs, rocks, or tussocks of sedge, or on the shore line. If disturbed, they dive directly to the bottom and bury themselves in the mud. Individuals have favorite basking sites to which they return regularly throughout the season. It is also common during this time to find individuals of either sex on upland areas adjacent to wetlands. They are usually solitary while wandering on land; if disturbed they quickly withdraw into their shells, to remain so until all is quiet.

Individuals of this species alternate sitting in the sun with feeding. Generally, Spotted Turtles will bask more on cold, sunny days than on warm, cloudy one, when they feed more often. They disappear underwater late in the afternoon and spend the night at the bottom of the pond. Spotted Turtles prefer cool temperatures. During the warm summer days they are not easily found; apparently they aestivate in the mud bottom of some waterway or in a muskrat burrow or lodge.

Spotted Turtles mature at about 8 to 10 years of age. Mating occurs from March to May and generally takes place in the water. Copulation follows what is often a long (up to one hour) and frantic chase of the female by the male. Several males may pursue a single female at the same time, biting each other and sometimes the female in the process. Nesting occurs in June, with from 2 to 8 (3 to 4 on average) smooth, white, elliptical eggs laid in sunny, well-drained soil in open meadows, fields, or along roadsides. Typically, the nest-building process begins in the early evening, and as is true of all turtles, involves the hind legs and feet- usually alternately. This species digs a 2 - 2.5 in. deep hole, taking up to one hour or more to finish the task. Once finished, the female takes a short rest before depositing her eggs. During the egg laying process, the female positions each egg in the nest with her hind feet. When finished laying, she will scoop the excavated earth back onto the eggs and smooth over the covered nest by dragging her plastron over the site to minimize nest predation. The eggs incubate for 10 to 12 weeks. Hatchlings emerge from the nest in August or September in search of food and shelter in the edges of grassy, wet meadow areas and bogs. They may overwinter in the nest. Hatchlings are particularly carnivorous, hunting small land and water insects, worms, and snails. The adult Spotted Turtle is omnivorous, with a varied diet ranging from aquatic vegetation to larval amphibians, slugs, snails, insects, and worms, all of which are consumed only while the turtle is submerged in water.

**POPULATION STATUS IN MASSACHUSETTS:** At the turn of the century, the Spotted Turtle was considered one of the most common turtles in Massachusetts, if not the most common. Today, it is classified as a **Species of Special Concern** in Massachusetts. Spotted Turtles have been found in 139 Massachusetts towns. The majority of documented occurrences are in the southeast portion of the state; roughly 40% of all Massachusetts occurrences are from Bristol and Plymouth counties. There have been no recent Spotted Turtle sightings reported from Suffolk County or from the towns in the northwest corner of the state. Most (71%) of the records are of sightings of single turtles; therefore, it is yet to be determined if these individuals are part of healthy, growing populations.

**MANAGEMENT RECOMMENDATIONS:** Threats to the Spotted Turtle are numerous. This species is highly prized by the pet trade where they regularly command prices as high as \$400 in Japan and Europe. Illicit commercial exploitation of the species is depleting populations in many parts of their range and may be contributing to the demise of already declining populations in New England. Development and habitat fragmentation are likely the greatest threat to the Spotted Turtle. Increased residential development and construction of many new roads, altering of wetlands, and destruction of upland habitats - all severely impact the Spotted Turtle. Another factor is nest predation by skunks, raccoons, and foxes where populations have increased in recent years. Mortality as a result of road kills also takes a heavy toll on egg-laying females as they travel to their preferred nesting sites such as roadsides, sand pits, yard and foundation excavations.

Specific management recommendations to protect the habitat of this species include the following:

**Timber Harvesting--**In forested wetlands known to be inhabited by Spotted Turtles, harvesting should be restricted to frozen winter conditions. Regulations under the Forest Cutting Practices Act (304 CMR 11.04 8G) that limits cutting to 50% of the basal area should be strictly observed. When timber harvesting near a vernal pool, precautions should be taken in both wet and dry seasons to preserve the local environment around the pool. These precautions include not allowing heavy equipment in vernal pool depressions, not operating machinery within 50 feet of a vernal pool during mud season, and preventing any extra woody material from falling into vernal pool depressions. However, because many amphibians attach their eggs to downed woody material, any existing woody material should not be removed from the depression.

**Other--**In general, there should not be any alteration of the area surrounding a vernal pool, and any impact to the pool depression area should be avoided. Of particular concern is the possibility of impairing the water-retaining capability of the depression area, or altering bottom sediments which contain the eggs or other drought-resistant stages of the invertebrates which form the base of the vernal pool food chains. The area around a vernal pool should not be cleared, as leaves, twigs, and other woody materials provide many reptiles and amphibians with protection from high temperatures and from predators. As mentioned above, no woody material should be either added to or taken from the pool depression.

Conservation of Spotted Turtles likely depends first on locating viable populations and obtaining a better idea of the species' habitat needs, population dynamics, and natural history. Protecting wetland, upland corridors between wetlands, and potential nesting areas will be vital to the continued existence of one of Massachusetts's most charming reptiles.



Natural Heritage &  
Endangered Species  
Program

Commonwealth of Massachusetts  
Division of Fisheries & Wildlife  
Field Headquarters  
Route 135  
Westborough, MA 01581  
(508) 792-7270, ext. 200

MASSACHUSETTS ENDANGERED SPECIES

BALD EAGLE

*Haliaeetus leucocephalus* (Linnaeus)

**ETYMOLOGY:** The genus name is of Greek origin "*haliaetos*," meaning a bird, a sea eagle; the species name is of Greek origin "*leukos*" meaning white and "*kephale*" meaning head.

**DESCRIPTION:** The Bald Eagle is one of the most impressive and majestic birds in North America. It is one of eight species in the genus *Haliaeetus*, the "fish" or "sea" eagles, and is the only member of the genus that regularly occurs in North America. This species is one member of the family of *Accipiters*, all of which are in the order *Falconiformes*. It is also the largest raptor (bird of prey) in Massachusetts, attaining a wingspan of 2.0 to 2.2 meters (6.5 to 7.0 feet) with a body length of 0.9 meters (3.0 feet), and a weight ranging from 3.6 to 6.6 kilograms (8 to 15 lbs.) at maturity. Both sexes are similar in appearance but the females are notably larger than the males as is true with most raptor species.

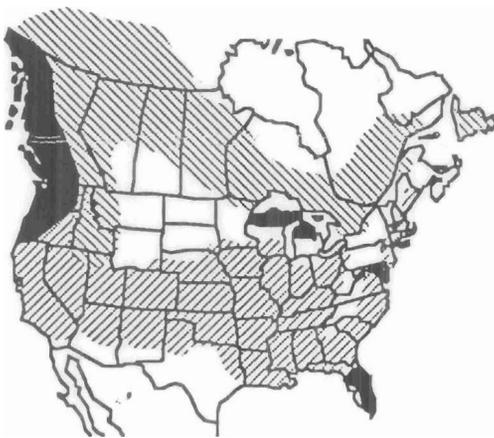


Adult Bald Eagles are distinctively colored with a white head and tail, brown body, pale yellow eyes, and bright yellow beak and feet. The adult plumage is attained at 4 to 5 years of age. The plumage of immature Bald Eagles may vary considerably. Immatures go through a sequence of plumage types before reaching maturity. These plumages include a uniformly dark phase in the first year, followed by phases with various amounts of white on the belly, back,

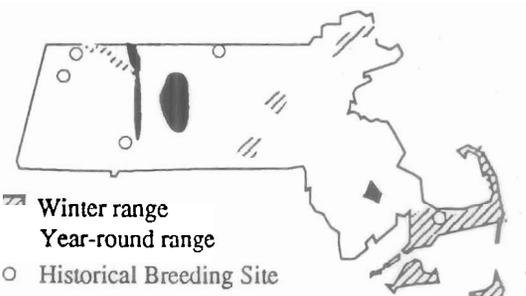
DeGraaf, Richard M. and Rudis, Deborah D.  
*New England Wildlife*. Amherst, MA:U.S.  
Dept. of Agriculture., N.E. Forest Experiment  
Station, Technical Report NE-108, 1986.

hatching to bright yellow in adults. In all feathered stages, the tail is rounded and the lower half of the tarsus is unfeathered.

Bald Eagles fly with heavy, deep strokes and soar on flattened wings. In silhouette, the beak, head, and neck are almost as long as the tail.



Range of Bald Eagle  
 Winter Range  
 Summer range  
 Year-round range



 Winter range  
 Year-round range  
 Historical Breeding Site  
 Distribution of Bald Eagle in Massachusetts

**SIMILAR SPECIES IN MASSACHUSETTS:** The large size and distinctive plumage of the Bald Eagle make it very easy to distinguish from all other birds in Massachusetts, with the exception of the Golden Eagle (*Aquila chrysaetos*). Both grow to approximately the same size, but the white head and tail of the adult Bald Eagle differentiates it from the Golden Eagle. Immature Bald Eagles may be confused with both the immature and the adult Golden Eagle. They can be distinguished because the adult Golden Eagle is nearly uniformly dark without any of the white mottling found on the immature Bald Eagle. Immature Golden Eagles have white wing patches and a white area at the base of the tail, which immature Bald Eagles do not have. The Golden Eagle's head and neck are shorter, rather than longer, than the tail. The Golden is feathered to the base of the leg, and the lower legs of the Bald eagle are unfeathered.

The turkey vulture is similar to an immature bald eagle in size and general coloration. At a distance, a distinction can be made by looking at the birds as they soar. Turkey vultures hold their wings somewhat upright, forming a shallow "V" when soaring and rock from side to side as they ride thermal air currents. Bald eagles hold their wings straight out from their body while soaring, with only the tips of the primary feathers curved slightly upward. Eagles do not rock from side to side as they soar, but rather make broad, sweeping circles as updrafts lift them skyward. At close range, the turkey vulture's small, featherless head which is red in adults and gray in juveniles makes identification quite simple.

**RANGE:** Bald Eagles occur from Alaska and Canada south throughout the United States to Florida and Baja California. In the lower 48 states, they occur sporadically over a wide area with notable seasonal concentrations in Florida, the Chesapeake Bay area, the Mississippi Valley and Pacific Northwest. In Massachusetts, occurrences are possible statewide, especially during migration in March-April and September-October; however, wanderers can appear virtually anywhere at anytime. In Massachusetts, Bald Eagles utilize the Quabbin Reservoir, part of the Connecticut River, and the Assawompsett Pond system throughout the year as both nesting and winter habitat. Bald Eagles also overwinter along the Merrimack River and along the coast of Cape Cod, Buzzard's Bay and the islands of Martha's Vineyard and Nantucket. Historically, the Bald Eagle bred throughout most of North America. Today, it is recolonizing much of its historic range where suitable habitat still exists.

**HABITAT IN MASSACHUSETTS:** Bald Eagles usually inhabit coastal areas, estuaries, and larger inland waters. This species requires a high amount of water-to-land edge incorporating stands of forest for nesting and trees projecting above the forest canopy for perching, an adequate supply of moderate-sized to large fish, an unimpeded view, and reasonable freedom from human disturbance. Wintering eagles require suitable roost trees for communal night roosting. In some cases these roosts may be 20 km or more from feeding areas and are in locations that are protected from the wind by vegetation or terrain, providing a more favorable thermal environment. The use of these protected sites helps minimize the energy stress encountered by wintering birds. The absence of a suitable night roost could limit the use of otherwise suitable habitat.

**LIFECYCLE/BEHAVIOR:** Courtship occurs in mid- to late- winter and is a spectacular sight consisting of aerial loops, cartwheels, dives, and ending with the prospective mating pair locking their talons together and diving straight down for hundreds of feet while spinning head over heels. Bald Eagles may live up to 30 years but mortality is relatively high in the immature age classes. They mate for life, but if one of a pair dies or is killed, the other will actively court another mate. Sexual maturity is reached at four to six years of age, but the birds may be considerably older before they breed for the first time.

The breeding and nesting season for Bald Eagles in Massachusetts begins in March. After courtship, the mated pair builds a large nest made with sticks and lined with sprigs of pine, grasses, and other soft materials. The male eagle collects the nest material and delivers it to his mate, who is responsible for most of the actual nest construction. Once the nesting site is chosen, the mated pair will return every year to the same site and add to the existing structure. The nests are located in hardwoods or conifers from 9 to 37 meters (30 to 120 feet) above the ground and may measure up to 3.6 meters (12 feet) high and 2.6 meters (8.5 feet) wide, with a weight of hundreds of pounds. Trees selected (also for roosting and sometimes perching) are typically older trees, taller than their surroundings. Ideally, the nest lies below the top of the crown in a live tree, where the young are sheltered above from the elements and the parent birds have adequate aerial access generally from the direction of the nearest water.

The female Bald Eagle lays one to three (two average) dull white eggs several days apart, usually by in late March or early April. The eggs are incubated (mostly by the female) for approximately 35 days until hatching. The eggs do not hatch at the same time, giving the first hatchling a significant advantage over its siblings.

Competition for food is intense, and if the adult eagles are not able to provide enough for all of their young, the older chick will take advantage of its greater strength and size to seize most of the food provided by the parents, causing its younger siblings to starve. This behavior increases the probability that at least one chick will survive. Young eaglets grow rapidly and may eat up to two pounds of fish per day. Ten weeks after hatching, they begin to make short flights from the nest, spending much time with the parent birds observing the adults as they catch and find food. By late fall the adults will no longer care for their young and the chicks begin life on their own. The entire breeding cycle, from nest construction to fledging of young, last six months. Most Bald Eagles appear to nest within 200 miles of where they hatched.

When available, fish (both marine and freshwater) is the Bald Eagle's preferred food. Fish may be captured by swooping from a perch or by coursing low over the water and dropping straight down when a fish is spotted. An eagle may plunge into the water to capture fish and may also steal fish from an osprey by harassing it until it drops its catch so the eagle can seize it. Prey too large to carry may be dragged to shore. Birds, especially waterfowl, are sometimes taken by bursting into a large flock and pursuing a straggler until it tires and can be captured. Bald Eagles also take crippled waterfowl and seabirds, small mammals and carrion, particularly dead fish.

In winter, eagles of all ages gather in large numbers in areas with open water where fish or other food sources are abundant. This "social grouping" is believed to facilitate locating and acquiring food and may possibly aid in establishing or maintaining pair bonds.

**POPULATION STATUS IN MASSACHUSETTS:** The history of the Bald Eagle is one of contradictions. On the one hand, its noble image has been portrayed on public documents, coin, currency, etc. as our nation's symbol since 1782 making it one of the most well-known creatures on earth. While on the other hand, its environment has been reduced and degraded, and the bird itself treated as vermin throughout North America for a century. As a direct result of mortality from deliberate killing by people incorrectly believing that the eagles killed livestock and drastic habitat changes (forest clearing and agriculture) as the human population increased, the Bald Eagle decreased in numbers in much of its range for many years. From 1917 to 1940 in Alaska alone where a bounty was placed on the Bald Eagle, at least 100,000 Bald Eagles are believed to have been killed. In the 20th century, the occurrence of man-made chemicals and pollutants in the environment is implicated in death, increased susceptibility to death, and diminished reproductive success. DDT and its metabolites, as well as other organochlorines, are well documented as causing eggshell thinning, breakage, and toxicity. One indirect chemical effect that is occurring is the phenomenon known as acid rain. Hundreds of Northern Hemisphere lakes have become so acidic that they no longer support viable fish populations. Lakes throughout New England, and the northern regions of Minnesota, Wisconsin and Michigan are considered most vulnerable to acidification. Early indications are that until the problem of acidification of lakes is addressed successfully, the future is uncertain for the aquatic-based biota on which the eagle is dependent in certain parts of its range. Additional disturbance has resulted from the growing human population, including a great increase in outdoor recreation and use of waterside areas, and timber cutting as well as continued shooting.

From 1982 to 1988, forty-one young Bald Eagles from Michigan and Canada were relocated to Quabbin Reservoir in Massachusetts. As a result of these efforts, Bald Eagles were confirmed as successfully breeding in the state in 1989, after an absence of more than 80 years. As of 1995, eight pairs of Bald Eagles have bred, producing a total of 52 wild young. Recovery efforts in many other states have also been successful. During the 1995 midwinter Bald Eagle survey in Massachusetts, 63 Bald Eagles were counted: Quabbin Reservoir(39), Merrimack River(9), Connecticut River(9), Wachusett Reservoir(2), Lake Assawompsett(2), and outer Cape Cod(2). To date, there are 9 pairs of Bald Eagles nesting in the state: Quabbin Reservoir(5), Connecticut River(3), and Plymouth County (1). Although the Bald Eagle is protected by the Migratory Bird Treat Act (1913), the Bald Eagle Act (1940; full protection except in Alaska; strengthened 1971), and the Endangered Species Act (1966), on February 14, 1978, its recognized status had become such that it is officially listed at the Federal level as Endangered in 43 of the lower 48 states and as Threatened in 5 others (MI, MN, OR, WI, & WA). The Federal status of the Bald Eagle was changed from Endangered status to Threatened status in 1995.

**MANAGEMENT RECOMMENDATIONS:** Critical to the survival of the Bald Eagle is the preservation and protection of its wetland habitat and maintaining the integrity of its known breeding, roosting, and wintering areas. In addition to these protection measures, preservation of its habitat along its migratory routes is also of great importance. In order to keep present populations secure, continued monitoring on both the state and regional level of eagle population growth and changes is also of utmost importance. Every effort should be made to eliminate human

disturbance in nesting and wintering areas through increased public education/ awareness of its detrimental effects on eagle populations. The Bald Eagle is still persecuted by wanton shooting and stepped-up law enforcement of laws presently in place protecting this species is needed to eliminate senseless killing. Lastly, identification and elimination of contaminant problems such as lead, mercury poisoning, indiscriminate poisons set for mammals, pesticides, acid rain, etc. must be closely monitored. With continued sound management and increased public awareness, the future of the Bald Eagle looks bright and promising and may truly be conservation's great success story.

Partially funded by a grant from the United States Environmental Protection Agency

1995

### Bibliography

- Bonney, Richard E., Jr; Kelley, John W.; Decker, Daniel J.; and Howard, Ronald A., Jr.  
Understanding Predation and Northeastern Birds of Prey. Ithaca, N.Y.: N.Y. State College of Agriculture/Cornell University.
- Clark, William S. "The Field Identification of North American Eagles." American Birds. September/October 1983.
- Davis, Bill. Massachusetts Division of Fisheries and Wildlife, Westborough, MA. Interview, 27 January, 1995.
- Defenders of Wildlife. The Bald Eagle. Washington, D.C.: Defenders of Wildlife.
- Johnsgard, Paul A. Hawks, Eagles, and Falcons of North America. Washington: Smithsonian Institution Press, 1990.
- Northern States Bald Eagle Recovery Plan.
- Palmer, Ralph S. Handbook of North American Birds. vol.IV. New Haven & London: Yale University Press, 1962.
- Seymour, George. Bald Eagle Leaflet. Sacramento, CA: California Dept. of Fish and Game.
- Terres, John K. The Audubon Society Encyclopedia of North American Birds. New York: Wing Books, 1991.



Natural Heritage & Endangered Species  
 Program  
 Division of Fisheries & Wildlife  
 Route 135  
 Westborough, MA 01581  
 (508)792-7270, ext. 200

## MASSACHUSETTS RARE AND ENDANGERED WILDLIFE

Common Tern  
 (Sterna hirundo)

### DESCRIPTION

Terns resemble small gulls, but are more graceful and have long forked tails, black caps and pointed bills. The Common Tern is 13 to 16 in (33-40 cm) long and has an orange-red bill with a black tip. **The amount of black on the bill changes from 1/3 of the bill in May to almost absent in July. The males and females are marked the same.** They are white below with pale gray back and wings. The white tail is edged with dark gray. The call is a harsh 'kee-urr'.



Forbush, E.H. Birds of Massachusetts.  
 Commonwealth of Massachusetts, 1929.

### SIMILAR SPECIES IN MASSACHUSETTS

The Roseate Tern usually has a solid black bill. The bill may have red at the base during May through July when the birds are incubating eggs. Unlike other terns in Massachusetts, the Roseate Tern's tail extends beyond the wing tips when at rest.

The Arctic Tern has a bill that is blood red to the tip and has short legs that give the bird the appearance of crouching. The Arctic Tern is grayer than the Common Tern and has white cheeks that contrast with the throat and breast.

### HABITAT IN MASSACHUSETTS

The Common Tern nests in colonies on sandy or rocky islands, sand dunes on barrier beaches and, less frequently, in salt marshes on sand spits and shingle beaches. This tern prefers areas that have open ground for the nest and patches of vegetation as cover for the chicks.

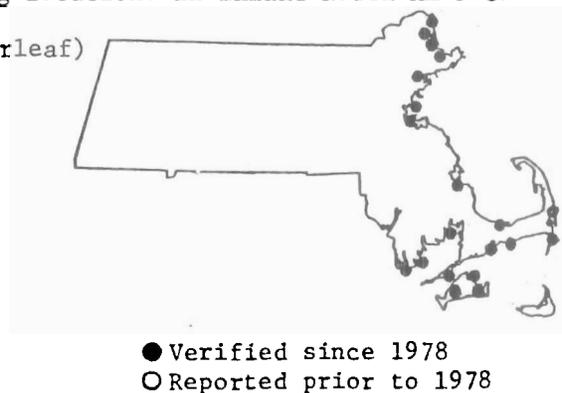
### RANGE

The Common Tern breeds along the Atlantic Coast from New England to North Carolina. It has scattered breeding locations in inland North America



Distribution of Sterna hirundo

(continued overleaf)



Breeding Distribution in Massachusetts  
 by Town

from northern New York, west through the Great Lakes to Montana and Alberta. The winter range of this species is from South Carolina and Baja, California, south to the Straits of Magellan.

In Massachusetts the Common Tern is restricted to the islands and barrier beaches along the coast. The Common Terns that nest in Massachusetts leave in September and October to wintering grounds on the coast of South America, from Colombia to southern Brazil. They return in late April or early May.

#### NESTING

The nests are depressions in the sand or a shallow cup of dead grass. Two or three mottled eggs are laid between mid-May and mid-June. Younger adults and birds that re-nest may continue to lay until mid-July. Both parents incubate the eggs which take about 22 days to hatch. The eggs usually hatch a day or two apart. Both adults also care for the chicks, bringing them fish to eat. The young are vulnerable to predation until they fledge about 23 days after hatching. The young birds depend on their parents for food for at least 8 weeks after fledging. In the late summer most of the birds move to the outer beaches of Cape Cod or the Islands. The families remain together at least until they migrate.

#### FEEDING

Common Terns feed within 5 miles (8 km) of the nesting area in shallow bays, inlets, tide-rips or along sheltered shorelines. They feed primarily on the sand lance (a slender fish up to 8.5 in) but also eat a variety of other small fish, crustaceans and invertebrates. They usually feed close to shore in water less than 15 in (40 cm) deep, but sometimes feed in deeper water over schools of predatory fish. Common Terns are generalist feeders taking a wide variety of prey by diving and dipping.

#### PREDATION AND DEFENSE

An important limit to breeding success is predation. Among the predators are the Great Horned Owl, Black-crowned Night Heron, Short-eared Owl, Common Crow, Red Fox, Norway Rat, Striped Skunk, Raccoon, Herring Gull and ants. The nocturnal Great Horned Owl will prey on adult terns as well as on the eggs and young birds. When the terns flee from the owl, other nocturnal predators are able to raid the nests unmolested. The terns do have a defense against diurnal predators such as humans, crows and gulls. A daytime intruder will be mobbed by the adult terns flying overhead, calling loudly, defecating, diving and even striking. Terns have suffered from displacement by the increasing numbers of gulls. If a pair of terns are unsuccessful at raising young several successive years they will relocate to another colony.

#### POPULATION STATUS

The Common Tern is classified as a Species of Special Concern in Massachusetts. In 1985 7,548 pairs nested in Massachusetts at 24 sites. The population is highly concentrated with 76% of the pairs nesting at only 4 sites. Massachusetts' population of Common Terns was greatly reduced by plume hunters in the late 1800's and recovered under protection to a peak of 40,000 pairs in the 1920's. Since the 1920's the tern population has declined overall with some years of increase. Though the 4 major colonies in Massachusetts are now protected from direct human disturbance through an intensive tern conservation program, large numbers of wintering terns are killed for food in South America.



# Natural Heritage & Endangered Species Program

MA Natural Heritage & Endangered Species Program  
Division of Fisheries & Wildlife  
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Westborough, MA 01581  
(508)792-7270, ext. 200

## MASSACHUSETTS RARE AND ENDANGERED PLANTS

### SILVERLING

(*Paronychia argyrochoma* (Michx.) Nutt.)

#### Description

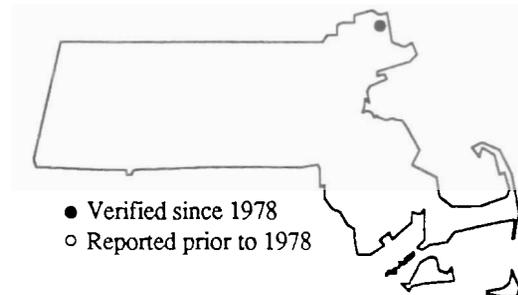
Silverling is a low-growing perennial in the Carnation family (Caryophyllaceae) that forms broad tufts. The plant rises from a slender taproot, and the 5-30 cm (2 - 12 in.) long, silky-hairy stems branch repeatedly at its base, giving the plant its tufted appearance. Although silverling generally grows singly or in small groups, it may occasionally grow in colonies. Its narrow, opposite leaves reach from 1 to 3 cm (0.4 - 1.2 in.) in length and may either be hairless or covered in silky hairs. In addition, the leaves have a pair of narrow stipules (vegetative appendages located where the leaves join the stem). Silverling's small flowers occur in dense, terminal, silvery clusters. Each blossom has five hairy sepals (members of the lowermost floral whorl) and petals that are greatly reduced and inconspicuous. The flowers are obscured by the thin, silvery



Crow, G. New England's Rare, Threatened, and Endangered Plants. U.S. Fish and Wildlife Service. 1982.



Documented Range of  
Silverling



Massachusetts Distribution by Town

**bracts (modified leaves associated with flowers).** Silverling blooms from July through August. Its fruit is a capsule (a fruit, containing many seeds, derived from a compound pistil).

#### Range

The documented range of silverling includes Maine, New Hampshire, Massachusetts and extends south to Virginia, West Virginia, North Carolina, Kentucky, Tennessee and Georgia.

#### Similar Species

Two other species of the genus *Paronychia* grow in Massachusetts--forked chickweed (*P. canadensis*) and hairy forked chickweed (*P. fastigiata*). However, both grow in habitats different from those of silverling; furthermore, their stems are not branched at the base.

#### Habitat in Massachusetts

In general, silverling grows in open areas in the crevices of granitic rock slopes and ledges and on gravelly soils that are poor in organic matter, usually at mid to upper elevations in mountains. The sole Massachusetts site--a granite, riverine island--is unique. Here, silverling grows in the crevices and crags of granite ledges situated above the high tide mark. It appears likely that this colony was established by seeds that floated down the Merrimack River. Among the tree species associated with silverling here are eastern red cedar (*Juniperus virginiana*), pitch pine (*Pinus rigida*), white pine (*Pinus strobus*), black cherry (*Prunus serotina*), gray birch (*Betula populifolia*) and various oaks (*Quercus* spp.). Other plant associates include black huckleberry (*Gaylussacia baccata*), crinkled hairgrass (*Deschampsia flexuosa*), pinweed (*Hypericum gentianoides*), sheep fescue (*Festuca ovina*), poison ivy (*Toxicodendron radicans*), and various mosses (*Polytrichum* spp.) and lichens.

#### Population Status

Silverling is presently listed as "Endangered" in Massachusetts, where there is only one current station. There is a severe lack of suitable habitat for silverling in the Commonwealth. Silverling is also considered rare in Maine, New Hampshire, West Virginia, Georgia, Kentucky and Tennessee. Threats to the species include heavy foot traffic and, at least in New England, its small population sizes and very restricted and local ranges.



# United States Department of the Interior

FISH AND WILDLIFE SERVICE  
New England Field Office  
22 Bridge Street, Unit #1  
Concord, New Hampshire 03301-4986



January 26, 1999

Mr. Anthony T. Mackos, P.E.  
Chief, Engineering/Planning Division  
U.S. Army Corps of Engineers  
696 Virginia Road  
Concord, MA 01742-2751  
ATTN: Evaluation Branch

Dear Mr. Mackos:

This responds to your letter, dated December 29, 1998, initiating coordination pursuant to the Fish and Wildlife Coordination Act and requesting information on the presence of federally-listed and proposed, endangered or threatened species in the vicinity of the flood protection feasibility study in Salisbury, Massachusetts.

This feasibility study will include a detailed examination of flooding problems in the Bayberry Lane area of Salisbury. All practical structural and non-structural flood control alternatives will be evaluated. A preliminary plan consists of approximately 3500 linear feet of floodwall along the periphery of the saltmarsh, on the inland side of Rt. 1A.

A member of my staff was unable to attend the on-site meeting due to a prior commitment. However, we will be happy to comment on the study as it progresses and will participate in the Section 404(b)(1) evaluation of any alternative selected for implementation.

Based on information currently available to us, the only federally-listed or proposed, threatened or endangered species under the jurisdiction of the U.S. Fish and Wildlife Service known to occur in the project area is the endangered piping plover (*Charadrius melodus*). Piping plovers are known to nest on both Salisbury Beach (at/near the State Park) and at Seabrook immediately north of the State line. Plovers feed in the intertidal zone along the beach and may nest south of the State line if the beach profile changes.

We suggest that you contact Hanni Dinkeloo of the Massachusetts Natural Heritage and Endangered Species Program, Division of Fisheries and Wildlife, 1 Rabbit Hill Road, Westborough, MA 01581-3337, at 508-792-7270, for information on state-listed species that may be present.

If you have any questions concerning these comments, please contact Philip Morrison at 603-225-1411.

Sincerely,

William J. Neidermyer  
Acting Supervisor  
New England Field Office

SAL- MEPA  
Johnson

Johnson/ja/78138

December 28<sup>29</sup>, 1998

Engineering/Planning Division  
Evaluation Branch

Mr. Jay Wickersham  
Executive Office of Environmental Affairs  
Massachusetts Environmental Policy Act Unit  
100 Cambridge Street  
Boston, Massachusetts 02202

Dear Mr. Wickersham:

This office is currently conducting a feasibility study under Section 205 of the 1948 Flood Control Act, as amended, in Salisbury, Massachusetts. Section 205, which is part of the Continuing Authorities Program, gives the U.S. Army Corps of Engineers authority to evaluate and design solutions to flooding problems. The purpose of this letter is to initiate study coordination on the proposed project. As the study progresses, an Environmental Assessment for the proposed work will be prepared. A Coastal Zone Management Consistency Determination, a Water Quality Certification, a Clean Water Act Section 404(b)(1) Evaluation, and appropriate State permits will also be acquired for any proposed work. A location map is enclosed to aid you in your work.

The study area is located in a residential area of Salisbury, Massachusetts. Salisbury is situated along the Atlantic shoreline approximately 30 miles northeast of Boston, Massachusetts. Recurring flooding along the Blackwater River tidal estuary prompted the Salisbury Town Manager to seek Federal assistance in solving this problem. This flooding problem was exacerbated in recent years with the replacement of the Route 286 bridge in New Hampshire. The new bridge has a larger opening, which has resulted in greater tidal fluctuations upstream from the bridge.

To determine the feasibility of Federal assistance by the Corps, a preliminary plan for flood protection was developed. This preliminary plan consists of approximately 3500 linear feet of floodwall that would extend from a point north of 9<sup>th</sup> Street, along the periphery of the saltmarsh, to a point south of Florence Avenue (see enclosed Location Map). The floodwall would consist of a vinyl sheet pile wall with a top elevation of 8.0 feet National Geodetic Vertical Datum (NGVD) and would include a landside earth berm. The plan also includes a pumping station to discharge interior runoff, and a storm water collection system. The preliminary plan would protect about 135 structures from flooding up to approximately the 10-year event.

The feasibility study will include a detailed examination of flooding problems in the Bayberry Lane area, which extends from 9<sup>th</sup> Street to Florence Avenue. All practical structural and non-structural flood control alternatives to address the flood problems and needs of this area will be formulated and evaluated. Reconnaissance level investigations of three other areas along the Blackwater River will also be conducted. These areas include Liberty Street, 16<sup>th</sup> and 17<sup>th</sup> Streets, and Beach Road. If flood protection in any of these areas is found to be economically feasible, the study will be expanded to include more detailed studies in those areas.

Ms. Judith Johnson, the Project Biologist, and Mr. Richard Heidebrecht, the Study Manager, will be conducting a coordinated on-site meeting with interested natural resource agency personnel on Tuesday, January 19, 1999, at 12:30 p.m. The purpose of the meeting is to explain the proposed project and to elicit agency concerns and suggestions. Please meet at the site identified on the enclosed location map. Your agency's participation at this meeting would be greatly appreciated.

If you require any further information, please contact Ms. Johnson at 978-318-8138 or Mr. Heidebrecht at 978-318-8513.

Sincerely,

Anthony T. Mackos, P.E.  
Chief, Engineering/Planning Division

Enclosure

CF:  
Bill Hubbard - E:mail  
Dick Heidebrecht - Eng/Plng  
Judith Johnson - Eng/Plng  
Eng/Plng Div Files  
*(SAL-MEPA)*

## Similar Letter sent to:

Mr. Jay Wickersham  
Executive Office of Environmental Affairs  
Massachusetts Environmental Policy Act  
Unit  
100 Cambridge Street  
Boston, Massachusetts 02202

Ms. Margaret Brady, Director  
Executive Office of Environmental Affairs  
Coastal Zone Management  
100 Cambridge Street  
Boston, Massachusetts 02202

Mr. Ed Reiner  
U.S. Environmental Protection Agency -  
CMA  
Region I  
J.F.K. Federal Building  
Boston, Massachusetts 02203

Mr. Jan Reitsma, Acting Secretary  
Executive Office of Environmental Affairs  
100 Cambridge Street  
Boston, Massachusetts 02202

Mr. Leigh Bridges  
Massachusetts Division of Marine Fisheries  
30 Emerson Avenue  
Gloucester, Massachusetts 01930

Mr. Michael Bartlett, Supervisor  
U.S. Department of the Interior  
Fish and Wildlife Service  
22 Bridge St., Ralph Pill Bldg.,  
4th Floor  
Concord, New Hampshire 03301

Mr. Donald R. Levesque, Director  
Department of Public Works  
Town of Salisbury  
39 Lafayette Road  
Salisbury, Massachusetts 01952

Mr. Michael W. Basque  
Town Manager  
Town of Salisbury  
Town Hall, P.O. Box 5072  
Salisbury, Massachusetts 01952

Mr. Peter Colosi  
Asst. Regional Dir. of Habitat Conserv.  
National Marine Fisheries Service  
Northeast Region  
One Blackburn Drive  
Gloucester, Massachusetts 01930-2298

Ms. Patricia Huckery  
Massachusetts Natural Heritage and  
Endangered Species Program  
Division of Fish and Wildlife  
One Rabbit Hill Road  
Westborough, Massachusetts 01581

Dr. Robert Deblinger, Ph.D.  
Assistant Director, Wildlife  
Division of Fish and Wildlife  
One Rabbit Hill Road  
Westborough, Massachusetts 01581

Mr. Richard Thibedeau, Director  
Bureau of Resource Protection  
Massachusetts Department of  
Environmental Management  
100 Cambridge Street, Room 1404  
Boston, Massachusetts 02202

Mr. Eugene Cavanaugh, Director  
Massachusetts Department of  
Environmental Management  
Office of Waterways  
349 Lincoln Street, Bldg. 45  
Hingham, Massachusetts 02043



COMMONWEALTH OF MASSACHUSETTS  
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS  
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT



OFFICE OF WATERWAYS  
349 LINCOLN ST. BLDG. #45, HINGHAM, MA 02043 PHONE 781-740-1600  
FAX 617-727-2950

March 18, 1998

Argeo Paul Cellucci  
GOVERNOR

Trudy Coxé  
SECRETARY

Peter C. Webber  
COMMISSIONER

Lieutenant Colonel Michael W. Pratt  
U.S. Army Corps of Engineers  
424 Trapelo Road  
Waltham, Massachusetts 02254-9149

Re: Salisbury/Salisbury Beach Flood Protection

Dear Colonel Pratt:

Please consider this letter as an indication of our intent to participate with the Corps of Engineers as the Local Sponsor for a feasibility study to protect part of Salisbury Beach from tidal back-shore flooding influenced by the bridge at Route 286 in Seabrook, NH. It is our understanding that the study will focus on the chronic tidal flooding problems being experienced in the area between 9th Street and Florence Avenue in Salisbury Beach, and that the study will also address tidal flooding in other areas between there and Beach Road.

We have been informed by your staff that the total estimated cost of the feasibility study will be \$210,000.00, the first \$100,000.00 of which will be borne entirely by the Corps of Engineers. We also understand that the remaining \$110,000.00 will be divided equally at \$55,000.00 each between the Corps and the Local Sponsor for the study. Please be advised that we presently expect that the local cost share for the study will also be divided equally between DEM and the Town of Salisbury, with each to be responsible for \$27,500.00 in study costs.

The feasibility study needs to explore both structural and non-structural alternatives to determine the most cost-efficient and environmentally benign approaches to alleviate the tidal flooding. This would include evaluation of the cost-effectiveness of retro-fitting the Route 286 bridge opening, flood-proofing the impacted structures, enhancing the Town's flood protection measures, erecting a protective flood wall, and other possible alternatives.

When we have received a draft Feasibility Cost Sharing Agreement (FCSA) from the Corps, we will use it to develop a

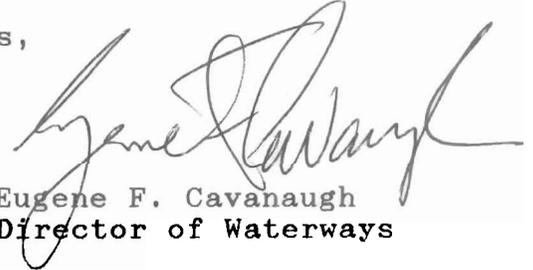
"mirror" State/Local Agreement with the Town. The "mirror" agreement will provide for Town financial participation with DEM on the feasibility study, and for DEM coordination of study activities between the Corps and the Town. Please be advised that we will also be contacting the New Hampshire Department of Transportation regarding their potential participation in study cost sharing, since the bridge creating the problem lies across the state boundary in New Hampshire.

If there are any questions, please contact me at (781) 740-1600.

Very truly yours,



Richard Thibedeau  
Director of Resource Protection



Eugene F. Cavanaugh  
Director of Waterways

EFC/LRL/lrl

Cc: Senator James P. Jajuga  
Representative Kevin Finnegan  
Commissioner Peter C. Webber, DEM  
Martin Suuberg, Deputy Commissioner  
Richard Heidebrecht, Corps of Engineers  
Michael Basque, Town Manager, Town of Salisbury



# Town of Salisbury

Massachusetts 01952

TOWN MANAGER  
(508) 465-2310

May 28, 1997

Mr. John Kennelly  
Army Corps of Engineers  
424 Trapelo Rd.  
Waltham, MA 02254-9149

Dear Mr. Kennelly:

As you are aware, the Town of Salisbury has experienced severe flooding over the past several years in the Black Rocks Creek area. This section of the community located in the north section of the beach, specifically in the areas of 9th Street, 10th Street, 11th Street, 12th Street and Liberty Street seem to be the most affected.

As I know you are aware of the flooding problems in this area, I would like to request your assistance in finding a solution to this problem. In that there are public safety issues involved, I would request that this be a high priority project.

If you have any questions, please feel free to contact me.

Sincerely,

A handwritten signature in cursive script, appearing to read "Michael W. Basque".

Michael W. Basque

MWB/jef