



# THE CLAM CHRONICLE



# Wisconsin's Mussel Conservation: Charting Status, Innovation, and Progress

In this issue, we bid adieu to Jesse Weinzinger, who moved on to other employment. He did great work for the DNR and will be missed. This is his last *Clam Chronicle* issue as editor.

This issue covers the proposed federal listing of the Salamander Mussel as endangered. We share insights into the species' unique biology, and the implications of federal protection. The article emphasizes increased legal protections, collaborative opportunities, and exciting research prospects for our growing community of volunteers actively engaged in mussel conservation.

Amidst severe drought, the Wisconsin Mussel Monitoring Program volunteers have demonstrated a willingness to help out our river treasures, playing a crucial role in rescuing stranded freshwater mussels.

Lisie Kitchel reports on a remarkable Salamander Mussel discovery and relocation in the Wisconsin River, underscoring the importance of understanding and preserving their habitat during infrastructure projects. We also discuss ongoing investigations into mussel populations in the Wisconsin River, revealing the impact of dams and we explore the innovative use of mussel "silos" in studying growth and assessing habitat suitability.

We highlight the pivotal role Conservation Genetics brings in assessing mussel population health and guiding conservation efforts. Finally, we delve into the progress in conserving the Snuffbox mussel in the Wolf River basin through propagation and reintroduction efforts.

Your unwavering dedication to mussel conservation is the driving force behind our success, and together, we continue to grow mussel conservation in Wisconsin.

If you have questions or would like more information about the Mussel Monitoring Program contact Lisie.Kitchel@wisconsin.gov.



Jesse's reaction after finding a Fawnsfoot in the Sugar River.  
Credit: Leonard Steinert



Lisie Kitchel and Leonard Steinert

The Clam Chronicle is an annual publication of the Wisconsin Mussel Monitoring Program, part of the Wisconsin Department of Natural Resources (DNR)'s Natural Heritage Conservation Program. Learn more about the Wisconsin Mussel Monitoring Program at: <https://dnr.wi.gov/tiny/941>.



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Cover Photo: Volunteers look for mussels on the Chippewa River.  
Credit: Leonard Steinert

# Federal Listing of the Salamander Mussel

By Jesse Weinzinger

Wisconsin Mussel Monitoring Program Coordinator

The Salamander Mussel (*Simpsonaias ambigua*), is a mussel species found in the rivers and streams of the Midwest, including several locations right here in Wisconsin. The Salamander Mussel is a small species, elliptical in shape, that is thin-shelled and reaches approximately 48–51 mm long (1.5–2 inches).

Known for their intriguing life cycle, Salamander Mussels are the only known North American freshwater mussel species known to have a non-fish host, the mudpuppy for reproduction. The mussels' unique biology and fascinating interdependence with mudpuppies make them an integral part of our state's natural heritage. Unfortunately, the Salamander Mussel's population has faced several challenges over the years, making it necessary to consider federal protection.

The decision to list the Salamander Mussel as endangered comes after a comprehensive species status assessment conducted by the U.S. Fish and Wildlife Service. The assessment found that of the 66 known existing populations across the Salamander Mussel's range, more than 80 percent are at high risk from one or more primary threats, and about 14 percent of the populations are at moderate risk. None of the populations across the range is experiencing low risk. These primary threats include contaminants, changes in water flow, landscape alteration, invasive species, and risks to mudpuppies. This underscores the critical need for immediate action to protect this species and its habitat.

## Proposed Federal Listing

The U.S. Fish and Wildlife Service (USFWS) has taken a significant step by proposing to list the Salamander Mussel as an endangered species under the Endangered Species Act. This listing is an essential move towards ensuring the long-term survival and recovery of this species. As volunteers of the Wisconsin Mussel Monitoring Program, it's helpful to understand the implications of this listing and how it aligns with our conservation efforts.

## What the Federal Listing Means for Us

1. Increased Protections: The federal listing will



Typical Salamander Mussel habitat found on the Wisconsin River.  
Credit: Jesse Weinzinger



Salamander Mussels found on the Chippewa River.  
Credit: Jesse Weinzinger

- provide the Salamander Mussel with enhanced legal protections, including designation of critical habitats.
2. Conservation Collaboration: The listing opens the door for greater collaboration with federal agencies, researchers, and other organizations dedicated to the conservation of endangered and threatened species.
  3. Research Opportunities: As volunteers, this presents an exciting chance to engage in meaningful research projects, potentially involving the Salamander Mussel and its habitat.

By staying informed about the proposed federal listing, you can further support our shared mission to protect the Salamander Mussel and all native mussels in Wisconsin.

# Rescuing Freshwater Mussels: Volunteers' Vital Role During Severe Drought Conditions



UWSP students look for mussels on the Wisconsin River during a low-water event.  
Credit: Jesse Weinzinger

*By Jesse Weinzinger*  
*Wisconsin Mussel Monitoring Program Coordinator*

*By Lisie Kitchel*  
*Mussel & Snail Specialist*

In recent months, much of Wisconsin has experienced drought conditions, leaving very little water in some river systems, as well as impacting soil moisture, poor agricultural challenges, increased wildfire activity, and tested overall ecosystem resilience. As some of our state's largest rivers have reached near-historic low water levels, many volunteers of the Wisconsin Mussel Monitoring Program inquired about what one can do to help our river pearls, and many stepped up and rescued many (even hundreds) of mussels. A super big THANKS goes to all those wonderful volunteers that noticed stranded mussels and spent time and effort picking up exposed mussels and putting them into deeper water! Some volunteers noticed

that there were gaping mussels that did not close when touched or picked up, unfortunately those mussels were beyond saving, but those that closed were worth rescuing. Freshwater mussels are often overlooked but incredibly vital and are among the first to feel the effects of drought. When drought takes hold, they find themselves exposed to a range of threats. Their responses to low water conditions can be distressing. As water levels dwindle, they are not often able to find deeper water and become at risk of desiccation and excessive exposure to harsh environmental conditions. Diminishing water depths also make them more accessible to predators and parasites, further endangering their populations.

Dedicated volunteers across Wisconsin took action to make significant impacts on the survival of hundreds of freshwater mussels during severe drought conditions. One of the most effective methods of support is relocating these mussels to deeper, more stable waters. By doing

so, we can offer them a lifeline, protecting them from the adverse effects of low water levels. To assist in this endeavor, gather essential supplies such as buckets or bags (mesh laundry bags work well) and identify suitable locations with deeper water or consistent water flow. Handle the mussels with care, ensuring you don't damage their shells or soft tissues, and transfer them to the deeper water. This act of compassion and conservation will go a long way in ensuring that freshwater mussels continue to thrive in our rivers for generations to come, thanks to the dedication and efforts of volunteers like you, steps to help "rescue" mussels during drought or low water conditions:

1. **Monitor River Conditions:** Keep an eye on your local river conditions. Regularly check water levels, temperature, and potential threats like pollution events which are all the more harmful under low water conditions. Report any concerns to local

**“This act of compassion and conservation will go a long way in ensuring that freshwater mussels continue to thrive in our rivers for generations to come, thanks to the dedication and efforts of volunteers like you...”**

DNR officials for pollution events or the Wisconsin Mussel Monitoring Program otherwise.

2. **Mussel Relocation:** One of the most effective ways to aid mussels during droughts is to relocate them to deeper, more stable water. To do this:

- **Gather Supplies:** You'll need buckets, bags, or other clean containers, and a gentle touch.
- **Identify Suitable Locations:** Find deeper sections of the river or areas with consistent flow.
- **Carefully Relocate Mussels:** Gather mussels and place them in the deeper water.

3. **Raise Awareness:** Educate your community about the importance of freshwater mussels and the threats they face during droughts. A well-informed community can contribute to their protection and may help recruit more individuals to help salvage mussels.



*Left: Fatmucket (Lapsilis siliquoidea) seeks deeper water using its foot. Credit: Jesse Weininger*

*Top: Spike (Eurynia dilatata) stranded along the banks of the Embarrass River. Credit: Jesse Weininger*

# Salamander Mussel Bonanza in the Wisconsin River!!

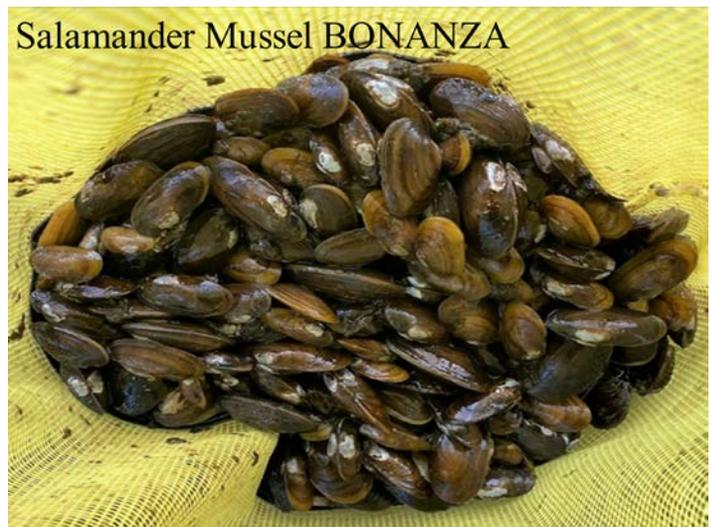


By Lisie Kitchel  
Mussel & Snail Specialist

Moving mussels out of harm way for bridge construction projects is common practice. But finding over 700 individuals of a rare species was far from common place! The Lone Rock Bridge over the Wisconsin River south of Spring Green is slated to be replaced and consultants relocating mussels in the project area happened upon some sandstone ledges that looked like possible Salamander mussel habitat, so they investigated.

Salamander mussels have very specific habitat requirements. They do not hang out in the bottom of the river like the majority of other mussel species. They prefer hiding under big slab rocks or in ledgy crevices safely protected from but adjacent to the fast-flowing water. This is habitat where their only host species and name sake. the mudpuppy (an aquatic salamander), also hangs out, and they are often found together.

There were sandstone ledges at the Lone Rock bridge where layers had been worn away leaving gaps between the ledges, perfect for Salamander mussels. And indeed it was, the consultants swept their fingers along the ledges and first found 80 individuals, which was quite the find, then more and more and more Salamander mussels until finally they found a grand total of 731 individuals, of all ages and sizes, a mega find!! Until that time the highest number of Salamander mussels reported from a single



*Bag of Salamander mussels waiting to be transported to new home.  
Credit: Noah Berg*

location had been 30 individuals, so this was over 700 MORE.

The next issue was where to relocate these habitat specialists since they had to be moved out of harm way and that kind of habitat is not that common. After much searching, all the Salamander mussels were rehomed and they will live on in the Wisconsin River with their host the mudpuppy in that special habitat.

# Investigating Mussel Populations in the Wisconsin River



Titanic Rock of the Wisconsin River.  
Credit: Jesse Weinzinger

By Jesse Weinzinger  
Wisconsin Mussel Monitoring Program Coordinator

Wisconsin's freshwater mussels, vital to the state's aquatic ecosystems, are in dire straits, with nearly 70 percent classified as threatened, endangered, or extinct. Dams, pollution, and invasive species have led to a decline in their numbers, and the Wisconsin River between the Prairie du Sac and Castle Rock dams is no exception.

The damming of rivers disrupts mussel communities, hinders fish migration, and limits genetic diversity. However, the lack of comprehensive data about these mussels in the Wisconsin River between the Castle Rock Dam and Prairie du Sac Dam further complicates conservation efforts. Therefore, ongoing surveys are looking to fill these knowledge gaps and better understand mussel populations in the Wisconsin River.



Left: Canary Kingshell.  
Credit: Jesse Weinzinger

Top: Higgins Eye (*Lampsilis higginsii*).  
Credit: Jesse Weinzinger.

To date, DNR biologists have recorded 28 species in the project area, including 8 state listed species, and three federally listed (or proposed) species. We also documented the occurrence of a newly recognized species (*Lampsilis sietmani*), which taxonomically separated from *Lampsilis teres* in 2021. Observed species richness notably decreases above the Prairie du Sac dam, changing from 22 observed species to 19. Surveys above the Killbourn Dam at Wisconsin Dells further decreases, observing 13 live species. We also notice a change in mussel communities between each dam; each river reach contain species that either don't persist or are in low abundance in the other river segments.

Preliminary results provide evidence that dams at Prairie du Sac and Wisconsin Dells are having a noticeable impact on the mussel community. As shown in other studies, barriers such as dams can have negative impacts on mussel populations, affecting both individual mussels and their habitats. Dams can disrupt this natural process by preventing fish from reaching upstream habitats where mussels live and reproduce. They can also fragment rivers systems, isolating mussel population that can lead to reduced genetic diversity and limit the ability of populations to adapt to changing environmental conditions.

Results from this project will further investigate how the lower dams of the Wisconsin River are impacting mussel populations. We hope to provide essential information for conservation efforts, enabling data-driven recommendations for future restoration and management to supplement mussel recovery in Wisconsin's largest river.

# Students Use Mussel “Silos” to Study Mussel Growth



By Leonard Steinert  
Conservation Biologist

Some rivers and freshwater systems have been hit hard by pollution and habitat degradation here in Wisconsin. This can lead to large declines in mussel populations that may depend on rivers and streams that have been polluted and degraded. Even when communities and conservation groups work to improve ecosystems, it can be hard to know when reintroducing native species is feasible. Silo studies can help determine when water quality improves enough to support freshwater mussels.

An area including parts of the Fox river near Green Bay was designated as a Great Lakes Area of Concern (AOC) in the 1980s. This was due to heavy pollution, sediment contamination, poor water quality and habitat deterioration. Since then, the Wisconsin DNR along with community stakeholders have been working to remediate some of the adverse effects to restore this area.

In the summer of 2022, the WDNR partnered with UW Green Bay to study how suitable rivers in the AOC have become since the remediation efforts began. To do this, we used silos to hold juvenile mussels, place them in rivers, and measure how many survive, and how fast the surviving mussels grew. The silos holding the mussels consisted of a half dome made of concrete with a hollow chamber in the center where the mussels are held.

*Lampsilis siliquoidea* (fatmucket) were used because they are known to be sensitive to many pollutants such as ammonia. The stock of fatmuckets used were from the Genoa Fish Hatchery. The siloes were placed in the Fox River, Duck Creek, Dutchman Creek, and Wequiock Creek and the juvenile mussels were measured 7 times over the summer.

Based on the findings of the study, the growth and survivorship of fatmuckets indicates that the water quality has improved enough in the AOC that it could potentially support a mussel population. Silo studies in general are relatively limited in showing habitat suitability, as it only considers water quality. Good habitat for mussels also includes substrate, host fish availability, and of course there are many zebra mussels in the AOC which would have posed a challenge for reestablishing native species. Another limitation of the study was that these homemade silos ended up losing some juveniles to the river, and ultimately cut down the overall sample size for the study.

Our findings will inform future studies to better help us understand the best way to reintroduce and support a mussel population in the AOC when the time is right for a return. There are still other elements of the rivers that may not be conducive to supporting mussel populations such as poor sediment and invasive species, but our silo study shows that water quality may be suitable again for our native species.

# Conservation Efforts Aim to Restore Endangered Snuffbox

By Jesse Weinzinger

Wisconsin Mussel Monitoring Program Coordinator

In an effort to conserve the federally and state-endangered Snuffbox mussel (*Epioblasma triquetra*), research, monitoring, and propagation activities are underway in Wisconsin's Wolf River basin. The Snuffbox mussel, facing threats to its existence, has seen its populations decline and become increasingly fragmented. The project's primary goal is to propagate and reintroduce Snuffbox mussels into river reaches from which they have been extirpated, contributing to their conservation and expanding their range.

Working in collaboration with the Genoa National Fish Hatchery (GNFH), the project involves propagating Snuffbox juveniles for reintroduction into suitable sites in the Wolf River basin. Gravid females and host fish for propagation are provided to the GNFH. This approach avoids relocating adult Snuffbox, which could potentially harm existing populations.

Three years of targeted broodstock searches in the Wolf River revealed 134 live Snuffbox mussels. Notably, observations indicated a strong male-biased sex ratio, with approximately 6 males for every female. While two



Tagged Snuffbox used for propagation.  
Credit: Jesse Weinzinger

previous years of hatchery propagation were unsuccessful, the third year was a charm, producing and releasing 11,710 juvenile Snuffbox mussels into the Wolf River.

The project also involved habitat mapping to identify suitable reintroduction sites based on habitat quality, water conditions, and the presence of host fish, logperch. The results of the project are a promising step toward Snuffbox mussel conservation in the Wolf River basin, with the potential for continued reintroductions and habitat restoration efforts.



Biologists survey Snuffbox in the Embarrass River.  
Credit: Jesse Weinzinger

# Conservation Genetics

By Jesse Weinzinger

Wisconsin Mussel Monitoring Program Coordinator

Genetics, the study of heredity and variation in living organisms, is part of the mussel conservation toolkit in Wisconsin. As part of ongoing projects like work in the Fox River watershed, we use genetics to assess the health of mussel populations by analyzing diversity and structure. This information reveals the impact of natural processes and human activities, aiding in the identification of resilient populations.

To carefully extract DNA from a freshwater mussel, we implement non-invasive viscera-swabbing methods. This method, which requires the slight opening of the valves uses cotton-swabs to collect tissue from the viscera or foot has been shown to provide effective results while preserving the health of the animal, when compared with other tissue collections such as by mantle-clipping.

Understanding the genetic structure of mussel populations holds profound implications for conservation management. The identification of resilient populations, influenced by factors like dam construction, non-point pollutants, and invasive species, helps guide targeted conservation efforts.

Currently, the Wisconsin DNR is utilizing conservation genetics to better understand resiliency of the following species: Rainbow mussel (*Cambarunio iris*), Salamander (*Simpsonaias ambigua*), Ellipse (*Venustaconcha ellipsiformis*), Slippershell (*Alasmidonta viridis*), and Elktoe (*Alasmidonta marginata*).



Biologist gently checks opens the mussel to collect a swab sample.  
Credit: Leonard Steinert



Rainbow (*Cambarunio iris*) wait to be processed.  
Credit: Leonard Steinert



Open extent of a processed mussel.  
Credit: Leonard Steinert

# Conservation in Action: A Watershed Management Approach to Declining Mussels in the Fox River Watershed

By Jesse Weinzinger

Wisconsin Mussel Monitoring Program Coordinator

Progress in the Illinois-Fox River watershed mussel conservation project is showing promising results. This project includes population investigations, genetic diversity assessments, and mussel propagation activities. To date, surveying efforts extended to 79 sites within the Fox River watershed and 12 additional sites beyond, leading to the discovery of 24 species of freshwater mussels. Among these sites, variations in species diversity were observed, with some displaying significant richness.

The project also involved collecting genetic samples of Rainbow mussels, where known populations persist in each state including those outside the watershed. Live Rainbow mussels were predominantly found in Waukesha County in the Fox River watershed but samples were also processed from the Milwaukee River watershed in Fond du Lac County.

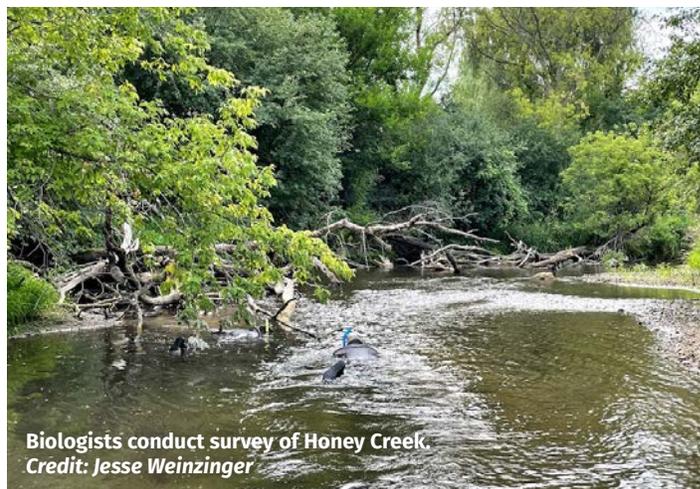
In Wisconsin, surveying efforts extended to 32 sites, with a majority within the Fox River watershed. A total of 3,656 freshwater mussels were observed, and the most abundant species was the Ellipse. Illinois, through the Illinois Natural History Survey (INHS), surveyed 47 sites in the Fox River watershed and collected genetic samples. Notably, no live Rainbow mussels were found in Illinois portion of the Fox River watershed, but relict shells were recovered from one location.

With one year left in this project, WDNR and INHS plan to analyze spatial and temporal trends in local populations as well as an evaluation of rainbow shell and its genetic makeup from samples taken in Wisconsin and Illinois. We will also share volunteer opportunities to help participate in the release of propagated rainbow mussels.



Rainbow Mussel with attached Zebra Mussel.  
Credit: Leonard Steinert

2023/05/19



Biologists conduct survey of Honey Creek.  
Credit: Jesse Weinzinger



Ellipse (*Venustaconcha ellipsiformis*)  
Credit: Jesse Weinzinger

2023/07/19

