



Freshwater Mussel, Fish and Macroinvertebrate Ecology

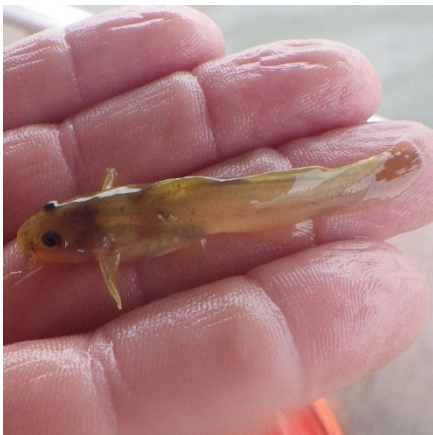
EcoAnalysts is a small business natural resource consulting company established in 1992 with the purpose of applying ecological sciences to management and stewardship of natural resources. We provide Natural Resource Consulting and in-house Environmental Laboratory Services to private and public-sector clients ranging from small-scale developments to large-scale projects.

ECOLOGICAL SERVICES

EcoAnalysts St. Louis, Missouri area office specializes in providing studies and advice concerning freshwater organisms to industry, state, and federal agencies. The EcoAnalysts staff is experienced in ecological studies related to mussels (unionids), zebra mussels, aquatic insects, fish, large river, small stream, and lake habitats. Our biologists and malacologists are familiar with current research and have excellent working relationships with state and federal agencies from North Dakota to Texas and east to New York. Our ADC-certified divers are experienced with aquatic sampling methods and are highly skilled in surface-supplied diving, the most efficient method of collecting in waters with low visibility and strong currents. EcoAnalysts owns all the equipment necessary for fieldwork, including custom-built dive boats, surface-supplied dive system, GPS equipment, and water quality meters, allowing our clients scheduling flexibility and assuring them reliable results.



Our sampling methods and mitigation solutions are readily accepted by regulatory agencies and have been presented as standards to other consulting firms. These sampling methods are currently being taught by our Science Coordinator, Heidi Dunn, at the U.S. Fish & Wildlife Service's National Conservation Training Center.



What We Do

We consider your project's objectives, design, and operation, as well as regulatory policies and ecosystem needs, to develop practical solutions and mitigation options.

- ◆ Threatened and endangered species regulatory agency consultation and mitigation design
- ◆ Freshwater mussels, fish, and macroinvertebrates: biological monitoring and survey

Mission

We believe development and environmental needs can be balanced, permitting economic growth without adverse environmental impacts. We strive to develop mitigation solutions that meet the needs of aquatic species, regulatory agencies, and our clients.

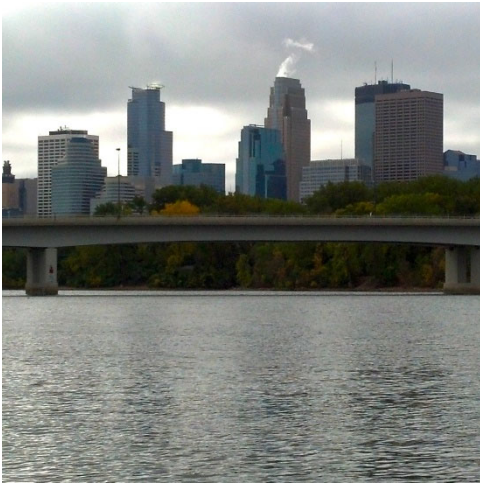
Contact Information

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FRESHWATER MUSSEL SURVEYS AND RELOCATION

Freshwater Mussel Surveys and Relocation



EcoAnalysts expert staff have conducted over 650 unionid mussel surveys in large rivers and smaller creeks throughout the Midwest. Our experience includes endangered species surveys, impact assessments, relocations, and long-term monitoring of unionid communities, as well as Biological Assessment preparation, evaluation of impacts using modeling results, mitigation design and implementation, and formal consultation with U.S. Fish and Wildlife Service. These services are usually associated with developments such as bridge replacements, water uptake/discharge facilities, hydropower generation, barge fleeing, sand and gravel dredging, and river channel modifications.

Our mussel survey and relocation methods and mitigation recommendations have served as standards for many state agencies in the Midwest and helped guide the USFWS protocol for mussel surveys in the Ohio River and Mississippi Rivers, and the Wisconsin DNR protocols for mussel relocation.

Surface-Supplied Diving

Our ADC-certified divers are experienced with aquatic sampling methods and are highly skilled in surface-supplied diving, the most efficient and safe method of collecting in waters with low visibility and strong currents. EcoAnalysts owns all the equipment necessary for fieldwork, including custom-built dive boats, surface supplied dive system, GPS equipment, and water quality meters, allowing our clients scheduling flexibility and assuring them reliable results.



Project Highlights

Bend Road, Meramec River Mussel Survey

Mussel Sampling; Large riverine biological survey and assessment; Statistical analysis; Impact analysis; Biological; Assessment/Agency Coordination; SCUBA diving

Prior to replacing the Bend Road bridge over the Meramec River, Franklin County hired EcoAnalysts staff to conduct a mussel survey from upstream of the existing bridge to downstream of the proposed new bridge using SCUBA diving. After identifying two mussel beds, EcoAnalysts staff worked with Franklin County, U.S. Fish and Wildlife Service, and Missouri Department of Conservation to develop a plan to avoid or minimize bridge construction and demolition impacts to these mussel beds and endangered species.

Baseline Studies, Long-term Monitoring and Thermal Impact Analysis at Quad Cities Nuclear Station (Exelon)

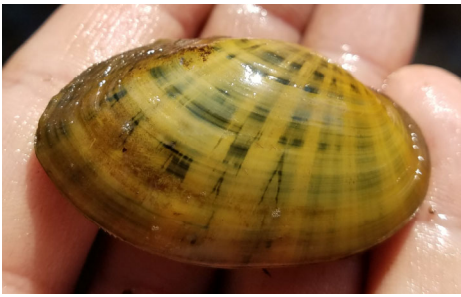
QCNS discharges its thermal effluent into the Mississippi River and while investigating an application for an alternate thermal standard, hired EcoAnalysts staff, to ensure that an alternate standard would not affect an indigenous shellfish community under 316(a) of the Clean Water Act, and to mitigate impacts under Section 10 of the Endangered Species Act.



The unionid life cycle (spawning, glochidia release, fish host activity, fish host infestation period) and behavior (siphoning/feeding rates, burrowing) is temperature dependent, however the thermal triggers and critical thermal maximums for most species are unknown. A unionid monitoring program was established to satisfy Section 316(a) and Section 10 requirements. Data from the mussel monitoring program were used to demonstrate that QCNS would not affect the integrity of the indigenous freshwater mussel community and develop the first freshwater mussel Habitat Conservation Plan.

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EcoANALYSTS, INC.

EcoAnalysts is a small business natural resource consulting company established in 1992 with the purpose of applying ecological sciences to management and stewardship of natural resources. We provide Natural Resource Consulting and in-house Environmental Laboratory Services to private and public-sector clients for a large range of projects. EcoAnalysts staff have conducted over 650 aquatic species surveys throughout the US. Our experience includes:

- Aquatic species habitat assessments and delineations
- Aquatic species presence/absence surveys
- Aquatic species density and richness studies
- Impact assessments
- Aquatic species relocations and monitoring
- Preparation of state and federal documents
- Biological Assessment preparation
- Evaluation of impacts using modeling results
- Mitigation design and implementation
- Consultation with state agencies
- Formal consultation with USFWS

FRESHWATER MUSSEL RELOCATIONS



There has been an increasing interest in freshwater mussels by various state agencies across the US., and many species are now listed as Threatened or Endangered at the state and/or federal levels. Due to this, many agencies are now requiring a relocation of freshwater mussels before they will approve some projects. EcoAnalysts Inc. has the staff and expertise to help clients conduct relocations in an efficient, and cost-effective manner.

WHAT IS A MUSSEL RELOCATION?

Just like it sounds, mussels are collected and taken to a new location to ensure their safety before construction.

- Often this involves coordination between multiple groups including: Department of Natural Resources, USFWS, Department of Transportations, the Public, and other groups.
- Depending on what is known about the mussel population, a pre-relocation survey may be necessary to determine density, abundance and distribution of mussels.
- Once a plan is worked out and approved, the relocation can occur
- Often post-relocation monitoring is also required

WHAT KINDS OF PROJECTS CAN BE AFFECTED?

- Construction within a reservoir, lake, river and/or perennial stream
- Pipelines
- Bridges and road construction
- Lake and river intake/discharge facilities
- Dams and cofferdam work
- Boat ramps
- Dredging
- Stream and river restoration



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FRESHWATER MUSSEL RELOCATIONS



IMPORTANT CONSIDERATIONS:

- Timing- Contact an expert to assess state-required aquatic species activities to ensure deadlines are met.

TAKE AWAY:

- EcoAnalysts' experts can help clients overcome environmental challenges in an efficient, and cost-effective manner.

WHY ECOANALYSTS, INC.?

- Our extensive mussel survey experience- over 650 surveys across the US.
- A working knowledge of mussel species occurring across the US.
- Our survey plans are readily accepted by state and federal agencies.
- Our survey and relocation methods and mitigation recommendations have served as standards for state agencies and the USFWS.
- Our working relationship with state agencies and the USFWS, allowing us to quickly obtain approval for scopes of work.
- Our knowledge of construction methods and potential impacts to mussels associated with those methods.
- Our knowledge of mussel biology, construction practices, and regulatory requirements which helps to reduce impacts, determining mitigation, and assist with agency/permit negotiations and requirements.
- Our team of experienced malacologists and divers. We have sufficient personnel to conduct surveys in a safe and timely manner. Our team meets all OSHA and ADCI standards for diving.



Our clients include:

- CH2M
- Departments of Transportation
- SCI Engineering Inc.
- Ramboll Environ
- U.S. Fish and Wildlife Service
- Stantec Consulting Services Inc.
- Illinois Natural History Survey
- U.S. Army Corps of Engineers
- Burns & McDonnell Engineering
- Gulf South Research Corporation

PROJECT HIGHLIGHTS:

174 Bridge Replacement, Mississippi River

- Scope of work development
- Mussel survey of construction/demolition areas
- Assistance with Biological Assessment/Formal consultation/Agency coordination
- Development of avoidance, minimization, mitigation, and monitoring efforts
- Pre-construction mussel relocation
- Long-term monitoring of relocated mussels



EcoAnalysts, Inc. (ECO) was subcontracted to assist with mussel issues associated with the replacement of the Interstate 74 Bridge over the Mississippi River. In 2014, ECO conducted a survey to determine the density, distribution, and species composition within the impact area, and found a significant community. In 2015 ECO conducted surveys to find suitable relocation sites for mussels and delineated 7 possible locations. In 2016, ECO assisted with agency coordination, developing take estimates, and monitoring and mitigation studies. In one of the largest known mussel relocations in the country, ECO then relocated approximately **153,000** mussels from the impact area in 2016 and 2017. **32** species were relocated, including **3 federally endangered species** and 4 state listed species. ECO will monitor these areas periodically over the next 10 years to evaluate how large increases in mussel density affect both resident and relocated mussels.

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