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**SPECIES COMPARISON TABLE**

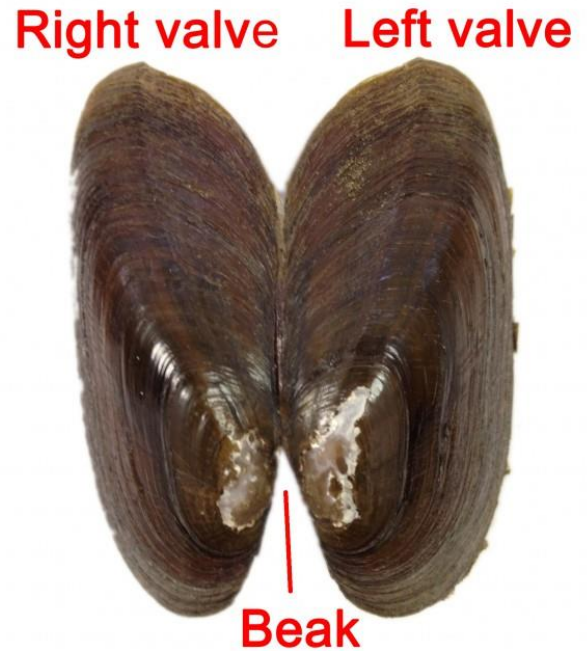
**DICHOTOMOUS KEY TO NEW JERSEY SPECIES**

Content written by Jeanette Bowers-Altman, Principal Zoologist with the New Jersey Endangered and Nongame Species Program. Range maps by Mike Davenport.

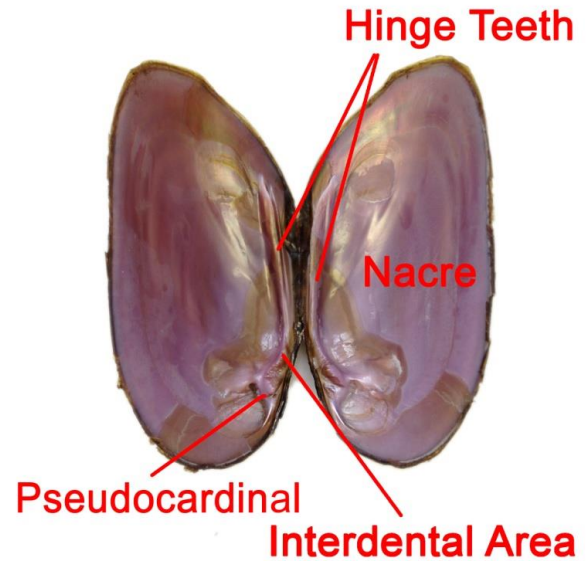
**HOW TO IDENTIFY MUSSELS**

Freshwater mussels are a diverse and variable group of animals. We use the shells as the most convenient and consistent basis for identification. In order to describe the attributes of shells that define a species, it is necessary we ‘speak the same language’ and use specific terms. The illustration below is a display of how the shells should be oriented to define left and right, which end is the front (anterior) versus the back (posterior), and which side is the topmost (dorsal) and which is the bottommost (ventral). Other important features are also depicted: the lateral hinge teeth, pseudocardinal teeth, beak, the interdental area, outer shell skin (periostracum), and the nacre (mother-of-pearl).

Left and right sides are determined by placing a shell down with the outside facing upward, and the hinge on top. The beak will be to one side or the other of the centerline. If the beak is located to the right of the centerline, the shell is designated as the right valve. An example is shown below:



The anterior of a valve is the rounded end from which the foot emerges; it is also the end closest to the beak. The posterior is the opposite end, generally more pointed and located farther from the beak. This is the end from which the siphon emerges. Example:



Other shell features include: the back, or dorsal area, located adjacent to the hinge, the ventral area (or the bottom of the shell) opposite of the hinge, growth lines may be evident as concentric lines, each of which reflect an earlier shell configuration, hinge teeth (if present), and pseudocardinal teeth (if present), the nacre, periostracum, beak, and interdental area (if present).

The hinge is the area where the shells connect when the mussel is alive. The hinge teeth, if present, run parallel and adjacent to the hinge. Pseudocardinal teeth (if present) are located on either side of the hinge teeth, and act to keep the shell from being easily opened by external forces. The interdental area is the area of a shell between the two types of teeth described above. The periostracum, or epidermis, is the outer most layer of the shell, and may exhibit textures as a result of growth. The nacre is the inner most layer of the shell, closest to the living animal within. It is smooth and may exhibit species specific colors.

In addition to the shell components, general shell shape can be an important aspect of species identification. Many times the observer has a live mussel to identify, but is rightfully reticent to sacrifice the specimen for positive identification (indeed, it is illegal to harm a listed freshwater mussel species without a special permit!).

Determination of general shell shape, inflatedness, posterior ridging, shell sculpturing, and location of the beak can provide positive identification, especially if used in conjunction with empty shells found in the area.

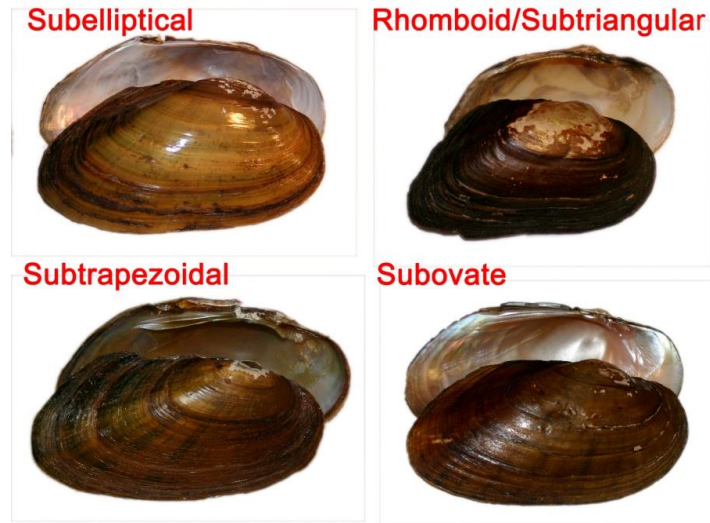
When viewed from the top or from the ends, an inflated shell is noticeably rounder.



Lilliput. © Allen Barlow

Freshwater mussel valves will generally fall into one of the following illustrated shape categories. It is important to note, however, that individual

mussels grow in response to the local environment, and may be unrecognizable in specific areas. Valve shape and growth can be altered by injury to the individual at an earlier age.



Clockwise from top left: an alewife floater, dwarf wedgemussel, eastern lampmussel, and eastern eliptio. Photos by Allen Barlow.

Coloration can prove to be useful in mussel identification, but this characteristic is variable; it changes with water body, age of the mussel, and substrate. Color rays and banding examples are displayed below. There is a general darkening of the outer shell skin as the individual grows.



Tidewater mucket. © Allen Barlow

In addition to color changes, the general shell shape can change dramatically throughout the growth process.



On the left is a young green floater. An older specimen is on the right. Note the difference in color and shape. © Allen Barlow

Shell detailing can be an integral component of identification (texture and fine sculpturing).



Paper pondshell, a species with an extremely thin shell. © Allen Barlow

**MUSSEL SPECIES: Dwarf Wedgemussel (*Alasmidonta heterodon*)**

NJ Status: **State Endangered**



Dwarf wedgemussel, left view. © Allen Barlow



Dwarf wedgemussel, right view. © Allen Barlow

**External Characteristics:**

**Size:** up to 1.5 inches

**Shape:** elongate triangular

**Coloration:** yellowish to blackish

**Internal Characteristics:**

**Lateral Teeth:** 1 left, 2 right (diagnostic)

**Pseudocardinal Teeth:** 2 left, 1 right

**Nacre:** bluish white

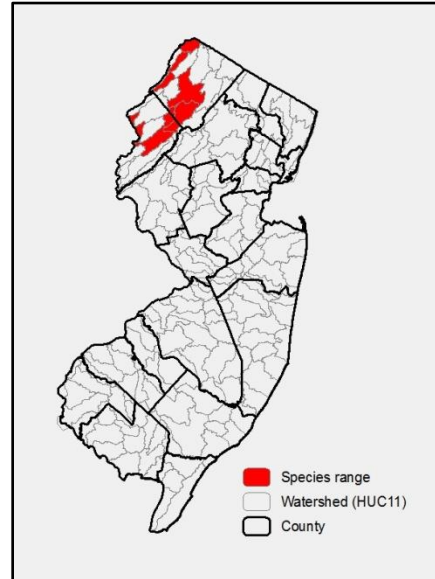
**Other Traits:** shell has a well-defined posterior ridge

**Similar to:** Creeper, brook floater, triangle floater

**Habitat Preferences:** Dwarf wedgemussels are found in streams and rivers. This species prefers

sandy substrates with slow to moderate currents. It has been located in streams designated as suitable for trout habitat/stocking.

**NJ Distribution:** Dwarf wedgemussels are only found in a few streams in NJ. The upper Delaware River, Flat Brook, selected areas of the Paulins Kill, and the Pequest River are the areas of reported presence.



**Conservation:** The Dwarf wedgemussel is a Federally and State Endangered species. Due in part to habitat destruction and interruption of fish species hosts, this species has suffered population losses throughout the northeast and middle Atlantic Region of the US in the last century. Its small size and coincidental association with trout streams make the species subject to trampling. As with most small mussels, it is rather short lived (~15 years). This species is in the same genus as the triangle floater and the brook floater.

## MUSSEL SPECIES: Triangle Floater (*Alasmidonta undulata*)

NJ Status: **State Threatened**



Triangle floater, left view. © Allen Barlow



Triangle floater, right view. © Allen Barlow

### External Characteristics:

**Size:** up to 3 inches

**Shape:** roughly triangular, inflated

**Coloration:** young show yellowish green rays;  
adults are black

### Internal Characteristics:

**Lateral Teeth:** **absent**

**Pseudocardinal Teeth:** **2 left, 1 right, very robust**

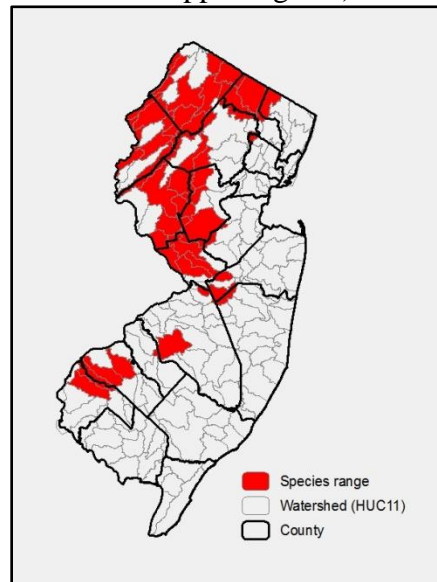
**Nacre:** dull white

**Other Traits:** shell is moderately thick and sturdy

**Similar to:** creeper, brook floater, dwarf  
wedgemussel

**Habitat Preferences:** Triangle floaters can be located in streams and rivers. In slower moving water bodies, look for it in small riffles. It is almost always found in sand or finer gravel and does not appear to thrive in silty muddy bottoms. It has been observed at the base of several beaver dams throughout the state.

**NJ Distribution:** Triangle floaters have been found in tributaries to the Delaware River, from Salem County to Sussex County, but as yet, have not been observed in rivers leading to the Atlantic Ocean (the Raritan River system has waterways connecting to both receiving waters, and triangle floaters are found in the upper regions).



**Conservation:** The triangle floater is widely distributed in NJ waterways leading to the Delaware River. Seldom occurring in large numbers, usually only a few individuals are found during timed inventories. It is currently listed in NJ as Threatened due primarily to its low abundance and threats to occupied areas.

## **MUSSEL SPECIES: Brook Floater** **(*Alasmidonta varicosa*)**

NJ Status: **State Endangered**



Brook floater, left view. © Allen Barlow



Brook floater, right view. © Allen Barlow

### **External Characteristics:**

**Size:** up to 3 inches

**Shape:** trapezoidal to kidney-shaped, inflated

**Coloration:** yellowish green to greenish black,  
rays easily visible in young

### **Internal Characteristics:**

**Lateral Teeth:** **absent**

**Pseudocardinal Teeth:** **1 left, 1 right, small**

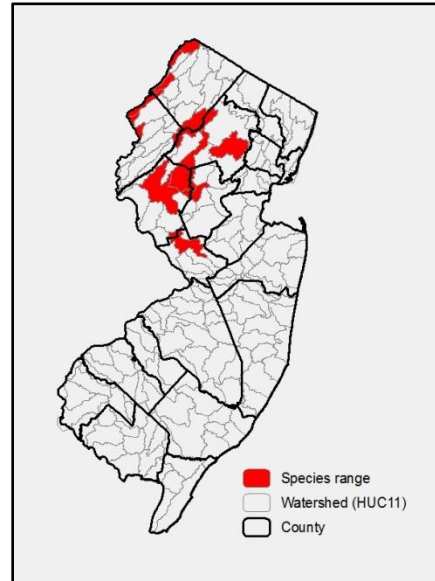
**Nacre:** bluish white to pale orange

**Other Traits:** **Posterior sculpting**, foot often orange, siphon opening circular, small gravel may be attached to sculpturing on posterior

**Similar to:** Creeper, triangle floater, dwarf wedgemussel

**Habitat Preferences:** Brook floaters are generally found in smaller rivers. They are associated with fine gravel but may be found situated between rocks that act as protection against episodic floodwaters and high currents.

**NJ Distribution:** Brook floaters have been found in low numbers in the Stony Brook and Flatbrook, and in the Lamington, Musconetcong, Delaware and Raritan (North Branch) rivers.



**Conservation:** The brook floater is a State Endangered species. Low numbers and the prevalence of older individuals reported in occupied habitats may indicate that no new reproduction is occurring.

## MUSSEL SPECIES: Alewife Floater (*Anodonta implicata*)

NJ Status: **Secure/Stable**



Alewife floater, left view. © Allen Barlow



Alewife floater, right view. © Allen Barlow

### External Characteristics:

**Length:** up to 7 inches

**Shape:** elongate with rounded ventral margins

**Coloration:** yellowish brown, variable

### Internal Characteristics:

**Lateral Teeth:** absent

**Pseudocardinal Teeth:** absent

**Nacre:** white to pale pink

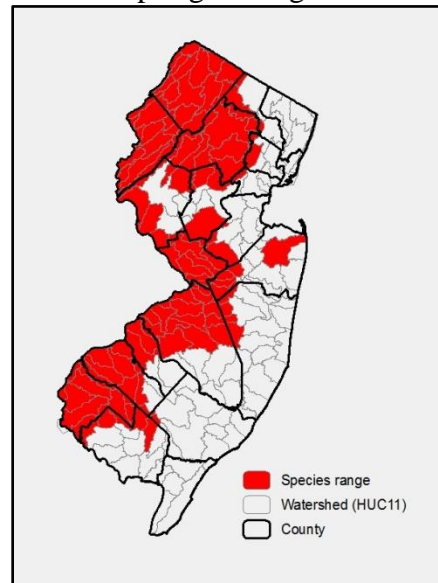
**Other Traits:** anterior ventral shell thicker than rest

**Similar to:** Eastern floater

**Habitat Preferences:** The alewife floater has been found in a variety of habitats and substrate types. It may require the presence of anadromous fish (alewife and perhaps other members of the herring family) to act as a host for the glochidial stage. It is

often found at and downstream of the base of obstructing dams or other impediments to the host fish.

**NJ Distribution:** The alewife floater is the state's third most common freshwater mussel species. It has been observed in the Delaware River, Oldman's Creek in Gloucester County, Salem Creek in Salem County, Paulins Kill in Sussex and Warren counties, as well as in other areas throughout the state. It can often be found in waterways that sustain a spring herring run.



**Conservation:** This species is sometimes concentrated at the base of dams. Persons using the waterway below such structures (e.g. swimmers and anglers) should take care if wading. This species is thin shelled and easily breakable. Any dam structures that facilitate anadromous fish passage upstream should be kept in good repair. Observations for Atlantic Ocean drainage systems along the east coast of New Jersey are limited; it is expected this species will be located in river systems that do not originate in the Pine Barrens.

## **MUSSEL SPECIES: Eastern Elliptio** **(*Elliptio complanata*)**

NJ Status: **Secure/Stable**



Eastern elliptio, left view. © Allen Barlow



Eastern elliptio, right view. © Allen Barlow

### **External Characteristics:**

**Size:** up to 5 inches

**Shape:** variable – usually sub-trapezoidal

**Coloration:** variable – tan with green rays to black

### **Internal Characteristics:**

**Lateral Teeth:** 2 left, 1 right

**Pseudocardinal Teeth:** 2 left, 1 right, well developed

**Nacre:** variable – white, pink, gold, purple

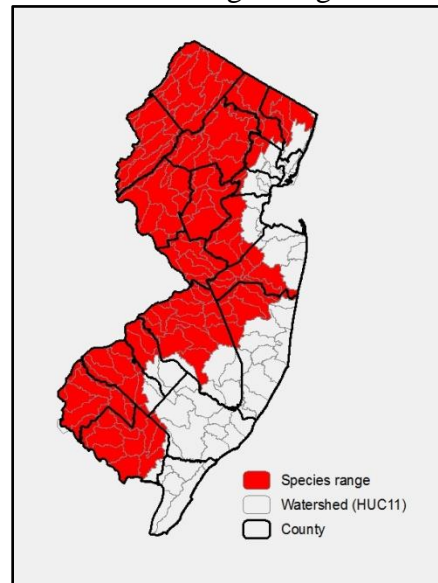
**Other Traits:** green rays in young, highly variable

**Similar to:** Creeper. Green rays in some young may cause confusion with young triangle floaters and eastern lampmussels. Very slow growing

individuals become quite inflated and may be confused with older eastern floater species.

**Habitat Preferences:** This hearty species is found in a wide variety of flow conditions and substrate types. It occurs in slow to rapidly flowing waterways, and in sediments ranging from fine silt to hard rocky bottoms.

**NJ Distribution:** The eastern elliptio is found in small streams to large rivers in both the Delaware River and Atlantic Ocean drainage systems, except in acid waters originating in the Pine Barrens.



**Conservation:** Eastern elliptio represent more than 92 percent of the mussels found in New Jersey during a 10 year inventory of streams and rivers. Their abundance is attributable to the use of many fish species as glochidial hosts, the ability to survive in flowing and non-moving waters, and their relatively robust tolerance to many forms of water pollution.



## MUSSEL SPECIES: Yellow Lampmussel (*Lampsilis cariosa*)

NJ Status: **State Threatened**



Yellow lampmussel, left view. © Allen Barlow



Yellow lampmussel, right view. © Allen Barlow

### External Characteristics:

**Size:** up to 5 inches

**Shape:** **ovate, inflated**

**Coloration:** **bright yellow** to yellowish brown

### Internal Characteristics:

**Lateral Teeth:** 2 left, 1 right

**Pseudocardinal Teeth:** 2 left, 2-3 right

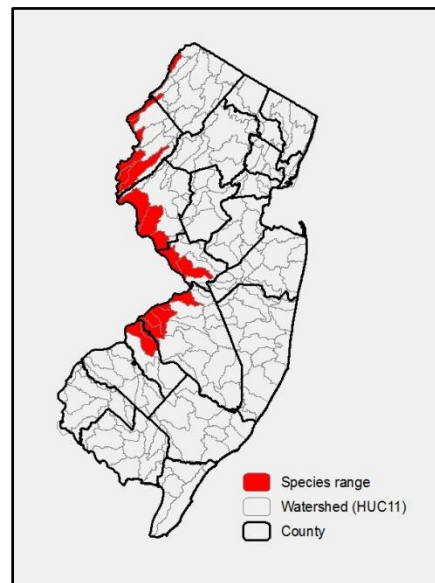
**Nacre:** white

**Other Traits:** **pseudocardinals robust and located under beak**, shell thick and heavy

**Similar to:** Eastern lampmussel, tidewater mucket

**Habitat Preferences:** The yellow lampmussel prefers large rivers and is often found in sand/silt or cobble substrates.

**NJ Distribution:** New Jersey's occurrences of the yellow lampmussel are restricted to the Delaware River.



**Conservation:** Yellow lampmussel is listed throughout the northeast as Special Concern, Threatened, or Endangered. Its heavy shell morphology allows this species to inhabit high flow waterways and make individuals resistant to crushing. Dredging operations could adversely affect populations.

**MUSSEL SPECIES: Eastern  
Lampmussel (*Lampsilis radiata*)**

NJ Status: **State Threatened**



Eastern lampmussel, left view. © Allen Barlow



Eastern lampmussel, right view. © Allen Barlow

**External Characteristics:**

**Size:** up to 6 inches

**Shape:** subovate to ovate, slightly inflated

**Coloration:** yellowish green to brownish black

**Internal Characteristics:**

**Lateral Teeth:** 2 left, 1 right

**Pseudocardinal Teeth:** 2 left, 2-3 right

**Nacre:** white to pinkish

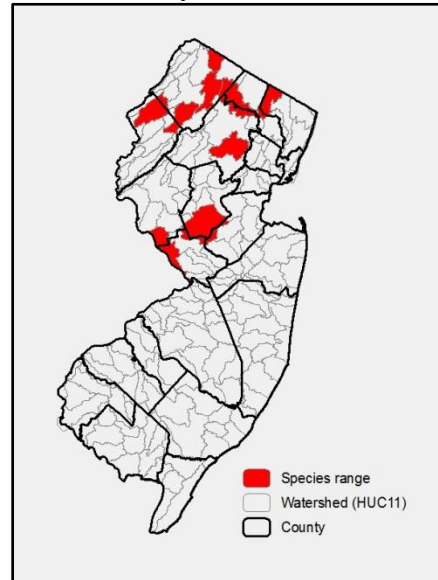
**Other Traits:** **rays prominent**

**Similar to:** Yellow lampmussel, tidewater mucket

**Habitat Preferences:** Eastern lampmussels can be found in a variety of habitats. They are reported to prefer medium to coarse sands.

**NJ Distribution:** This species is known from locations such as the Ramapo, Pequannock, Paulins

Kill and Wallkill rivers and in Lake Aeroflex, Morris County.



**Conservation:** The eastern lampmussel may be more prevalent in lakes in New Jersey than in flowing waterways. It is reported to be abundant in Connecticut lakes and ponds. More surveys are needed in deeper water habitats to determine state distribution. Although moderately tolerant of pollutants, this species may not be able to survive periods of drought in flowing water.

## MUSSEL SPECIES: Green Floater (*Lasmigona subviridis*)

NJ Status: **State Endangered**



Green floater, left view. © Allen Barlow



Green floater, right view. © Allen Barlow

### External Characteristics:

**Size:** up to 2.5 inches

**Shape:** ovate to trapezoidal, variable

**Coloration:** yellow to brownish green

### Internal Characteristics:

**Lateral Teeth:** 2 left, 1 right vestigial

**Pseudocardinal Teeth:** 2 left, 1 right

**Nacre:** bluish white

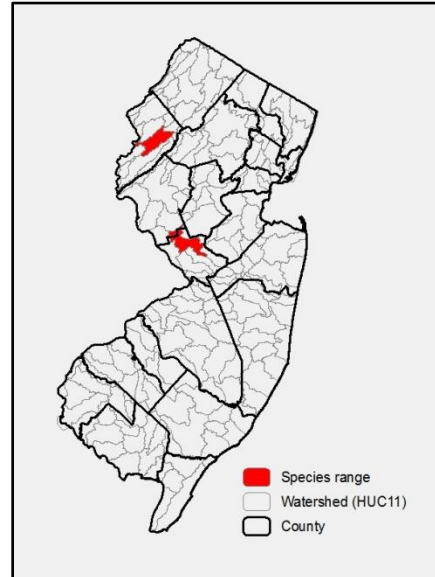
**Other Traits:** left valve with interdental tooth,  
dark green rays

**Similar to:** Eastern elliptio, dwarf wedgemussel,  
triangle floater

**Habitat Preferences:** The green floater can be  
found in smaller streams, pools and eddies. It

prefers slow currents and gravelly or sandy  
substrates.

**NJ Distribution:** The green floater once occurred  
in the Passaic, Raritan, Delaware and Pequest  
rivers, but hasn't been found alive since 1996, when  
a single individual was recorded in the Stony  
Brook. In addition, a few partial shells were found  
in the Pequest River in 2007.



**Conservation:** More surveys are needed to  
determine if green floaters are extirpated in the  
state. There is some evidence that the species may  
not require a host fish in order to complete its life  
cycle. Any sighting of this species should be  
reported to the Endangered and Nongame Species  
Program.

## MUSSEL SPECIES: Tidewater Mucket (*Leptodea ochracea*)

NJ Status: **State Threatened**



Tidewater mucket, left view. © Allen Barlow



Tidewater mucket, right view. © Allen Barlow

### External Characteristics:

**Size:** up to 3 inches, occasionally larger

**Shape:** ovate, inflated

**Coloration:** yellowish to greenish brown

### Internal Characteristics:

**Lateral Teeth:** 2 left, 1 right

**Pseudocardinal Teeth:** 2 left, 2 right

**Nacre:** pinkish or salmon

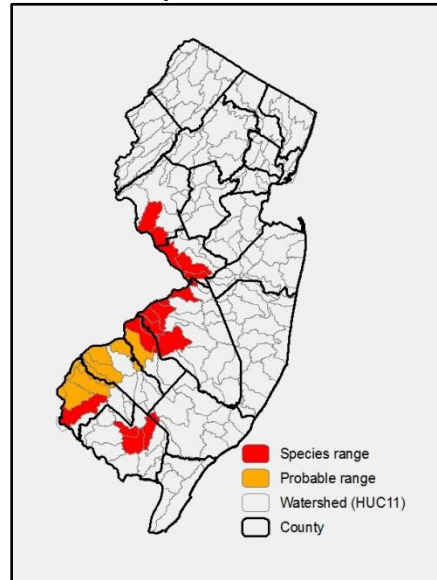
**Other Traits:** Pseudocardinal teeth thin and well anterior to beak

**Similar to:** Yellow lampmussel, eastern lampmussel.

**Habitat Preferences:** The tidewater mucket is associated with tidewaters and can be found in sand/silt and small gravel substrates.

**NJ Distribution:** This species can be found in the lower half of the Delaware River and tributaries. It

also occurs in several southern New Jersey lakes. It is historically known from the lower Passaic River.



**Conservation:** The tidewater mucket is listed as Special Concern or Threatened in the New England area. Although fish species found to be host fish include white perch and banded killifish, it may also rely on anadromous fish runs for glochidial distribution.

## MUSSEL SPECIES: Eastern Pondmussel (*Ligumia nasuta*)

NJ Status: **State Threatened**



Eastern pondmussel, left view. © Allen Barlow



Eastern pondmussel, right view. © Allen Barlow

### External Characteristics:

**Size:** up to 6 inches

**Shape:** narrow and elongate, compressed

**Coloration:** greenish black to dark brown or black

### Internal Characteristics:

**Lateral Teeth:** 2 left, 1 right, thin and delicate

**Pseudocardinal Teeth:** 1-2 left, 1-2 right, thin

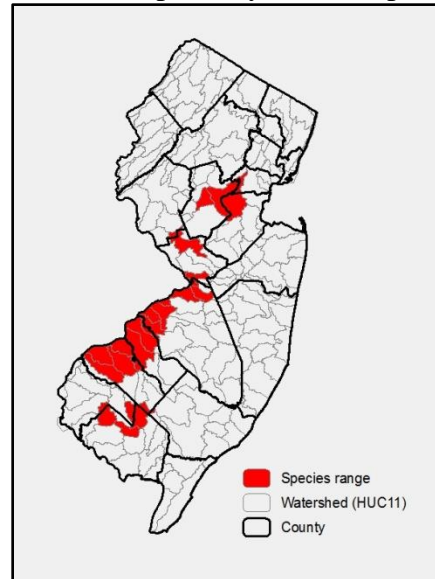
**Nacre:** bluish white

**Other Traits:** **Periostracum extends beyond ventral margin.** Females more rounded on ventral surface

**Similar to:** Eastern pondmussel is unlike any other species found in New Jersey.

**Habitat Preferences:** The eastern pondmussel is often associated with tidewaters. It is found primarily in fine sediments, but a few individuals have been located far upstream in rocky bottoms.

**NJ Distribution:** The eastern pondmussel has been reported in the Delaware River and tributaries, Stony Brook, and Duke's Brook. A fairly large population is found in the Maurice River drainage area. It is reportedly found in ponds and lakes.



**Conservation:** The eastern pondmussel is a State Threatened species. Given its propensity for tidal waters and soft sediments, channel dredging has probably contributed to this species reduced populations.

## **MUSSEL SPECIES: Eastern Floater** **(*Pyganodon cataracta*)**

NJ Status: **Secure/Stable**



Eastern floater, right view. © Allen Barlow

### **External Characteristics:**

**Size:** up to 7 inches +

**Shape:** elongate with rounded ventral margins

**Coloration:** yellowish green to brown

### **Internal Characteristics:**

**Lateral Teeth:** absent

**Pseudocardinal Teeth:** absent

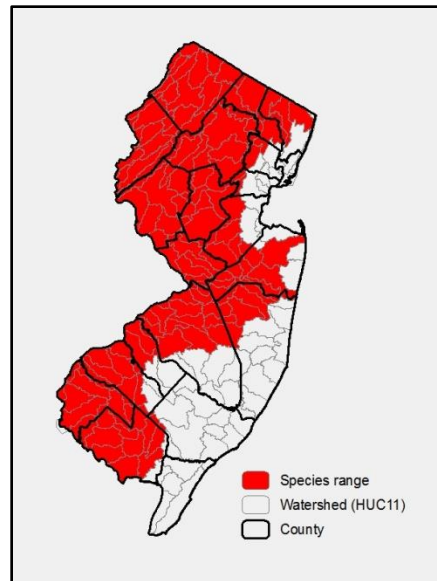
**Nacre:** bluish white

**Other Traits:** shell thin and fragile, banding in young

**Similar to:** Alewife floater

**Habitat Preferences:** Eastern floater is found in both flowing and non-moving water systems. This species is tolerant of fine silts and is often found at the base of dams.

**NJ Distribution:** Eastern floaters are found in both the Delaware River and Atlantic Ocean drainage systems.



**Conservation:** The Eastern Floater is the second most abundant freshwater mussel species in New Jersey. It is relatively tolerant of pollutants and stream modifications; thus, it is widely distributed in New Jersey waterways.

## MUSSEL SPECIES: Chinese Pond Mussel (*Sinanodonta woodiana*)

NJ Status: **Introduced/Highly Invasive**



Chinese pond mussel, outside view. © Allen Barlow



Chinese pond mussel, interior view. © Allen Barlow



Chinese pond mussel, beak view. © Allen Barlow

### External Characteristics:

**Size:** up to 12 inches

**Shape:** young subovate; adults elongate with well-rounded ventral margins

**Coloration:** greenish to brownish, rays in young

### Internal Characteristics:

**Lateral Teeth:** absent

**Pseudocardinal Teeth:** absent

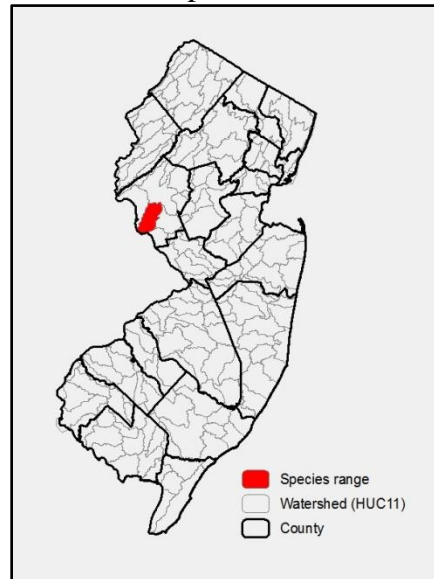
**Nacre:** white to bluish white

**Other Traits:** young with thin shell, thickens with age

**Similar to:** Eastern floater

**Habitat Preferences:** The Chinese Pond Mussel prefers muddier substrates and is reported from slow running rivers to eutrophic ponds. It is a broad host generalist, meaning that every fish species tested was found to be a suitable glochidial host.

**NJ Distribution:** North American distribution of the Chinese pond mussel is limited to Wickecheoke Creek and man-made ponds in Franklin Township, Hunterdon County. There is an ongoing effort to eradicate the species from New Jersey waters.



**Conservation:** This highly invasive species most likely arrived in our state from East Asia as glochidia attached to imported bighead carp. It has been widely introduced in Europe, where it is spreading rapidly, decimating native mussels by outcompeting them for food and space. Its capacity to filter large amounts of water combined with its ability to infect a wide array of host fish species makes the Chinese pond mussel an especially dangerous invader. Stopping its spread in NJ is crucial to protecting our native mussel fauna.

## MUSSEL SPECIES: Creeper (*Strophitus undulatus*)

NJ Status: **State Special Concern**



Creeper, left view. © Allen Barlow



Creeper, right view. © Allen Barlow

### **External Characteristics:**

**Size:** up to 4 inches

**Shape:** subovate to subtrapezoidal

**Coloration:** yellowish to dark brown or black

### **Internal Characteristics**

**Lateral Teeth:** absent

**Pseudocardinal Teeth:** swollen knob on each valve

**Nacre:** white to bluish white

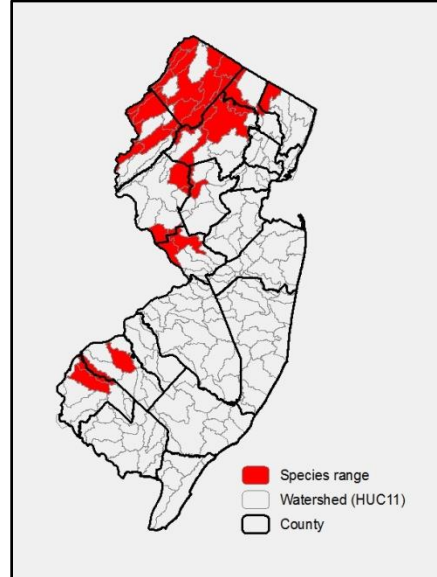
**Other Traits:** fine rays may be present

**Similar to:** Brook floater, triangle floater, dwarf wedgemussel

**Habitat Preferences:** Creepers are found in clean running water and are associated with fine to coarse sand and gravel sediments. They have been

reported from small brooks and creeks to large rivers.

**NJ Distribution:** Creepers have been found in brooks and rivers that are part of the Delaware River drainage system. They have been located in waterways such as the Musconetcong, Rockaway and Lamington rivers, Paulins Kill, Chambers Book, Stony Brook, Mantua and Oldmans creeks.



**Conservation:** Although widespread along the Delaware River drainage, this species seldom appears in great numbers. The relatively sparse numbers may preclude much successful reproduction, thus a Special Concern status is afforded this species.



**MUSSEL SPECIES: Lilliput (*Toxolasma parvum*)**

NJ Status: **Introduced**



Lilliput, left view. © Allen Barlow



Lilliput, right view. © Allen Barlow



Lilliput, beak view. © Allen Barlow

**External Characteristics:**

**Size:** up to 1.5 inches

**Shape:** elliptical or wedge shaped, **inflated**

**Coloration:** dark green to black

**Internal Characteristics:**

**Lateral Teeth:** 2 left, 1 right

**Pseudocardinal Teeth:** 2 left, 1-2 right

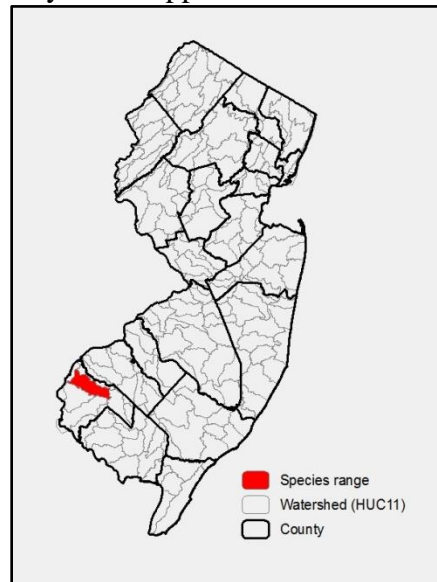
**Nacre:** iridescent white

**Other Traits:** **cloth-like texture on outside of shell**, sculpturing when live.

**Similar to:** When alive, this species is easily identified by the texture of its periostracum. After shell erosion occurs, its small size and shape could be mistaken for the dwarf wedgemussel, except for lateral teeth geometry.

**Habitat Preferences:** Live specimens have only been found in wet shoreline depressions in coarse sand after seasonal flooding events. Shells found downstream.

**NJ Distribution:** This species has only been found only in the upper reaches of the Salem River.



**Conservation:** The specimens found were 2 to 3 years old and may have washed out of a lake. This is the first record of this species in New Jersey.

## MUSSEL SPECIES: Paper Pondshell (*Utterbackia imbecillis*)

NJ Status: **Introduced**



Paper pondshell, left view. © Allen Barlow



Paper pondshell, right view. © Allen Barlow

### External Characteristics:

**Size:** up to 4 inches

**Shape:** moderately elongate with rounded ventral margins

**Coloration:** greenish to brownish, variable

### Internal Characteristics:

**Lateral Teeth:** absent

**Pseudocardinal Teeth:** 2 left, 1 right, very robust

**Nacre:** white to bluish white

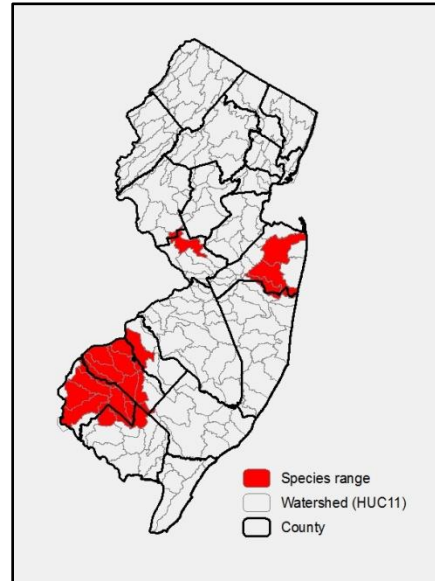
**Other Traits:** **beak depressed below hinge line, shell extremely thin**

**Similar to:** eastern floater, eastern pondmussel

**Habitat Preferences:** The paper pondshell is reported to use more host fish species than any other North American freshwater mussel. It can be

found in muddy substrate in ponds and lakes, and well as in protected pockets at the base of dams and in muddy areas of streams.

**NJ Distribution:** Paper pondshells were recently introduced into New Jersey waters, and are rapidly spreading up the Delaware River and its tributaries, including the Maurice and Salem river systems. It is prevalent throughout Gloucester and Salem counties.



**Conservation:** Given the species' ability to proliferate using a variety of fish hosts, along with its successful invasion of lower New Jersey, the paper pondshell is expected to continue spreading up the Delaware River system. Its proclivity to reside in muddy substrates should keep this species from displacing native stream mussels, but could successfully compete with pond dwelling species.

## MUSSEL SPECIES: Atlantic Rangia (*Rangia cuneata*)

NJ Status: **Introduced**



Atlantic rangia, left view. © Allen Barlow



Atlantic rangia, right view. © Allen Barlow

### External Characteristics:

**Size:** up to 2 inches

**Shape:** oval-triangular, with numerous concentric growth rings

**Coloration:** black to light brown to yellow

### Internal Characteristics:

**Lateral Teeth:** upper & lower surfaces in left valve and upper surface of right valve serrated

**Cardinal Teeth:** 2 in each valve, forming a ^ projection

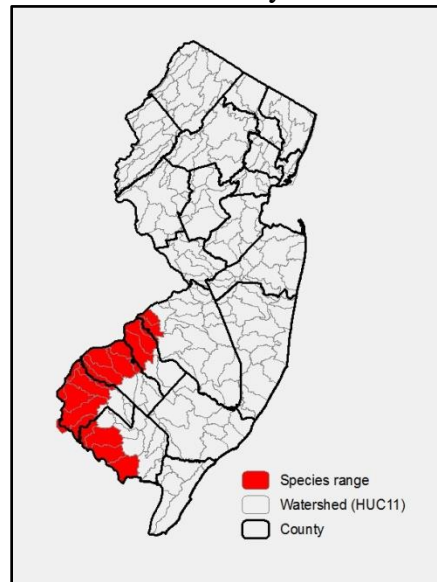
**Nacre:** glossy white, sometimes tinged with blue or blue-gray

**Other Traits:** shell thick and sturdy, beak bulbous and curving anteriorly

**Similar to:** Asian clam

**Habitat Preferences:** The Atlantic rangia can be found in fresh to brackish waters with low salinities (0-18 parts per thousand). It prefers higher turbidity areas with soft substrates comprised of sand or mud.

**NJ Distribution:** The Atlantic rangia wasn't reported from the east coast north of Florida around 1955. Until this time, the species was thought to occur from the Gulf Coast of northern Florida to Texas. In the early 1960's, it was reported from Chesapeake Bay, and then was first collected at Oakwood Beach, Delaware Bay in 1971. In addition to Delaware Bay, it is now known to occur in the lower portion of the Delaware River (from approximately Palmyra southwards). It has been reported in the Maurice River and Menantico Creek, and possibly occurs in tidal areas of other southern tributaries. The species is also prevalent in the Hudson River estuary.



**Conservation:** The Atlantic rangia belongs to the Mactridae family (saltwater clams, marine bivalve mollusks). The species is included in our guide since it is known to occur in several areas inhabited by freshwater mussels. It is often confused with the invasive Asian clam. Both species are prolific and known to cause biofouling in power plants and water treatment systems. To prevent their spread, it is recommended that water be drained from boats, live wells, and bait wells before launching into other waterways.

## **MUSSEL SPECIES: Asian Clam** **(*Corbicula fulminea*)**

NJ Status: **Introduced/Invasive**



Asian

clam. © Allen Barlow

### **External Characteristics:**

**Size:** <2 inches

**Shape:** ovate in young, triangular in adults; inflated

**Coloration:** yellow-green to light brown

### **Internal Characteristics:**

**Lateral Teeth:** 2 serrated teeth on each side of right valve, 1 on each side of left valve

**Cardinal Teeth:** 3 in each valve

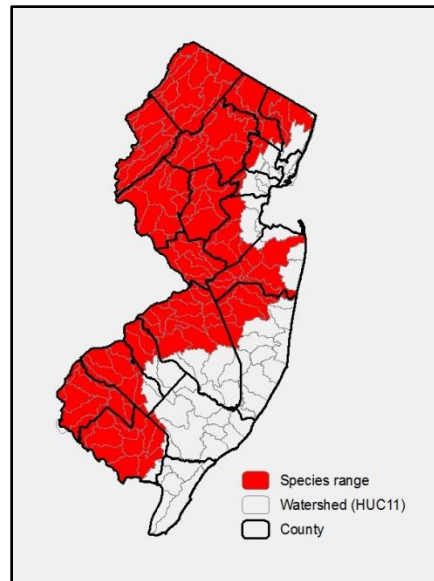
**Nacre:** white to bluish-white

**Other Traits:** shell moderately thick and sturdy, centrally located beak, distinct, coarse growth rings

**Similar to:** Atlantic rangia, fingernail clam

**Habitat Preferences:** Asian clams can be found in brackish to freshwater rivers, streams, lakes, ponds and canals. They have been known to thrive in a variety of substrate types, including silt, sand, gravel, and cobble. This species is extremely sensitive to cold temperatures and to low oxygen conditions, which often produces extreme fluctuations in populations.

**NJ Distribution:** This invasive species is widely distributed throughout the state. It has been found in the Delaware River and many of its tributaries (especially from Trenton southwards), the Raritan River, Stony Brook, Millstone and other NJ waterways. It is especially prevalent in the Rancocas Creek system.



**Conservation:** The Asian clam is thought to have been introduced in the United States around 1938. It belongs to the Cyranidae family, unlike NJ's freshwater mussels, which belong to the family Unionidae. The species is extremely prolific, competing for food and space with native freshwater mussels and other filter feeding bivalves. Asian clams have been known to cause biofouling in power plants and water treatment systems. To prevent their spread, it is recommended that water be drained from boats, live wells, and bait wells before launching into other waterbodies.

## **ZEBRA MUSSEL (*DREISSENA* *POLYMORPHA*)**

**NJ Status: Not present within NJ but highly invasive. Please report any suspected observations to the NJ DEP immediately (1-877-WARN DEP)!!!**



Zebra mussel cluster. Photo taken by D. Jude, Univ. of Michigan.

One of the most notorious invasive species within the United States is the zebra mussel. This species is native to lakes and rivers in southern Russia. It is believed to have “hitchhiked” across the world within the ballast water of ships, or possibly on their anchors, and arrived in the US during the late 1980’s. They now occur throughout the Great Lakes and can be found within both of our neighboring states, Pennsylvania and New York.

This species differs from our native species in several ways. The larval stage is free-swimming and does not require a fish host. It also uses byssal threads to attach itself to hard surfaces under the water, such as rocks, manmade structures, or even other mussels. They compete with native species for food and can also kill them by attaching themselves

to the shells of native species, rendering them immobile and unable to feed or reproduce. Although some native fish will feed on them, our native wildlife cannot keep their populations in check. They are prolific breeders.

Due to this species’ ability to cover and encrust structures over time, they are a major threat to hydroelectric and nuclear power plants, public water supply plants, and other industrial facilities. They also have a major impact on the ecosystems they invade. They are such efficient filter feeders that they can reduce the biomass of phytoplankton within a water body substantially, creating a clearer water column which allows sunlight to penetrate farther, which in turn, result in greater amounts of plant life.

This freshwater mussel has a “D” shaped shell which is sometimes, but not always, striped (hence, the name zebra). They are usually about the size of a fingernail but can grow up to 2 inches in size. Unlike any freshwater mussel in New Jersey, they also have byssal threads which they use to attach themselves to hard surfaces.

Use precautions when fishing, diving, and/or boating in waters containing zebra mussels. Zebra mussels can live for a week outside of water if the conditions are right. The free swimming larval stage can be spread within water while the adults can attach themselves to watercraft and gear. Disinfect and dry boats before moving them to another body of water. Drain bilge tanks and wells and empty bait buckets before washing them out with hot water or 10% bleach. Inspect boat trailers as well for any potential hitchhikers.

**Please report any suspected observations of Zebra Mussels within New Jersey to the NJ DEP immediately (1-877-WARN DEP)!!!**

## Species Comparison Table of Freshwater Mussels of New Jersey

Freshwater Mussel Species	Lateral Hinge Teeth	Pseudocardinal Teeth	Shape	Maximum Size (inches)	Periostracum Traits	Nacre Color	Other Traits
Dwarf Wedgemussel	1 left : 2 right	2 left : 1 right	elongate triangular	1.5	yellowish to blackish	bluish-white	posterior ridge
Triangle Floater	absent	2 left : 1 right robust	triangular inflated	3	yellowish green to black;	whitish	green rays in young
Brook Floater	absent	1 left : 1 right small	sub-trapezoidal to reniform - inflated	3	yellowish green to greenish brown	bluish white to pale orange	posterior sculpturing orange foot often
Eastern Elliptio	2 left : 1 right	2 left : 1 right well developed	variable - usually sub-trapezoidal	5	variable - tan with green rays to black	variable - white pink, gold, purple	green rays in young highly variable
Eastern Floater	absent	absent	elongate with rounded ventral margin	7+	yellowish green to brown	bluish white	shell thin and fragile banding in young
Alewife Floater	absent	absent	elongate with rounded ventral margin	7	yellowish brown variable	white to pale pink	anterior ventral shell thicker than rest
Eastern Pondmussel	2 left : 1 right thin and delicate	1-2 left : 1-2 right thin	narrow and elongate compressed	6	greenish black to dark brown or black	bluish white	periostracum extends beyond ventral margin
Tidewater Mucket	2 left : 1 right	2 left : 2 right	ovate inflated	5	yellowish to greenish brown	pinkish or salmon	pseudocardinals thin well anterior to beak
Yellow Lampmussel	2 left : 1 right	2 left : 2-3 right	ovate inflated	5	bright yellow to yellowish brown	white	pseudocardinals robust located under beak
Eastern Lampmussel	2 left : 1 right	2 left : 2-3 right	subovate to ovate slightly inflated	6	yellowish green to brownish black	white to pinkish	rays usually prominent
Green Floater	2 left : 1 right vestigial	2 left : 1 right	ovate to subtrapezoidal variable	2.5	yellow to brownish green - thin	bluish white	left valve with interdental tooth, dark green rays
Creeper	absent	swollen knob on each valve	subovate to subtrapezoidal	4	yellowish to dark brown or black	white to bluish white	fine rays may be present
Paper Pondshell *	absent	absent	moderately elongate hinge line straight	4	greenish to brown - very thin	white to bluish white	beak depressed below hingeline
Lilliput *	2 left : 1 right	2 left : 1-2 right	elliptical or wedge shaped, inflated	1.5	dark green to black	iridescent white	clothlike texture sculpturing when live
Chinese Pond Mussel*	absent	absent	ovate-subovate (juveniles) to elongate (adults) can be very inflated when older	12	light green (juveniles) to brown (adults)-variable	iridescent white to bluish white	juveniles with thin, fragile shell and sail-like projection on dorsal margin

red notes are diagnostic

\* Introduced species

## Key to the Freshwater Bivalves of New Jersey

1. a. shell with a very sharp posterior ridge, shaped like the marine mussel, *Mytilus*, generally less than 30 mm, and attached to a hard substrate with byssal threads.....**Zebra mussel**  
 b. animal without byssal threads attaching adult to substrate, with or without teeth but not with the above shape.....2
2. a. valves with cardinal teeth and two sets of lateral teeth.....3  
 b. valves with one set of lateral teeth and pseudocardinal teeth or without teeth.....5
3. a. shell thick and sturdy, beak bulbous and curving anteriorly.....**Atlantic rangia**  
 b. shell moderately thick, beak not bulbous nor curving.....4
4. a. valves with serrated lateral teeth.....**Asian clam**  
 b. valves with smooth lateral teeth.....**Fingernail clam**
5. a. hinge teeth absent.....6  
 b. hinge teeth present.....10
6. a. beaks not projecting above the hinge line..... **Paper pondshell**  
 b. beaks projecting above the hinge line.....7
7. a. beak sculpture double looped or as bars.....8  
 b. beak sculpture concentric and coarse, pseudocardinal teeth represented by a thickening near the beaks.....**Creeper**
8. a. ventral margin well rounded in young, shell thin, but thickens with age, size becomes colossal, beak sculpture appear as bars ..... **Chinese pond mussel**  
 b. ventral margin relatively flat, or slightly rounded, beak sculpture double looped.....9
9. a. nacre salmon or copper colored, shell prominently thickened along the anterior ventral margin below the pallial line.....**Alewife floater**  
 b. nacre bluish or white, shell uniformly thin, epidermis greenish.....**Eastern floater**
10. a. lateral teeth absent or reduced, neither functional nor interlocking.....11  
 b. lateral teeth well developed, functional and interlocking.....13
11. a. fine transverse ridges on posterior slope present, posterior ridge rounded, pseudocardinal teeth reduced and elongate, shell rounded and usually less than 70 mm long..... **Brook floater**  
 b. fine transverse ridges on posterior slope absent, pseudocardinal teeth strong.....12
12. a. pseudocardinal teeth strong and triangular with rough surfaces, shell small to medium, triangular to ovate ..... **Triangle floater**  
 b. pseudocardinal teeth pronounced and smooth, shell large, to 150mm, elongate, oval and kidney-shaped, shell very thick and heavy .....**Freshwater pearl mussel** (presumed extirpated)
13. a. right valve with two lateral teeth, rare..... **Dwarf wedgemussel**  
 b. right valve with one lateral tooth.....14
14. a. height/length less than or equal to 0.48, posterior ridge prominent, posterior end of shell pointed; pseudocardinal teeth elongate, shell usually less than 110 mm in length.....**Eastern pondmussel**  
 b. height/length greater than 0.48.....15
15. a. nacre variable in color, can be purple, shell subrhomboid with well defined posterior ridge and slope, compressed as young, very common.....**Eastern elliptio**  
 b. nacre white or colored but not purple.....16
16. a. left valve with small interdental tooth, giving the appearance of three pseudocardinal teeth, shell more or less compressed and subrhomboid in outline, epidermis dark green with numerous green rays or brown, adult shell less than 65 mm long, posterior ridge rounded.....**Green floater**  
 b. left valve without interdental tooth, valve appears to have only two pseudocardinal teeth.....17
17. a. shell elliptical or wedge-shaped, small and inflated, less than 1.5 inches, outer shell surface with fabric-like texture.....**Lilliput**  
 b. shell ovate or sub-ovate, inflated.....18
18. a. adult shell usually less than 80 mm in length, thin, hardly thicker anteriorly than posteriorly until older, beak more centrally located, epidermis dull yellow without rays or with fine rays all over the shell, in or near tidewaters.....**Tidewater mucket**  
 b. adult shell often greater than 80 mm in length, much thicker anteriorly than posteriorly, may have obvious broad color rays.....19
19. a. shell without green rays or with green rays restricted to the posterior slope ..... **Yellow lampmussel**  
 b. shell with rays all over (may be obscured in old adults), height/length less than 0.60 in males and in most females, posterior ridge low and rounded, beaks not prominent.....**Eastern lampmussel**

**Note: Much of this key was taken from Bogan, A.E. 1993.  
 Workshop on Freshwater Bivalves in Pennsylvania**