



Natural Heritage & Endangered Species Program

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Massachusetts Division of Fisheries & Wildlife

Dwarf Bulrush *Lipocarpa micrantha* (Vahl.) G. Tucker

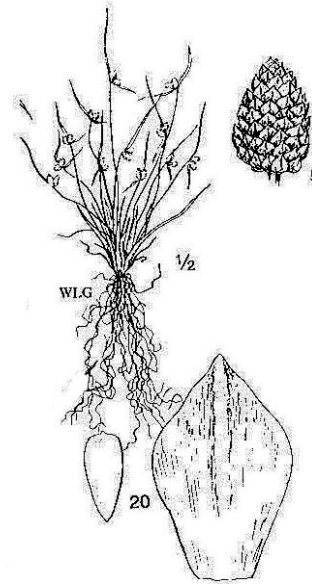
State Status: **Threatened**

Federal Status: **None**

DESCRIPTION: Dwarf Bulrush (*Lipocarpa micrantha*) is a tiny, wiry annual sedge (family Cyperaceae), which inhabits sandy to peaty shores of low-nutrient ponds and lakes.

AIDS TO IDENTIFICATION: Reaching just 2 to 20 cm (<0.1–8 in.) in height, this tiny bulrush grows in small tufts, and has very slender stems, leaves, and bracts. The leaves are up to 10 cm (4 in.) in length, and just 0.5 mm wide. The terminal bract appears to be a continuation of the stem, and the inflorescence appears lateral. The stem bears 1 to 3 egg-shaped spikelets, each with numerous spirally-arranged, overlapping scales. The scales are 1 to 2 mm long, and narrowly rounded with a small awn (sharp tip). The flowers, which develop beneath the scales, have both female and male parts, and no bristles. The fruit, an achene, is cylindric, iridescent brown, and 0.5 to 0.7 mm long.

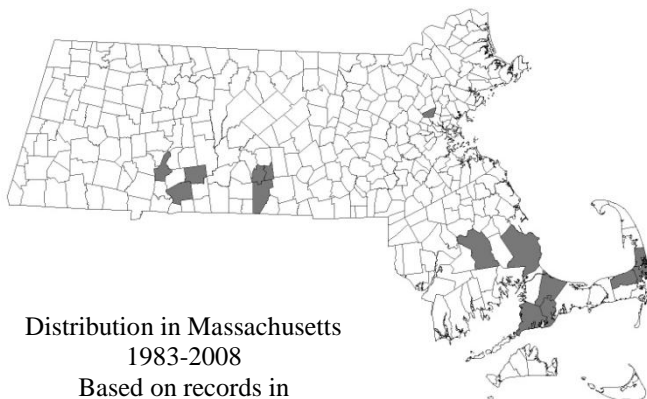
SIMILAR SPECIES: When examined at maturity, Dwarf Bulrush is not likely to be confused with other bulrushes in Massachusetts, due to its dwarf size and slender foliage.



Holmgren, N.H. 1998. *The Illustrated Companion to Gleason and Cronquist's Manual*. NY Botanical Garden.

HABITAT: Dwarf Bulrush inhabits sandy to peaty, gently sloping shores of acidic, low-nutrient freshwater ponds with dramatic water-level fluctuation. This annual sedge germinates in a band of shore exposed following late season water-level recession. In Massachusetts, it is found along the shores of coastal plain ponds, and of ponds outside of the coastal plain that have similar hydrology, and water chemistry.

Associated species include several species of flatsedge (*Cyperus* spp.), Autumn Fimbry (*Fimbristylis autumnalis*), Canadian St. John's-wort (*Hypericum canadense*), Golden Hedge-hyssop (*Gratiola aurea*), and several species of spike-sedge (*Eleocharis* ssp.).



Distribution in Massachusetts
1983-2008

Based on records in
Natural Heritage Database

A Species of Greatest Conservation Need in the Massachusetts State Wildlife Action Plan

Massachusetts Division of Fisheries & Wildlife

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THREATS: Threats to Dwarf Bulrush include any activities that change the natural hydrology, water quality, or soil integrity of its habitat. Examples include water table drawdown from local wells, eutrophication resulting from nutrient inputs from septic systems and lawns, and trampling and soil disturbance due to recreational use of pondshores (i.e., hiking, sunbathing, swimming, fishing, boat-launching, and raking or digging).

RANGE: The range of Dwarf Bulrush is broad, encompassing nearly all of the eastern and midwestern states, Quebec and Ontario, and a portion of the west. It is rare or extirpated throughout most of New England.

POPULATION IN MASSACHUSETTS: Dwarf Bulrush is listed under the Massachusetts Endangered Species Act as Threatened. All listed species are legally protected from killing, collection, possession, or sale, and from activities that would destroy habitat and thus directly or indirectly cause mortality or disrupt critical behaviors. Dwarf Bulrush is currently known from Barnstable, Hampden, Middlesex, Plymouth, and Worcester Counties, and is historically known from Dukes, Essex, Hampshire, and Norfolk Counties.

MANAGEMENT RECOMMENDATIONS: Preservation of Dwarf Bulrush requires protection of the natural hydrology, water quality, and soil integrity of its habitat. Like other pondshore plant species that inhabit late-season exposed shores, it requires pronounced water-level fluctuations, and acidic, nutrient-poor water and substrate, free from major soil disturbance.

Dwarf Bulrush populations should be monitored regularly to identify possible threats. This species is best surveyed when mature fruit are present, mid-August to late September, depending on when water levels recede.

Protection of Dwarf Bulrush may require exclusion of new wells and septic systems, prohibitions on fertilizer use, and restrictions on recreational use of the pondshores. Recreational activities such as swimming, fishing, and boat-launching should be diverted from plant population locations by providing alternative locations for these activities.

Also, habitat should be monitored for exotic plant species invasions. The nature of coastal plain ponds makes them generally inhospitable to many exotic plants, but they can become established at sites that have major soil disturbance or heavy nutrient inputs. Exotic species that could establish along the shoreline of coastal plain ponds include Common Reed (*Phragmites australis* ssp. *australis*), Gray Willow (*Salix cinerea*), and Purple Loosestrife (*Lythrum salicaria*). All active management of rare plant populations (including invasive species removal) is subject to review under the Massachusetts Endangered Species Act, and should be planned in close consultation with the Massachusetts Natural Heritage & Endangered Species Program.

Fruiting time in Massachusetts

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Updated 2015

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Natural Heritage & Endangered Species Program

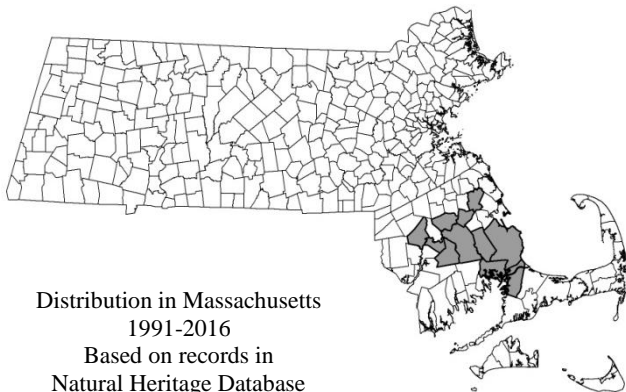
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Massachusetts Division of Fisheries & Wildlife

Northern Red-bellied Cooter *Pseudemys rubriventris* pop.1

State Status: **Endangered**
Federal Status: **Endangered**

DESCRIPTION: The Northern Red-bellied Cooter (*Pseudemys rubriventris* LeConte, 1830) is a distinctive, large (25 to 34 cm [10 to 13.5 in.]), basking turtle that can weigh up to 5.8 kg (12.7 lbs). The carapace (upper shell) of an adult Red-bellied Cooter is black to brown with faint reddish markings. The plastron (bottom shell) of the males is pale pink with dark mottling, while females have red plastrons with borders of grey along the seams of the shell plates. The color of the head, neck, limbs, and tail is black, with yellow or ivory lines. The upper jaw is notched, and a yellow arrow-shaped stripe runs along the throat and neck. Both sexes may become progressively melanistic (blacken) with age. Some adult males develop a marbled reddish carapace. Males are smaller (average 27.2 cm; max. 30.7 cm), than females (average 29.8 cm; max. 34.3 cm), but have longer tails and longer front claws. Hatchlings are about 2.5 cm (1 in.) in length, and more circular in shape, than adults. They have a slightly keeled, olive or green carapace marked with greenish-yellow hieroglyphics. Like adults, juveniles have yellow stripes on the head, neck, and limbs.



Above: An adult female Northern Red-bellied Cooter from Plymouth, Mass., showing characteristic brownish carapace with red markings.

SIMILAR SPECIES: Eastern Painted Turtles (*Chrysemys picta*) are often mistaken for Red-bellied Cooters. Both species have yellow markings on the head and neck and both may have orange plastrons. Red-bellied Cooters lack a pronounced yellow spot behind the eye, have alternated patterned scutes across the back (unlike the Eastern Painted Turtle), can be five times as massive (as adults), and have a carapace that is normally flattened or slightly depressed on top. The Red-bellied Cooter's plastron is coral red or pink, often with dark markings and circular spots along the perimeter, whereas, the Painted Turtle in Plymouth County usually has a solid orange or yellow plastron with no dark markings and a striped perimeter. The Red-Eared Slider (*Trachemys scripta elegans*) is not native to Massachusetts, but has become common in some ponds in the Plymouth area. Sliders may be told from Red-bellied Cooters by the red stripe behind the eye and darker markings on the plastron. Other turtles from the pet trade occasionally show up, including southern species of Cooters and the Yellow-Bellied Slider (*Trachemys scripta scripta*).

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TOP: A comparative photo of a female (left) and male (right) Northern Red-bellied Cooter from Plymouth, Mass. Note the pinkish red plastron color of the female and the larger overall size. MIDDLE: Some adult males (such as the one pictured here) become melanistic with age, losing their juvenile coloration. BOTTOM: Occasionally, older males will develop a marbled, salmon-colored carapace.

RANGE: Massachusetts populations of Northern Red-bellied Cooter comprise an isolated, disjunct population approximately 200 miles from the nearest populations in New Jersey. In Massachusetts, the species is currently confined to ponds and rivers within Plymouth County and eastern Bristol County. Massachusetts populations were formerly described as a distinct subspecies, *P. rubriventris bangsi* (Plymouth Redbelly Turtle). The primary range of the Northern Red-bellied Cooter extends from the Coastal Plain of New Jersey south to the Outer Banks of North Carolina, inland to West Virginia in the Potomac watershed. Archaeological evidence from Massachusetts midden sites indicates that prior to European settlement, Red-bellied Cooters occurred as far north as Ipswich, Essex County, as well as in the Sudbury River and on Martha’s Vineyard.

HABITAT IN MASSACHUSETTS: In Massachusetts, the Northern Red-bellied Cooter primarily inhabits freshwater ponds and rivers that have abundant aquatic vegetation and suitable basking sites in the form of logs, rocks, and vegetation mats. Most of the original documented occurrences of Red-bellied Cooters were associated with coastal plain ponds, although they have also been documented in manmade reservoirs and cranberry ponds and introduced to larger lakes and rivers. Red-bellied Cooters nest in exposed sand and gravel, lawns, gardens, and roadsides near ponds and rivers from late May to early July.



Above: Exemplary coastal plain pond habitat of the Northern Red-bellied Cooter in Plymouth, Mass.

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LIFE CYCLE & BEHAVIOR: Red-bellied Cooters overwinter at the bottom of ponds and rivers. During the active season, they are found almost exclusively in water. Females will emerge to nest and some individuals each year will move between nearby ponds. Red-bellied Cooters bask on logs, woody debris, rocks, vegetation mats, and manmade rafts throughout the active season.

The Red-bellied Cooter feeds primarily on aquatic vegetation, particularly milfoil (*Myriophyllum* spp.). Especially when young, it may occasionally eat crayfish and invertebrates.

It is known that mating occurs frequently in the spring. From late May to early July, the female begins nesting activity. Red-bellied Cooters have been found nesting on both vegetated and unvegetated areas and in disturbed as well as undisturbed soils. Females typically nest within 91 m (100 yds) of the water's edge. Females dig flask-shaped nests approximately 10 cm (4 in.) deep. In Massachusetts, females typically lay 10-20 eggs and incubation lasts approximately 73 to 80 days. Red-bellied Cooters exhibit temperature-dependent sex determination (TSD); warmer nest site temperatures produce females and cooler sites produce males. Hatchlings emerge from late August through October; overwintering in the nest has been observed very rarely in Plymouth. Hatchling emergence depends more on the conditions of the substrate, temperature patterns, and nest site location than on the timing of egg deposition by the females. Rainfall may also affect emergence. Some hatchlings may overwinter in the nest if the late summer weather is unseasonably cool.

Female Red-bellied Cooters reach maturity at approximately 13 to 20 years of age (later than males). Sexual dimorphism may be apparent at 5 to 7 years. The life expectancy is believed to be more than 50 years.

THREATS: Although the Northern Red-bellied Cooter appears to be a pond and riverine generalist across most of its range, it has unique biological needs that make it vulnerable to a variety of environmental changes at the northern edge of its range. Available nesting habitat has probably decreased over the last two decades due to residential construction and changes in certain land use practices, such as fire suppression. In the past, areas adjacent to the ponds burned with some regularity, creating pitch pine/scrub oak barrens dotted with

openings and grasslands. Such openings were good nesting areas, allowing the heat of the sun to penetrate and incubate the eggs. Today, these areas burn infrequently and, as a result, consist more of closed-canopy forests. Residential expansion has also increased population densities of natural predators, collection as pets, water pollution, and road mortality.

In some instances, herbicide use in ponds to decrease pond vegetation and the infiltration of herbicides from adjacent cranberry bogs is believed to have altered the Red-bellied Cooter's food source and exposed it to chemical contamination. These impacts combined with the species' late maturation age and low rate of reproduction (less than one-third of females reproduce yearly) have made it difficult for the Red-bellied Cooter to thrive. Hatchling mortality is very high for this species, with intense predation on the eggs by skunks and raccoons (which increased in population size as residential areas increased) destroying as many as half of the Red-bellied Cooter's existing nests. Bullfrogs, water snakes, wading birds, and predatory fish such as pickerel and bass feed on hatchling turtles.



Above: Note the strongly cusped jaws of this adult female Northern Red-bellied Cooter.

MANAGEMENT RECOMMENDATIONS:

Continued inventory and population studies, targeted habitat management, upland habitat conservation, and public outreach and education are vital to the recovery and persistence of the Northern Red-bellied Cooter in Massachusetts.

Management needs include periodic, standardized monitoring of known and potential populations. It is also of primary importance to protect occupied and potential

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habitat, while improving habitat at ponds with known populations by clearing or creating nesting beaches and providing basking sites where necessary.

The Natural Heritage and Endangered Species Program has led a headstarting program for Red-bellied Cooters since 1984. MassWildlife, in cooperation with numerous partners, annually collects about 100 hatchlings each year and raises them in captivity for their first year, producing yearlings that at the time of release are approximately the size of a 3-year-old in the wild. The larger yearlings are significantly less likely to be predated and therefore more likely to make it to adulthood. From 1984 to 2016, more than 4,000 headstarted turtles have been released at more than 30 sites in southeastern Massachusetts. From 2013 to 2016, MassWildlife and the University of Massachusetts Amherst partnered on a study of the effectiveness of the headstart program, finding that annual survivorship rates appear to exceed 95% in many ponds and that reproduction and recruitment in headstarted populations is widespread but locally variable. Research is ongoing to determine the extent and status of the Northern Red-bellied Cooter population in Massachusetts.

ACTIVE PERIOD

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

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Updated 2016

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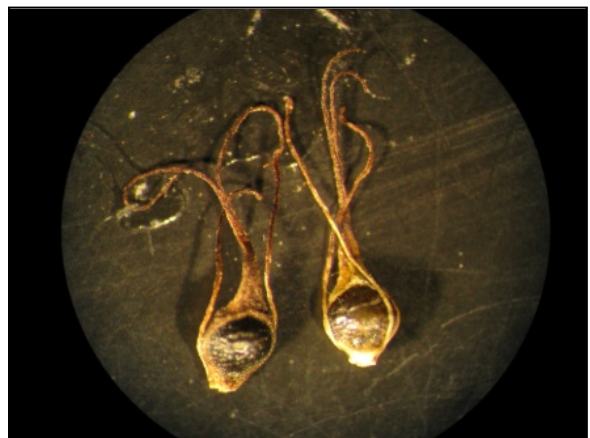
Long-beaked Beaksedge *Rhynchospora scirpoides* (Torrey) A. Gray

State Status: **Special Concern**

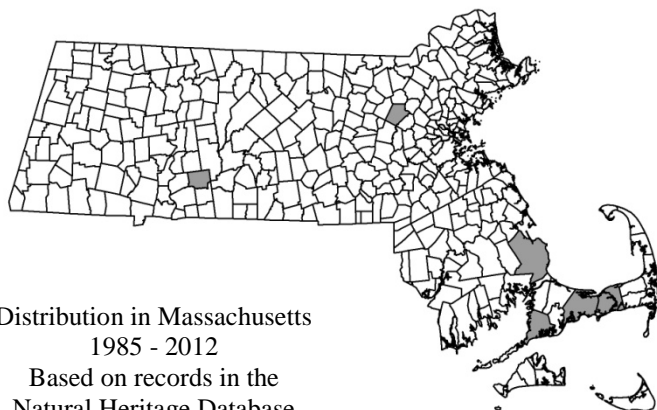
Federal Status: **None**

DESCRIPTION: Long-beaked Beaksedge is a caespitose annual in the Sedge family (Cyperaceae) that occurs on coastal plain pond shores in Massachusetts. The genus name *Rhynchospora* (“beaked seed”) refers to the tubercle (triangular projection) that is found at the summit of the achenes (one-seeded, dry, fruits). The species name *scirpoides* means “resembles a bulrush” (*Scirpus*), referring to the growth form and the shape of the spikes. Long-beaked Beaksedge grows 20 to 80 cm tall. It has both terminal and axillary inflorescences, with long, leafy bracts that exceed at least the axillary ones.

AIDS TO IDENTIFICATION: A technical manual and hand lens or microscope are needed for identification of Long-beaked Beaksedge and other *Rhynchospora* species. This species is best identified with mature fruits. The achenes are orbicular to lenticular, red-brown to dark brown, with a faintly rugose (horizontally wrinkled) body. The achene is 1 to 3 mm long, including a tall tubercle (0.5–0.9 mm) that is continuous with the ridged margin of the achene. The leaves are flat, narrow, 1 to 5 mm wide, and have glabrous sheaths. The lower portion of the culm (flowering stem) is leafy.



Long-beaked Beaksedge has terminal and axillary inflorescences with long, leafy bracts (top); achenes are faintly rugose, with long tubercles (bottom). Photos by Jennifer Garrett.



Distribution in Massachusetts
1985 - 2012
Based on records in the
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SIMILAR SPECIES: Long-beaked Beaksedge is distinct from other beaksedges (*Rhynchospora* spp., often referred to as beaked-rushes) in having a relatively long tubercle (beak). This species is very similar to Short-beaked Beaksedge (*R. nitens*), a Threatened species in Massachusetts that grows in the same habitats and may be found with Long-beaked Beaksedge. Short-beaked Beaksedge has a shorter tubercle (0.1–0.3 mm tall) and distinctly rugose achenes with ridged margins that end abruptly at the tubercle. Long-beaked Beaksedge also may be mistaken for the more common Autumn Fimbry (*Fimbristylis autumnalis*), an associated species that is smaller, thinner, and does not have a tubercle on the achene.

POPULATION STATUS IN MASSACHUSETTS:

Long-beaked Beaksedge is listed under the Massachusetts Endangered Species Act as Special Concern. All listed species are protected from killing, collecting, possessing, or sale, and from activities that would destroy habitat and thus directly or indirectly cause mortality or disrupt critical behaviors. Long-beaked Beaksedge is currently known from Barnstable, Plymouth, and Middlesex Counties, and an inland coastal plain pond shore in Hampden County. Curiously, this species has not been found in coastal plain pond habitats in Bristol, Dukes or Nantucket Counties.

RANGE: Long-beaked Beaksedge occurs in the eastern coastal states from Massachusetts, Connecticut, and Rhode Island south to Florida, where it can be found year-round. Its range extends west in the southern coastal states to Texas; it is also found in Michigan, Indiana, and Wisconsin.

HABITAT: Long-beaked Beaksedge is found in wet, peaty sands of gently sloping coastal pond shores and depressions with seasonal and annual water level fluctuations. This species can be found when pond levels are drawn down and the pond shore becomes exposed, often growing with a suite of annual sedges, grasses, and herbs characteristic of coastal plain ponds. Long-beaked Beaksedge grows with several other rare species, including Short-beaked Beaksedge, Wright’s Rosette-grass (*Dichantheium wrightianum*), and Plymouth Gentian (*Sabatia kennedyana*). Associated species on the Plant Watch List are Annual Umbrella-sedge (*Fuirena pumila*), Black-fruited Spike-sedge (*Eleocharis melanocarpa*), Pink Tickseed (*Coreopsis rosea*), and Hyssop Hedge-nettle (*Stachys hyssopifolia*). More

common associates include other beaksedges (*Rhynchospora* spp.), spike-sedges (*Eleocharis* spp.), Autumn Fimbry, Canada Bluejoint (*Calamagrostis canadensis*), Warty Panic-grass (*Panicum verrucosum*), White Water-lily (*Nymphaea odorata*), Yellow-eyed Grass (*Xyris difformis*), and many other coastal plain pond shore species.

THREATS AND MANAGEMENT

RECOMMENDATIONS: Protection of natural hydrological conditions is critical for conservation of Long-beaked Beaksedge and other species restricted to coastal plain pond shore habitats. Water withdrawals and residential development near coastal plain ponds should be limited to avoid disruptions to these sensitive ecosystems. Regular monitoring of known occurrences of rare pond shore species is important to identify threats to specific populations. Surveys should be conducted when water levels are low and pond shore habitat is exposed, as seeds survive in the seed bank and germinate on exposed substrate. Beach use and small boat launches should be located in areas that will not threaten known populations. Off-road vehicles and bicycles should be strictly prohibited on pond shores, and trails should be located along upper shore lines and shrub borders so that trampling of sensitive vegetation is avoided. Although invasive species monitoring is recommended, caution is needed with herbicide or other treatments to avoid damage to populations of rare species. All active management of state-listed plant populations (including invasive species removal) is subject to review under the Massachusetts Endangered Species Act, and should be planned in close consultation with the Massachusetts Natural Heritage & Endangered Species Program.

Flowering and Fruiting in Massachusetts

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

REFERENCES:

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 NYNHP Conservation Guide - Long-beaked Beakrush (*Rhynchospora scirpoides*). New York Natural Heritage Program, Albany, NY.

Updated 2019

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Plymouth Gentian *Sabatia kennedyana*

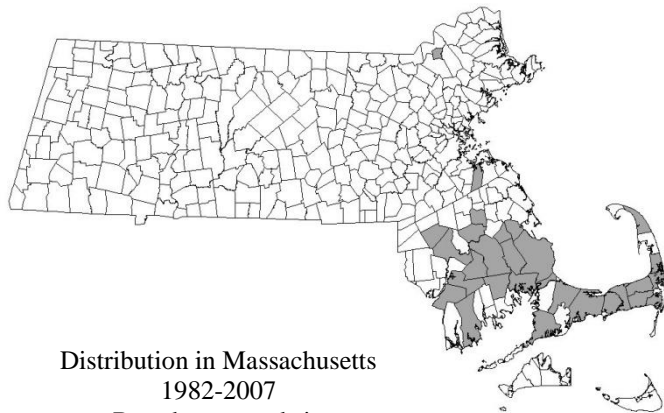
Fernald

State Status: **Special Concern**

Federal Status: **None**

DESCRIPTION: Plymouth Gentian (*Sabatia kennedyana*) is a globally rare and showy perennial herb of the gentian family (Gentianaceae), with striking pink and yellow flowers and opposite lance-shaped leaves. It inhabits the sandy and peaty shorelines of coastal plain ponds.

AIDS TO IDENTIFICATION: Plymouth Gentian reaches 12 to 28 inches (30–70 cm) in height, with opposite branches bearing narrowly lanceolate leaves. The leaves are entire, sessile, and 0.8 to 5 inches (2–5 cm) in length. The flowers, which form atop long pedicels, are pink with a yellow center bordered by red; they have 9 to 11 petals, each of which is 0.6 to 1.1 inches (1.5–3 cm) in length. Plymouth Gentian blooms between early July and mid-September, depending on when the water level of the site decreases enough to expose adequate shoreline. The fruit is a capsule with two valves.



Distribution in Massachusetts
1982-2007

Based on records in
Natural Heritage Database

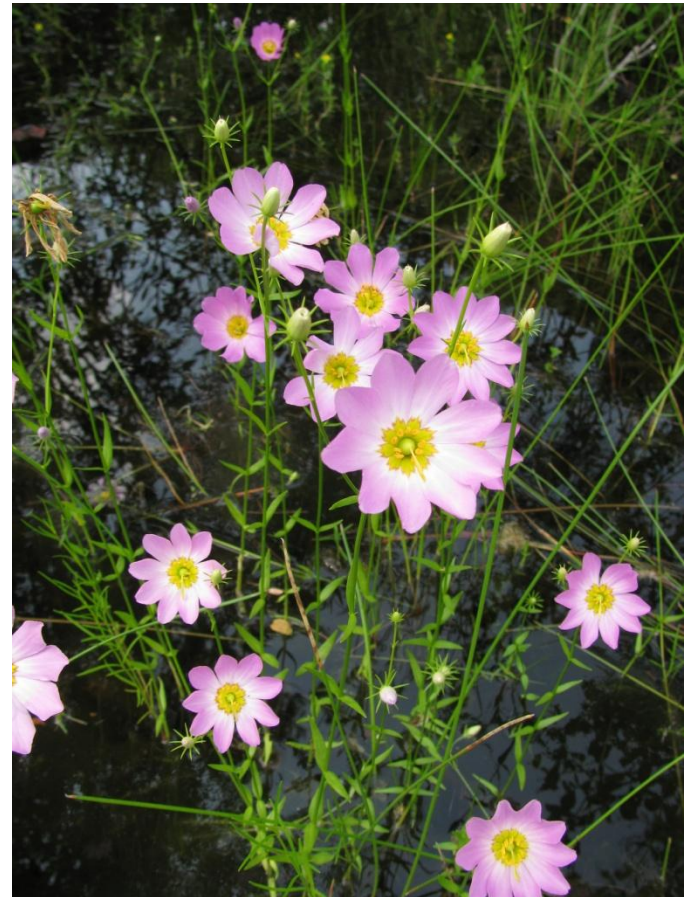


Photo by Jennifer Garrett, NHESP

SIMILAR SPECIES: Slender Marsh Pink (*Sabatia campanulata*, Endangered) occurs in similar habitat in Massachusetts, but has only 7 or fewer petals per flower. Rose Coreopsis (*Coreopsis rosea*), another showy flower of coastal plain pondshores, is somewhat similar to Plymouth Gentian due to its radial pink and yellow inflorescence. Rose Coreopsis, however, is a composite (family Asteraceae) with disc and ray flowers, and linear, rather than lanceolate, leaves.

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HABITAT IN MASSACHUSETTS: Plymouth Gentian grows along the seasonally wet, sandy to peaty soils of low-nutrient, acidic, coastal plain pondshores. It prefers full sun and does not compete well with shrubs; therefore, fluctuating water levels are important for the persistence of this species at a site. Associated species include Golden Hedge-hyssop (*Gratiola aurea*), Pondshore Rush (*Juncus pelocarpus*), Slender-leaved Goldenrod (*Euthamia tenuifolia*), Toothed Flatsedge (*Cyperus dentatus*), and Rose Coreopsis (*Coreopsis rosea*). Several rare species can be associated with Plymouth Gentian, including Long-beaked Bald-sedge (*Rhynchospora scirpoides*, Special Concern), Short-beaked Bald-sedge (*Rhynchospora nitens*, Threatened), Torrey’s Beak-sedge (*Rhynchospora torreyana*, Endangered), Terete Arrowhead (*Sagittaria teres*, Special Concern), and Wright’s Panic-grass (*Dichantherium wrightianum*, Special Concern).

THREATS: Plymouth Gentian is threatened by any activity that changes the hydrologic regime, water, quality, or soil integrity of the coastal plain pond it inhabits. Region-wide, coastal plain ponds are imperiled due to shoreline development, water table drawdown (from wells), eutrophication (resulting from fertilizers and septic systems), and soil disturbance from heavy recreational use (ORV, horse, and foot traffic; camping; boat-launching; raking and digging).

RANGE: Plymouth Gentian has a very limited range, consisting of the coastal plain areas of Nova Scotia, Massachusetts, Rhode Island, North Carolina, South Carolina, and Virginia; it is rare in each of these locations except for Virginia (where it has been introduced).

POPULATION STATUS IN MASSACHUSETTS: Plymouth Gentian is listed under the Massachusetts Endangered Species Act as a Species of Special Concern. All listed species are legally protected from killing, collection, possession, or sale, and from activities that would destroy habitat and thus directly or indirectly cause mortality or disrupt critical behaviors. Plymouth Gentian is currently known from Barnstable, Essex, Norfolk, and Plymouth Counties, and is historically known from Nantucket County.

MANAGEMENT RECOMMENDATIONS: Management of Plymouth Gentian requires protection of the hydrology, water quality, and soil integrity of its

habitat. Like many other coastal plain pondshore plant species, Plymouth Gentian requires pronounced water-level fluctuations; acidic, nutrient-poor water and substrate; and an open, exposed shoreline, free from major soil disturbance. The hydrologic regime is particularly important; coastal plain pondshore species often require low water years for reproduction, but their persistence at a site depends on high water years to keep dense woody vegetation from taking over the shoreline. Protection of Plymouth Gentian habitat may require regulation of new wells, exclusion of septic systems, prohibitions on fertilizer use, and restrictions on recreational use of the site. Recreational activities such as swimming, hiking, horseback riding, and ORV use should be diverted from the plant population location by re-routing trails, installing fences, and providing alternative locations for the activities.

Populations should be monitored to identify threats such as over-shading, invasive plant establishment, and soil disturbance. Plymouth Gentian is most likely to be observed in the middle to late summer when water levels have decreased to expose shoreline. Sites that have encroaching woody vegetation could be carefully thinned after the growing season (November–April).

Habitat sites should be checked for the early stages of exotic plant species invasions. The low-nutrient, acidic shores inhabited by Plymouth Gentian are generally inhospitable for many exotic invasive plants, but invasives could become established at sites that have received heavy soil disturbance or nutrient input. Exotic species that could establish at such sites include Common Reed (*Phragmites australis* ssp. *australis*), Gray Willow (*Salix cinerea*), and Purple Loosestrife (*Lythrum salicaria*). To avoid inadvertent harm to rare plants, all active management of rare plant populations should be planned in consultation with the Massachusetts Natural Heritage and Endangered Species Program.

Flowering time in Massachusetts

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

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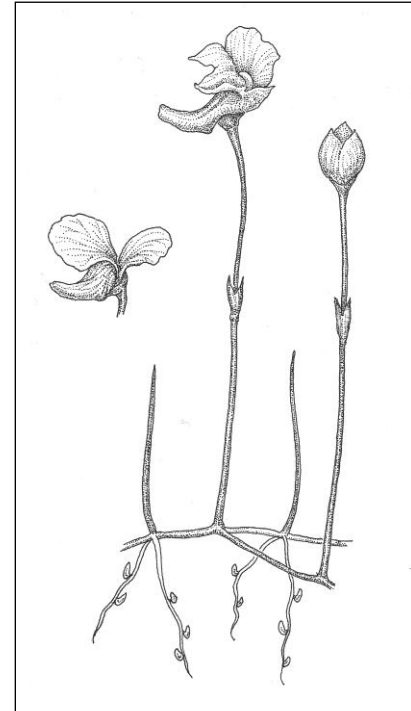
Resupinate Bladderwort *Utricularia resupinata*

B.D. Greene ex Bigelow

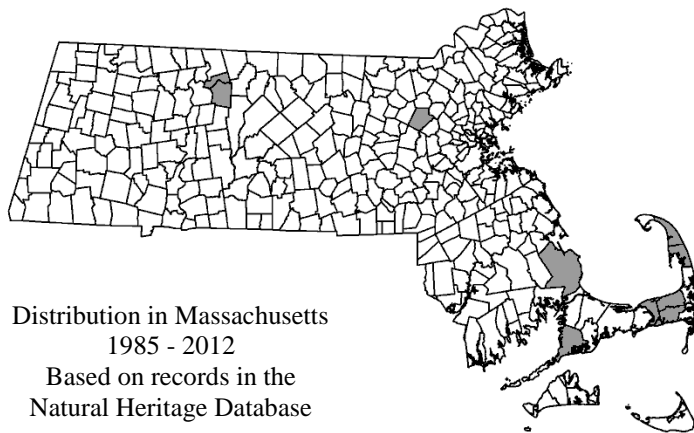
State Status: **Threatened**

Federal Status: **None**

DESCRIPTION: Resupinate Bladderwort is a carnivorous aquatic species in the Bladderwort family (Lentibulariaceae). It is found in shallow to moderately deep waters (up to 3 m or more) of sandy ponds. The stems are thread-like and creep on or just below the substrate, producing tiny three-parted leaves. The center segment of each leaf is erect and looks like a tiny blade of grass, with one or more cross-septa. The two lateral segments of each leaf grow downward into the substrate, are white in color, and look superficially like roots. These root-like leaves bear tiny bladders that open abruptly when disturbed and suck in passing prey, which are digested to provide nutrients for the plant. Bladderworts do not have true roots. Flowering occurs when water levels drop sufficiently to strand plants on shore or in very shallow water; for some populations this occurs only in very dry years. Flowers are showy, purple, and occur singly at the tips of upright, unbranched flower stalks that are typically less than 15 cm long (occasionally up to ~ 30 cm). The flower is subtended by a tubular bract, and flower parts are fused into two lips, with a prominent spur protruding from the lower lip. Bladderwort species reproduce both sexually by seed and asexually by producing compact, starch-filled "winter buds" (turions) that detach from the parent plant and disperse.



*Resupinate Bladderwort has single purple flowers at the top of unbranched flower stalks, cross-septa on erect leaf segments, and tiny bladders on downward growing lateral segments.
Illustration by Elizabeth Farnsworth.*



Distribution in Massachusetts
1985 - 2012
Based on records in the
Natural Heritage Database

AIDS TO IDENTIFICATION: It is not necessary to uproot Resupinate Bladderwort for positive identification. In flower, this species is identified by:

- A single purple flower at top of leafless stalk
- A tubular bract below the flower that surrounds the flower stalk
- Leaf cross-septa visible with a hand lens
- A single terminal seed capsule

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SIMILAR SPECIES: Two other bladderworts have growth forms and habitat affinities similar to those of Resupinate Bladderwort. Horned Bladderwort (*U. cornuta*) is common and may be found with Resupinate Bladderwort. Subulate Bladderwort (*U. subulata*) is uncommon and listed under the MA Endangered Species Act as Special Concern. Most botanists do not distinguish these three species when fertile material is lacking, although the leaf cross-septa of Resupinate Bladderwort are diagnostic. Resupinate Bladderwort is unique in having bracts below the flower that are fused into a cup-like structure that surrounds the flower stalk. Other bladderwort species have bracts that appear as green scales below the flowers.

POPULATION STATUS IN MASSACHUSETTS:

Resupinate Bladderwort is listed under the Massachusetts Endangered Species Act as Threatened. All listed species are protected from killing, collecting, possessing, or sale, and from activities that would destroy habitat and thus directly or indirectly cause mortality or disrupt critical behaviors. Resupinate Bladderwort is currently recorded from Franklin, Middlesex, Plymouth, and Barnstable Counties. There are additional historical records from Berkshire, Hampshire, Hampden, and Essex Counties.

RANGE: Resupinate Bladderwort occurs on the coastal plain from the Atlantic Provinces of Canada south to Florida and Alabama, and from Nova Scotia and Quebec west to the Great Lakes States, and south to Pennsylvania, Indiana and Illinois.

HABITAT: Resupinate Bladderwort grows submerged in sandy-bottomed ponds, most often occurring on the coastal plain. Flowering plants are only found along the edges of ponds when water levels have dropped to expose normally submerged habitat. In these areas, plants are typically found where there is thin peat or mud overlying wet sand.

THREATS AND MANAGEMENT

RECOMMENDATIONS: The flat, sandy pondshore areas that are prime habitat for Resupinate Bladderwort sometimes experience heavy recreational use; monitoring of populations in such sites is needed to develop management guidelines. Best management practices should be followed to prevent nutrient enrichment of ponds from lawn fertilizers, faulty septic systems, and other sources. Competition from native or

non-native aquatic species may potentially threaten populations of Resupinate Bladderwort, though this has not been well-documented. All active management of rare plant populations (including invasive species removal) is subject to review under the Massachusetts Endangered Species Act, and should be planned in close consultation with the Massachusetts Natural Heritage & Endangered Species Program.

Flowering in Massachusetts

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Fruiting in Massachusetts

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

REFERENCES:

Crow, G.E., and C.B. Hellquist. 1985. Aquatic Vascular Plants of New England: Part 8. Lentibulariaceae. New Hampshire Agricultural Experiment Station Bulletin 528. Durham, NH.

Crow, G.E., and C.B. Hellquist. 2000. *Aquatic and Wetland Plants of Eastern North America: Volume 1. Pteridophytes, Gymnosperms and Angiosperms: Dicotyledons*. The University of Wisconsin Press, Madison.

Haines, A. 1994. Key to the genus *Utricularia* in Maine based on vegetative characteristics. *Maine Naturalist* 2: 47-49.

Haines, A. 2011. *Flora Novae Angliae – a Manual for the Identification of Native and Naturalized Higher Vascular Plants of New England*. New England Wildflower Society, Yale Univ. Press, New Haven, CT.

Scribailo, R.W., M.S. Alix, and S.A. Namestnik. 2011. Historical notes and new records for the rare Atlantic coastal plain species *Utricularia resupinata* (Lentibulariaceae) in Indiana. *Rhodora* 113: 32-46.

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**Short-beaked Beaksedge
Rhynchospora nitens
(Vahl) A. Gray**

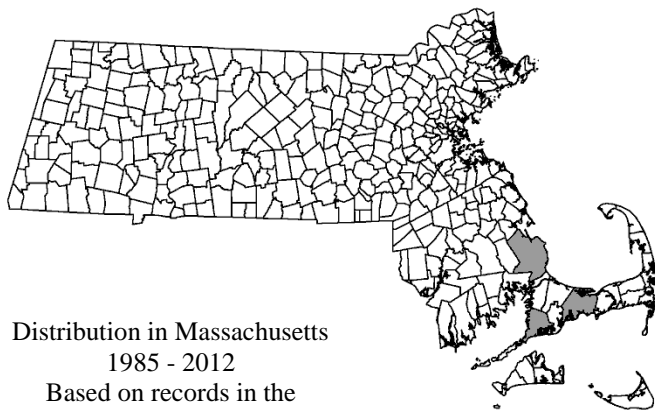
State Status: **Threatened**
Federal Status: **None**

DESCRIPTION: Short-beaked Beaksedge (*Rhynchospora nitens*) is a tufted annual species in the Sedge family (Cyperaceae). In Massachusetts, plants are typically short, often under 15 cm tall. The leaves are linear, proximally flattened, and 1 to 5 mm wide. The flowering stem (or culm) is nearly rounded and many ribbed. Terminal and axillary umbel-like inflorescences are comprised of 1 to 5 diffuse flower clusters on glabrous stalks subtended by leafy bracts. Spikelets are many-flowered, dark brown to nearly black, ovoid, and 3 to 7 mm long. Achenes (dry, one-seeded fruits) are likely shed close to the parent plants. The seeds are long-lived and require drying and exposure of moist pond shore substrate for successful germination. Short-beaked Beaksedge was formerly placed within the genus *Psilocarya* by some botanists.

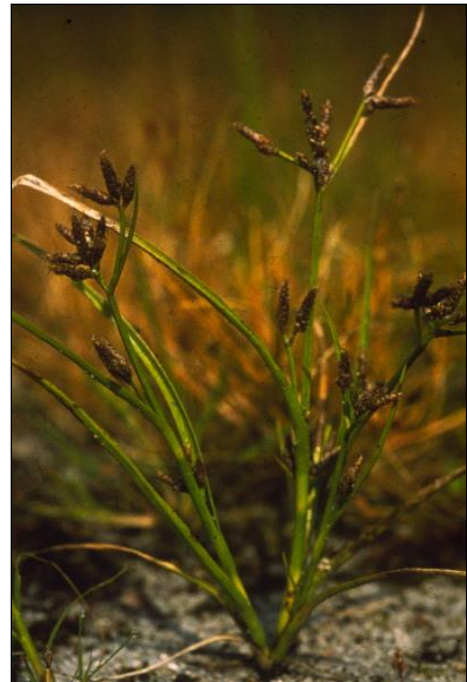


Short-beaked Beaksedge grows on the exposed sand of coastal plain pondshores. Photo by Bruce Sorrie.

AIDS TO IDENTIFICATION: The spikelets of Short-beaked Beaksedge are many-flowered and subtended by spirally imbricate one-nerved scales (~ 3 mm). The achenes are slightly wider than long, 0.7 to 1.3 mm, and become dark brown or nearly black once mature. At the top of the achene is a very short and rather broad “horn” or tubercle, 0.1 to 0.3 mm tall. The achene has a strongly



Distribution in Massachusetts
1985 - 2012
Based on records in the
Natural Heritage Database



Culms have terminal and axillary flower clusters on glabrous stalks subtended by leafy bracts. Photo by Bruce Sorrie.

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ridged surface characterized by wavy rows of vertical raised cells.

SIMILAR SPECIES: Short-beaked Beaksedge is similar in appearance and often confused with Long-beaked Beaksedge (*Rhynchospora scirpoides*), a species that is listed as Special Concern in Massachusetts. Both species are found in coastal plain pond habitats. The tubercle of Long-beaked Beaksedge is somewhat triangular in shape and is almost as long as the achene. The achene of Long-beaked Beaksedge has raised pale margins and is rather weakly ridged in comparison with the strongly ridged achene of Short-beaked Beaksedge.

POPULATION STATUS IN MASSACHUSETTS: Short-beaked Beaksedge is listed under the Massachusetts Endangered Species Act as Threatened. All listed species are protected from killing, collecting, possessing, or sale, and from activities that would destroy habitat and thus directly or indirectly cause mortality or disrupt critical behaviors. Short-beaked Beaksedge occurs in Plymouth and Barnstable Counties; extant populations are small, consisting of a few hundred plants or fewer.

RANGE: Short-beaked Beaksedge is found from southeastern Massachusetts to Florida and eastern Texas. It is disjunct to Michigan and considered extirpated in Indiana. Short-beaked Beaksedge is considered rare throughout much of its range.

HABITAT: Short-beaked Beaksedge is an obligate wetland species found on the moist sandy shores of shallow freshwater coastal plain ponds. These ponds are highly acidic and water levels naturally rise and fall in relation to seasonal and yearly changes in the water table. Seeds of Short-beaked Beaksedge require a period of drying and exposure to germinate and may remain dormant in the soil seed bank for many years until conditions are appropriate for germination.

Typical associates of Short-beaked Beaksedge include Canadian St. John's-wort (*Hypericum canadense*), Dwarf St. John's-wort (*H. mutilum*), Spatulate-leaved Sundew (*Drosera intermedia*), Northern Meadow-beauty (*Rhexia virginica*), Warty Panic-grass (*Panicum verrucosum*), Pondshore Flatsedge (*Cyperus dentatus*), Autumn Fimbry (*Fimbristylis autumnalis*), Reticulate Nut-sedge (*Scleria reticularis*), and Long-beaked Beaksedge (*Rhynchospora scirpoides*).

THREATS AND MANAGEMENT

RECOMMENDATIONS: Artificial withdrawal of water and other changes in ground and surface water hydrology may alter the specialized cycle of flooding and drawdown required by Short-beaked Beaksedge. Extant populations should be monitored to gain a better understanding of population dynamics, cycles of flooding and drawdown, and current threats. Sites that supported Short-beaked Beaksedge historically should also be surveyed periodically, as this species may persist in the seed bank for many years until drawdown conditions are suitable for germination. Short-beaked Beaksedge may be damaged by off-road vehicles, raking and clearing of shoreline vegetation for beach use, loss of habitat for storage of boats, and conversion of wetland habitats for cranberry cultivation. These activities should be prohibited in coastal plain pondshore habitats. Best management practices should be implemented to prevent or reduce nutrient enrichment from lawn fertilizers, faulty septic systems, and flocks of grazing ducks or geese. Monitoring for invasive species is needed for early detection and control. All active management of rare plant populations (including invasive species removal) is subject to review under the Massachusetts Endangered Species Act, and should be planned in close consultation with the Massachusetts Natural Heritage & Endangered Species Program.

Fruiting in Massachusetts

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

REFERENCES:

- Clark, F.H. 2003. *Rhynchospora nitens* (Vahl) A. Gray, Short-beaked Beaksedge, a Conservation and Research Plan for New England. Prepared for the New England Plant Conservation Program of the New England Wild Flower Society, Framingham, MA.
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Terete Arrowhead *Sagittaria teres*

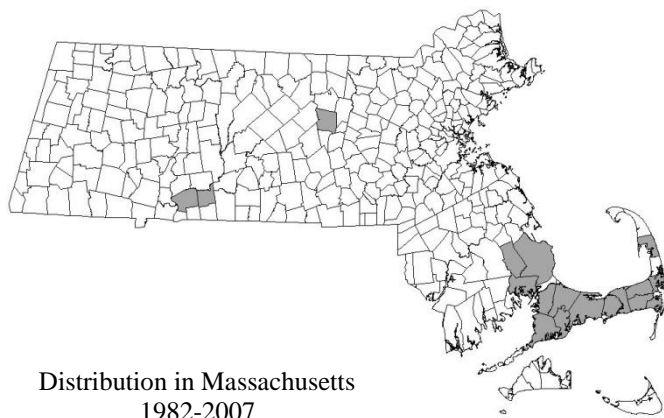
S. Watson

State Status: **Special Concern**

Federal Status: **None**

DESCRIPTION: Terete Arrowhead (*Sagittaria teres*) is a perennial emergent aquatic plant of the water-plantain family (Alismataceae), which grows in shallow water along the margins of coastal plain ponds. It has linear basal leaves and white flowers, which bloom from July to September.

AIDS TO IDENTIFICATION: Terete Arrowhead, unlike several other arrowheads, has linear, terete (rounded in cross section), and tapering leaves rather than sagittate, or arrow-shaped leaves. The leaves arise from a rhizome in a rosette; they vary in length, ranging from 1.2 to 8 inches (3–20 cm). The stem is erect, slender, and leafless, reaching 12 to 15 inches (30–38 cm) in height. The flowers, which have white petals and yellow centers, are 0.75 inch (2 cm) wide, and are borne in two to four whorls at the top of the stem. Fruits of this species are achenes (hard, one-seeded fruits), less than 0.1 inch (2–3 cm), with one to three prominent wings on each face.



Distribution in Massachusetts
1982-2007

Based on records in
Natural Heritage Database



Hellquist, C.B., and G.E. Crow. 1981. *Aquatic Vascular Plants of New England: Part 3. Alismataceae*. New Hampshire Agricultural Experiment Station, University of New Hampshire, Durham.

SIMILAR SPECIES: Most arrowheads in Massachusetts have some sagittate leaves present, thus differentiating them from Terete Arrowhead. One other state-listed species, River Arrowhead (*S. subulata*) (Endangered), and the more common Grass-leaved Arrowhead (*S. graminea*) most resemble Terete Arrowhead because of their linear, unlobed leaves. Both of these species however have flat, rather than terete leaves.

HABITAT IN MASSACHUSETTS: In Massachusetts, Terete Arrowhead inhabits muddy, sandy, or peaty soils in shallow water along the margins of acidic ponds, primarily coastal plain ponds. Associated species include Pipewort (*Eriocaulon aquaticum*), Water-lobelia (*Lobelia dortmanna*), bladderworts (*Utricularia* spp.), Golden Hedge-hyssop (*Gratiola aurea*), Pond-shore Rush (*Juncus pelocarpus*), and spike-sedges (*Eleocharis* spp.). Several rare species may be associated with Terete

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Arrowhead, including Resupinate Bladderwort (*Utricularia resupinata*) (Threatened), Plymouth Gentian (*Sabatia kennedyana*) (Special Concern), Torrey’s Beak-sedge (*Rhynchospora torreyana*) (Endangered), Long-beaked Bald-sedge (*R. scirpoides*) (Special Concern), and Short-beaked Bald-sedge (*R. nitens*) (Threatened).

RANGE: Terete Arrowhead occurs along the coastal regions of New Hampshire, New York, New Jersey, and North Carolina.

THREATS: Terete Arrowhead is threatened by any activity that changes the hydrologic regime, water quality, or soil integrity of the coastal plain pond it inhabits. Region-wide, coastal plain ponds are imperiled due to shoreline development, water table drawdown (from wells), eutrophication (resulting from fertilizers and septic systems), and soil disturbance from heavy recreational use (ORV, horse, and foot traffic; wading and swimming; camping; boat-launching; raking and digging).

POPULATION STATUS IN MASSACHUSETTS: Terete Arrowhead is listed under the Massachusetts Endangered Species Act as a species of Special Concern. All listed species are legally protected from killing, collection, possession, or sale, and from activities that would destroy habitat and thus directly or indirectly cause mortality or disrupt critical behaviors. Terete Arrowhead is currently known from Barnstable, Plymouth, Hampden, and Worcester Counties, and is historically known from Middlesex County.

MANAGEMENT RECOMMENDATIONS: Management of Terete Arrowhead requires protection of the hydrology, water quality, and soil integrity of its habitat. Like many other coastal plain pondshore plant species, Terete Arrowhead requires pronounced water-level fluctuations, acidic, nutrient-poor water and substrate, and an open, exposed shoreline, free from major soil disturbance.

Terete Arrowhead populations should be monitored regularly to identify possible threats. This species is most likely to be observed in mid to late summer during low water years.

Protection of Terete Arrowhead habitat may require exclusion of new wells and septic systems, prohibitions on fertilizer use, and restrictions on recreational use of the coastal plain pondshore. Recreational activities such as swimming, fishing, and boat-launching should be diverted from the plant population location by providing alternative locations for the activities.

Also, habitat sites should be monitored to enable early detection of exotic plant species invasions. The nature of coastal plain ponds makes them generally inhospitable for many exotic invasive plants, but invasives could become established at sites that have received heavy soil disturbance or nutrient inputs. Exotic species that could establish along the shoreline of coastal plain ponds include Common Reed (*Phragmites australis* ssp. *australis*), Gray Willow (*Salix cinerea*), and Purple Loosestrife (*Lythrum salicaria*).

Boats are a very common vehicle for aquatic plant introductions, and habitat sites with boat access should be carefully monitored for introductions of non-native aquatic species, such Variable Water-milfoil (*Myriophyllum heterophyllum*) and Inflated Bladderwort (*Utricularia inflata*).

To avoid inadvertent harm to rare plants, all active management of rare plant populations (including exotic species removal) should be planned in consultation with the Massachusetts Natural Heritage and Endangered Species Program.

Flowering time in Massachusetts

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

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