FAIRMOUNT WATER WORKS
INTERPRETIVE CENTER

FAQs

1. **What is a freshwater mussel?**
   FM are filter-feeding bivalve mollusks and one of the most endangered phylum of animals.

2. **What should we all know about FM?**
   They provide a number of ecosystem services, which are benefits provided by natural systems that contribute to societal and environmental health. Mussels are filter feeders, meaning they take in water and remove and bind particles from the river (algae, zooplankton, bacteria, detritus,etc.). An adult mussel can filter up to 6-10 gallons of water per day and some species may be capable of filtering even more! Fewer particles in the river allows sunlight to penetrate deeper into the water column, thus allowing more photosynthetic activity and producing more oxygen for the water. Sunlight also promotes the growth of macrophytes on the bottom of the aquatic system, which provides habitat for many other aquatic species. Additionally, FM can help to stabilize riverbanks by burrowing into sediment and creating mussel beds at the bottom of the river.

3. **Why is the Philadelphia Water Department and other city partners investing time and money on freshwater mussels?**
   By restoring native FM populations, we increase the potential for cleaner waters. This would mean our water treatment plants would need to use fewer chemicals and less energy to clean the water. This is a multi-faceted approach helping both our local aquatic ecosystems and your water bill!

4. **What is the Fairmount Water Works Mussel Hatchery?**
   The FWW MH opened in 2017 as both an educational demonstration and a research and development lab. Our goal is to use innovative propagation techniques to optimize the production and growth of freshwater mussels.

5. **What is propagation?**
   In our lab, propagation is the process of replicating the natural reproduction cycle of FM by promoting the attachment of larval FM, called glochidia, onto their host fish's gills.

6. **Why are there fish in the lab if you're trying to hatch mussels?**
   FM begin their lives as parasitic larvae called glochidia, first living within the female mussel's marsupia. When the female mussel releases her glochidia into the water, they must attach to their host fish's gills. Each mussel species utilizes different types of fish as their host. Some are generalists and can use many different host fish species while some mussels will only use a single species of fish as their host. If the glochidia successfully attaches to their correct host, they will become encysted, traveling upstream with the fish.
   When the larvae have metamorphosed into juvenile mussels, they will fall off the fish and onto the bottom of the riverbed and begin filtering water on their own. At this point the mussel is only about the size of a grain of sand!

7. **What part of propagating mussels is done in the FWW Mussel hatchery?**
   The FWW Mussel Hatchery replicates the natural reproductive cycle of freshwater mussels. Gravid female mussels (mussels with larval glochidia in their brood pouches) are collected from healthy mussel beds in the Delaware River and are brought to the lab. (These mussels are returned to their homes once propagation is complete.) Fish hosts are also collected from hatcheries or from natural systems. Both the mussels and fish are given time to acclimate to the laboratory setting before propagation begins.

   In a propagation trial, FWW scientists flush out the larval glochidia from the gravid females and collect them in beakers. The host fish are placed into 5-gallon buckets with a few liters of water. Scientists estimate the number of viable glochidia by performing a salt test before evenly distributing them between buckets of host fish. (A salt test is when a grain of salt is added to the sample of glochidia. Viable glochidia will close in response to the greater salinity. Glochidia that do not close are not viable. A sample needs to have at least 90% viable glochidia to be used.) Scientists will then agitate the water in hopes of promoting attachment of the glochidia onto the host fish gills. The gills of the host fish are carefully examined every 5 minutes to monitor the amount of encystment. Once scientists determine that a suitable amount of glochidia have attached, the fish are returned to their tanks where they are kept happy and healthy until the glochidia metamorphose into juvenile mussels and drop off the fish gills. Juvenile mussels are then kept in the lab until they are about 1-5mm. At this stage, they are then transported to baskets and placed in natural ponds/lakes where they can continue to receive proper nutrients to grow even bigger and stronger. After 1-2 years in a basket, the mussels will be large enough to be placed in rivers and start filtering the water!

8. **What outcomes are we measuring?**
   Scientists measure several parameters within the lab. Some of the most important parameters are the growth rates and survivorship of the juvenile mussels. This is to ensure the mussels are growing properly and are receiving sufficient nutrients. Scientists measure the length of the mussels' shells every 2 weeks to determine how fast they are growing. They also carefully estimate the number of healthy juveniles observed. Both of these parameters help the scientists track their success and optimize their practices.

9. **What city partners are involved?**
   Partners of the Fairmount Water Works Interpretive Center and the Philadelphia Water Department include the Academy of Natural Sciences at Drexel, Audubon Mid-Atlantic, Bartram's Garden, and the Partnership for the Delaware Estuary. These organizations make up the Aquatic Research Restoration Center, or the ARRC.

10. **What if I want to visit a stream to collect mussels with my science class?**
    Nearly two-thirds of about 300 freshwater mussel species are imperiled, vulnerable or extinct. Nearly 82% (54 species) of the native mussels in PA are considered endangered, extirpated or of special concern (PABS, 2008). Even species that seem wide-spread might be experiencing declines as many populations of these species consist of older individuals possibly indicating little to no reproduction is happening. Harvesting of endangered and threatened mussels is prohibited under state law. Since mussel species are difficult to identify, handling mussels in any body of water that has a vulnerable or sensitive species is prohibited.

    In particular, the handling of freshwater mussels in the wild is subject to specific regulations. If you plan to engage with freshwater mussels in any capacity, it's essential to consult the relevant sections of the Pennsylvania Code and adhere to all state regulations to ensure the protection and conservation of these species. To survey mussels in Pennsylvania, you need a valid Pennsylvania fishing license, a scientific collector's permit, and a special permit to survey for endangered and threatened species.