Estuary Arrowhead
*Sagittaria montevidensis*
Cham. & Schlecht
ssp. *spongiosa* (Englem.) Bogin

State Status: Endangered
Federal Status: None

**DESCRIPTION:** Estuary Arrowhead is a spongy aquatic member of the Water-plantain family (Alismataceae). Like other species in this family, plants are rooted to the substrate with septate roots. The leaves are modified into narrow (4–18 cm long, 0.5–1 cm wide), spongy phyllodia, and the tips of the leaves are slightly expanded and spatula-like (or rarely more sagittate). Erect peduncles bear one to four whorls of white, inconspicuous flowers; flowers may also be solitary. Fruiting heads (1.2–2.1 cm in diameter) are comprised of a cluster of small, flattened achenes, each narrowly winged on the margins and with a short lateral beak.

**AIDS TO IDENTIFICATION:** Estuary Arrowhead is the only annual arrowhead species in New England and one of a few arrowheads that occupy tidally-influenced habitats. It is best identified when in flower or fruit. Estuary Arrowhead can be recognized by its erect, spongy leaves with spatulate tips. In rare instances, this species may have expanded blades, typically without basal lobes. Inflorescences are supported by thick, relatively short peduncles that are usually shorter than the leaves, and thick, spongy pedicels. The flowers are perfect (at least the lowermost ones), with erect, appressed sepals that enclose the flower and fruiting head. The pedicels become recurved when the flowers mature.

**SIMILAR SPECIES:** Estuary Arrowhead is similar to a few other arrowheads that may occur in tidal waters. River Arrowhead (*S. subulata*) also has bladeless leaves and recurved fruiting pedicels, but differs from Estuary Arrowhead by its longer (to 30 cm), wider (1–6 mm) leaves, longer peduncles, and greater number of flower whorls (up to 10). It has pistillate lower flowers with reflexed sepals in fruit, and achenes with one to three toothed wings on each face. Grass-leaf Arrowhead (*S. graminea*) can have phyllodial leaves but these are not spongy, and are long (to 30 cm) and flattened on top. It also has long peduncles (to 5 dm), up to 12 flower whorls, pistillate lower flowers with reflexed sepals, and...
ascending pedicels when in fruit (although this species rarely fruits in our range). Mud Arrowhead (S. rigida) has highly variable leaves and may have phyllodial leaves. It differs from Estuary Arrowhead by its longer peduncle (to 8 dm), greater number of flower whorls, upper staminate flowers with long pedicels (1.5–3 cm), lower pistillate flowers that are nearly sessile, and fruiting pedicels that are ascending, with larger achenes (2–3 mm) and reflexed sepals.

**POPULATION STATUS IN MASSACHUSETTS:**
Estuary Arrowhead is listed under the Massachusetts Endangered Species Act as Endangered. 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. This species is known from Middlesex and Essex Counties.

**RANGE:** Estuary Arrowhead occurs from New Brunswick south along the coast to Delaware and eastern North Carolina.

**HABITAT:** Estuary Arrowhead is restricted to sandy shores and mudflats of freshwater and brackish tidal rivers and marshes in coastal areas. Plants are submersed under high tide conditions and exposed during low tides. Species found in association with Estuary Arrowhead in Massachusetts include Grass-leaf Arrowhead, Perfoliate Pondweed (Potamogeton perfoliatus), Little Spike-rush (Eleocharis acicularis), Water Purslane (Ludwigia palustris), Wild Rice (Zizania aquatica), Atlantic Mudwort (Limosella australis), Estuary Beggar-ticks (Bidens hyperborea), Lilaeopsis (Lilaeopsis chinensis), and Dotted Smartweed (Persicaria punctata).

**THREATS AND MANAGEMENT RECOMMENDATIONS:** As for many rare species, exact needs for management of Estuary Arrowhead are not known. This species occurs in freshwater tidal marshes and stream banks, and any alteration of hydrological conditions or increased sedimentation due to changes in adjacent land use should be avoided. Competition from invasive wetland species could also reduce the available habitat of Estuary Arrowhead. 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 and Fruiting in Massachusetts

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**REFERENCES:**


[Updated 2015]

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

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