



Natural Heritage & Endangered Species Program

Massachusetts Division of Fisheries & Wildlife
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Eastern Pondmussel *Ligumia nasuta*

State Status: **Species of Special Concern**
Federal Status: None

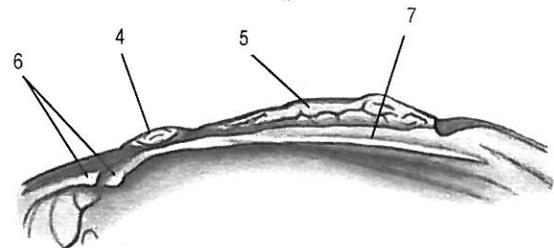
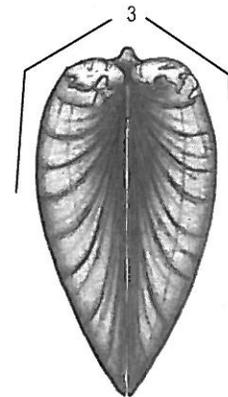
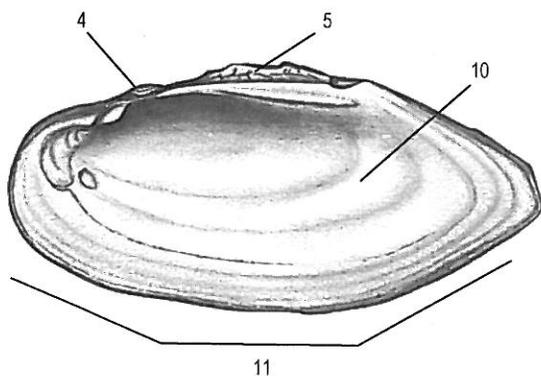
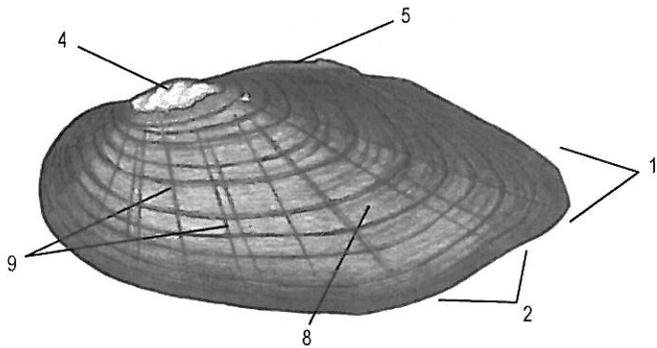
Description: The eastern pondmussel is a medium-sized to large mussel that may exceed six inches (150 mm) in length. The shape is distinctly elongate or elliptical and the posterior end tapers to a blunt point (1). Shells of sexually mature females may be slightly more rounded toward the posterior ventral margin (2) than males or adolescent females. Shells are laterally compressed (3), and despite being thin, they are quite strong. Beaks are low (4) and barely extend beyond the line of the hinge (5). Hinge teeth are well developed but delicate—the left valve has two pseudocardinal teeth and two lateral teeth, and the right valve has two pseudocardinal teeth (6) and one lateral tooth (7). The periostracum (8) is yellowish or greenish-black in young individuals, but usually dark brown or black in older specimens. Shell rays (9) are sometimes evident on those individuals with a light-colored periostracum. The nacre (10) is usually purple, pink, or silvery-white.

Similar Species in Massachusetts: Due to its elongate shape (11), pointed posterior end (1), and laterally

compressed shell (3), the eastern pondmussel is easy to distinguish from all other species in Massachusetts.

Range: The eastern pondmussel is distributed throughout Atlantic coastal drainages from Virginia to New Hampshire and in the eastern Great Lakes region. It is most abundant in southeastern Massachusetts, particularly in large coastal plain ponds on the mainland and on Cape Cod. Small populations also occur in the central Connecticut River Valley, especially in low-gradient sections of several tributaries to the Connecticut River

Habitat: The eastern pondmussel inhabits streams, rivers, and small to large lakes and ponds. It exhibits no distinct preference for substrate, depth, or flow conditions. It has been found at relatively high densities at depths of 15-25 feet in coastal ponds where the substrate was primarily mud (Nedeau and Low 2008), and in shallow rivers with relatively strong currents and a substrate of gravel and cobble (Nedeau 2008). In the Connecticut River watershed, populations are known primarily from streams



Illustrations by Ethan Nedeau

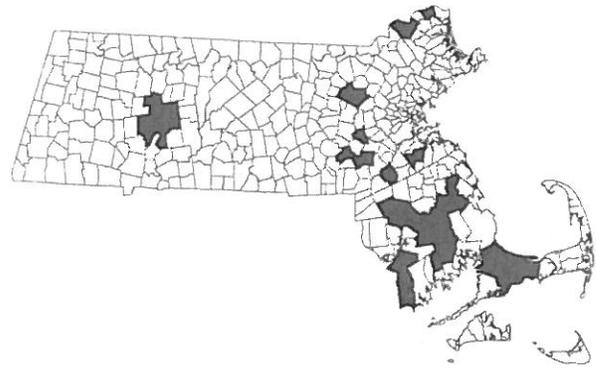
Text contributed by Ethan Nedeau, December 2007, Eastern Pondmussel Fact Sheet.

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and rivers (Nedeau 2008), but in eastern Massachusetts, including Cape Cod, there are more lake and pond populations.

Biology: Eastern pondmussels are essentially sedentary filter feeders that spend most of their lives partially burrowed into the bottoms of rivers, streams, lakes, and ponds. Eastern pondmussels, like all freshwater mussels, have larvae (called glochidia) that must attach to the gills or fins of a vertebrate host to develop into juveniles. Sexually mature female eastern pondmussels use papillae along their mantle margins to lure potential host fish; this behavior was described by Corey *et al.* (2006). Displaying females tend to migrate toward the surface of the sediment, and may even lie fully on the surface of the sediment (unburied) to increase their visibility to fish. They will also part their valves widely, exposing more of the mantle edge. Host fish(es) for this species have not yet been determined, though the mussel's range suggests that its hosts have some affinity for coastal areas. Closely related species have been reported to parasitize centrarchids (sunfishes and bass) as well as the banded killifish. These fish species occur throughout the eastern pondmussel's range in Massachusetts and southern New England. Little else is known about the biology of the eastern pondmussel.

Population Status in Massachusetts: The eastern pondmussel is a species of special concern in Massachusetts, as well as Connecticut and New Hampshire. A few sizeable populations exist in coastal plain ponds of eastern Massachusetts, however, riverine populations in the state are generally sparse with the exception of a couple tributaries to the Connecticut River. The species is currently known from 24 lakes/ponds and 13 rivers, however, less than ten of these sites support

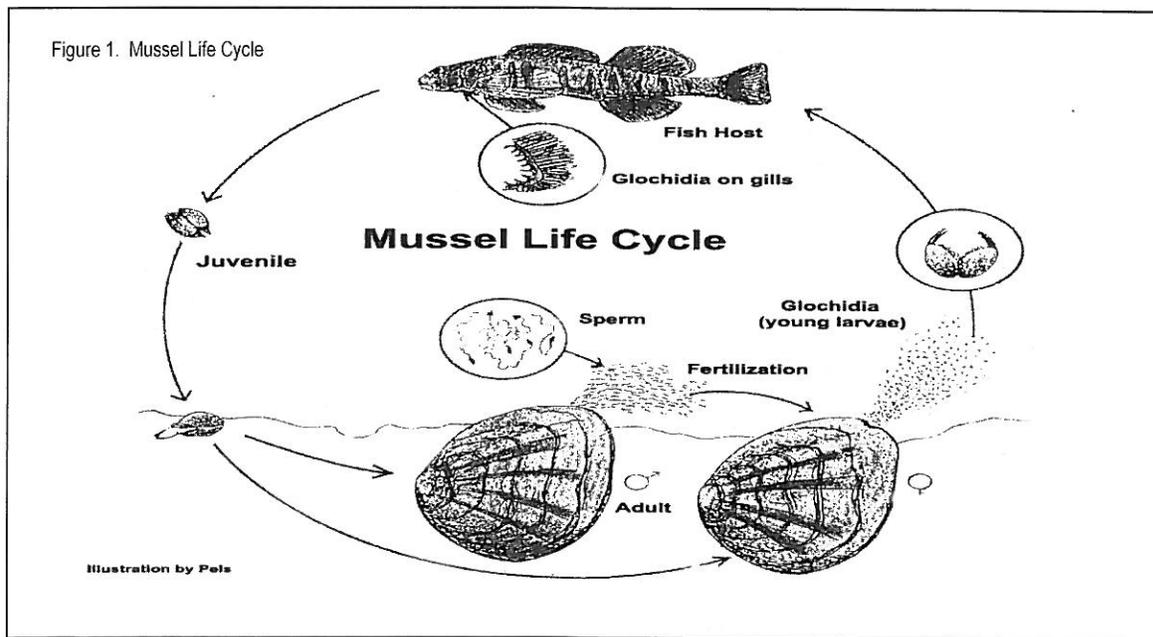


Distribution in Massachusetts
1984-2009

Based on records in Natural Heritage Database

sizeable populations. There are an additional 34 historic occurrences that have not been documented in the last 25 years and therefore are not subject to MESA protection. Surveys of historic sites and a careful status review are needed.

Threats: Because eastern pondmussels are essentially sedentary filter feeders, they are unable to flee from degraded environments and are vulnerable to the alterations of water bodies. Eastern pondmussels occur in lakes and rivers, and the threats in these two habitats are slightly different. Overlapping threats include nutrient enrichment, sedimentation, non-native and invasive species, and the many consequences of urbanization. River populations of eastern pondmussels are threatened by alteration of natural flow regimes, encroachment of river corridors by development, habitat fragmentation caused by dams and road-stream crossings, and a legacy of land use that has greatly altered the natural dynamics of river



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corridors (Nedeau 2008). Lake populations are challenged by intense development, modification, and recreational use of sensitive shoreline habitats, and by increasing eutrophication. Dams and other stream barriers in the rivers that connect lakes to coastal waters may also affect lake populations of eastern pondmussels. Invasive plants and animals, such as European milfoil and Asian clams, are having severe impacts on the fragile ecology of coastal plain ponds. The ultimate consequences on eastern pondmussels and other native species are not completely known, but the prognosis is bleak. 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.

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. 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 so that conservation and restoration efforts, as well as regulatory protection, can be effectively targeted. Coastal plain ponds are critical to the long-term viability of the eastern pondmussel in Massachusetts, and these habitats are also experiencing intense development pressure and recreational use. Understanding this threat and developing conservation and management strategies is a high priority for NHESP. 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:

- Understand the effects of shoreline development and recreational use of lakeshores
- 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

Further Reading

- Corey, C.A., R. Dowling, and D.L. Strayer. 2006. Display behavior of *Ligumia* (Bivalvia: Unionidae). *Northeastern Naturalist* 13(3): 319-332.
- Lefevre, G., and W.C. Curtis. 1911. Metamorphosis without parasitism in the Unionidae. *Science* 33: 863-865.
- Nedeau, E.J. 2008. *Freshwater Mussels and the Connecticut River Watershed*. Connecticut River Watershed Council, Greenfield, Massachusetts. xviii+132 pp.
- Nedeau, E.J., and J. Victoria. 2003. *A Field Guide to the Freshwater Mussels of Connecticut*. Connecticut Department of Environmental Protection, Hartford, CT.
- Nedeau, E.J., M.A. McCollough, and B.I. Swartz. 2000. *The Freshwater Mussels of Maine*. Maine Department of Inland Fisheries and Wildlife, Augusta, Maine.
- Raithel, C.J., and R.H. Hartenstine. 2006. The Status of Freshwater Mussels in Rhode Island. *Northeastern Naturalist* 13(1): 103-116.
- Vaughn, C. 1993. Can biogeographic models be used to predict the persistence of mussel populations in rivers? pp.117-122 in K.S Cummings, A.C. Buchanan and L.M. Koch (eds), Conservation and Management of Freshwater Mussels: proceedings of a UMRCC symposium. 12-14 October 1992, St. Louis, Missouri. Upper Mississippi River Cons. Com., Rock Island, Illinois. 189 pp.

Updated: 08/01/09

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