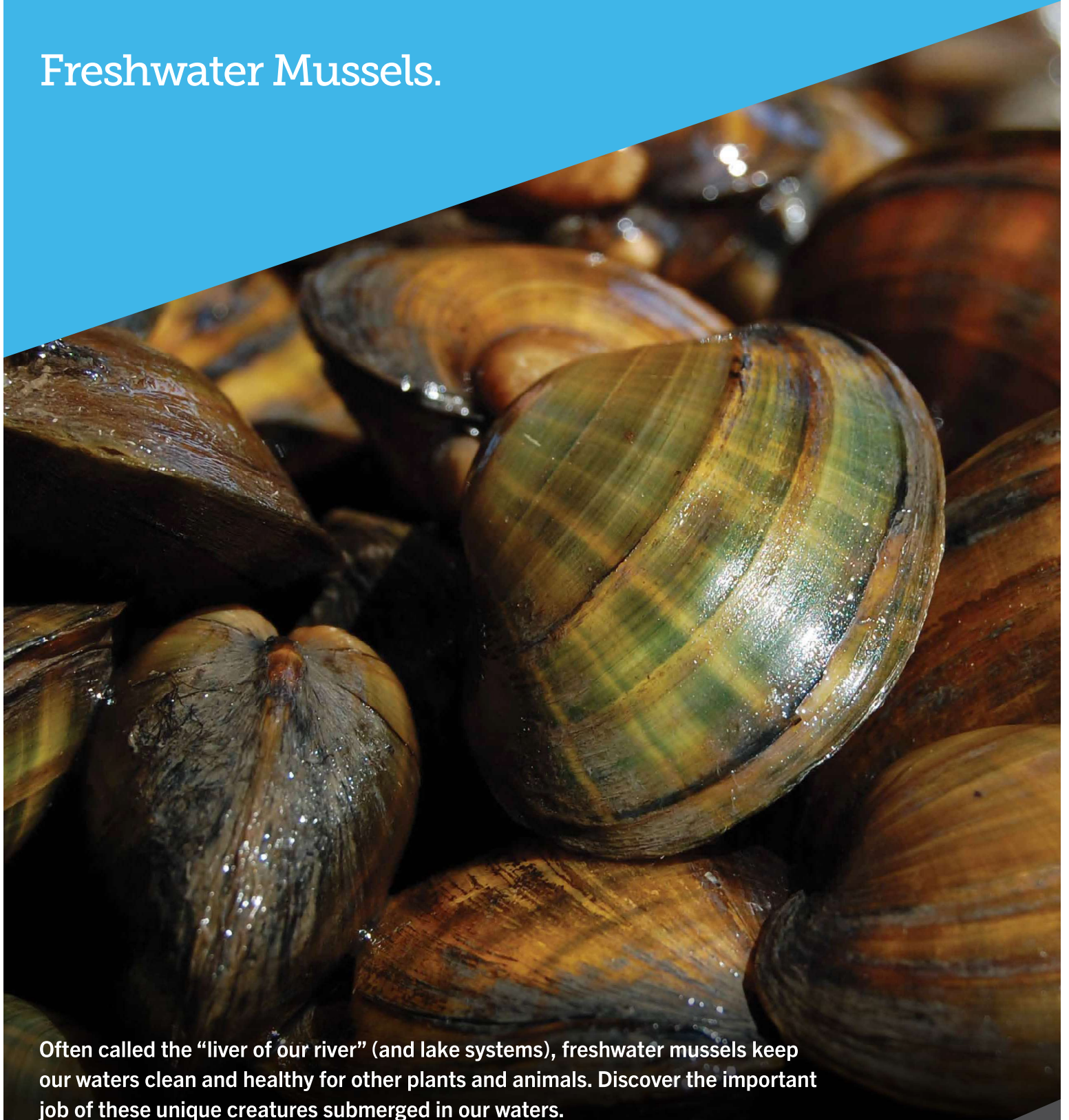


Virtual Discovery Kit.

Be curious. | GRAND
RAPIDS
PUBLIC
MUSEUM

Freshwater Mussels.



Often called the “liver of our river” (and lake systems), freshwater mussels keep our waters clean and healthy for other plants and animals. Discover the important job of these unique creatures submerged in our waters.

Higgins Eye Pearly Mussel, an endangered species.
Photo Credit: Gary J. Wege, <https://bit.ly/3yPLYeK>



grpm.org

What is a Mussel?

Mussels are invertebrates (that means they don't have a backbone!) that grow their own protective shells. They appear as oval shaped shells in the gravel and sand at the bottom of rivers and lakes.

Mussels belong to a class of mollusks known as bivalves. The shell is split into two halves or "valves" that can be opened and closed with the use of hinged joints.

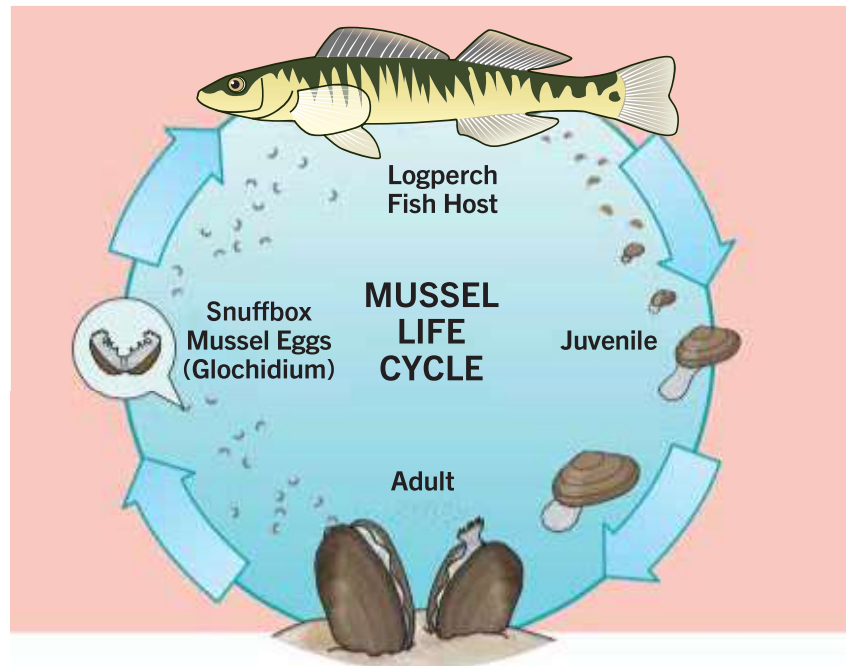
Mussels have a special organ called the foot, which can be extended out from the shell. The foot is used to push the mussel along the bottom of the river and can also be used to keep the mussel attached to the bottom of the river so that it doesn't drift away.

Mussels are filter feeders so they eat tiny things (like algae, bacteria, and soil) floating in the water. Mussels do not have mouths, so they eat through an organ called a siphon.

Mussel Life Cycle.

Mussels have a unique life cycle! Mussels require a fish to host mussel eggs; this means the female mussel does not carry a baby in their stomach like mammals do. Mussel eggs attach to the gills of the fish where they grow until they are large enough to fall off and grow on their own.

Mussels need to attract fish in order to transfer their eggs over to them, so mussels have skin flaps that are shaped like small fish to lure the host fish over. Once the fish attacks the lure, the mussel closes down on the fish and sprays its eggs onto the host fish.



This snuffbox mussel lured a logperch with a fish-shaped skin flap, snapped shut, and is transferring her eggs to the logperch where they will grow until they are big enough to survive on their own.

Photo Credit: Dr. Chris Barnhart,
<https://bit.ly/4fW3i2k>

Historical Use of Freshwater Mussels in the Grand River.

Beginning in the 1800s, mussels were collected from the Grand River to create jewelry from their shells. Buttons were a particularly popular accessory.



Button Hole Mussel Shell (2014.14.4)
GRPM Collections



Mother of Pearl Buttons (2018.25)
GRPM Collections

By the 1930s, the mussel population was at risk due to overharvesting (that means too many were taken from the Grand River and they couldn't reproduce quickly enough). In 1944, the Michigan Department of Conservation put a 5-year pause on taking mussels out of the river and it greatly helped the population recover on their own.

After World War II ended in 1945, plastic buttons dominated the market and mother-of-pearl buttons like those seen above, were no longer in demand. This brought an end to using mussel shells for buttons.



Button Hole Mussel Shell on display in *Fashion + Nature*

Threats to Freshwater Mussels.

Freshwater Mussels are an endangered species. Invasive species, destruction of riverbanks and the pollution of waterways makes it difficult for mussels to be successful. Mussels need their habitat to be just right otherwise they can't live in that area.

Invasive Species.

Invasive zebra and quagga mussels arrived in North America in the 1980s which was, and still is, very dangerous for native freshwater mussels. Zebra and quagga mussels grow and reproduce much faster than native mussels and they use the same resources. If too many zebra and quagga mussels enter a river or lake, they can starve out native mussels.



Zebra Mussels are a non-native, invasive species that are found in the Grand River.

Photo Credit: Smithsonian Environmental Research Center,
<https://bit.ly/3WX86Mx>



Quagga Mussels are a non-native, invasive species that are found in the Grand River.

Photo Credit: United States Geological Service,
<https://bit.ly/4fVKSPc>

Snuffbox mussels are a native species found in the Grand River.

What differences do you notice between snuffbox mussels and the zebra and quagga mussels above?



Photo Credit: Brenda Van Ryswyk,
<https://bit.ly/4cA1b1y>



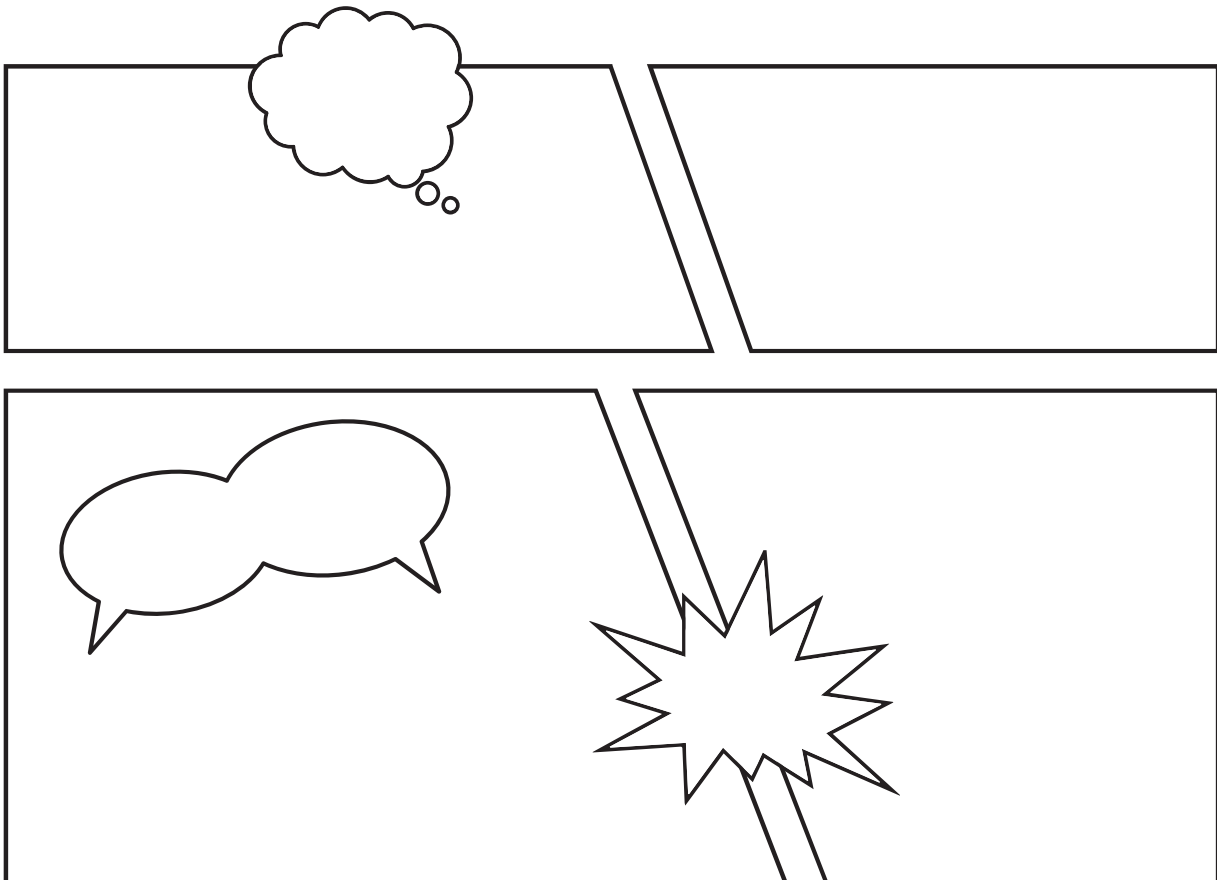
Invasive zebra mussels attached to larger mussel shells, pulled from Huron River in Dexter Township, Michigan.

Photo Credit: Lon Horwedel,
<https://bit.ly/4fXk9Ss>

Invasive mussels attach to native species and scrounge off their resources.

Imagine what a snuffbox mussel (native) would say to a zebra mussel (invasive) if it found a group of zebra mussels living on it!

Draw a comic of the interaction below:



Habitat Destruction.

As the city of Grand Rapids developed, the Grand River was heavily impacted. Native species populations like the snuffbox mussel were negatively impacted by the growth of industry and factories along the river. Check out this historic timeline of the Grand River. What do you notice about the ways the Grand River was used? How did this affect aquatic species in the river?



Grand Rapids in 1835 by Aaron Turner
(2012.60.1)
GRPM Collections



Grand Rapids, 1856 by Sarah Sterns
Nelson
GRPL Collections



Transporting logs on the Grand River,
circa 1878 (166189)
*The Grand River was used as a highway
to transport logs for furniture
and other industries.*
GRPM Collections



Powers Water Canal, circa 1887
*This canal was built to
direct water through the city.*
GRPL Collections



Floodwall reconstruction, circa 1905-1936
(178044.739)
*Flood walls and earth embankments
were built to prevent more flooding.*
GRPM Collections



Floodwall reconstruction, circa 1905-1936
(178045.318)
*Flood walls and earth embankments
were built to prevent more flooding.*
GRPM Collections



Low water levels in the Grand River, 1927
City of Grand Rapids Archives



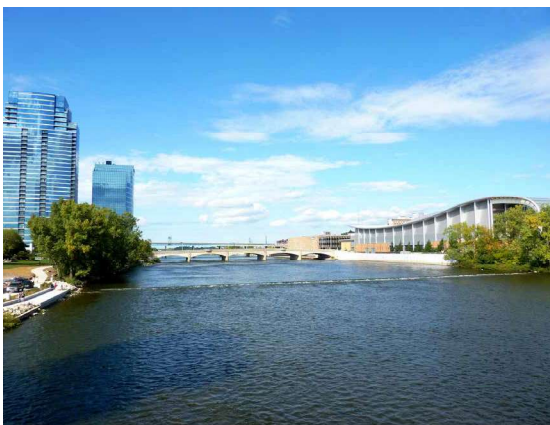
Low rise dams were installed in the Grand
River, circa 1927 (178345)
GRPM Collections



Urban renewal projects of the 1960s
included the construction of new buildings
and highways in downtown Grand Rapids
(1987.92.3)
GRPM Collections



Beginning in the 1980s, the city of
Grand Rapids has developed a network of
connected parks and trails along the
Grand River.
Photo Credit:
Friends of Grand Rapids Parks



Over the last 25+ years, point source
pollution sources in the Grand River have
been identified and restricted in order to
improve the health of the West Michigan
waterways.



As Grand River restoration projects
continue, freshwater mussels (including the
endangered snuffbox mussels), will be
relocated in the river to ensure their health
and safety.

Photo Credit:
Michigan State University,
<https://bit.ly/3XeoY2s>

Conserving and Protecting Freshwater Mussels.

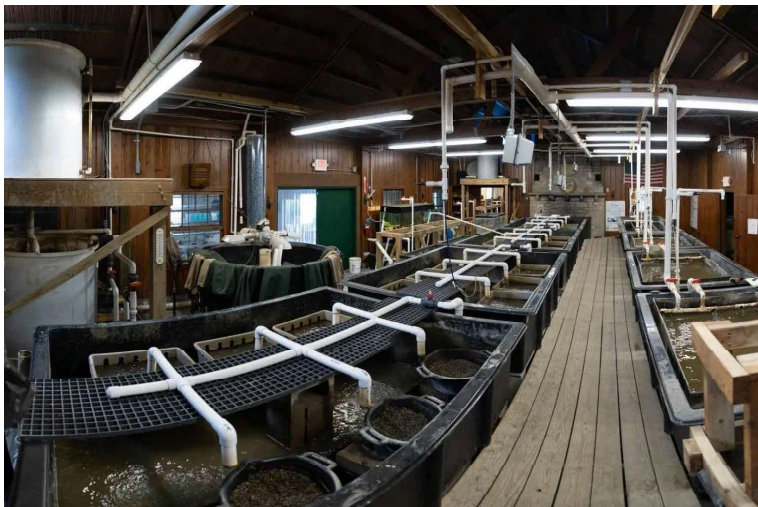
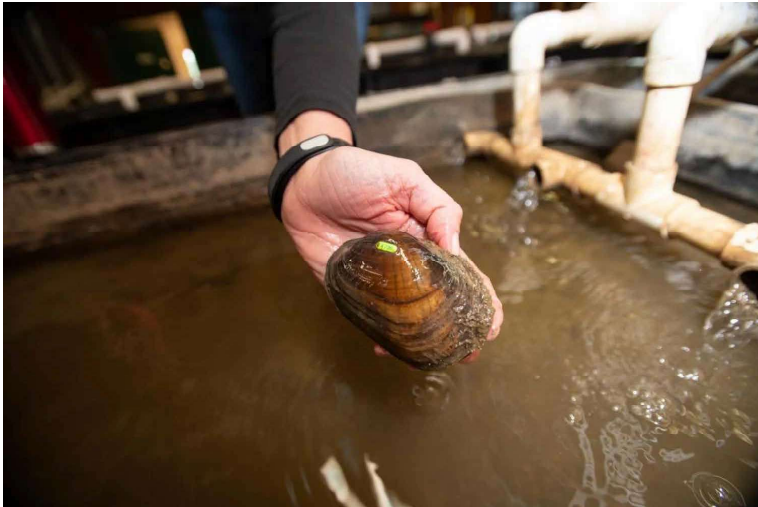
Thirty different species of freshwater mussels have been found in the Grand River. Many of these species are currently threatened or endangered. Without help from humans, freshwater mussels will likely go extinct. Not only would it be terrible to permanently lose several unique species, but mussels also provide many things for river and lake ecosystems.

Mussels naturally keep our waters clean through their filter feeding. By filtering particles that float through the water, mussels make nutrients available to smaller creatures. Mussels are also a food source for fish, mammals, and birds.

Due to their hardened shell, mussels also become a habitat space for small plants to grow on top of after the mussel dies.

Mussels are an indicator species. This means that they give information to scientists about the health of a waterway based on how many (or how little) mussels are in the water. For example, if a once-robust mussel population is declining, this is a signal that something is amiss in the waterway.

It's important to continue conserving mussels as they provide many services to our waters. Organizations like the Columbus Zoo and Aquarium in Ohio host the Freshwater Mussel Research and Conservation Center and focuses on the study and preservation of freshwater mussels and other organisms. Locally, the John Ball Zoo and Grand Valley State University are engaged in research on the Grand River freshwater mussel communities.



Scientists are dedicated to conserving freshwater mussel populations.

Photo Credit: Freshwater Mussel Research and Conservation Center,
<https://bit.ly/3AA9Bsi>

Be curious.

Scientists are working hard to spread awareness about freshwater mussels and continue to develop projects that help conserve them. Here are some strategies scientists and communities do to protect freshwater mussels in Michigan:

1. Design maps showing areas that are known to have threatened or endangered species so people know which places to protect.
2. Relocate mussels to safe areas when construction projects will disturb the area they are living in.
3. Properly identify harmful invasive species like zebra and quagga mussels so they can be removed.
4. Prevent the building of houses, parking lots and sidewalks along riverbanks as these result in faster water runoff into rivers and lakes.
5. Plant native trees and grasses along the banks of rivers and lakes to reduce water runoff.
6. Stopping sources of pollution from entering the water such as fertilizers, farm animal waste and wastewater from cities.
7. Reduce emissions and other causes of global warming to keep rivers and lakes cool enough for mussel habitats.

What ideas do you have for protecting freshwater mussels?

Write or draw your ideas below!

A large, empty rectangular box with a dashed gray border, intended for students to write or draw their ideas for protecting freshwater mussels.

Freshwater Mussels and Art.

Artist Roger Peet travels the United States working on murals that highlight endangered species. Along the Tennessee river in Knoxville, Tennessee his mural depicting the life cycle of freshwater mussels is on display.



Photo Credit: Roger Peet, <https://bit.ly/46Yn3T1>

In his artist statement, Roger says:

“Everywhere on Earth is unique, with qualities that distinguish it from other places both near and far. One of those qualities is biodiversity — the plants and animals that call a place home and may not be found anywhere else. Those species embody an area’s natural history and contribute to what makes it irreplaceable — and they also have something to say about the future, as many are in danger of going extinct. When we lose species, the places we inhabit and the lives we live become poorer and shallower as a result. To help bring these species into the light, we decided to paint them on the walls.

“The goal of this project is to foster connections between people and the other forms of life that surround them. Whether that’s a fish in a river, a butterfly flitting from plant to plant, or a caribou chewing lichen from a tree, we’re bringing together artists and communities to create big, bold images that will become part of the neighborhoods where they’re created, making it a little easier for people to care about the species struggling to survive in their midst.”

What is your opinion on combining art and science? Do you agree or disagree with Roger that public murals bring attention to endangered species?

See more of Roger's endangered species murals here:

https://www.biologicaldiversity.org/about/creative_media/endangered_species_mural_project/

Using Roger's murals as inspiration, create your own mural about the freshwater mussels of the Grand River.

A large, empty rectangular area defined by a dashed gray border, intended for creating a mural about freshwater mussels of the Grand River.

What do you think?

What is the most interesting thing you learned in this Discovery Kit?

Name one way you can help keep the Grand River watershed healthy.

What is one question you still have about freshwater mussels?

Learn more!

Freshwater Mussels in the Grand River:

- <https://bit.ly/4fsFsKk>

Fascinating Freshwater Mussels by the Xerces Society:

- https://www.youtube.com/watch?v=R0Gqx6Y_RyU

All About Freshwater Mussels by the US Fish and Wildlife Service:

- <https://www.youtube.com/watch?v=OWjIwfx67eY>

Freshwater Mussel Filtration Timelapse from the Minnesota Department of Natural Resources:

- https://www.youtube.com/watch?v=s_CaNfFtHhg

Freshwater Mussels of Michigan poster by Michigan State University:

- <https://mnfi.anr.msu.edu/pdfs/FreshwaterMusselsOfMichiganPoster.pdf>

Freshwater Mussel Research and Conservation Center hosted by the Columbus Zoo:

- <https://www.columbuszoo.org/blog/watters-aquatic-conservation-center-marks-beginning-exciting-new-chapter-freshwater-mussel>

Special thanks to the City of Grand Rapids!



Be curious.