

MUSSELS

FRESHWATER MUSSELS:

Dwarf wedgemussel, *Alasmidonta heterodon*

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

Brook floater, *Alasmidonta varicosa*

Status: *State:* Endangered (pending) *Federal:* Species of Special Concern

Green floater, *Lasmigona subviridis*

Status: *State:* Endangered (pending) *Federal:* Species of Special Concern

Yellow lampmussel, *Lampsilis cariosa*

Status: *State:* Threatened (pending) *Federal:* Species of Special Concern

Eastern lampmussel, *Lampsilis radiata*

Status: *State:* Threatened (pending) *Federal:* Not listed

Eastern pondmussel, *Ligumia nasuta*

Status: *State:* Threatened (pending) *Federal:* Not listed

Tidewater mucket, *Leptodea ochracea*

Status: *State:* Threatened (pending) *Federal:* Not listed

Triangle floater, *Alasmidonta undulata*

Status: *State:* Threatened (pending) *Federal:* Not listed

Identification

All freshwater mussels have a calcium carbonate bivalve shell that is divided into a left and right half. The shell consists of three layers; the outer periostracum, the middle calcium carbonate, and the inner nacre. The periostracum (or epidermis) protects underlying calcium carbonate from the corrosive action of low pH water and damage from moving sand and gravel. A thin prismatic layer of crystalline calcium carbonate lies beneath the periostracum. The nacre or mother-of-pearl is the innermost and often thickest layer of the shell. It is comprised of thin, stacked calcium carbonate plates that lie parallel to the shell's surface. In many species, the color and texture of the nacre are important for identification.

Lateral and pseudocardinal teeth, separated by an interdentum, are located dorsally inside the shell. Lateral teeth are elongated and raised interlocking structures along the hinge line of a valve, whereas pseudocardinal teeth are triangular-shaped hinge teeth near the shell's anterior-dorsal margin. The interdentum is a flattened area of the hinge plate between the lateral and pseudocardinal teeth. The three points of apposition, which are taxonomically important in most species, serve to hold the two valves together. Some groups entirely lack lateral and pseudocardinal teeth. The umbo or beak is the dorsally raised, inflated area of the bivalve shell. Representing the oldest part of the shell, umbones appear as external swellings and are often points of taxonomic significance.

The valves are held closed by internal muscles. Empty shells show scars of former mussel attachment areas. Freshwater mussels have a large, muscular foot that extends between the valves and functions in locomotion and anchorage. The anterior and posterior retractor muscles draw the foot into the shell, while the anterior protractor helps in foot extension. Large anterior and posterior abductors draw the shell together.

Habitat

New Jersey's Endangered and Threatened Freshwater Mussel Species:

The **dwarf wedgemussel** is a rare freshwater mussel with a trapezoid-to-ovate or "humpbacked" shell rarely exceeding 1.5 in. in length. It is characterized by having two lateral teeth on the right valve of the shell, but only one on the left (thus the species name *heterodon*). The ventral margin is mostly straight. The beaks are low and rounded, projecting only slightly above the hinge line. The periostracum, or outer shell, is dark brown or yellowish brown and often exhibits greenish rays in young mussels. The nacre, or inner shell, is bluish or silvery white.

The dwarf wedgemussel once existed in 70 localities within 15 major Atlantic slope drainage basins from New Brunswick, Canada to North Carolina (U.S. Fish and Wildlife Service 1993). Today however, this species is thought to be extirpated from all but approximately 30 small sites in New Hampshire, Vermont, Maryland, North Carolina, New York, Connecticut, Virginia, and New Jersey.

In New Jersey, the dwarf wedgemussel historically inhabited areas of the Delaware, Hackensack, and Passaic rivers. These populations, however, are thought to

be extirpated because of water quality degradation and other factors. There are only three known active state occurrences of this elusive species; the Paulins Kill, Pequest River, and a portion of the upper Delaware River.

Preferred habitat of the dwarf wedgemussel ranges from muddy sand to sand and gravel/pebble bottoms in rivers and creeks with slow to moderate current. Favoring clean and relatively shallow water with little silt deposition, this species is known to co-occur with other freshwater mussels such as the eastern elliptio (*Elliptio complanata*), triangle floater (*Alasmidonta undulata*), creeper (*Strophitus undulatus*), eastern floater (*Pyganodon cataracta*) and eastern lampmussel (*Lampsilis radiata*).

Fish species identified as suitable hosts for the dwarf wedgemussel include the tessellated darter (*Etheostoma olmstedi*), mottled sculpin (*Cottus bairdi*) and Johnny darter (*Etheostoma nigrum*, not found in N.J.) (Michaelson and Neves 1995).

The **brook floater** has a small, kidney-shaped shell that is slightly thicker towards the anterior. There is a conspicuous posterior slope with wavy ridges perpendicular to the growth lines. The ventral margin is straight and slightly concave centrally. The outer shell color ranges from yellowish brown to dark brown and the nacre is a glossy bluish-white to orange in the umbo region. The pseudocardinal teeth exist as weak knobs and lateral teeth are absent. The species has a bright orange to pinkish foot.

The brook floater ranges from the Savannah River Basin in South Carolina north to the St. Lawrence River Basin in Canada and west to the Ohio River Basin of West Virginia. In New Jersey, there are reported occurrences in the Stony Brook, Musconetcong, Raritan, Lamington and upper Delaware rivers.

Habitat of the brook floater includes rapids or riffles on rock and gravel substrates. The species prefers small streams and is commonly associated with the eastern elliptio (*Elliptio complanata*) (Clarke 1981). Reported host fishes for the species that occur in New Jersey include the slimy sculpin (*Cottus cognatus*), longnose dace (*Rhinichthys cataractae*), golden shiner (*Notemigonus crysoleucas*) and pumpkinseed (*Lepomis gibbosus*).

The **green floater** is a small, rare mussel with an ovate trapezoid shell that is fragile and thin. The posterior ridge is rounded. The outer shell is light yellow or brown with many green rays, especially in juveniles. The pseudocardinal and lateral teeth are small and delicate. The beak cavity is shallow. The nacre can be white to blue and is iridescent towards the posterior end.

The green floater can be found from the Cape Fear River Basin in North Carolina north to the Hudson River Basin and westward to St. Lawrence River Basin in New York. In New Jersey, the species once occurred in the Passaic, Raritan, Delaware, and Pequest rivers, but is now represented by a single known individual in the Stony Brook in Mercer County.

This species can be found in smaller streams, most often in pools and eddies with gravelly and sandy bottoms (Ortmann 1919). It is averse to strong currents (Clarke



Photo courtesy North Carolina Wildlife Resources Commission

1985). The host fish is not known. There is some evidence that the green floater may not require a host fish in order to complete its life cycle (Barfield and Watters 1998, Lellis and King 1998).

The **yellow lampmussel** has a medium-sized shell, with males elliptical and somewhat elongate and females more ovate. Shells are moderately inflated and thick. The anterior margin is rounded and the ventral margin is slightly curved. The umbos are swollen and raised above the hinge line. The pseudocardinal teeth are compressed and the beak cavity is somewhat deep. The periostracum is smooth, shiny and usually yellow with brown patches.

The nacre is white to bluish white. There may be green or black rays on the posterior slope.

The species ranges from Georgia to the Lower Ottawa River Canada and eastward to Nova Scotia. New Jersey occurrences of the yellow lampmussel are restricted to the Delaware River.

The yellow lampmussel prefers large rivers that drain more than 1,200 sq. Km (Strayer 1993), and is often found in sand/silt substrates. Although the host fish has not been identified, a migratory species such as the alewife is the suspected host.

Shells of the **eastern lampmussel** are elliptical and have a rounded posterior ridge. The posterior and anterior ends are rounded and swollen umbos extend above the hinge line. The periostracum is brown and extensively rayed. The nacre is white and may be tinged with pink or salmon. This species has long lateral teeth and two pseudocardinal teeth on the left and right valves.

The eastern lampmussel ranges from South Carolina north to the St. Lawrence River Basin. In New Jersey, the species is known from locations in the Ramapo, Pequannock, and Wallkill rivers.

The eastern lampmussel is found in a variety of habitats. It is reported to prefer medium to coarse sands. The host fish is unknown.

The **eastern pondmussel** can be distinguished by its bluntly pointed posterior and distinctive posterior ridge. The shells are elongate and twice as long as wide. The dorsal margin is straight and the ventral margin (the side that opens) is curved. The beaks are low and located in the anterior quarter of the shell. The lateral teeth are long and straight. The pseudocardinal teeth are compressed. The nacre is white, but can also vary



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from an iridescent blue to salmon. The periostracum is greenish yellow to dark olive or brown.

The eastern pondmussel occurs from Cape Fear River Basin, North Carolina, to the St. Lawrence River Basin, Canada, and westward through northern parts of the continent's Interior Basin. In New Jersey, the species can be found in the Delaware River and several of its tributaries.

The eastern pondmussel is often associated with tidewaters. The host fish is unknown.

The **tidewater mucket** appears similar to the yellow lampmussel. The shell is small; males are elliptical and females are ovate, subinflated and thin. The anterior end is rounded; the posterior margin is evenly rounded, somewhat pointed in males and truncated in females. The beaks are moderately swollen, raised above the hinge line, and are located near the middle of the shell. The periostracum is yellow to brown or olive green and is often covered with fine green rays. The pseudocardinal teeth are compressed; the lateral teeth are short and curved. The beak cavity is shallow and the nacre is bluish-white and sometimes pink.

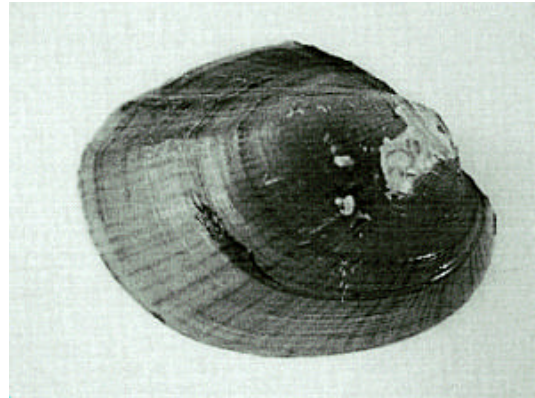


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Wildlife Resources Commission

The tidewater mucket ranges from the Savannah River Drainage Basin in Georgia north into Nova Scotia. In New Jersey, the species occurs in the Delaware River.

This species is associated with tidewaters and can be found in sand/silt substrates. The host fish is undetermined.

The **triangle floater** is a small, ovate to triangular shaped mussel. The lateral teeth are absent, but there is an interdental projection in the left valve. The pseudocardinal teeth are large and well-developed. The periostracum is yellowish-green to black and is extensively rayed. The nacre is pinkish-salmon posteriorly and whitish on the anterior portion.

The triangle floater is a generalist and can be found in a variety of stream and river habitats. The host fish is not determined.

Status and Conservation

The dwarf wedgemussel is afforded protection through federal and state Endangered Species acts, federal and state Clean Water acts, Flood Hazard Area Control Act rules (stream encroachment), and environmental reviews of proposed development projects. The other species listed above are scheduled to be listed as state endangered or threatened in late 2001/early 2002. Federal and state Clean Water acts, stream encroachment rules, environmental reviews of proposed development projects and the state Endangered Species Act will serve to help protect existing populations.