

Hitching a ride to survive and thrive

Reproduction is a tricky process for our native freshwater mussels. After fertilization, a female holds her fertilized eggs in a special area called the marsupium. Here, they grow into a larval stage called glochidia. In the spring or summer, the glochidia are released and begin life as parasites, hitching a ride on a host fish. Making this more complicated, most Unionid mussels are host-specific, which means that each mussel species has to use a specific host fish or the glochidia will not survive.

To ensure successful transmission of the parasitic glochidia to the fish host, female freshwater mussels of the family Unionidae (most of our native mussels belong to this family) have developed some astonishing adaptations and strategies. The fleshy mantle of many females in this family changes during this time to resemble remarkably realistic mimics of small fish, crayfish, or aquatic insects. The female manipulates the lure, enticing an attack from the host fish. This allows glochidia to be propelled toward the fish's gills and fins where they will then attach. The glochidia then attempt to attach to the fish's gills and fins.

After several weeks attached to the host fish, the glochidia resemble tiny adult mussels. The young mussels then detach and drift to the stream bottom, now fully independent. This is a critical time for the young mussels, as they will only settle in ideal streams and river habitats.

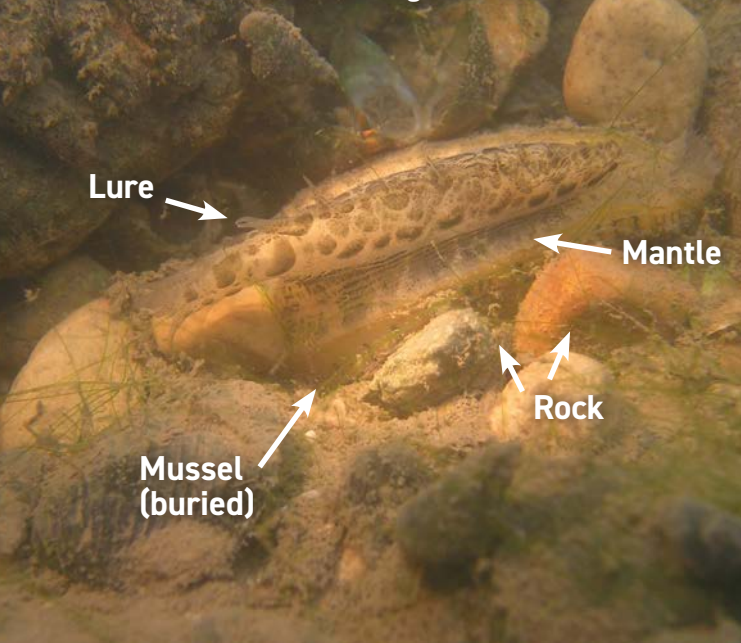


The role mussels play in water quality

Mussels are the natural filterers of aquatic systems. Because everything in the waterway goes through their gills, they are sensitive to many kinds of pollutants. Sediment in the waterways is especially harmful, suffocating mussels and interfering with important processes needed to survive. Because of these sensitivities, studying these aquatic organisms is important for assessing the health of our water resources. Their presence in a water body is generally a positive indicator of overall water quality and health.

Mussels of different species develop different shell shapes and sizes. Clean streams in Indiana have a diverse mussel community with mussels of all ages (max age for mussels in this area is 20-25 years), while waters devoid of mussels may be indicative of a problem in the waterway.

Nestled in the bed of a stream, freshwater mussels are well camouflaged.



Introduction

The West Fork of the White River begins in Lynn, IN, near Winchester. This warm water stream meanders throughout Randolph County before entering Delaware County, passing through Muncie for approximately nine miles. A majority of this stretch is sampled annually by the Bureau of Water Quality to assess the health of the White River's fish, macroinvertebrate and mussel communities. Let's take a look at some of the clean water species they encounter during their biological monitoring.

The waters of the West Fork White River in Delaware County are home to many animals that are relatively unknown to most people. Beneath the water surface, we expect to see fish, but there is also a wide assortment of aquatic insects, crustaceans and mollusks as well. The variety of life in a stream ecosystem is very rich indeed, but these animals and their well-being are often overlooked simply because we don't see them when we take a casual glance at a stream. We must look below the water surface, and sometimes below rocks and even into the stream bottom, to get a complete picture of life in a stream.

One inhabitant you might find on the river bottom is the freshwater mussel. Although freshwater mussels are distributed all over the world, the greatest abundance and variety are found in North America. Freshwater mussels are fascinating creatures with surprising life histories, including intriguing adaptations for survival.

A freshwater mussel displays a "lure" to attract a potential host for its larval offspring.



Resources

Cummings, K.S. and C.A. Mayer. 1992. *Field Guide to Freshwater Mussels of the Midwest*. Illinois Natural History Survey Manual 5. 194 pp.

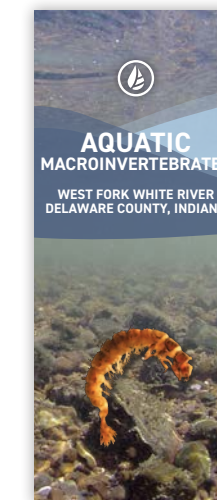
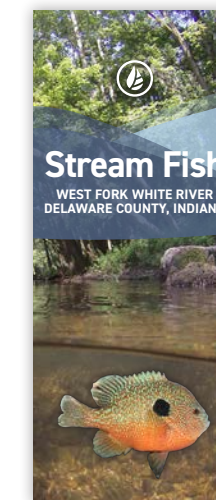
Unio Gallery at Missouri State University
unionid.missouristate.edu/

USFWS. *America's Mussels: Silent Sentinels*. www.fws.gov/midwest/endangered/clams/mussels.html

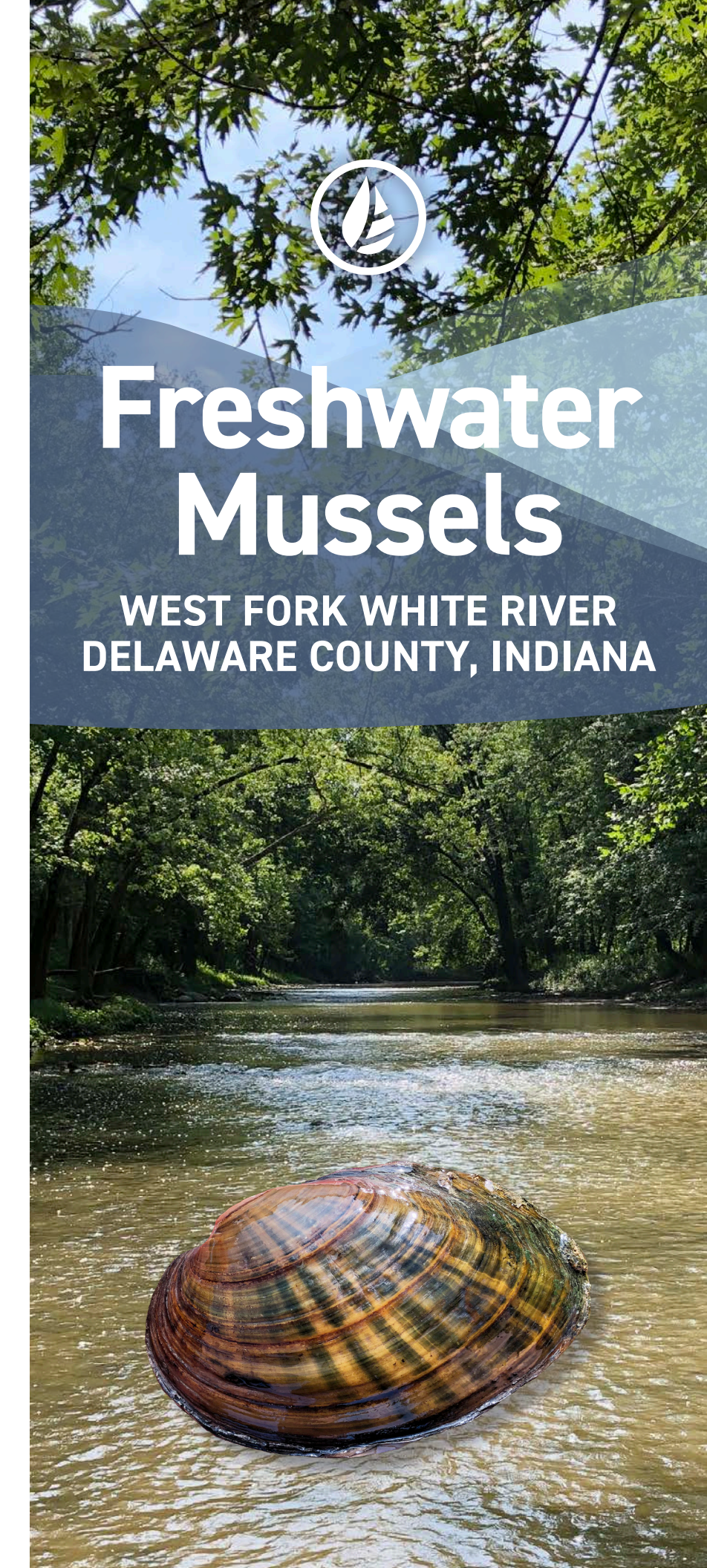
Text contributed by: David Inskeep, Biology teacher at Northwestern High School, Kokomo, Indiana; Sarah Brichford, Field Technician Howard County Stormwater District; and Laura A. Bowley, Aquatic Biologist at the Muncie Sanitary District's Bureau of Water Quality.

Photos contributed by: Muncie Sanitary District's Bureau of Water Quality.

Check out our other brochures to learn more about the many creatures that call White River home.



5150 W. Kilgore Ave, Building #8, Muncie, IN 47304
Phone: 765-747-4896 | MuncieSanitary.org

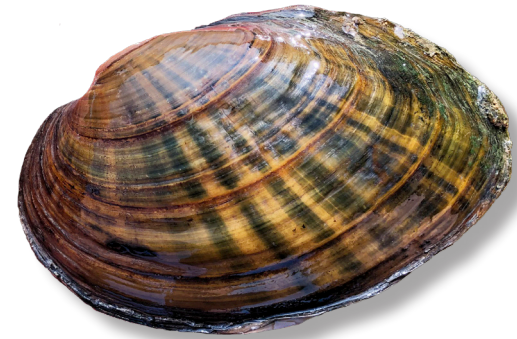


Freshwater Mussels

WEST FORK WHITE RIVER
DELAWARE COUNTY, INDIANA

Mussels of the West Fork White River in Delaware County

*Nine of the seventeen commonly found native mussel species in the White River in Delaware County**



Mucket

Actinonaias ligamentina
Grows up to 7"



Threeridge

Amblema plicata
Grows up to 7"



Rainbow

Villosa iris
Grows up to 3"



Plain Pocketbook

Lampsilis cardium
Grows up to 7"



Flutedshell

Lasmigona costata
Grows up to 7"



STATE SPECIAL CONCERN

Wavyrayed Lampmussel

Lampsilis fasciola
Grows up to 4"



Fatmucket

Lampsilis siliquoidea
Grows up to 5"



White Heelsplitter

Lasmigona complanata
Grows up to 8"



Spike

Eurynia dilatata
Grows up to 5"

Present status

North America has an abundance of clean, shallow, moderately flowing streams and rivers, and is home to the greatest mussel diversity in the world. Many mussel species are restricted to a particular geographic area or location (endemic). There are currently 70 native species known in Indiana, and 21 found in West Fork White River in Delaware County.

Although they are widespread, mussels are sensitive to pollution, and significant declines in mussel populations throughout North America have been documented. Freshwater mussels are considered one of the most endangered groups of animals in North America. According to The Nature Conservancy, about 70 percent of freshwater mussels in North America are extinct or imperiled. Currently, 42 species are listed as federally endangered, and another 70 have been proposed for listing. Contributing factors include: over-harvest (button and cultured pearl industries), water pollution (sediment and chemicals), habitat alteration/destruction (streambed excavation and dams), and competition from exotic species (zebra and quagga mussel, Asian clam).

Since 1991, it has been **ILLEGAL TO TAKE OR POSSESS FRESHWATER MUSSELS IN INDIANA**. Live mussels must be left undisturbed, and shells cannot be collected except with a special permit from the Indiana Department of Natural Resources. These protections will help Indiana mussel populations to recover and sustain their important role in healthy aquatic ecosystems.

Introduced mussels

Introduced (also called exotic, invasive, non-native, or alien) species are those which are not native to a geographic location. Because they are not native, they have no natural predators and can thrive, usually to the detriment of native species. Introduced species take over the living spaces of our native species, deplete their food sources, and interfere with their life cycles. Populations grow very quickly and are susceptible to mass die-offs. We currently have two introduced mussel species in the White River in Delaware County.

Asiatic Clam

Corbicula fluminea
Max length: 2 inches; lifespan: 2-4 years



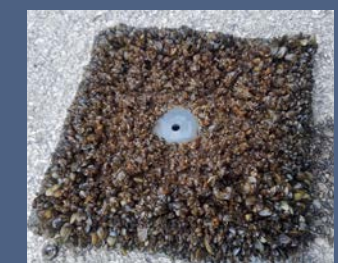
The Asiatic clam has been found in this area since the 1980s. It is capable of self-fertilization and a single clam can produce 100,000 young in a lifetime. At this point, our waterways have generally adapted to this invasive species.

Zebra Mussel

Dreissena fluminea
Max length: 2 inches; lifespan: 2-5 years



The zebra mussel was likely introduced in the Great Lakes in the 1980s via ballast water transfer. Their native range is the Ural and Caspian Sea region in Asia. They are particularly devastating because their juveniles, or veligers, are microscopic and free-swimming. This allows them to be easily and unknowingly dispersed on waders, bait buckets, trailers, boats, etc. Once they become adults, they are able to attach to objects and create large clusters of mussels that can clog pipes, engines, etc. They can also attach to aquatic insects, crayfish, and our native mussels, which can lead to the death of these native species. An adult female zebra mussel can release up to a million young during a single spawning season. Zebra mussels were discovered in Prairie Creek Reservoir in 2015, and had spread to the river by 2017. Now they are found throughout the White River in Delaware County, with the densest areas between Prairie Creek and Yorktown.



Zebra mussels covering a sampler plate

*Not to scale