



**Natural Heritage
& Endangered Species
Program**

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Massachusetts Division of Fisheries & Wildlife

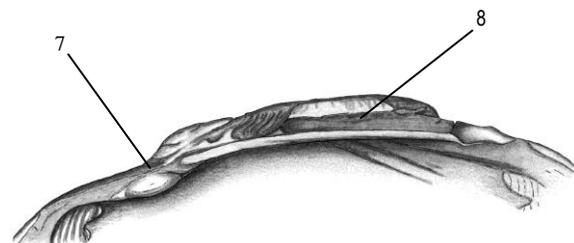
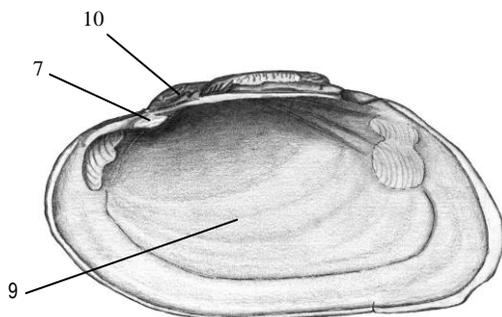
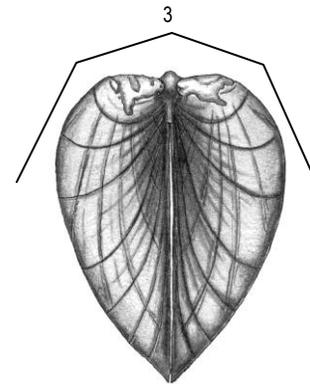
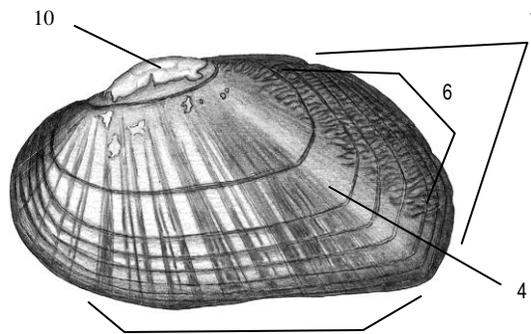
**Brook Floater
*Alasmidonta varicosa***

State Status: **Endangered**
Federal Status: **None**

DESCRIPTION: The Brook Floater is a small mussel that rarely exceeds three inches (75mm) in length. The shape is trapezoidal to almost elliptical, and it has a prominent posterior ridge that gives it a “roman nose” lateral profile (1). The ventral margin (2) is usually flat or slightly indented. The valves are moderately inflated (3), giving it a swollen appearance in cross section. The periostracum (4) is yellowish-green in young animals to brownish-black in mature specimens and usually has prominent green rays (5). Rays are often obscure in heavily eroded or stained shells. The diagnostic feature for this species is a series of corrugations (or raised ridges) along the dorso-posterior slope (6), perpendicular to the growth lines; these corrugations are difficult to discern on shells that are young, eroded, stained, or covered with algae. Pseudocardinal teeth (7) are poorly developed, consisting of one small knob-like tooth on

each valve. Lateral teeth (8) are absent. The color of the nacre (9) is variable, ranging from bluish-white to pinkish-white to a pale orange. The foot is usually the striking color of cantaloupe but the intensity of that color is variable. The Brook Floater has a unique habit of “gaping” (relaxing its adductor muscles and opening its valves) when removed from the water, exposing its cantaloupe-colored foot and mantle cavity.

SIMILAR SPECIES IN MASSACHUSETTS: Brook Floater shells (dead animals) can be identified without difficulty, although sometimes are confused with the Creeper (Special Concern), which has a similar shape and poorly developed pseudocardinal teeth. Accurate identification of live animals usually relies on the corrugations on the shell, shape of the animal, cantaloupe-colored foot, and its habit of gaping when



Illustrations by Ethan Nedean

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

Massachusetts Division of Fisheries & Wildlife

1 Rabbit Hill Rd., Westborough, MA; tel: 508-389-6300; fax: 508-389-7890; www.mass.gov/dfw

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removed from the water. Live juveniles or highly eroded adult Brook Floater, Triangle Floater, and Creeper can sometimes be difficult to distinguish. Unlike the Brook Floater, the Triangle Floater has a triangular or slightly ovate shape, uneven and coarse sculpturing on the beak (10), and a ventral margin that is more rounded. The Triangle Floater also has well-developed pseudocardinal teeth. The Creeper is more laterally compressed than the Brook Floater, its pseudocardinal teeth are more poorly developed, and its shell is considerably thinner and more fragile. An expert should be consulted to identify the Brook Floater because it is listed as Endangered in Massachusetts and because the novice may confuse it with two other protected species.

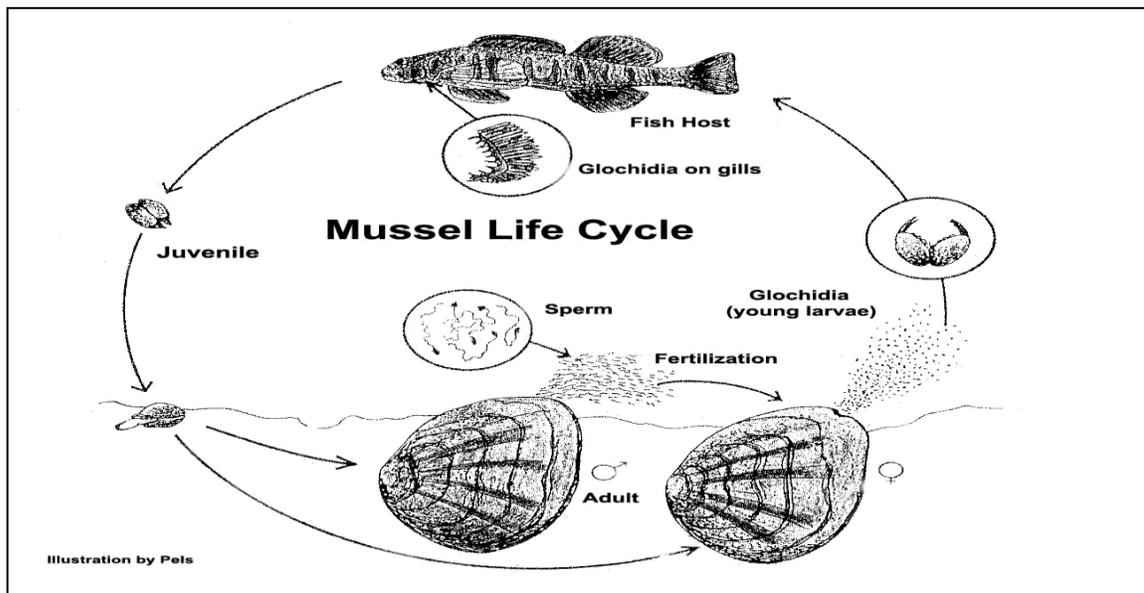
RANGE: The North American range of the Brook Floater includes Atlantic coastal rivers from South Carolina to Nova Scotia and New Brunswick. In Massachusetts, the Brook Floater occurs in only four rivers in three different watersheds. Based on historic records and relatively recent surveys, it may have been eliminated from four watersheds in Massachusetts.

HABITAT: The Brook Floater inhabits streams and rivers of varying sizes, but ones that usually have low to moderate flow velocities and stable substrates (Nedeau 2008). In fast water, they often will be found clustered in protected areas such as behind boulders and near banks.

The Brook Floater never occurs in lakes or reservoirs but may inhabit the upstream end of small impoundments created by run-of-river dams. Like most other mussel species, the Brook Floater is sparse or absent in headwater streams and high-gradient river reaches that are prone to scour. It is frequently found in streams that have low calcium levels, low nutrients, and good water quality. They usually occur with the Triangle Floater, Eastern Pearlshell, Creeper, and Eastern Elliptio.

BIOLOGY: Brook Floaters are essentially sedentary filter feeders that spend most of their lives partially burrowed into the bottoms of rivers and streams. Like all freshwater mussels, larvae (called glochidia) of the Brook Floater must attach to the gills or fins of a vertebrate host to develop into juveniles. Several fish hosts have been reported under laboratory conditions, including Longnose Dace, Blacknose Dace, Slimy Sculpin, Golden Shiner, Pumpkinseed Sunfish, Yellow Perch, Margined Madtom, and Tessellated Darter.

No studies have confirmed how well laboratory results relate to the availability of hosts or parasitism under natural conditions. Given its large number of widely distributed host fish, its rarity is likely due to aspects of their biology and ecology that are unrelated to host availability, such as sensitivity to water quality or habitat conditions.



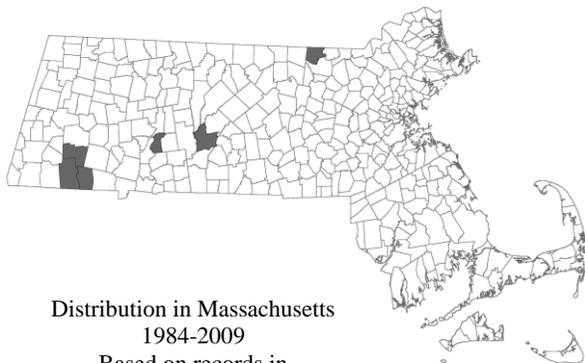
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POPULATION STATUS IN MASSACHUSETTS:

The Brook Floater is one of the most endangered mussels in northeastern North America. It is listed as endangered in Massachusetts, Connecticut, and New Hampshire, and threatened in Vermont and Maine (Nedeau 2008). It is extirpated in Rhode Island (Raithel and Hartenstine 2006). Recent studies indicate that the extant populations in Massachusetts are significantly fragmented, low in density, and prone to mortality due to old age and poor condition. A few patches of Brook Floaters with densities high enough to be considered viable exist; however, they exhibit a high degree of spatial clustering and are significantly isolated from one another. There is growing concern that some populations have dwindled to the point where reproduction is unlikely and persistence beyond the life span of the remaining individuals is improbable. The persistence of Brook Floaters in Massachusetts seems to be closely tied to its survival and reproduction within isolated areas that are highly vulnerable to random events such as mortality related to floods, droughts, predators, poorly planned development or disturbance, pollution, or even trampling. This species is currently known from only four water bodies in the state. There are an additional 12 historic occurrences, several of which are believed extirpated, that have not been documented in the last 25 years and therefore are not subject to MESA protection. Surveys of historic sites and long-term monitoring of known populations are critically needed.

THREATS: Because Brook Floaters are essentially sedentary filter feeders, they are unable to flee from degraded environments and are vulnerable to the



Distribution in Massachusetts
1984-2009
Based on records in
Natural Heritage Database

alterations of waterways. Some of the many threats to the Brook Floater and its habitat in Massachusetts include: nutrient enrichment, sedimentation, point-source pollution, alteration of natural flow regimes, water withdrawal, encroachment of river corridors by development, non-native and invasive species, habitat fragmentation caused by dams and road-stream crossings, and a legacy of land use that has greatly altered the natural dynamics of river corridors (Nedeau 2008). In addition, the long-term effects of regional or global problems such as acidic precipitation, mercury, and climate change are considered severe but little empirical data relates these stressors to mussel populations. As local populations of Brook Floaters decline and/or become extirpated in response to these threats, dispersal distances between populations increase, weakening overall reproductive success, and ultimately genetic diversity.

CONSERVATION AND MANAGEMENT

RECOMMENDATIONS: Discovery and protection of viable mussel populations is critical for the long-term conservation of freshwater mussels. Currently, much of the available mussel occurrence data are the result of limited presence/absence surveys conducted at road crossings or other easily accessed points of entry. In addition, regulatory protection under MESA only applies to rare species occurrences that are less than 25 years old. Surveys are critically needed to monitor known populations, evaluate habitat, locate new populations, and assess population viability at various spatial scales (e.g., river, watershed, state) so that conservation and restoration efforts, as well as regulatory protection, can be effectively targeted. The NHESP has produced *Freshwater Mussel Habitat Assessment and Survey Guidelines* and has been working with qualified experts to conduct surveys. Other conservation and management recommendations include:

- Maintain naturally variable river flow and limit water withdrawals
- Identify, mitigate, or eliminate sources of pollution to water bodies
- Identify dispersal barriers for host fish, especially those that fragment the species range within a river or watershed, and seek options to improve fish passage or remove the barrier
- Maintain adequate vegetated riparian buffer along rivers and lakes
- Protect or acquire land at high priority sites

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