

Project Name: Michigan Sulfide Ore Mining Project, Menominee County Component  
Project Code: #3003-VSM2006-01  
Grantee: The Sierra Club Foundation  
85 Second Street, Suite 750  
San Francisco, California 94105

Contact: Rita Jack, Sierra Club Michigan Chapter 517-484-2372

**Project Background:**

A mine exploration company is prospecting for zinc and gold in sulfide ore deposits in Michigan’s Menominee River watershed in small headwater tributaries located west of Stephenson, MI. The area is lightly populated, with much of the land zoned for recreation. There are a few year-around residents, plus several “camps”. A mine would represent a significant shift in land use, including heavy industry, heavy truck traffic, fewer trees, more roads and many more people. Since there is little published water quality information available about the area, Sierra club began a volunteer water monitoring project to assess water quality in areas targeted for sulfide mining before any major change in land use occurs. Continued long-term monitoring would help determine if any changes in water quality may be associated with mining activity or any other change in land use.

**Goals:**

Assure long-term viability of the project by recruiting and keeping motivated volunteers. Assess the status and track water quality trends in several small, unnamed Menominee River tributaries. Develop Data Quality Goals, and a Quality Assurance Project Plan (QAPP), in order to produce unbiased scientifically valid results. Communicate all data quarterly to MiCorps, the Michigan Department of Environmental Quality (MDEQ) and the public. Increase public participation in public comment periods for any water quality discharge or other permits by encouraging project participants to engage in these opportunities.

**Measurable Objective(s):**

1. Recruit 40 volunteers from our Sierra Club membership and from the area.
2. Encourage experts to help train other volunteers.
3. Foster leadership, delegate important tasks, and encourage accountability.
4. Give volunteers opportunities to learn when possible.
5. Perform a bi-annual inventory of the benthic macroinvertebrate community, using established methods provided by the MiCorps staff and an approved QAPP.
6. Monthly, use hand-held meters to measure pH, conductivity, dissolved oxygen, and temperature, and track these results. (Note: the Sierra Club Mackinac Chapter already owns equipment to perform these additional water quality tests.)
7. Work with MiCorps staff to develop a QAPP to assure all data are gathered using scientifically rigorous and repeatable methods.
8. Train all new volunteers to adhere to the QAPP in their monitoring, provide opportunities for retraining and for side-by-side data collection to compare their data collection.
9. Submit data to the MDEQ through the MiCorps Data Exchange website and in an annual report, and also maintain the data in our own database. Data or information deemed important or time-sensitive will be communicated immediately.
10. Make our data accessible to the public on our Sierra Club Web site.
11. Involve 10 or more project participants in using water quality data to make informed public comments during public comment periods on any draft permits before the MDEQ.

**Objectives Met:**

Our objectives were well met, except for #6, #9, and so far, #11. We did not implement the monthly monitoring plan for using the handheld meters. We have performed these tests at all monitoring events. We did not submit a paper or electronic data report to the MDEQ because our data are accessible at [www.micorps.net/data/view/search](http://www.micorps.net/data/view/search) on the MiCorps website in a format that makes the data much more useable. So far, we have not used our data in permit comments, because the mine prospectors have not submitted permit applications. We’re especially

satisfied with outcomes for objectives #1, #2 and #3: we trained and deployed 45 volunteers, Dr. Keith West from the University of Wisconsin-Marinette agreed to take over managing the scientific investigation aspects of the project, and the local Front Forty group agreed to handle all recruiting, media outreach, and volunteer management for the project, meaning this project should remain active for many years. In addition, the Sierra Club Michigan Chapter developed a page on their website to help recruit new volunteers, see <http://michigan.sierraclub.org/issues/greatlakes/articles/shakeysentinels.html>.

### **Challenges Encountered and Overcome:**

1. All of our volunteers were new to water monitoring and its benefits, so we started with the basics in our trainings. They learned quickly, though there was initially some hesitancy in applying rigorous monitoring methods. By the second year our volunteers were much more knowledgeable and confident.
2. The higher confidence level led to some over-rigorous collecting, and two of our D-nets were broken. Additional training helped correct this.
3. Initially our monitors had trouble seeing the macroinvertebrates, so some of the tiny ones were missed at first. However, we continued to go over the “picking methods” in every training session, and our volunteers are now quite good at spotting even the tiniest macroinvertebrate.
4. There were challenges with actually identifying the very small macroinvertebrates. In some cases we needed to use a microscope to see their features such as gills or the number of tarsal claws. This made identifying them at stream-side very difficult. Instead, the monitors brought their collections in 5-gallon buckets back to our meeting area, where we all worked at separate tables to “pick the bugs” while we chatted and ate lunch. This approach allowed us to involve additional volunteers who didn’t feel able to help with monitoring. They arrived in the early afternoon and joined a table to help out.
5. We had intended to monitor 10 sites, however we located only 8 sites that fit our selection criteria. We later dropped one site because it became unwadable.
6. The Project Manager lives in East Lansing and the project area is 8 hours away by car. This led to higher travel expenditures that included lodging and per diem, as well as mileage. However, very generous volunteers provided lodging in their homes, so substantially cut some of those costs.

### **Summary of Training and Monitoring Events, Number of Sites Monitored, Number of Volunteers:**

Forty-five volunteers worked to monitor 7 sites on Menominee River tributary streams located west of Stephenson, Michigan. We chose sites that may be impacted if a sulfide mine is built in the area, plus one site as a control. We held five training sessions, one before the project began, plus one on the morning of each monitoring day. We covered benefits of water monitoring, methods of macroinvertebrate collection, and what types of habitat to sample from, such as sand bars on outside bends, gravel and rocks in riffle areas, rooted or floating or overhanging vegetation, and submerged rocks and woody debris or chunks. We also learned how to identify the macroinvertebrates, and how to conduct habitat assessment.

### **Environmental Benefits of Monitoring**

The mine exploration company notified the MDEQ that they began their two year environmental review, signaling their intent to submit a sulfide mine permit application. Because of the Shakey Water Sentinels’ volunteer monitoring, there is now more environmental information about the area available to the agencies. Therefore the state will be in a better position to make decisions about granting any permits. There is also now a cadre of knowledgeable individuals who are better informed about their watershed, so they may make appropriate and useful comments on the permit applications.

### **Lessons Learned**

Because the Project Manager lived 8 hours away, some tasks were difficult, such as holding extra training sessions that were separate from the monitoring days. But we managed that by holding one initial long training session, and then by adding hour long trainings every monitoring day.

## **Outreach and Education Efforts**

The local citizens have undertaken the greater portion of public outreach by presenting slide shows and hosting discussions about the proposed gold and zinc mine. They've visited every township meeting in Menominee County, some of them multiple times, and have also crossed the Menominee River to the Wisconsin side to present there. They talk about the potential effects of a sulfide mine, and talk about what they're doing about it, including the water monitoring project. (Several of the water monitoring volunteers reside in Wisconsin.)

Volunteers are given the opportunity to provide input at every monitoring event, especially while sitting around the tables and sorting the macroinvertebrates. They've become quite knowledgeable, and readily share their knowledge with newcomers, and help to answer questions and with training sessions.

## **Key Volunteer Partners**

Dr. Keith West, Professor of Geography at UW-Marquette, has participated since the beginning, and has generously agreed to lead the science aspects of the monitoring efforts, including training new volunteers, data tracking and data entry on the MiCorps website, and managing the project's quality assurance objectives. Dr. West signed onto the quality assurance project plan.

Chauncey "Riverwalker" Moran has participated since the beginning, offering his water monitoring and macroinvertebrate identification expertise. Mr. Moran has undertaken several volunteer monitoring efforts in the Upper Peninsula, and was very helpful in locating appropriate monitoring sites along the small Menominee River tributaries, and shared many "how-to" monitoring tips. His participation and insights helped volunteers to better understand the value of volunteer water monitoring.

Mike Boerner has participated since the beginning, offering his family's cottage as a "base camp" for all monitoring activities. He's provided the morning coffee, cooked the afternoon lunch, and allowed us full run of the cottage. Mr. Boerner also immediately became one of our lead volunteers, by becoming a "collector", and helping to train others.

Ron and Carol Henriksen have participated since the beginning, plus took the lead on public education about mining in sulfides. They've made presentations to at least 100 groups over the last 3 years, and have recruited many new volunteers to the project.

Marla Tuinstra has participated since the beginning, plus took the lead on media outreach by using her local newspaper connections to have articles placed for each monitoring session, all of which have brought in new additional volunteers. Both Mr. and Mrs. Tuinstra have helped monitor many times as well.

All of the volunteers have worked very hard to learn the many tasks associated with water monitoring. They have exceeded their data quality objectives for both monitoring and for habitat assessment in every monitoring session.

## **Work Products – copies are attached**

- Spring 2007 Newsletter: *Report on Fall 2006 Monitoring & Announcement of June 16, 2007 Spring Monitoring, Shakey Water Sentinels, Menominee County*
- Fall 2007 Newsletter: *Inside: Planning for Fall 2007 Monitoring and Report on Spring 2007 Monitoring, Shakey Water Sentinels, Menominee County*
- Monitoring Job Description, specific to the Shakey Water Sentinels
- Spring 2008 Water Monitoring Announcement: Shakey Lakes area Menominee County, Michigan's Upper Peninsula
- Photo Postcard to announce the monitoring dates to volunteers, w/ photo of Menominee River

- Topographic map of the monitoring sites

### Project Sustainability

The threat of sulfide mining hasn't ended – the company has notified the state they have begun the various environmental studies that are required for a non-ferrous metallic mineral mining permit. The Shakey Water Sentinel volunteers have made it clear they intend to continue to monitor the water quality in the small streams, to continue building the baseline water quality record. Dr. West has agreed to continue to provide assistance from the university on data management and training for new volunteers, plus will bring his students into the project as his teaching schedule allows. Dr. West also has opportunities for grant funding through the university and other sources, should the need arise for funding for equipment or other expenditures. We expect the project will continue for many years.



Above: In October 2006, a drilling rig is drilling cores from 1500 feet below ground surface. The cores are analyzed for mineral content and concentration, and for economic viability.



Above: Two volunteers sample macroinvertebrates from an unnamed Menominee River tributary that the project has dubbed "Lower Boerner Creek". The site is site #3.



Above: Volunteer monitors pick macroinvertebrates from rocks and from leaf packs at stream side.



Above: Volunteers go through samples to pick macroinvertebrates at the base camp.