

Dedicated to the Memory of Commissioner Enoch S. "Inky" Moore Jr.



PLAY

Spring
2007

Pennsylvania • League • of • Angling • Youth

Flex Your Mussel Knowledge

by Keith Edwards



▲
Creeler
mussel

White heel splitter
mussel ▼

Mussels are becoming harder to find. Mussels, along with snails and clams, are members of the mollusk family. This family is the world's second largest group of animals. There are about 100,000 mollusk species worldwide. A mollusk can be as small as a snail or as large as a 20-foot-long giant squid.

Freshwater mussels in Pennsylvania are called **bivalves**. Bivalves have two shells, or valves. They are filter-feeders. Water is pulled in through a **siphon**. Their gills filter the water for oxygen and **plankton** needed for food.

In the United States, there were once nearly 300 different freshwater mussel species. There are 50 mussel species remaining in Pennsylvania. It is estimated that 15 other species are **extirpated**, which means that they are no longer found in Pennsylvania.

This issue of PLAY focuses on the life history of mussels found in Pennsylvania, and some of the reasons why mussel populations are declining.

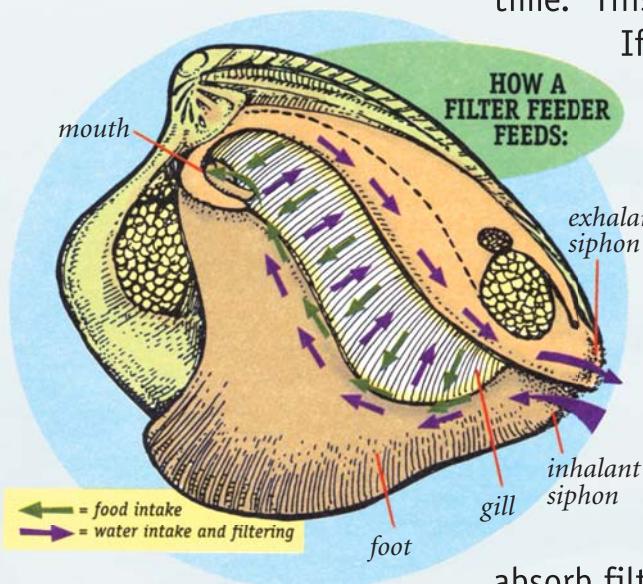
◀ Fatmucket
mussel



Spike mussel ▲

Healthy Mussels = Healthy Water

Pocketbook mussel



Mussels can make water cleaner. Mussels pull, or inhale, water into their soft body through a siphon. The gills filter oxygen and suspended food particles. During this

process, the mussel also filters particles of bacteria, silt, ***detritus*** and chemicals. Detritus is small bits of decaying plant and animal material. The mussel then expels, or exhales, all water and any wastes through another siphon.

This process makes the water cleaner than it was before the mussel filtered it. One of the chemicals that a mussel filters from the water is calcium carbonate. This chemical is used to form the mussel's shell.

Mussels may absorb some chemical pollutants in their bodies and shells. These chemicals can build up over time. This process is called ***bioaccumulation***.

If these mussels are collected and then studied in a laboratory, scientists can identify the contaminants to determine the water quality conditions that have existed in the mussel's aquatic ***habitat***. Pollutants in the soft, fleshy interior parts of the mussel can indicate recent or current exposure. Pollutants in the shell can indicate past chemical exposure.

Mussels are filter-feeders. They absorb filtered food through their mouths for nutrients. Gills absorb oxygen for the mussels to breathe. The foot of the mussel is a muscle used to move across the bottom of rivers and streams. Mussels have an inhalant siphon and an exhalant siphon. The inhalant siphon is used to draw water into the mussel's body and the exhalant siphon is used to expel water and wastes.

Where do Mussels

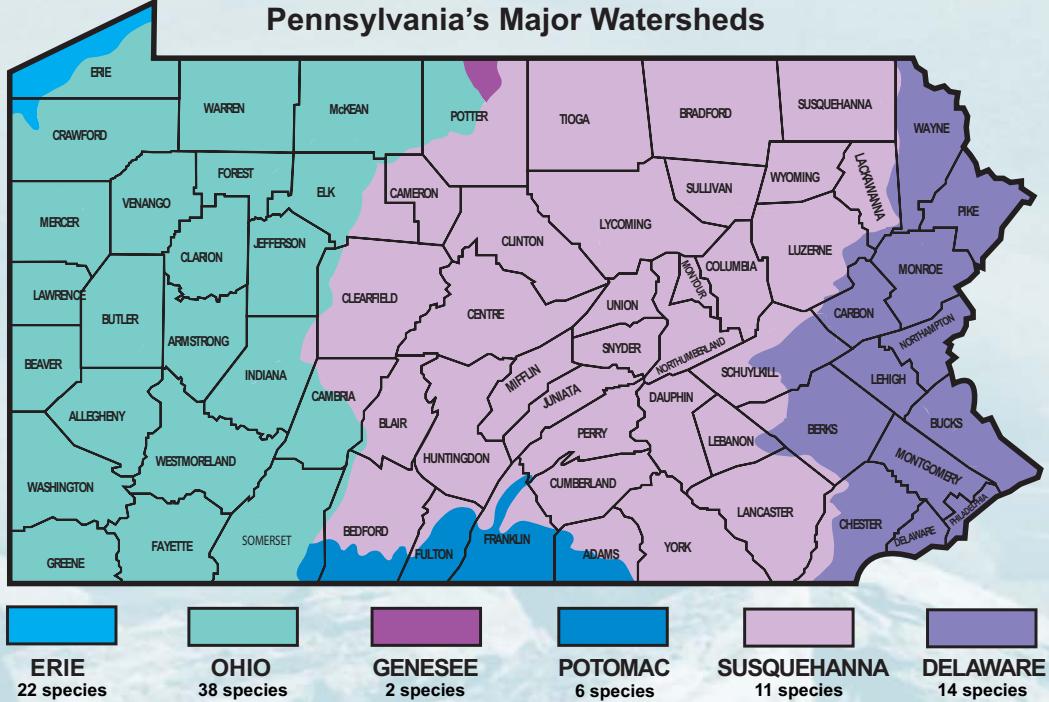
Live?

Mussels live on the bottom of rivers, streams and lakes. They like the shallow, sandy and gravelly parts, but some mussels can live in mud. Some mussel species prefer deeper and colder water than others. Some mussel species like faster-flowing water, while others choose habitats that have slower-moving current. Large mussel populations live in French Creek, a **tributary** of the Allegheny River, which is in the Ohio River Watershed. Some 26 different mussel species can be found there. The map on this page shows the number of species in each of the major river watersheds.

How do biologists identify different mussel species?

A **malacologist** studies mollusks. These biologists examine different characteristics to identify mussels: Shell size, thickness, shape, texture, color (inside and out) and patterns of lines, waves and bumps; color of the fleshy body; and the location where the mussel was found. Male and female mussels of the same species may have somewhat different sizes and shapes.

Number of Mussel Species Found in Pennsylvania's Major Watersheds



Birth of new Mussels

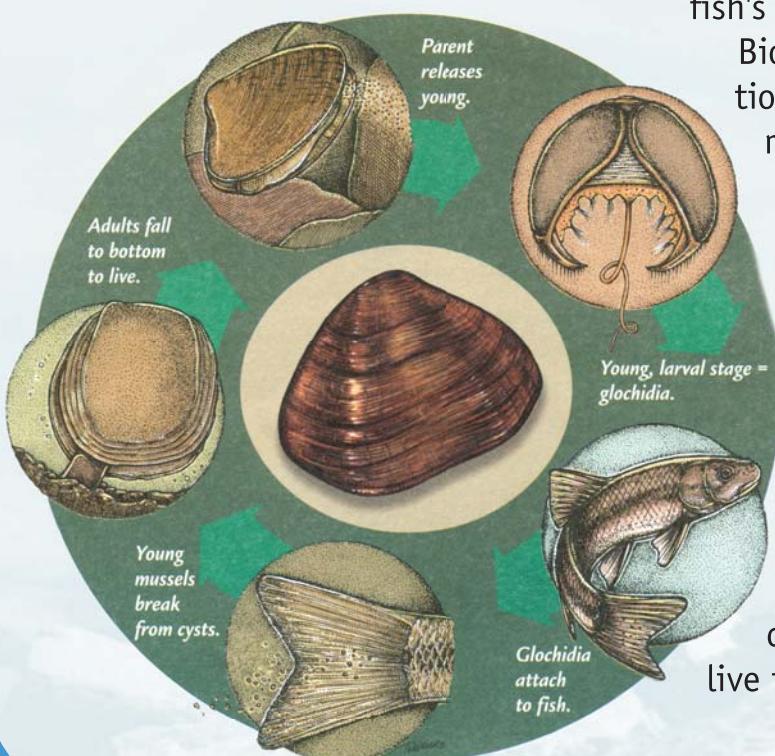
Fertilized eggs develop inside the female parent's shell. The parent releases the young (called glochidia), through the exhalant siphon. They are the size of a period on this page. Some mussel species put their fertilized eggs in tiny packages called conglutinates, while other species release individual larvae. Some fish think the packages are food and swallow them.

The individual or packaged larvae may sink to the bottom and wait until a "host" fish brushes against the bottom. The larvae may also float in the water column until they are eaten

or touched by a fish. Each larva then attaches to a fish.

Some mussel species attach only to certain fish species. For example, the salamander mussel is a rare Pennsylvania species that attaches to a specific amphibian host species—the large salamander known as the mudpuppy. To increase the chances of their young making contact with a fish host, some females "go fishing." By displaying specially adapted tissues that look like a tiny minnow, they lure fish to swim near them. Sensing a fish nearby, the female releases her young toward the fish. The young then attach to the fish's gills or fins.

Biologists believe that the selection of specific fish hosts helps the mussel species spread its young to areas most likely to have the type of habitat they need to survive. If the glochidia attach to the wrong fish host, they typically die. After they attach to the host fish, the tissues of the fish grow over the tiny larvae and create a cyst. When ready, the young mussel breaks out of the cyst and falls to the bottom to live the rest of its adult life.



Why are Mussels in danger?

Mussels are one of the most endangered groups of animals. Protecting mussel habitat protects mussel populations. Populations can decline from changes in water conditions and water quality. These changes are brought about by dredging, which uproots mussels and destroys their habitat. Dams reduce water flow, which reduces available food nutrients. In addition, siltation changes water quality. Soil eroded off the land settles out of the water and smothers the mussels. Pollution from industrial, agricultural, mining, oil and gas well-drilling, chemicals, and other sources enter the water and poison mussels.

Changes in water quantity also cause mussel populations to decline. Droughts make shallow water more reachable by predators. Droughts can also raise water temperature. Flooding can also damage or destroy mussel habitat.

Removing water from rivers can destroy or damage mussel habitat. Water relocation, building bridges for roads, and poaching can also disturb mussel populations.

Mussel populations are affected by the loss of certain "host" fish, to which newborn mussels attach for growth.

Competition for food and space from invasive species like zebra mussels also affects native mussel populations.

Zebra Mussel Invasion

Zebra mussels have nearly eliminated native mussels in some locations. In 1988, the first zebra mussels were spotted in Lake St. Claire near Lake Erie. These invaders arrived as stowaways in the ballast water of a ship from Europe. They are now found in many waterways in the eastern half of the United States. They are much smaller (less than 2 inches) than native mussels, and they reproduce rapidly. They attach themselves to hard surfaces. In zebra mussel-infested waters, it is not unusual for native mussels to be completely covered by zebra mussels. Competition for food and oxygen weakens and eventually starves native mussels.



Zebra
Mussels



Which Mussels are in danger?



Northern riffleshell mussel

In Pennsylvania,
the northern
riffleshell,
the dwarf
wedgemussel
and the clubshell
are currently on
the federal
endangered
species list.

Clubshell mussel ►

Currently, three mussel species in Pennsylvania are on the federal ***endangered species*** list. They are the northern riffleshell, the dwarf wedge-mussel and the clubshell. The Pennsylvania Fish & Boat Commission has also listed these three species, as well as the eastern pearlshell, as state endangered so that they receive special protection. Scientists are studying these four species and many others in Pennsylvania and around the world because of the severe decline in their numbers.

About 25 additional mussel species (or half of the species remaining) in Pennsylvania are rare and declining in abundance. Globally, mussels are the most imperiled taxa—group of similarly classified organisms in the animal kingdom. This decline in mussel abundance and continuing threat to their survival also appear to be true in Pennsylvania.

The Future of Mussels

Many different agencies are working together to find solutions to problems facing our mussels. They are surveying, monitoring and restoring habitats. Some mussels facing extinction have been taken to fish hatcheries for safe-keeping. Hatcheries are developing ways to raise rare mussels for release. They are then put back into restored streams and rivers. Aquariums and zoos also help by conducting research and education programs.



Keith Edwards is the Commission's Northwest Region aquatic resources program specialist.

Can Mussels move?

Mussels have a muscular "foot" that helps them burrow and move small distances. During early fall, mussels tend to move deeper into suitable riverbed material. They may burrow downward several feet from the riverbed's surface. This movement is believed to be triggered by dropping water temperature and shorter daily

hours of sunlight. The foot also helps anchor them against strong currents and may prevent a hungry muskrat from tugging them out for its dinner!

A mussel's shell, however, provides its main protection from predators. Their hard, calcium-based shells consist of two halves joined by a hinge.

Match the Word to the Definition (Words can be found in this newsletter).

- A. Bivalves**
- B. Siphon**
- C. Plankton**
- D. Malacologist**
- E. Tributary**
- F. Larvae**
- G. Habitat**
- H. Invasive species**
- I. Endangered species**
- J. Extirpated**
- K. Bioaccumulation**
- L. Detritus**
- M. Poaching**

- 1. Organisms at risk of becoming extinct because they are so few in number or threatened by changing environmental conditions.
- 2. The early, immature forms of an animal at birth before they change into adults.
- 3. Small bits of decaying plant and animal material.
- 4. Plant or animal that threatens environmental or agricultural resources by the damage it causes.
- 5. The place or environment where a plant or animal naturally or normally lives and grows.
- 6. Having a pair of shells, or valves.
- 7. No longer found.
- 8. Taking game or fish by illegal methods.
- 9. A person who studies mollusks.
- 10. A smaller stream or river that flows into another larger stream, river or lake.
- 11. Microscopic plants and animals suspended in the water.
- 12. A tubular organ used to draw in or eject fluids.
- 13. The process of an organism or part of an organism's absorbing chemical pollutants.

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