FRENCH CREEK VALLEY CONSERVANCY

FACTSHEET

Freshwater Mussels


Kidney Shell

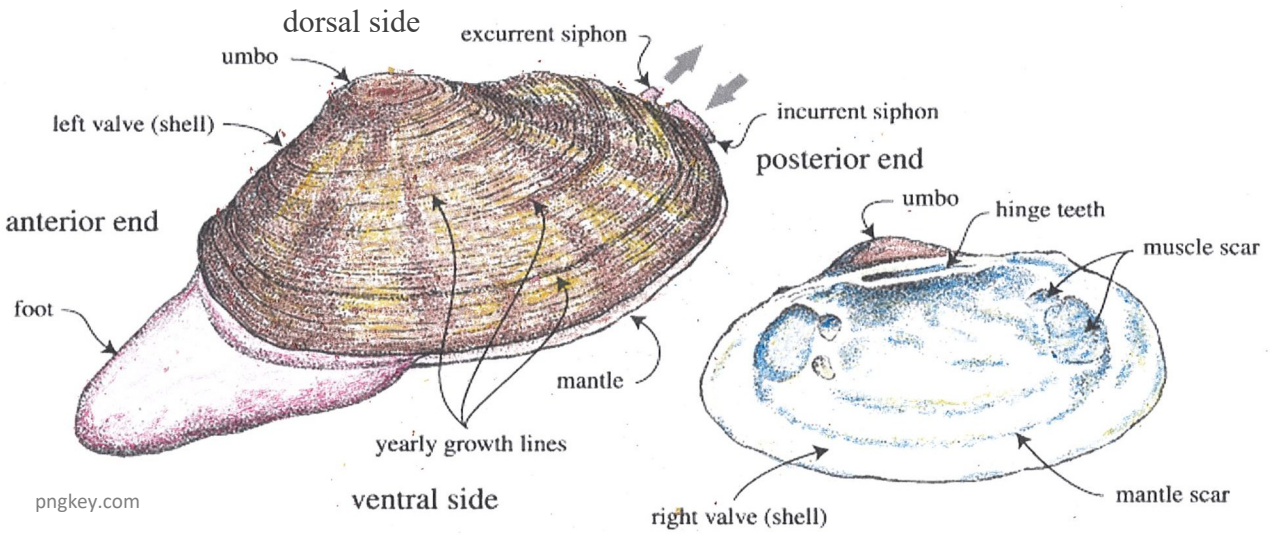

Fluted Shell

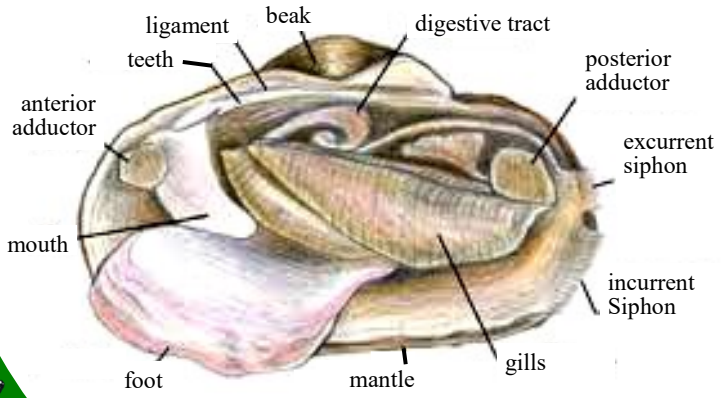
INTRODUCTION

Freshwater mussels occur on every continent except Antarctica, with the order Unionid encompassing more than 800 species worldwide. Their greatest diversity is found in North America, which supports nearly 300 species. In Pennsylvania, mussels are represented by two families, *Unionidae* and *Margitiferidae*. Although all of Europe contains only 16 freshwater mussel species, Pennsylvania alone has historically supported 67 species, with about 54 still present today. The French Creek watershed, in particular, has long been a hotspot for mussel diversity. 31 species have been documented there historically, and recent surveys confirm that 30 species still persist in the system.

Freshwater mussels are descended from their saltwater relatives—oysters and marine clams. As members of the phylum *Mollusca* (which also includes snails, squids, and marine clams), mussels have a soft body with a digestive tract, gills, and a muscular foot, all housed within two hard shells joined at the back and strengthened by hinged teeth. Mussels are filter feeders, so water continuously pumps through their bodies. One adult mussel can filter 8–15 gallons of water per day. Water enters through the incurrent or branchial siphon and exits through the excurrent or anal siphon. Oxygen and food (plankton and organic matter) are filtered out during this process. Because of this, mussels are considered an indicator species of good water quality.

MUSSEL ANATOMY





Gina Mikel-Scientificillustrator.com

The mussel's hard shell is made up of two halves called **valves**. Inside the shell, a thin tissue called the **mantle** completely surrounds the soft body. The mantle is also responsible for secreting the two valves of the shell. **Growth lines** on the shell indicate age; each growing season is marked by the space between two lines. The valves, held together by an elastic-like hinge, can be closed by two strong **adductor muscles** whenever the mussel senses a threat.

Freshwater Mussels

MUSSEL LIFESTYLE

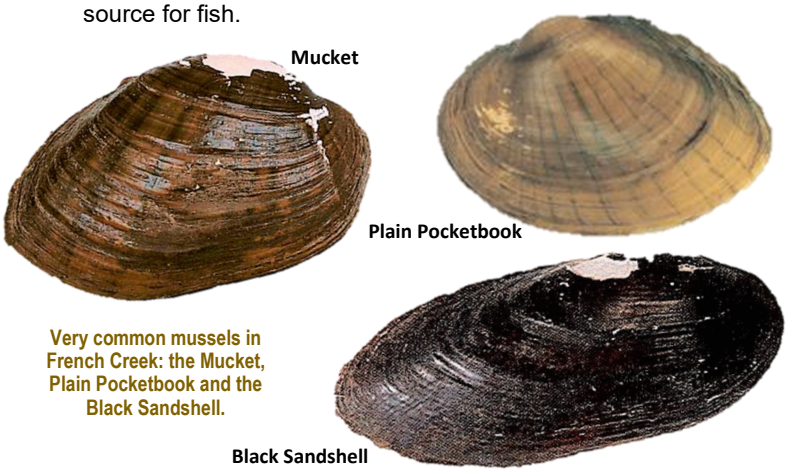
Mussels spend their entire adult lives partially or fully submerged in sand, mud, or gravel in permanent bodies of water. Often, the only visible parts are the tips of their shells and their two siphons, as they take in detritus, phytoplankton, zooplankton, diatoms, bacteria, and other microorganisms, which are filtered out by the mussels. This feeding method makes them especially vulnerable to water pollution and the degradation of aquatic ecosystems.

Although the mussel's foot can be used for movement, adult mussels rarely travel more than 100 meters in their lifetime. Different species have varying maximum lifespans, ranging from 10 to 100 years. The age of a mussel can be estimated by counting the dark rings on its shell, which are thought to result from winter resting periods.

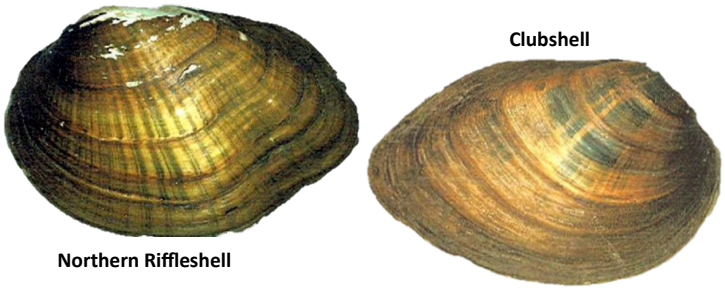
Water is drawn into the large fringed incurrent syphon, microscopic particles get filtered and clean water is expelled through the excurrent siphon.

HABITIAT

Mussel beds in stream systems typically occur in areas with low flood stress, stable sediments, and highly oxygenated water. The exposed shells of mussels poking up from the substrate also provide habitat for various plants and aquatic insect larvae (macroinvertebrates), such as caddisfly larvae. Aquatic insects further benefit from the nutrients produced by mussels. Thus, the habitat and food provided by mussels to macroinvertebrates, in turn, support fish species, as many of these insects serve as a food source for fish.

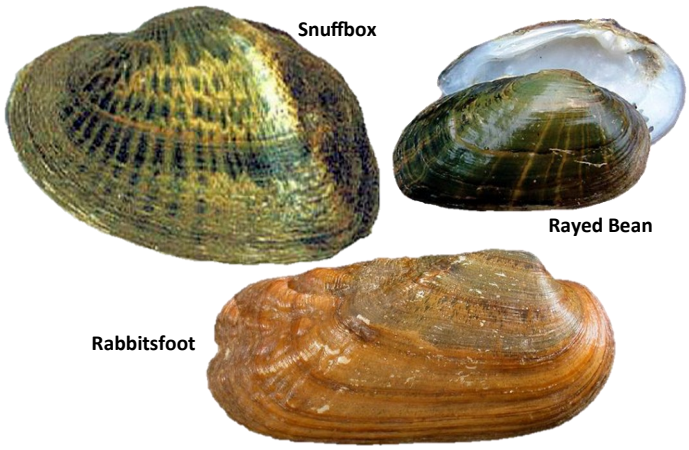


Very common mussels in French Creek: the Mucket, Plain Pocketbook and the Black Sandshell.



RARE SPECIES

Almost 70% of U.S. freshwater mussels are at risk of extinction. In the French Creek watershed, the **Northern Riffleshell**, **Clubshell**, **Rayed Bean, Rabbitsfoot, Longsolid**, and **Snuffbox** are federally listed. The **Salamander Mussel** is listed by the state of Pennsylvania. Listings can change over time as habitats degrade or improve and researchers observe population declines or recoveries. The **Pink Heelsplitter** has been found historically in the watershed but is not found within its boundaries today. Although this species can still be found in the Allegheny River, especially in the navigational pools formed by locks and dams.



FOOD SOURCE

Freshwater mussels are an important food source for muskrats, minks, raccoons, otters, fishers, and some birds, such as herons. It is not unusual to find piles of discarded mussel shells along the bank, where a muskrat or other animal has enjoyed a meal of mussels. These piles are known as **middens**.

Muskrats are just one of the many animals that utilize freshwater mussels as a food source.

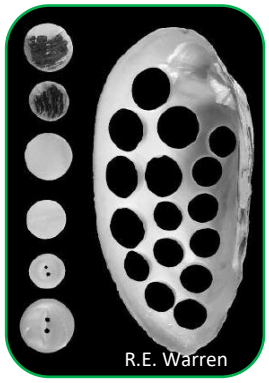
Freshwater Mussels

HISTORY

Buttons made from freshwater mussel shells.

Historically, Native Americans not only ate mussels but also used their shells to make utensils, tools, and jewelry. Between the late 1800s and mid-1900s, mussel shells were harvested to supply a multimillion-dollar pearl button industry. However, with the invention and widespread use of plastics in the 1940s and 1950s, the pearl button industry collapsed.

By the 1950s, the Japanese had found a new use for mussel shells in cultured pearl production. The shells are cut and polished into small beads, which are inserted into oysters to serve as nuclei for pearls. Even today, a small quantity of mussel shells is exported from the United States to Japan and China for this purpose.



Mussel used for buttons.

THREATS

As relatively stationary filter feeders, mussels are highly influenced by the conditions of their aquatic environment. Most declines in native mussel populations occurred when river systems experienced dramatic changes in water quality and habitat conditions. Major land use changes throughout the 20th century, along with large-scale waterworks projects that dammed or diverted rivers, led to the loss of many species in the Tennessee and Ohio River basins. Today, ongoing threats such as dredging, sedimentation, and non-point source pollution continue to contribute to the decline of Pennsylvania's mussel populations.

INVASIVE SPECIES THREATS

ROUND GOBY

Round Gobies were first discovered in the French Creek watershed in Lake LeBoeuf in 2014, where researchers believe they were introduced through bait releases. They were subsequently found in LeBoeuf Creek in 2015 and in French Creek north of Cambridge Springs in 2016. These aggressive, small fish—native to the Black and Caspian Seas—grow rapidly, reproduce prolifically, and consume nearly anything that fits in their mouths, including the young of native species.

Now that they are established in French Creek, researchers believe eradication is no longer possible. The full impact of these invasive fish on native species is still not well understood; however, scientists warn that they pose a significant threat to the mussels and darters found in French Creek and nearby lakes. Studies show that Round Gobies consume juvenile native mussels of all sizes, as well as aquatic insects—especially midges. They may also affect fish and darter populations by competing for food and habitat. This disruption, in turn, may negatively impact native mussels, including federally endangered species, since some fish and darters serve as hosts during mussel reproduction.

Invasive Round Goby fish eat juvenile freshwater mussels.

Invasive Zebra Mussels attach to freshwater mussels.

ZEBRA MUSSELS

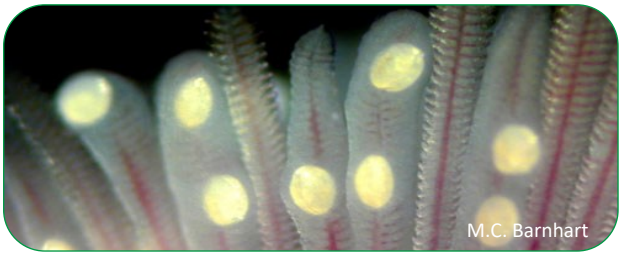
Public interest in mussels surged in the early 2000s due to the attention given to the Zebra Mussel, a non-native species from Eurasia that was introduced into the Great Lakes in the 1980s. With behavior significantly different from our native mussels, this comparatively small species reproduces prolifically, causing major problems for both humans and native mussels.

As an invasive colony species, Zebra Mussels attach to any hard surface, often clogging water intake lines and other equipment, which can be costly. They also colonize native mussels, impeding water flow, competing for food and oxygen, and eventually killing the mussel.

Researchers studying Zebra Mussels in the French Creek watershed predict that the species will cause problems primarily in specific sections of the creek, where the waters are deep and slow, resembling their preferred lake habitat. However, Zebra Mussels remain a significant threat to the ecological balance of lakes and ponds within the watershed.

REPRODUCTION

Freshwater mussels have a unique method of reproduction. The male releases sperm into the water, which is carried by the current and enters the female through the incurrent siphon. The eggs are fertilized and develop into an intermediate larval stage known as glochidia. Glochidia are stored in the female's gills within a brood pouch. In spring or summer, depending on the species, the glochidia are expelled into the water, where they attach to the gills and fins of passing fish (see below).



Glochidia attach to a host fish and ride with it for several weeks, metamorphosing into tiny freshwater mussels before dropping off. By hitching a ride on a fish, mussels can disperse over long distances. This method of reproduction is the only way mussels can move upstream. Therefore, the health of a mussel population depends not only on clean water and ample food sources but also on the availability of host fish and the absence of barriers to dispersal (e.g., dams).

Many mussel species develop adaptations to produce a lure—a piece of living tissue that resembles a minnow, aquatic insect, or another potential food source to attract a host fish (see above). When the fish nibbles on the lure, the female mussel releases the glochidia into the fish's face. Some species of mussels even snap their shells shut, temporarily holding the fish captive before expelling the glochidia and then releasing the fish (see below).

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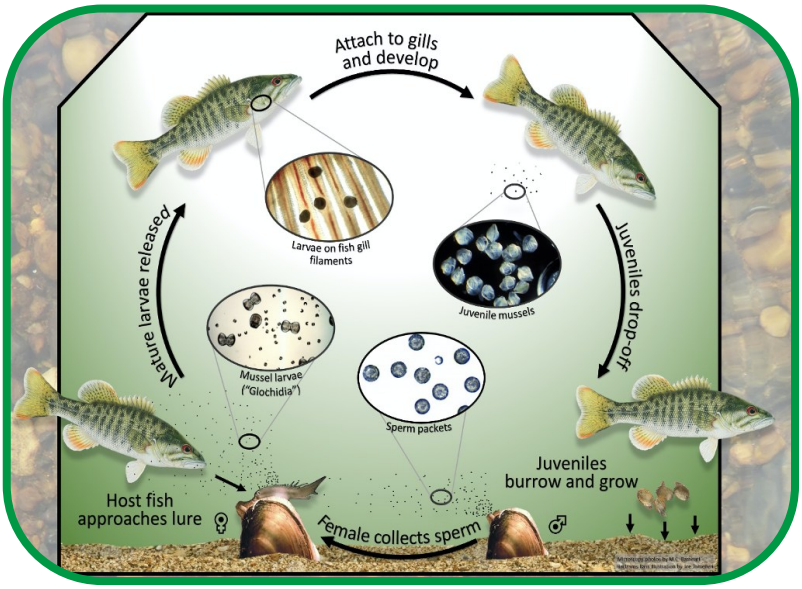
UNIQUE LIFE CYCLE



Matthew Rowe, DNRWRD

MUSSELS OF FRENCH CREEK

1.	Elktoe	*Alasmidonta marginata*
2.	Three-Ridge	*Amblema plicata*
3.	Cylindrical Papershell	*Anodontoides ferussacianus*
4.	Rainbow	*Cambarunio iris*
5.	Purple Wartyback	*Cyclonaias tuberculata*
6.	Spike	*Eurynia dilatata*
7.	Northern Riffleshell *	*Epioblasma rangiana*
8.	Snuffbox *	*Epioblasma triquetra*
9.	Longsolid *	*Fusconaia subrotunda*
10.	Plain Pocketbook	*Lampsilis cardium*
11.	Wavy-Rayed Lampmussel	*Lampsilis fasciola*
12.	Pocketbook	*Lampsilis ovata*
13.	Fatmucket	*Lampsilis siliquoidea*
14.	White Heelsplitter	*Lasmigona complanata*
15.	Creek Heelsplitter	*Lasmigona compressa*
16.	Flutedshell	*Lasmigona costata*
17.	Black Sandshell	*Ligumia recta*
18.	Mucket	*Ortmanniana ligamentina*
19.	Clubshell *	*Pleurobema clava*
20.	Round Pigtoe	*Pleurobema sintoxia*
21.	Pink Heelsplitter (historical)	*Potamilus alatus*
22.	Fragile Papershell	*Potamilus fragilis*
23.	Kidneyshell	*Ptychobranchus fasciolaris*
24.	Giant Floater	*Pyganodon grandis*
25.	Salamander Mussel †	*Simpsonaias ambigua*
26.	Eastern Pondmussel	*Sagittunio nasutus*
27.	Creeper	*Strophitus undulatus*
28.	Rabbitsfoot *	*Theliderma cylindrica*
29.	Lilliput	*Toxolasma parvum*
30.	Paper Pondshell	*Utterbackia imbecillis*
31.	Rayed Bean *	*Paetulunio fabalis*

*** Federally Listed** **† State Listed**

Updated 2026