

## Mining in the Penokee Range?

By Michele Wheeler, Executive Director

As you all know by now, there has been a lot of interest in developing an iron mine in the Penokee Range near Mellen. This area lies in the headwaters of the Bad River watershed, and Lake Superior's Chequamegon Bay. This is a complex issue for the area, and the degree of impact that this type of land use could bring is unknown. However, BRWA will approach this topic like we do all other land uses in the watershed: we will work to provide relevant information to promote responsible and effective decision-making on issues affecting the watershed. By relying on sound science, and partnering with other local organizations, we will work to invest all citizens in critically and objectively evaluating this very big development and what it may mean to our watershed.

We do know that there is great interest in this potential project, as is evident by the many conversations heard around town, recent press in local papers, and the huge citizen turnout at the January 2011 public forum held at the Northern Great Lakes Visitor Center.

This issue of *Watershed Waves* focuses on what we as an organization currently know about the potential for a taconite iron mine in the Penokee Range. We will continue to feature informational articles like these related to mining in future issues of *Watershed Waves*, as this issue remains at the forefront of our community. Additionally, see inside for "Voices from the Watershed" to learn how you can get your questions or concerns addressed by BRWA. Stay tuned. ♦



*Penokee Ridge at Whitecap*



*Public turnout was high at a forum on the topic held in January at the Northern Great Lakes Visitor Center.*

## "Spring" is Coming...

### *Join us for the 7th Annual "Spring for the Water"*

Yes, it's true, "spring" is almost here! On Saturday, March 26, BRWA will be hosting our 7th Annual "Spring for the Water" event, from 5:00-8:30 pm at the Northern Great Lakes Visitor Center in Ashland. Join us for our signature event to provide your support to the BRWA organization, while having a great time too!

This year will again feature our famous silent auction, as well as a bucket raffle to add to the fun. We'll have some of the same items that you've loved in the past, with new items as well. We've got local food items from local producers; local art such as jewelry and other hand-crafted items; and local experiences, such as fishing trips, yoga instruction, photography sessions, and meals at restaurants. To check out the complete list of items and descriptions visit [www.badriverwatershed.org](http://www.badriverwatershed.org) to see what we've come up with!

The delicious gourmet food will be catered this year by Jonathan Berthel of Penokee Mountain Foods that will feature fresh locally grown foods from right here in our watershed. We will also be awarding the second Karen Danielsen Outstanding Stewardship Award to a volunteer that has shown Karen's same enthusiasm and commitment to BRWA's mission. And of course, we will have some live music and lively conversation with fellow BRWA supporters like you!

Tickets are \$25 per adult and can be purchased by calling 715-682-2003. As an extra incentive, if you purchase your tickets by March 15, you will receive ten complimentary bucket raffle tickets per person. Please join us as we celebrate and support the achievements of BRWA, and help us to make this year the best one yet! ♦

### About BRWA:

#### What we do

We are a community organization that works to involve all citizens in taking care of and enjoying their home watershed. We accomplish this by conducting educational programs and forums about how our watershed can be affected by the decisions we make. In addition, we assist citizens to gather information, identify problems and implement solutions to maintain the integrity of our watershed for future generations.

#### Our Vision Statement

The Bad River Watershed Association envisions a future in which change and development within the watershed grow from a stewardship ethic that seeks to minimize ecological damage, while maximizing ecological and community health.

#### Our Mission Statement

The mission of the Bad River Watershed Association is to promote a healthy relationship between the people and natural communities of the Bad River watershed by involving all citizens in assessing, maintaining and improving watershed integrity for future generations.

## The Ironwood Iron Formation in the Penokee Range

By Tom Fitz

The Ironwood Iron Formation is a bedrock layer that extends 75 miles from Lake Gogebic in Michigan to near Jackson Lake, south of Grand View, Wisconsin. The formation is 480 feet thick and is sandwiched between a quartz layer (the Palms Formation), to the south and a slate layer (the Tyler Slate) to the north (see Figure 1). The originally horizontal sedimentary

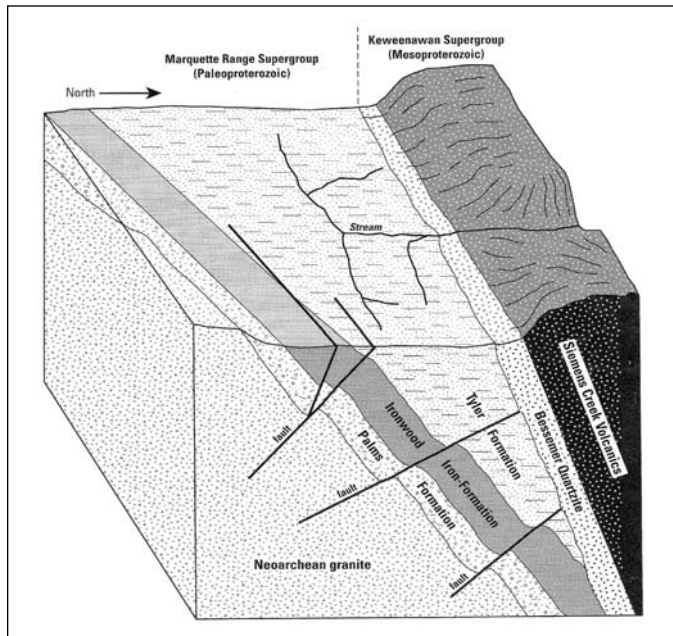


Figure 1. Block diagram showing the Ironwood Formation and adjacent bedrock layers. The view is looking toward the west. (From U.S.G.S. Professional Paper 1730)

formation has been known for a long time—in fact, about 40 mines worked the Ironwood Formation in the 19th and 20th centuries. Between 1877 and 1967 more than 325 million tons of ore were extracted from mines located between Upson, Wis., and Wakefield, Mich., mostly from underground workings. It has been estimated that the Ironwood contains 2.2 billion tons of economic ore, making it one of the largest iron reserves in North America.

A lot of attention has been focused on the Ironwood Formation because of its iron resource, but its geologic significance has also been studied in recent years. Iron formations are unusual rocks that formed during only one period of earth history that ended very abruptly 1.8 billion years ago. Why their deposition stopped has only recently been revealed by geologists



Figure 2. A student examining the Ironwood Formation. The dark layers are magnetite, the white is quartz. (Photo by Tom Fitz)

working in the Lake Superior Region, and is a story of abrupt and dramatic worldwide change. The timing of their demise correlates perfectly with the time of an enormous meteorite impact at Sudbury, Ontario. It is thought that the force of the impact mixed the entire world's ocean, changing seawater chemistry in such a way that iron formation could no longer be deposited. The top of the Ironwood Formation, and corresponding iron formations in Michigan and Minnesota, are all marked by a distinctive layer of broken rock that records the shock wave and tsunamis created by the meteorite impact—an impact that changed the world forever. ♦

The Ironwood Formation is composed thin layers of the minerals magnetite ( $\text{Fe}_3\text{O}_4$ , an iron oxide) and quartz ( $\text{SiO}_2$ ) (see Figure 2). Magnetite is the mineral of interest to mining companies because it is mostly iron, and it is attracted to a magnet—a property that makes it simple to extract from crushed ore. The Ironwood Formation is a relatively rich mineral deposit, meaning the proportion of economic mineral is high and the volume of the deposit is large.

The economic and resource importance of the formation has been known for a long time—in fact, about 40 mines worked the Ironwood Formation in the 19th and 20th centuries. Between 1877 and 1967 more than 325 million tons of ore were extracted from mines located between Upson, Wis., and Wakefield, Mich., mostly from underground workings. It has been estimated that the Ironwood contains 2.2 billion tons of economic ore, making it one of the largest iron reserves in North America.

—Tom Fitz is associate professor of geoscience at Northland College. This article is the first in a two-part series on the Ironwood Iron Formation. In the next issue of Watershed Waves: A look at the potential for mining the Ironwood Formation in the Penokee Range and its potential impacts to the watershed.

### GEOLOGICAL GLOSSARY

- A bedrock **formation** is a large layer of rock that is distinctly different than adjacent strata.
- The bedrock ridge that crosses Northern Wisconsin and the Upper Peninsula of Michigan is called the **Gogebic Range** in the east end and the **Penokee Range** in the west end. It has similar rocks and landscapes along its entire 75-mile length. The Ironwood Formation is one of six bedrock formations in the range.
- The term **iron formation** refers to rocks that are mostly iron oxide minerals such as magnetite. If there are a lot of layers of quartz, then they are called **banded iron formation**, or **BIF**. **Taconite** is another term that is used for any iron-rich rock that is mined.

## Preliminary Data Indicate "Excellent" Water Quality in Penokee Range Streams

By Matt Hudson, BRWA Watershed Action Director

As our watershed community prepares for the possibility of a large-scale iron mining operation near Mellen, there are a lot of questions and concerns about what such a development could do to the health of our watershed resources. One of the best things we can do as a community is to learn about and understand what we have before such a development takes place.

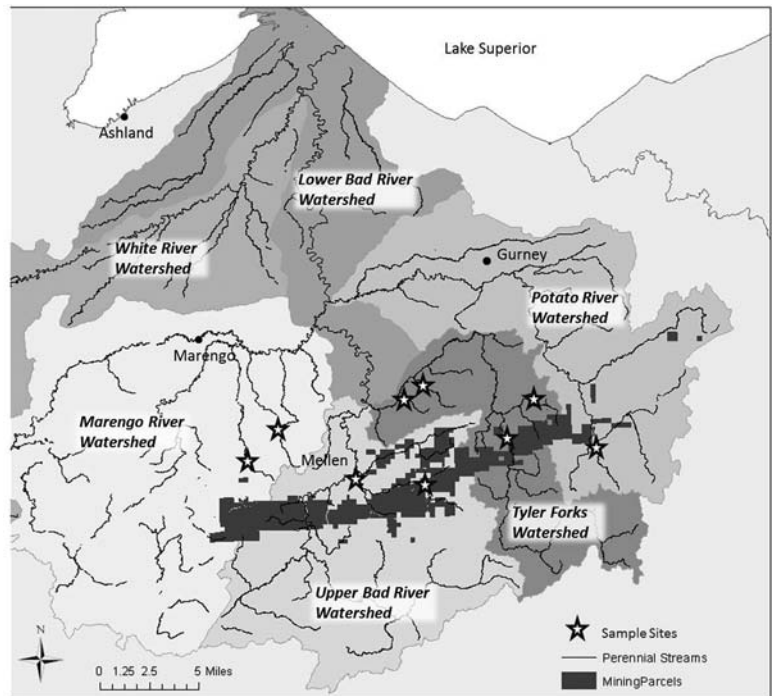
As we explored in the cover story of the Winter 2011 issue of *Watershed Waves*, small streams are often overlooked, but play an important role in providing clean water for the healthy ecosystems we have in most areas of the Bad River watershed. Unfortunately, these streams can easily be taken for granted if we don't pay attention and learn about them.

In an effort to learn more about some of these small streams in the vicinity of the Penokee iron ore body, BRWA worked with an Environmental Studies class from Northland College this past fall. One focus of the class was to collect some basic information about the health of some of these streams using macroinvertebrates.

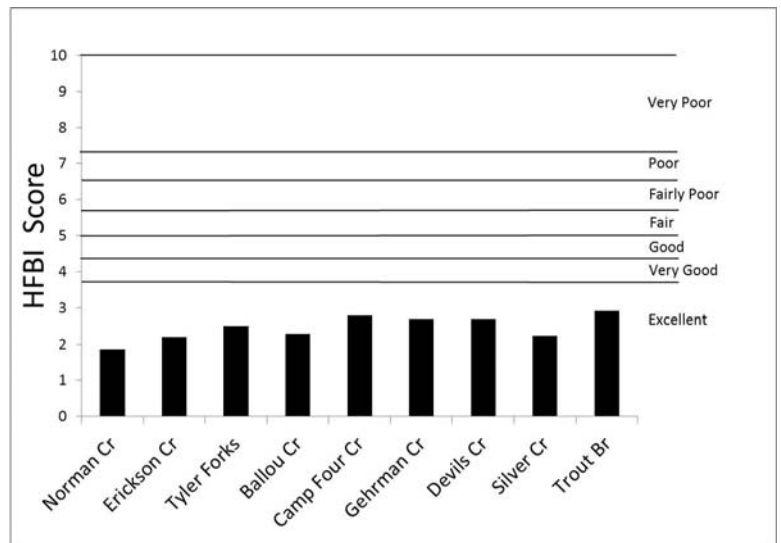
Macroinvertebrates are the aquatic bugs that live in our streams and are attached to whatever is on the stream bottom including rocks, logs, and leaves. Macroinvertebrates provide important long-term information about water quality in a stream because they typically spend a large part of their lives in the water and differ in their tolerance to pollution. Therefore, the types of macroinvertebrates we find in a stream give us important information about whether there are pollution sources making the stream unhealthy and give us some information on baseline conditions in these streams.

Students worked with BRWA staff and volunteers to collect and identify the macroinvertebrates from locations on nine streams (Map 1). The data were used to calculate the Hilsenhoff Family Biotic Index to translate the type of macroinvertebrates collected into a score that gives us a sense of how healthy the streams are. Results indicate that water quality at all nine stream sites is "Excellent," which we would expect given the low amount of human activity currently in these areas (Graph 1).

Thanks to Grant Herman and all the students who helped collect this information and provided us a "first look" at the health of some of these streams. As we emerge from winter, it looks like 2011 will be a busy year for stream monitoring in the Penokees as more attention gets focused on the possibility of a mining proposal. BRWA will be working with our partners to identify monitoring needs and be providing more opportunities for volunteers and community members to collect information about water resources in the vicinity of the potential mining area. ♦



Map 1. Location of sites sampled by Northland College and BRWA for macroinvertebrates during fall 2010. Subwatersheds of the Bad River Watershed are identified and shaded.



Graph 1. Hilsenhoff Family Biotic Index (HFBI) score for each stream site sampled by Northland College and BRWA for macroinvertebrates during fall 2010.

**ARE YOU INTERESTED IN  
VOLUNTEERING THIS SPRING  
TO MONITOR WATER QUALITY?  
Please contact Valerie at 682-2669**

## What's Involved in the Iron Mining Permitting Process?

By Kevin Brewster, BRWA Board Member

The possible development of an iron mine in the Bad River watershed near Mellen brings with it a lot of questions: How will it affect the water, air, wildlife, local economy, and overall atmosphere of the region? How long will it take to permit and develop a proposed mine? What are some ways citizens can stay informed during this involved process? While there are many questions yet to be answered, here we provide an overview of the permitting process, how citizens can participate and stay informed, and where in the process the iron mining project is at currently.

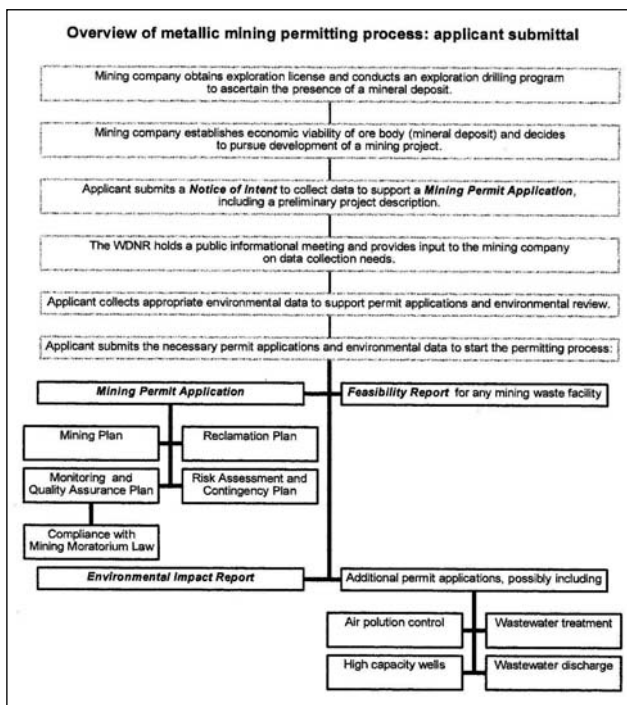
**Exploration:** For a prospective mining company, the first step before beginning the permitting process is that the company must receive licensing from the Wisconsin Department of Natural Resources (DNR) to conduct exploratory drilling and file a drilling plan. Drilling and site reclamation are regulated and supervised by DNR personnel. After the exploratory drilling is complete, and if a company decides it wants to pursue mining an area, it then embarks on a permitting process with the State of Wisconsin and local governments.

**Notice of Intent:** The first official step to initiate the permitting process is the filing of a *Notice of Intent* document with the DNR. This document includes contact information for the applicant, project site maps, expected date of submission of the permit application, existing environmental data, a preliminary project description, description of the proposed method of extraction and processing, nature of the wastes produced, and estimated project schedule. The timeframe for approving a permit from start to finish varies widely. It can sometimes take from two and a half to four years, but may go on even longer depending on many variables.

**Scope of Study:** After reviewing the document, the DNR notifies the applicant regarding additional specific information it may require. In response, the applicant develops a *Scope of Study* report, which provides detailed information about the additional data required including type, methods used, and methods for data verification and quality assurance.

**Public Hearings:** One of the best ways for citizens to stay informed about the permitting process and have their concerns heard is by attending local meetings. Mandatory public hearings are scheduled to solicit input from the public, local government and other agencies. Here public opinions are heard and made part of the DNR's official record of public input. This record of testimonial evidence is part of the *Master Hearing* process

discussed below. Matters discussed at public hearings include environmental impacts and monitoring, assembling contact lists of those wanting updates of DNR actions, DNR verification of the applicant's compliance with permitting requirements, and many other matters.



**Environmental Impact Report:** The applicant is required to submit an *Environmental Impact Report* documenting the existing physical, biological, and socioeconomic conditions in the proposed project area. This entails gathering a large amount of background information on the project area's geology, hydrology, ecology, economy and demographics. These data are then used to formulate an estimate of the project's impacts to the area.

**Environmental Impact Statement:** After review of the applicant's submittals, the DNR publicly issues an *Environmental Impact Statement*. This extensive document discloses information on the

proposed project including location, description of the ore body, developed mine structures and land footprint, processes and infrastructure involved, environmental monitoring, site reclamation requirements, duration of the project and anticipated environmental and socioeconomic impacts.

**Master Hearing:** The *Master Hearing* is an opportunity for further public comment. It is a formal legal proceeding similar to a trial, presided over by a Hearing Examiner appointed from the Wisconsin Division of Hearings and Appeals. At the hearing, evidence and testimony from the Public Hearing and all other permit and approval matters are entered into a formal record. On the basis of the record of the hearing, the Hearing Examiner decides if the proposed project is appropriate and in compliance with all applicable laws, or if further environmental impact data is required. Decisions reached in the Master Hearing are subject to administrative or judicial appeal if all parties are not satisfied.

*Editor's Note:* As of this newsletter printing, BRWA has confirmed that Gogebic Taconite, LLC has made a request to the DNR for the application form to obtain a license to begin exploratory drilling, but have not yet submitted that application. The DNR has not issued a license to begin exploratory drilling at this time. Gogebic Taconite has also not yet submitted the *Notice of Intent* that is required to initiate the permitting process for an iron mine. BRWA will work to inform our members if and when that process is initiated, and work to inform members of when and how you can provide your input into this detailed process. ♦

# Thank You!

**Thanks to our Donors:** Town of Marengo, Derek & Kim Ogle, Jim & Jane Emerson, Dennis & Pat Musil, Slavick-Matis Family, Cathy Zimmerman, Mlynarek-Sorensen Family, Larson-Spangberg Family, Linda Jorgenson & Jack Gunderson, Joy & Jim Perry, David & Terri Bahe, Art Techlow, Carl & Jean Kubley, Terry & Kay Peters, Dr. Heinz & Janice Vogel, Iron County Land & Water Conservation Dept, Landis & Steven Spickerman, Jeff Silbert, Patrick Mayotte, Jim & Mimi Crandall, Hidden Vue Farm, Elizabeth Bader, Freshwater Future, U.S. Fish and Wildlife Service Great Lakes Basin Fish Habitat Partnership, Johnson Family Foundation, Duluth Superior Area Community Foundation, National Fish and Wildlife Foundation, Town of Grand View, Mike Klump, Rolland & Joyce Kiel, and anonymous donors.

**Thanks to our Water Quality Volunteers:** Rachel Coughtry, Caleb Coughtry Carpenter, Jack Wichita, Roland Wolff, Henry Gradillas, Andrea Haugo, Joan Elias, Ulli Kastens, Ed Kolodziejski, MaryJo Gingras, Heather Palmquist, Kent Goeckermann, Colleen Matula, Jerry Setzke, Dale Thomas, and Tracey Ledder.

**Special thanks to:** Dr. Sharon Anthony, Andrew Weir, and Alex Bruns of Northland College for making the chemical standards needed for the Volunteer Water Chemistry Quality Control Sessions; Dr. Sharon Anthony of Northland College and Joan Elias of the National Park Service- Great Lakes Network Office for providing lab space for the volunteer sessions; and Dr. Kevin Schanning of Northland College for assisting BRWA with the Community Assessment Project.

## Voices from the Watershed

There is certainly more to consider than what is printed in this newsletter regarding the potential for mining in the watershed. BRWA staff recently met with a representative from Gogebic Taconite to learn more about what's happening. And BRWA is also working with local groups (townships, agencies, other NGOs) to discuss what mine development could mean for the watershed and local people.

What do you think about when you consider mining in the watershed? What concerns do you have? How do you want to get involved?

Let us know what kinds of information you need, and we'll work with partners to provide what we can. Let us know what you're thinking about, and we'll work to answer your questions with accurate information. We'll also publish some of the Q and A's in future issues of our newsletter.

How do I submit my questions/comments to BRWA?

By mail: P.O. Box 875, Ashland, WI 54806

By phone: 715-682-2003

By email: brwa\_wi@yahoo.com

By website: www.badriverwatershed.org

Or, you can "Like" us on Facebook and send us a message



### Board of Directors

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## Support the work of BRWA

Anybody who supports our mission can become a member of the Bad River Watershed Association. Consider enhancing your membership by making a financial donation to help support our work.

\$100 Your name \_\_\_\_\_

\$ 50 Address: \_\_\_\_\_

\$ 25 \_\_\_\_\_

\$ \_\_\_\_\_ Phone and/or email: \_\_\_\_\_

Clip this form and send with your tax-deductible check to: Bad River Watershed Association, P.O. Box 875, Ashland, WI 54806. Thank you!

### DOUBLE YOUR DONATION FOR FREE!

We have received an anonymous challenge donation from a local supporter to improve our outreach to watershed citizens. This means that every dollar donated will be matched by an equal amount up to \$3,000. (That's right, your \$25 donation just became \$50 and your \$100 donation just bumped up to \$200.) So far we've raised \$1,725 towards this challenge. Contribute today to help us secure the rest.

### BRWA Team

Michele Wheeler

Executive Director/

Culvert Program Manager

Matt Hudson

Watershed Action Director

Valerie Olinik-Damstra

Citizen Involvement Coordinator

& Volunteer Coordinator

### Contact BRWA!

715-682-2003 - phone  
badriverwatershed.org

*Address Service Requested*



## Spring 2011 Watershed Waves

Get your Watershed Waves via email

If you would prefer to get this newsletter in electronic format, please send a message with that request to: [brwa\\_wi.yahoo.com](mailto:brwa_wi.yahoo.com)



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## JOIN US FOR A POTLUCK MEETING!

- **MARCH 10: MRWP Project Community Meeting & Potluck**

Join BRWA for the spring meeting of the Marengo River Watershed Partnership (MRWP) Project from 5:30-7:30 p.m. at the Marengo Valley Elementary School, located at 62408 State Hwy 112, Ashland, WI.

This meeting will feature a panel of town representatives that will be discussing how their towns are already working to implement the Watershed Action Plan through their comprehensive plan activities. There will also be a community discussion about current projects that will be going on in the Marengo River Watershed as well as future project ideas.

The potluck will begin at 5:30 pm and the community meeting will begin at 6 pm. Please bring a dish to pass. If you have any questions or would like to RSVP, please call Valerie at 682-2669.

## ...AND MORE EVENTS!

- **MARCH 16:** Friends of the White River Annual Meeting, NGLVC, 6pm
- **MARCH 17:** BRWA Board Meeting, Location and Time TBD
- **MARCH 26:** "Spring for the Water", NGLVC, 5pm
- **APRIL 9:** Wild Rivers Chapter of Trout Unlimited Expo, NGLVC, 12pm
- **MAY 19:** BRWA Board Meeting, Location and Time TBD