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Number 60



# THE RIVERWATCH

THE QUARTERLY NEWSLETTER OF  
THE ANGLERS OF THE AU SABLE



**SPECIAL REPORT ON OIL & GAS** ♻️



### THE RIVERWATCH

The RIVERWATCH is a quarterly publication of The Anglers of the Au Sable, a non-profit corporation dedicated to the protection of the Au Sable River, its watershed and surrounding environs. Dues are \$25 per year. For membership please contact:

**The Anglers of the Au Sable**

P.O. Box 200

Grayling, MI 49738

[www.AuSableAnglers.org](http://www.AuSableAnglers.org)



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## VISIT WEBSITE FOR UPDATES ON KOLKE CREEK AND THE SUPREME COURT

As RIVERWATCH 60 goes to press the outcome of the re-hearing for the Kolke Creek Case is unknown. Please go to [www.ausableanglers.org](http://www.ausableanglers.org) for updates on Attorney General Bill Schuette's attempt to overturn the Court's recent rulings.

Also, let AG Schuette and Governor Rick Snyder know what you think about this action.

**Governor Rick Snyder**

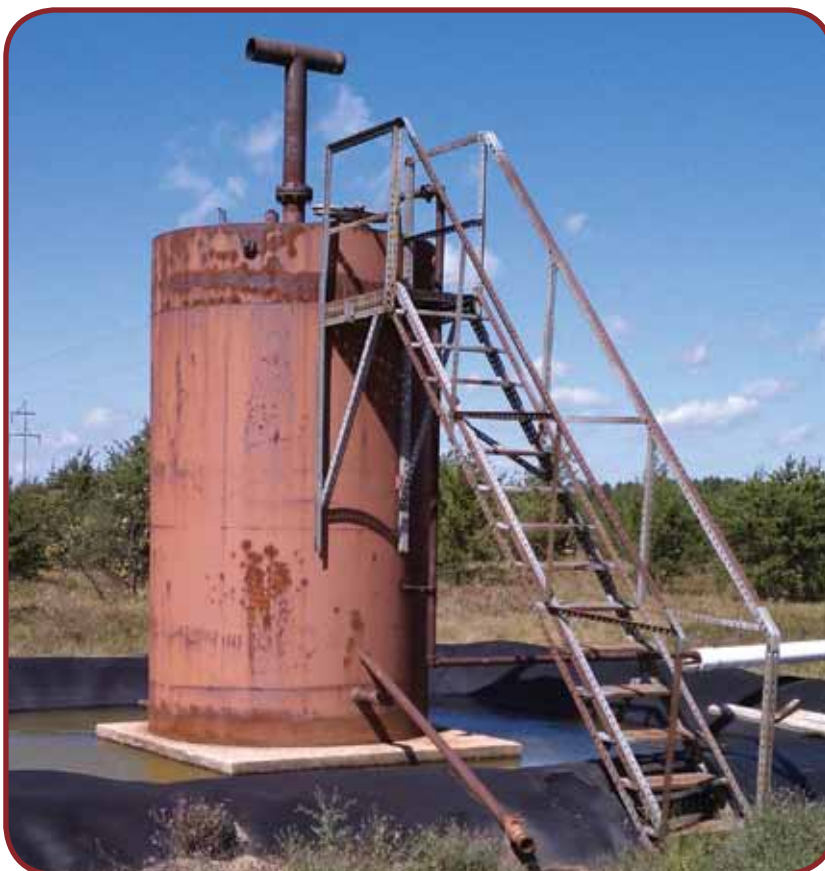
(517-373-3400)

[Rick.Snyder@michigan.gov](mailto:Rick.Snyder@michigan.gov)

**Attorney General Bill Schuette**

(517-373-1110)

[miag@michigan.gov](mailto:miag@michigan.gov)





FROM THE EDITOR

# OIL & GAS 2.0

In the last decade Anglers of the Au Sable has become immersed in the issue of oil and gas use in Michigan. Through two court cases we have become aware of the impact on the resource by these activities. Many of us thought that we had seen it all, but there was even more to the story. Now, as we enter the second decade of the 21st century, new threats to our forests and streams have come to our attention.

Back in the summer of 2003 it seemed so very simple; stop the exploratory well near the Mason Chapel. On its face the idea of allowing a wellhead and central processing facility so near an area both environmentally sensitive and popular with outdoor recreationists seemed preposterous. Yet, we watched the U.S. Forest Service twist the National Environmental Protection Act (NEPA) into a pretzel trying to allow and defend Savoy's right to drill.

Those were dark days. It was unclear whether the courts would see the breaches of statute as clearly as we did.

In the end the courts sided with us. It was a satisfying victory, but tempered by Savoy's continued intent to drill. An Environmental Impact Statement (EIS) – something we wanted from the start – will guide any activities this time around. There are plenty of rea-

sons to be optimistic.

On the heels of the Savoy case came Kolke Creek. The issues of how to properly remediate the Hayes 22 central processing facility had statewide ramifications. The case of Merit Energy's violations of the Michigan Environmental Protection Act (MEPA) ultimately led to the State Supreme Court.

Everyone who cherished clean coldwater won a victory last December when the Court sided with Anglers in that case, and reversed two key previous rulings regarding citizens rights to challenge MDEQ permits for water use. These gains in protection of our water resource from improper use by the oil and gas industry as well as other entities may be short-lived. If the newly reconstituted State Supreme Court, now conservative in tone, has its say then we are living in a Prague Spring.

And now comes RIVERWATCH 60 – A Special Report on Oil & Gas. Investigative reporter, Jeff Alexander, well experienced with Michigan and the region's environmental woes, has uncovered and brought into focus threats both old and new.

While we labored on the Savoy and Merit Energy cases, few of us paid attention to the network of pipelines spread across Northern Michigan like a spider web.

The oil spill on the Kalamazoo River is instructive as to what we can expect on the Au Sable if Line 5, crossing about a mile above Parmalee Bridge, ever springs a leak.

A year ago how many knew what fracking was other than it sounded indecent? With the recent unprecedented sale of leases for natural gas exploration by the State, coupled with rumblings in the Middle East, this "revolutionary" method for gas extraction may become as common as a nut-hatch in our forests. Its impact on our supply and quality of groundwater is open to much debate.

Mr. Alexander, with the help of Board Member, John Bebow, himself an investigative reporter, thoroughly examined these and other issues salient to our conservation goals as we move forward. They conclude with a set of recommendations that we will study closely while planning a response.

Those who love our clean and pristine rivers and streams should read this report carefully, and then share it with a friend or family member. We need to educate ourselves in order to best respond to whatever may come next. There will be strength in numbers.

Welcome to Oil & Gas 2.0. It's time to upgrade our resolve as well to protect the Pure Michigan we love so dearly.

- THOMAS BUHR, RIVERWATCH EDITOR

## BIOS

**Jeff Alexander** is an award winning author and a former environmental journalist. He covered Great Lakes issues for 20 years for several Michigan newspapers, most recently for *The Muskegon Chronicle*. He is now self-employed and writes for several nonprofit organizations, including the National Wildlife Federation. He is the author of two books: “*The Muskegon: The Majesty and Tragedy of Michigan’s Rarest River*” and “*Pandora’s Locks: The Opening of the Great Lakes-St. Lawrence Seaway*.” He resides in Grand Haven.

**John Bebow** is 2nd VP of Anglers of the Au Sable. In his day job, he’s executive director of the Center for Michigan, a nonpartisan “think and do tank” focused on public policy, public engagement and in-depth journalism. He previously served as an investigative reporter at the *Chicago Tribune*, *Detroit News & Free Press*, *Ann Arbor News*, and *Traverse City Record-Eagle* and as a founding editor at *Mlive.com*. He was embedded with the U.S. Marines in Iraq in 2003 on behalf of the *Detroit News/Gannett Newspapers*. He is a frequent contributor to public radio and television and appears as a public speaker before a wide range of professional/trade associations. He holds a MBA with distinction from University of Michigan and lives in Milan with his wife, Monica, and 6-year-old daughter, Delaney.

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# ANGLERS' VIGILANCE A MUST FOR RIVERS TO THRIVE WHILE OIL & GAS INDUSTRY AGES AND GROWS IN NORTHERN MICHIGAN

For many, the mere mention of the Au Sable River conjures images of a sublime stream, its waters sparsely occupied by fly anglers casting toward wily trout.

The Au Sable River watershed, a 1,932-square mile drainage basin that supports one of America's premier trout streams and a robust recreational economy, is not widely known as one of Michigan's major oil and natural gas producing regions.

Indeed, it is.

The Au Sable River watershed sits atop some of Michigan's most productive oil and natural gas reserves. The lucrative geologic formations beneath the watershed — particularly beneath the counties of Otsego, Crawford and Roscommon counties — have spurred intense drilling activity over the past 75 years.

More than 4,000 oil and gas wells have been drilled in the watershed since the 1930s. Today, there are 2,828 active oil and gas wells in the watershed, according to data provided by the Michigan



*The Au Sable River, east of Grayling. Photo by Jeff Alexander*

Department of Natural Resources and Environment. (<http://bit.ly/heoIOc>)

The largest oil pipeline in the Midwest also bisects the heart of the Au Sable watershed. The 645-mile long Enbridge Energy pipeline extends from Superior, Wis., to Sarnia, Ontario and carries up to 22 million gallons of crude oil and natural gas liquids beneath the Au Sable River on a daily basis. It's a 58-year-old pipeline owned by the same company that is under intense scrutiny for a July 2010 pipeline break that spewed 843,000 gallons of crude oil into the Kalamazoo River near Marshall, Michigan. As this report will detail, Enbridge has responded positively to concerns raised by Anglers of the Au Sable — the pipeline company has taken numerous steps in recent months

to further safeguard the Au Sable from a pipeline mishap.

The upper half of the Au Sable River watershed also may become a focal point for the drilling of deep shale wells using a controversial technique known as hydraulic fracturing, or fracking.

State data indicate that the three counties in the upper watershed — Otsego, Crawford and Roscommon — sit atop some of the thickest deposits of Collingwood shale gas in northern Michigan. (*Unconventional Shale Gas Development in Michigan,* by Mel Kiogima, MDNR, June 2010, <http://bit.ly/gURoeK>)

Hydraulic fracturing uses millions of gallons of water mixed with sand and thousands of gallons of toxic chemicals to fracture deep shale reserves, a technology that allows more natural gas to seep out of the rock. The practice has caused numerous environmental problems in the 31 states where hydraulic fracturing of deep shale wells has occurred. (*Broad Scope of EPA's Fracturing Study Rises Ire of Gas In-*

## INTRODUCTION

*dustry,” ProPublica, April 2010, <http://bit.ly/bHdOZH>)*

Any deep shale wells drilled in the Au Sable watershed would extract millions of gallons of groundwater from the basin, which could take from the river essential resources. And spills of fracking fluids, which have been common in other states, could pose serious threats to the river and its tributaries.

This report, commissioned by Anglers of the Au Sable, explores the many oil and gas development issues in northern Michigan and how that industry may impact the world-class trout rivers the organization has worked for 25 years to protect.

This report concludes with 14 recommendations of how Anglers of the Au Sable can assure the rivers continue to thrive as the oil and gas industry both ages and grows in northern Michigan.

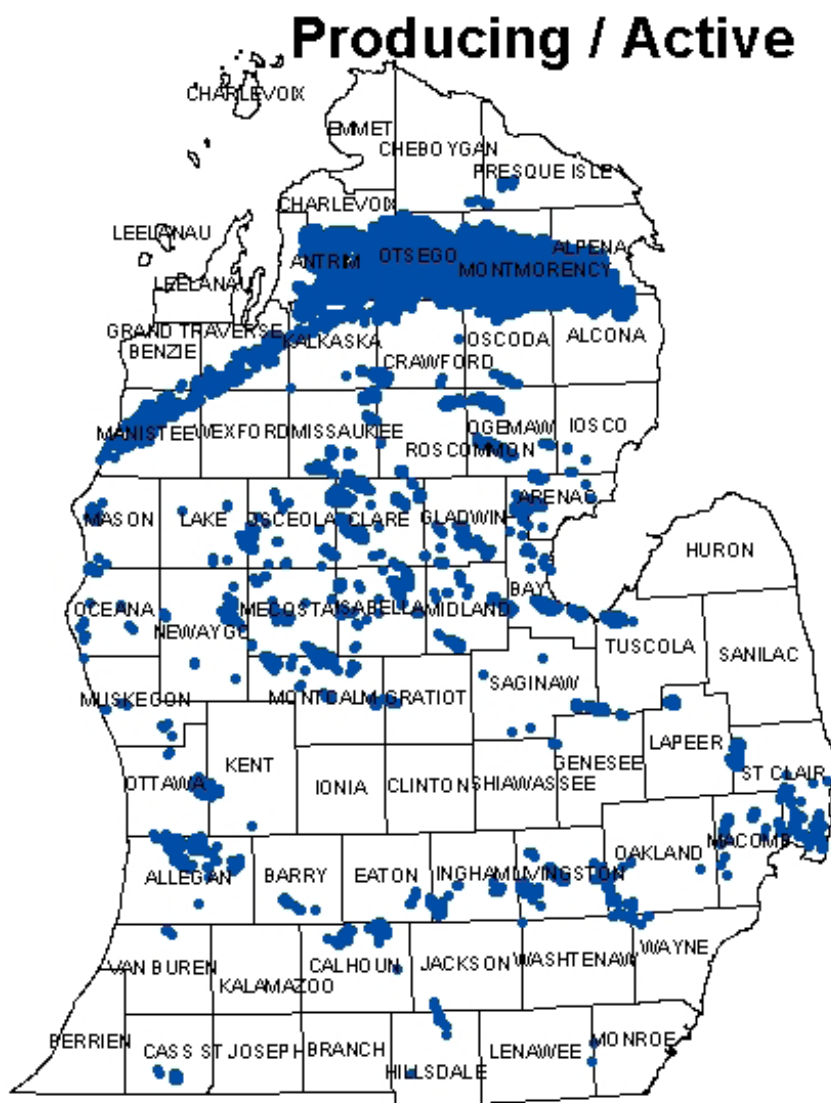
The recommendations outline how Anglers can intensify its watchdog role while also communicating more closely with regulators and industry representatives — because it is in all parties’

While this report is at times blunt, it is NOT designed as an anti-oil industry manifesto. It is an attempt to quantify the oil and gas infrastructure in the Au Sable River watershed, document what impact oil and gas exploration has had on the region, and evaluate how new types of exploration could affect the river system.

Michigan's oil and gas industry is an integral part of the state economy, employing 10,000 workers statewide and generating \$2 billion in annual revenue, according to the Michigan Oil and Gas Association.

Since 1925, when the state's first commercial oil field was developed in Saginaw, Michigan has produced more

than a billion barrels of crude oil and more than four trillion cubic feet of natural gas. Michigan state ranks 17th among 33 oil and gas producing states, accord-



*This state of Michigan graphic shows the location of the state's 14,000 active oil and gas wells.*



## INTRODUCTION

ing to the Michigan Oil and Gas Association. (***"The Facts About Michigan's Oil and Gas Industry, Michigan Oil and Gas Association, <http://www.michigan-oilandgasassociation.org/Info/MOGA.pdf>***)

The oil and natural gas produced by the 14,000 active wells in Michigan fuels our vehicles, heats our homes and helps keep the state economy humming.

The oil and gas industry also has left its mark on Michigan's environment, in more ways than one.

Fees imposed on oil and gas wells have provided more than \$550 million for the Michigan Natural Resources Trust Fund. That money has allowed the state to acquire or improve more than 135,000 acres of parks and other public lands; it has also funded numerous recreation and tourism-related projects, according to MOGA.

The downside: Some of the

50,000 oil and gas wells drilled in the state over the past 85 years have left a trail of pollution that has contaminated soils, groundwater or surface waters at hundreds of sites in Michigan.

environmental regulations at oil and gas wells and processing facilities.

The DNRE's Office of Geological Survey, which regulates oil and gas exploration in Michigan,

gets 77 percent of its funding from fees the oil industry pays the state. DNRE officials insisted that the oil and gas industry faces the same scrutiny as other businesses that handle toxic materials, but critics disagree.

There is also concern about the diligence of federal agencies charged with ensuring that

oil and natural gas pipelines operate safely.

The July 2010 pipeline break that spilled oil into the Kalamazoo River generated skepticism and concern about the federal government's oversight of oil and gas pipelines that transport millions of gallons of hazardous materials across Michigan every day.

Determining the condition of oil and gas pipelines is difficult because large sections of some



*This oil well in Otsego County is one of the 309 active oil wells in the Au Sable River watershed. Photo by Jeff Alexander*

Oil and gas wells in the Au Sable watershed have racked up more than 1,500 violations of environmental laws over the past two decades and contaminated soil and/or groundwater at dozens of sites, according to state records.

State officials said the vast majority of oil and gas wells in the watershed operate without harming the environment. But critics question how vigorously the Michigan DNRE enforces en-

pipelines are never inspected and government agencies are reluctant to share many pipeline inspection and safety records with the public.

It is against this backdrop of lingering concerns about oil and gas exploration that a new wave of drilling is poised to stir new controversy across northern Michigan.

Canadian-based energy giant Encana Corp. set off a frenzy of activity in 2010 when it revealed it had successfully produced natural gas from the Collingwood formation, a layer of gas-rich shale found 10,000 feet underground. Encana's successful well in Missaukee County marked the first time a company had extracted

natural gas from Michigan's portion of the Collingwood formation.

Only a few Michigan wells had been drilled into the Collingwood shale by the end of 2010 and none were located in the Au Sable River watershed.

But with significant Collingwood shale deposits beneath much of northern Michigan, it seems likely that oil and gas companies will eventually drill hydraulically fractured wells in the upper half of the Au Sable River watershed.

Because hydraulic fracturing is exempt from most state and federal water protection laws, there is

reason to be concerned about any Collingwood shale wells drilled in the Au Sable River watershed.

Oil and gas exploration has long played an important role in northern Michigan's economy and will continue to provide revenue and jobs for the foreseeable future.

But with thousands of aging oil and gas wells and a major, 58-year-old oil pipeline in the Au Sable River watershed — coupled with the possibility of new wells being drilled in deeper, harder to reach natural gas reserves — there is reason for concern that society's insatiable need for oil and natural gas could endanger Michigan's great trout streams.

## MIDWEST'S LARGEST OIL PIPELINE CROSSES UNDER ONE OF NATION'S PREMIER TROUT STREAMS

Near Luzerne, a small post along Highway M-72 marks the location of an underground pipeline that carries millions of gallons of crude oil beneath the Au Sable River watershed every day.

The round white post with the orange cap marks the location of a 30-inch diameter pipe that is part of the world's largest petroleum pipeline. Owned by Canada-based Enbridge Energy, the underground pipeline carries an average of 19 million gallons of crude oil and natural gas fluids daily across northern Michigan.

Known as Line 5, the 645-

mile long buried pipeline that bisects the Au Sable River watershed crosses beneath the river and its tributaries numerous times. Those crossings include the Main Branch near Luzerne as well as both Big Creek systems (near Lovells and Luzerne), which flow into both the North Branch and the Main Branch of the river.

A rupture in this pipeline could be devastating for trout and other aquatic life in the Au Sable River and its tributaries. According to federal government documents obtained by Anglers of the Au Sable, a worst-case scenario could

result in a spill of 1.5 million gallons of light crude into the Au Sable River in eight minutes.

To avert such disaster, the Anglers of the Au Sable and Enbridge have engaged in open and constructive dialogue since fall 2010. The Anglers view this growing relationship as a clear model for cooperation between the oil and gas industry and the conservation community in northern Michigan. There is no guarantee against environmental mishap, but Enbridge has been very responsive to Anglers' concerns, as explained below.



## KALAMAZOO RIVER SPILL ALERTS ANGLERS TO PIPELINE THREATS

Line 5 has existed in the Au Sable corridor for 57 years, but it drew little attention before July 2010, when another Enbridge pipeline, known as Line 6B, ruptured near Marshall, Michigan and spilled 843,000 gallons of crude oil into the Kalamazoo River. That spill polluted a 35-mile stretch of the river and Tallmadge Creek. It killed fish, coated more than 2,400 animals with oil, dislocated people who lived near the river and resulted in a cleanup bill which could total \$550 million.

The Kalamazoo River spill alerted the Anglers of the Au Sable to both Line 5 and a second oil pipeline, owned by Markwest Energy, which flows under the Upper Manistee River in Deward.

Although it is impossible to predict how many trout or other aquatic species might be killed or injured in a hypothetical oil spill on a northern Michigan trout stream, the Kalamazoo River oil spill in July 2010 and studies of other spills provide some insight. The possible worst-case impacts include:

- **Short-term effects:** The combination of oil in the river and bacteria consuming the oil would cause dissolved oxygen levels in the river to plummet, threatening fish and other aquatic life. Trout could avoid a massive die-off by swimming to areas not affected by the spill. But many fish would eventually be exposed to oil and its toxic compounds as the pollution spread throughout the river. The fish would consume traces of oil and toxins through their gills and by eating contaminated insects.
- **Fish health effects:** Oil can affect the spawning success of trout because the eggs of trout and other salmonids are “highly sensitive to oil toxins,” according to the U.S. Fish and Wildlife Service. A study of how an oil spill affected a trout stream in northern California concluded that lingering traces of oil in river bottom sediments could impair fish reproduction, damage immune systems, cause liver lesions and cataracts and make fish more susceptible to disease.
- **Long-term effects:** Recent research has found that



A sign along M-72, about two miles west of Luzerne, marks the spot of Enbridge Energy's buried oil pipeline, which bisects the Au Sable River watershed. Photo by John Bebow.

## OIL PIPELINE

tiny amounts of oil kills fish eggs and that oil toxins lingering in sediment and vegetation can harm aquatic ecosystems for decades after a spill occurs. (*“Exxon Valdez Oil Spill Impacts Lasting Far Longer Than Expected, Scientists Say,” Science News, Dec. 2003*)

- **Economic impact:** An oil spill would prompt state officials to ban fishing and boating on the affected portion of the river. Fishing and boating was banned on a 35-mile stretch of the Kalamazoo River downstream after the July 2010 Enbridge oil spill. That ban was to remain in effect until further notice. Such a

ban on the Au Sable or Manistee rivers in the wake of an oil spill could severely hurt the region’s economy and cause untold damage to the river’s reputation as one of America’s premier trout streams.

Biologists with the Michigan Department of Natural Resources and Environment have said it could be years before the full extent of ecological damage from the Kalamazoo River oil spill is known. Those same officials said it could take several years for the river’s ecosystem to fully recover.

A break in Line 5 anywhere in the Au Sable River watershed could dwarf the effects of the Ka-

lamazoo River oil spill. Here’s why:

- Line 5 carries nearly twice as much oil as the pipeline that ruptured near Marshall and polluted the Kalamazoo.
- The Au Sable is a cold water system, which is more ecologically fragile than a warm water system like the Kalamazoo River.
- Because the Au Sable has a lower flow rate than the Kalamazoo, it could take longer to flush oil out of its system.
- The Au Sable’s famed trout fishery and recreational economy are far more valuable than those associated with the Kalamazoo River.

## HOW OIL PIPELINES WORK IN OUR RIVER VALLEYS

Line 5 carries crude oil and natural gas fluids from Superior, Wis., to Sarnia, Ontario. It is the aorta of Enbridge’s Lakehead System, a 1900-mile long pipeline network that extends from North Dakota to Sarnia, Ontario.

Line 5 was installed in 1953. The walls of the pipe are one-half-inch thick and it is buried 12 feet below the riverbed where it crosses the main river channel of the Au Sable. Where it crosses tributaries, the pipe is approximately one-quarter-inch thick and buried approximately four feet below the streambed.

The other pipeline of concern, owned by Denver-based Mark-

west Energy, extends from Manistee County to the Enbridge pipeline in Lewiston. Built in 1973, the Markwest pipeline is comprised of a 100-mile long, 16-inch diameter pipeline and another 150 miles of smaller connecting pipes that gather oil from more than 1,000 wells in Manistee, Crawford and Otsego counties and transport it to the Enbridge pipeline. (*Markwest Web site, <http://bit.ly/gRN-bRj>*)

The Markwest

pipeline has the capacity to carry 2.5 million gallons of oil daily. From 2005 through 2009, the pipeline carried an average of



*A sign marks the location of the Markwest Energy oil pipeline that crosses the upper reaches of the Au Sable and Manistee rivers.*

*Photo by John Bebow*



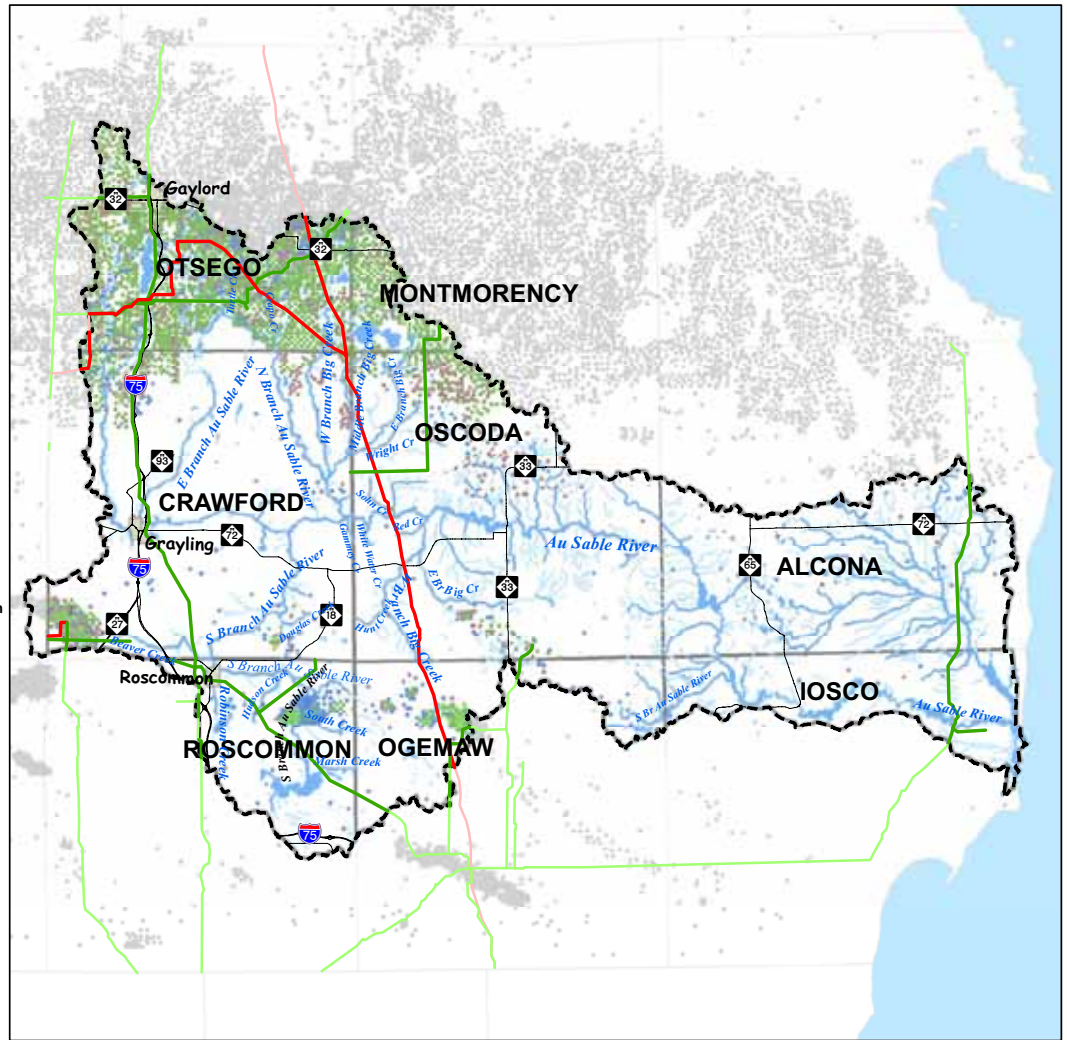
# OIL & GAS WELLS & PIPELINES *in the* AuSable River Watershed

- Pipelines**
- Gas Transmission
  - Hazardous Liquid
  - - - AuSable Watershed Boundary
  - Roads
- Oil & Gas Well Status**
- Active 245
  - Producing 2,830
  - Drilling Complete 9
  - Well Complete 13
  - Plugging Approved 912 -site restored
  - Plugging Completed 28 -needs restoration
  - Shut In 25
  - Plugged Back 6
  - Temporarily Abandoned 81
  - Suspended 4
  - Terminated Permit 1178
  - Permitted Well - not yet drilled 80
  - Wells outside watershed
- rivers
- Lakes
- County Boundaries



0 5 10 Miles

September 2010



*This map, based on data provided by state and federal agencies, shows the location of all oil and gas wells and oil and gas pipelines in the Au Sable River watershed. There are 84 miles of oil pipelines and 289 miles of natural gas pipelines in the Au Sable River watershed. There are 2,828 active oil and gas wells in the watershed, according to state data. Oil pipelines are shown in red; natural gas pipelines are shown in green. The green dots are oil and natural gas wells.*

573,000 gallons of crude oil daily from wells in northern Michigan to the Enbridge pipeline, according to company records. (*“Midwest Energy Partners LP Form 10-K submitted to the Securities and Exchange Commission in March 2010, [www.markwest.com](http://www.markwest.com)*)

Nationally, there are 2.3 million miles of oil and gas pipelines. Michigan ranks sixth nationally

in pipeline mileage, with 2,810 miles of oil/hazardous liquids pipeline and 65,192 miles of natural gas pipelines and distribution lines.

There are 84 miles of oil pipelines and 289 miles of natural gas pipelines in the Au Sable River watershed. (*PHMSA database, accessible at <http://bit.ly/hXQVrZ>*)

Enbridge’s Lakehead System is part of one of the world’s

longest petroleum pipelines, one that transports oil from western Canada to the upper Midwest and Montreal, — crossing the states of Minnesota, Wisconsin, Michigan and the province of Ontario along the way.

Pumping millions of gallons of oil across thousands of miles of land and many lakes and rivers on a daily basis keeps the region’s economy running smoothly. It



## OIL PIPELINE

is also inherently complex and sometimes dangerous.

Pipeline safety records obtained by Anglers of the Au Sable

through the federal Freedom of Information Act paint a sobering picture of what could happen if Line 5 ruptured in northern Michigan.

Enbridge officials would need approximately eight minutes to isolate a rupture in Line 5 and halt the flow of oil in the pipeline, according to federal records ob-



*This Enbridge Energy map shows the location of pipelines in the company's Lakehead System, which comprises one of the world's longest oil pipelines. The Line 5 pipeline that crosses beneath the Au Sable River carries up to 22 million gallons of crude oil daily from Superior, Wis., to Sarnia.*

tained by Anglers of the Au Sable. In that short span of time, the company estimates a “worst-case discharge” of 1.5 million gallons of oil into the environment. (*Maintenance Procedures, Emergency Response Book 7,” Enbridge Energy, January 2010*)

That’s nearly twice the volume of oil that spilled into the Kalamazoo River when Line 6B ruptured.

Fortunately, there haven’t been any major oil spills from Line 5 since it was installed in the 1950s, according to government documents.

A 2002 inspection of Line 5 by Enbridge officials indicated



the pipeline was in good condition, according to federal records. Enbridge also conducted a full inspection of Line 5 in 2006. The federal agency that regulates interstate petroleum pipelines — the U.S. Department of Transportation’s Petroleum and Hazardous Materials Safety Administration — has so far refused to provide

results of the 2006 inspection because of the investigation of the Kalamazoo River oil spill.

Enbridge has not provided detailed pipeline inspection records to Anglers of the Au Sable. But company officials have told Anglers that another detailed inspection of Line 5 in 2010 uncovered no significant

problems in the Au Sable region. Additional detailed inspections at finding cracks or dents in Line 5 are planned for 2011 and 2012 in the Au Sable region, according to company officials. The company conducts aerial surveillance on Line 5 in northern Michigan 26 times a year.

## ENBRIDGE ISSUES ELSEWHERE RAISED CONCERNS

The Kalamazoo River spill and other regulatory issues elsewhere in Enbridge’s vast pipeline system are what spurred Anglers of the Au Sable to inquire about the safety of Line 5 and seek on-going dialogue with the company.

The federal government documented 83 incidents on the Lakehead system since 2001. Those incidents ranged from significant oil spills to safety problems that increased the risk of additional spills, according to a report by the

U.S. House of Representative’s Committee on Transportation and Infrastructure. (*Hearing on “Enbridge Marshall, Michigan” September 2010, <http://bit.ly/fWFEDG>*)

Since 2001 there have been 31 oil spills from pipelines in Enbridge’s Lakehead System, according to federal records. Collectively, those spills released 1.9 million gallons of oil into environment and caused \$22 million in property damage. Problems in

the Lakehead System prompted PHMSA to take 28 enforcement actions against Enbridge (including warning letters and notices) since 2001, according to federal records. (*Hearing on “Enbridge Pipeline Oil Spill in Marshall, Michigan” September 2010, <http://bit.ly/fWFEDG>*)

- July 4, 2002: A pipeline in Itasca County, Minnesota spilled 252,000 gallons of crude oil, causing \$5.6 million of property damage.

## OIL PIPELINE

- Feb. 27, 2003: A pipeline in Monroe County, Mi., near Toledo, spilled 5,460 gallons of crude oil, causing \$255,000 of property damage.
- Oct. 13, 2003: A pipeline in Bay County, Mi., spilled 21,000 gallons of crude oil, causing \$120,000 of property damage.
- Jan. 18, 2005: A pipeline in Bay County, Mi., spilled 4,200 gallons of crude oil, causing \$45,750 of property damage.
- Feb. 2, 2007: A pipeline leak in Exeland, Wis., spilled 201,600 gallons of crude oil, causing \$4.5 million of damage.
- November 2007: Oil and gas from a ruptured pipeline near Clearbrook, Minn., ignited. Two workers died. The federal government fined Enbridge \$2.4 million.
- July 25-26, 2010: A ruptured pipeline near Marshall dumped 843,000 gallons of crude oil into Tallmadge Creek and the Kalamazoo River. Enbridge officials said the cleanup could cost \$550 million.
- Sept. 9, 2010: A broken pipeline near Chicago spilled 250,000 gallons of oil, causing an unknown amount of property damage.

## DETAILS OF THE KALAMAZOO RIVER INVESTIGATION

According to Congressional records, before the Kalamazoo River spill, Enbridge responded to known instances of corrosion or other defects in Line 6B by repairing some of the problems and otherwise reducing pressure in Line 6B to reduce stress on the pipe. Federal law allows companies to operate damaged pipelines at reduced pressure for one year before known defects must be repaired. (*Hearing on “Enbridge Pipeline Oil Spill in Marshall, Michigan” September, 2010, <http://bit.ly/fWFEDG>*)

Government records showed that Enbridge officials working at the company’s control center in Edmonton, Alberta, received an alarm about an abrupt pressure drop in Line 6B at Marshall at 5:58 p.m. on July 25, 2010.

Enbridge officials restarted the pipeline at 4:04 a.m. the next morning, July 26, but a series of pressure loss alarms over the next

three hours prompted the company to shut down the pipeline again at 7:46 a.m.

Enbridge employees began looking for leaks near the Marshall pumping station two hours later. But it was an employee of Consumers Energy, sent out to look for the source of petroleum odors in the Marshall area, who discovered the large oil spill into Tallmadge Creek, according to federal records.

The oil slick was discovered 17 hours after Enbridge received the first alarm of a pressure drop in Line 6B. More than 800,000 gallons of crude oil had spilled from the broken pipeline into Tallmadge Creek and the Kalamazoo River.

Testifying in September 2010 at a Congressional hearing, Enbridge President and CEO Patrick Daniel apologized for the Kalamazoo River spill. (*Enbridge CEO*

*Patrick Daniel apologetic but offers few details on oil spill at congressional hearing,” Kalamazoo Gazette, Sept. 15, 2010)*

Daniel told members of Congress that he could not provide specific information about why it took Enbridge so long to respond to the Kalamazoo River oil spill because federal agencies were investigating the incident. He said the company was in compliance with federal regulations regarding pipeline maintenance at the time of the spill.

“For Enbridge, no spill is acceptable,” Daniel told the Congressional committee.

Enbridge officials have said that the age of its pipelines is not an issue. They contend the pipelines can last indefinitely if properly maintained.

In the wake of the Kalamazoo River oil spill, Daniel said that some spills were inevitable when



pip ing large quantities of oil long distances.

“The value and importance of energy to society is so critical,”

Daniel told the Kalamazoo Gazette. “We all wish that we didn’t have to have pipelines. And we all wish that we didn’t have to experience accidents. We must remain

vigilant.” *(Enbridge CEO says spills are an inherent risk of oil pipelines,” Aug. 14, 2010, Kalamazoo Gazette)*

## ENBRIDGE RESPONDS TO ANGLERS’ CONCERNS

Anglers of the Au Sable board members contacted Enbridge in early fall 2010 and asked for a sit-down meeting to discuss Line 5 and to seek assurance that the Kalamazoo River mishap would not be repeated in northern Michigan.

Enbridge’s response to our request was swift and thorough.

Enbridge CEO Pat Daniel and numerous other safety and engineering experts for the company traveled to Gates Lodge in October 2010 at Anglers’ request. The Enbridge officials were able to see, first-hand, the economic and environmental value of northern Michigan trout streams. The meeting resulted in very important dialogue and a wide range of crucial follow up steps, including:

**1) MOCK DISASTER EXERCISES:** In late-January, 2011, more than 30 employees of Enbridge, the Michigan Department of Natural Resources and Environment, Oscoda County Emergency Management, and the Luzerne Fire Department met at Enbridge’s Bay City regional office for a “table top” disaster exercise. Three Anglers board members also participated. The exercise al-

lowed many of Enbridge’s front-line staffers in Michigan to appreciate the environmental sensitivity of the Au Sable corridor. More importantly, it allowed Enbridge and local emergency officials to tighten their disaster management plans, agree on precise locations for the launch of containment booms in the event of a major spill, and develop a number of time-saving procedures to heighten response to any incident. All involved in the January exercise agreed to participate in a “live exercise” in summer 2011 to put the disaster training to a test. Anglers board members also are working with Enbridge to better understand locations where Line 5 crosses tributaries.

**2) MAJOR PIPELINE IMPROVEMENTS:** Enbridge officials confirmed in January that the company plans this year to install a major remote-controlled valve on Line 5 on the south side of the Au Sable River crossing near Luzerne. A similar valve already exists on the north side of the river. The north side valve is designed to stop the pressur-

ized flow of millions of gallons of southbound oil in the event of a pipeline rupture. Likewise, the south side valve would prevent large amounts of back-flow of oil from going into the river. The new remote-controlled valve on the south side of the river would replace a hand-crank valve that requires a considerable amount of time to close. This voluntary valve upgrade will cost Enbridge hundreds of thousands of dollars.

**3) DETAILED CONTACT INFORMATION:** The first line of response in the event of a Line 5 mishap near the Au Sable River includes:

- o Luzerne Fire Department Chief Kelley Smith, 989-826-8304
- o Oscoda County Emergency Management Coordinator Elizabeth Galer, 989-826-1191.
- o Enbridge Pipeline Supervisor Mick Collier, 989-385-4654 (cell)
- o Enbridge Regional Manager Brian Buck, 989-684-0160, extension 30 (office); 989-385-4652 (cell)

As Enbridge CEO Pat Daniel readily admits, no matter how unlikely a worst-case spill may be, there is no way to absolutely guarantee such a nightmare won't happen. Obviously, a major rup-

ture of Line 5 at or near the Au Sable is in no one's interest. Enbridge answered our call. The company's follow-up steps, mock exercises, voluntary investment in pipeline safety upgrades and

ongoing dialogue provides considerable evidence that the company intends to serve as a positive steward in the Au Sable region.

## MICHIGAN SPILL HISTORY & WHO'S IN CHARGE?

There have been 64 significant spills from oil and natural gas pipelines in Michigan since 2001, not including the 2010 Kalamazoo River oil spill, according to PHMSA records. Those incidents caused \$23.5 million in property damage.

There has only been one significant spill from oil or gas pipelines or associated equipment in the Au Sable River watershed since 2001, according to federal data.

A leak at a Markwest Energy oil tank near Lewiston in January 2004 spilled 19,992 gallons of oil into a containment area, causing \$173,890 of property damage. The spill was contained on site and never reached the ground, according to federal records.

Federal authorities did not cite Markwest for any violations following that incident.

The regulatory system that oversees oil, gasoline and natural gas pipelines in Michigan is a mix of state and federal agencies. Here's the breakdown:

- The Michigan DNRE regulates oil and gas wells, processing facilities and flow

lines that carry oil and gas to pipelines.

- The Pipeline and Hazardous Materials Safety Administration, a branch of the U.S. Department of Transportation, regulates all interstate oil and natural gas pipelines — those that flow across more than one state. The agency focuses its regulatory efforts on those portions of intrastate pipelines that lie within High Consequence Areas — environmentally sensitive or highly populated areas.
- PHMSA contracts with most states for oversight of intrastate natural gas pipelines. In Michigan, the state Public Service Commission oversees 65,192 miles of natural gas pipelines; the agency has six inspectors.
- Intrastate oil pipelines — those that flow within the boundaries of a single state — are largely unregulated by PHMSA. No state agency regulates intrastate oil pipelines in Michigan. PHMSA, for instance, only enforces safety standards on a small portion of Markwest Energy's 250

miles of crude oil pipeline that crosses parts of the Au Sable and Manistee River watersheds.

Federal law requires companies to inspect oil and natural gas pipelines every five years, but only those portions of pipeline located in High Consequence Areas, such as the section of Enbridge pipeline that crosses the Au Sable River. Enbridge inspects all of its pipelines every five years, but the majority of oil pipelines in the U.S. are not inspected every five years, according to industry observers.

PHMSA, the federal agency charged with monitoring oil and natural gas pipelines nationwide, has 110 inspectors to keep tabs on 2.3 million miles of pipelines. (*"Spills Raise Fears about inspection of pipelines," Sept. 26, 2010, Detroit Free Press and "State, feds don't inspect pipelines," Aug. 22, 2010, Kalamazoo Gazette*)

The paucity of pipeline inspectors and lack of regulatory oversight for intrastate oil pipelines could have implications for the Au Sable and Manistee rivers.

The reason: The federal government regulates just five miles

of Markwest Energy's 250 miles of crude oil pipelines that cross Manistee, Otsego and Crawford counties. That pipeline carries 570,000 gallons of oil per day on average, according to company records.

PHMSA only regulates the five miles of the Markwest pipe-

line that is located in a so-called High Consequence Area, said Bryan Louque, an accident investigator for PHMSA. The other 245 miles of pipeline are not subject to the government's toughest environmental standards.

Company and federal officials would not disclose which

five miles of the Markwest pipeline falls within the High Consequence Area. Federal officials said they do not release maps of High Consequence Areas because they fear terrorists could use that information to guide an attack on oil and natural gas pipelines.

## SAFETY OF NATURAL GAS PIPELINES SHROUDED IN BUREAUCRATIC SECRECY

One of the most common signs along rural Michigan roads is the flat, yellow post that marks the location of buried natural gas pipelines.

In some areas, the markers that resemble a stubby version of the gray steel posts that support stop signs are more common than road signs.

The pipeline markers are common because natural gas pipelines criss-cross much of the state, delivering energy that provides heat in the winter and electricity year-round.

There are 65,192 miles of natural gas pipelines in Michigan, a figure that includes transmission, distribution and collection lines. There are 289 miles of natural gas pipeline in the Au Sable River watershed; those pipelines cross the river and



*A sign in Otsego County warns of a buried natural gas pipeline.  
Photo by Jeff Alexander*

its tributaries at several locations.

The largest natural gas pipeline is an interstate pipeline that runs along I-75. Owned by Great Lakes Gas Transmission, it extends from Wisconsin to Detroit, crossing the Upper Peninsula and

much of the Lower Peninsula along the way.

There are several other natural gas pipelines that cross the Au Sable River or its tributaries. The pipelines span parts of every county in the watershed but most are located in the west and east ends of the watershed.

There are no natural gas pipelines in the heart of the watershed. In fact, much of the watershed is devoid of natural gas pipelines. (See map)

The absence of natural gas pipelines in the middle of the watershed provides a measure of safety that government regulations cannot.

Natural gas pipelines are essential elements of a modern society, but their presence provides potential for considerable and



costly mishaps.

The September 2010 natural gas pipeline explosion that killed six and incinerated a neighborhood in San Bruno, Calif., was a powerful reminder of what can happen when pipelines aren't properly maintained.

In northern Michigan, emergency management officials have told Anglers that one of their biggest pipeline concerns would be the ignition of a natural gas leak resulting in a major forest fire.

Nationally, natural gas pipeline accidents have killed 35 people and injured 182 others since 1990, according to government data (<http://bit.ly/egg-voi>). Those incidents caused \$1.1 billion of property damage.

In 2006, a contractor digging with a backhoe near Lansing ruptured a natural gas pipeline, igniting a fireball that killed one person and caused \$1.5 million in property damage.

There were 12 significant incidents involving natural gas pipelines in Michigan between 2000 and 2009, according to state data (accessible at <http://bit.ly/>

[hJVJ66](http://bit.ly/hJVJ66)) Those incidents caused one death, two injuries and \$9.3 million in property damage.

During that same period, there were 36 significant incidents involving natural gas distribution lines in Michigan — the smaller pipes that carry gas to homes and businesses. Those incidents killed 3 people, injured 22 and caused \$9.4 million in property damage, according to state records (accessible at <http://bit.ly/fIVn10>)

cording to state data. (<http://bit.ly/epwsKb>)

Corrosion, improper welds and careless excavation caused most of the significant incidents at natural gas pipelines in Michigan over the past decade, according to state records.

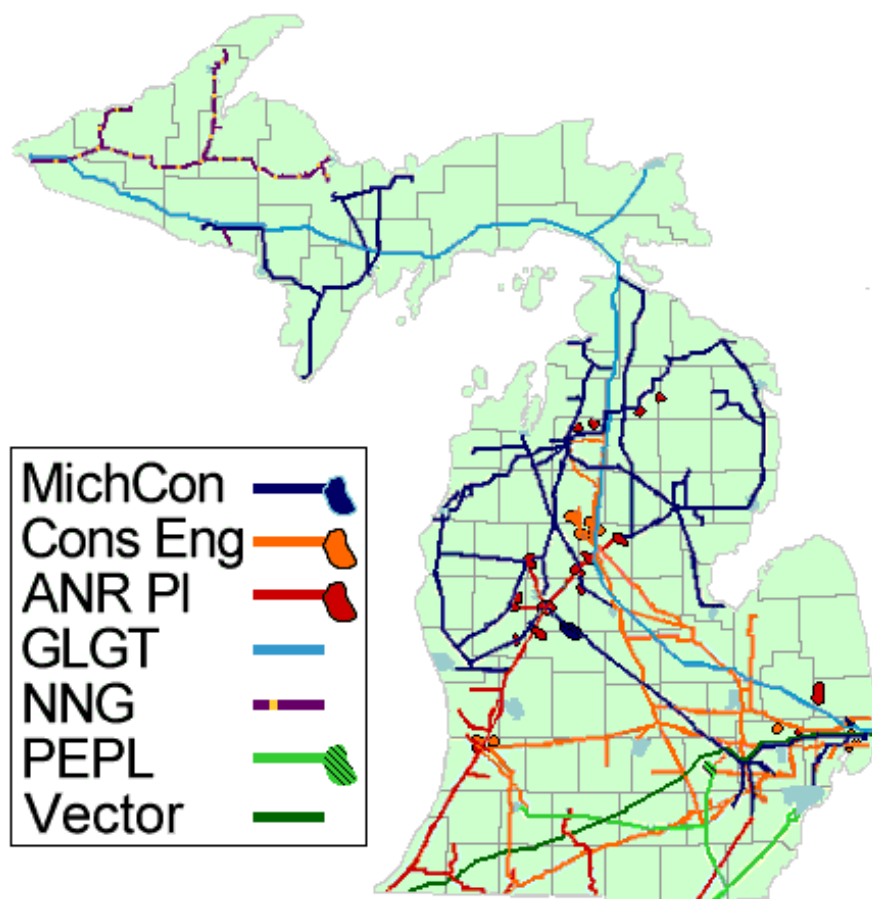
None of the significant incidents at natural gas pipelines occurred in the Au Sable River watershed; most occurred in the Detroit area, according to state records.

This Michigan Public Service Commission map shows the location of all natural gas pipelines in Michigan.

Although natural gas pipelines span three times more area than oil pipelines in the Au Sable River watershed, experts said oil pipelines present a far more serious environmental threat to the river.

If a natural gas pipeline exploded near the river or one of its tributaries, the shockwave could kill large numbers of fish.

A massive natural gas leak in the river system could cause oxygen depletion, as bacteria



Between 2001 and 2009, the Michigan Public Service Commission initiated 118 enforcement actions for probable safety violations at natural gas pipelines. The state assessed \$76,000 in fines for those violations, but has not levied a single fine since 2003, ac-

consumed methane and the other compounds in natural gas. The resulting decrease in dissolved oxygen could cause fish kills.

However, because natural gas is so volatile, it breaks down quickly in air or water, according to Thomas Rohrer, director of the Great Lakes Institute for Sustainable Systems at Central Michigan University. Rohrer was head of surface water quality enforcement for the Michigan Department of Environmental Quality in the 1990s.

The volume of natural gas entering an aquatic system would determine whether a spill caused widespread damage, Rohrer said.

In general, oil spills are considered a more serious environmental threat to rivers because oil does not quickly dissipate; natural gas does.

There have been few documented cases of natural gas leaks causing large fish kills or other widespread damage in aquatic ecosystems. Some of the most dramatic examples have been linked to the BP oil spill in the Gulf of Mexico in 2010 and methane releases from poorly designed drilling rigs that used hydraulic fracturing techniques to extract natural gas from deep shale re-

serves.

Determining the age, condition and compliance record of natural gas pipelines in the Au Sable River is a daunting task. State and federal agencies share oversight of natural gas pipelines and some of those agencies go to great lengths to prevent public access to inspection reports.

The federal government's Pipeline and Hazardous Materials Safety Administration (PHMSA) regulates interstate natural gas pipelines but contracts with many states to handle inspections and other regulatory duties for intrastate pipelines. In Michigan, the Public Service Commission regulates intrastate natural gas pipelines on behalf of the federal government.

PHMSA regulates the two interstate natural gas pipelines in the Au Sable River watershed, those owned by Great Lakes Gas Transmission and ANR Pipeline Co.

The Michigan PSC regulates the MichCon natural gas pipelines located in the watershed, according to John King, manager of gas operations for the Michigan Public Service Commission.

Most natural gas pipelines in the Au Sable River watershed were built prior to 1980; many were built in the 1960s, King said.

King, who has worked for the PSC since 1974, said he could not recall any major problems with natural gas pipelines in the watershed.

Some observers question whether Michigan has enough inspectors to effectively oversee natural gas pipelines. The state has just six inspectors to oversee thousands of miles of natural gas pipelines.

A Kalamazoo Gazette reporter asked King in August 2010 if all natural gas pipelines in the state were in compliance with safety standards. His response: "Sure." (*"State, feds don't inspect pipelines," Aug. 22, 2010, Kalamazoo Gazette*)

It was impossible to independently confirm King's claim without spending thousands of dollars for the right to review public documents.

The state files its pipeline inspection reports by inspector, not by pipeline, according



*Natural gas pipelines, like this one in Otsego County, crisscross northern Michigan. Photo by Jeff Alexander*

to King. The result: A byzantine record keeping system that makes it difficult and cost prohibitive for the public to easily assess the condition of any given pipeline.

Determining the condition or safety record of a single pipeline would require reviewing multiple reports from multiple inspectors, King said.

“We have tens of thousands of inspection records but they’re not easily accessible,” King said. “We’re trying to develop a better system of record keeping.”

In September 2010, Anglers of the Au Sable filed a Freedom of Information Act request with

the Public Service Commission to review state records that documented the age, condition and compliance history of natural gas pipelines located in the Au Sable River watershed.

The MPSC said it would cost \$13,777 to provide the requested documents. That fee included \$12,812 to copy 51,000 pages of documents, \$764 in labor costs and \$200 for mailing.

The Anglers verbally protested the fee, to no avail.

The Anglers then submitted a narrower FOIA request, seeking only to review inspection and compliance files for MichCon’s

pipelines in the Au Sable River watershed. The MPSC said the agency could provide those documents, but it would cost \$889 to locate and copy the records.

The Anglers plan to soon pay that fee and review the documents because of the importance of transparent access to regulatory files compiled and maintained with public tax dollars. Without clear access to those records, there is no way for the public to determine whether the pipelines that carry natural gas across the Au Sable watershed are in compliance with safety standards and environmental protection laws.

## OIL AND GAS WELLS, AND ENVIRONMENTAL PROBLEMS, ARE COMMON IN AU SABLE WATERSHED

The pale green oil well anchored to land that abuts the North Branch of the Au Sable River — across the road from the tony Mountain Lake Golf Club south of Gaylord — is a study in contrasts.

On the surface, the well known as Geraldine 3-35 appears relatively benign. There are no foul odors or oil spewing from the well and a lush thicket provides a visually pleasing backdrop for a large, green pump that resembles a giant grasshopper.

The problem is that the well’s industrial beauty is skin deep.

Beneath the surface is a different story.

The Geraldine 3-35 has poisoned a vast quantity of groundwater beneath its drilling rig, creating a costly problem that has repeatedly violated state environmental laws and periodically harmed the waters of the Au Sable River’s North Branch over the past two decades, according to state records. A plume of contaminated groundwater beneath the site is still spreading to the south and east, toward the North Branch.

Current and previous owners

of the Geraldine 3-35 have been working since 1994 to clean up a plume of contaminated groundwater that at one time spanned part of the headwaters of the Au Sable’s North Branch. That clean-up is still ongoing.

A state geologist summarized the severity of the problem in a 1994 email, which Anglers of the Au Sable obtained through the Michigan Freedom of Information Act.

“They’ve found benzene in the (ground) water across the river at 38-feet. Mega-bummer,” said DNRE geologist Andrea Sullivan



## OIL & GAS WELLS

in an email to her supervisor. “It is going to be a bigger and more costly cleanup than they thought. I think there’s a heck of lot more to find than they anticipated.”

Three different oil companies — Amoco, Shell Exploration Co. and Merit Energy — have owned the well since 1994 and none have been able to completely clean groundwater that was polluted by leaky oil tanks, according to state records.

Over the past 16 years, a cleanup system has treated 57 million gallons of contaminated groundwater extracted from beneath the site. The treatment sys-

tem has dramatically reduced pollution levels in the groundwater, but elevated concentrations of toxic and cancer-causing BTEX compounds found in petroleum — benzene, toluene, xylene and ethylbenzene — were still present in 2010 in some monitoring wells near the North Branch, according to state records.

Without conducting any sampling in the river, the consulting firm that wrote the 2010 report concluded the concentration of toxic chemicals entering the North Branch via the contaminated groundwater was likely within state limits.

An earlier investigation said the close proximity of the river was drawing contaminated groundwater deep into an aquifer that feeds the Au Sable’s North Branch.

“The Au Sable provides a potential sink or avenue for BTEX (oil toxins) movement off site,” according to a 1998 report prepared for Shell, the well’s previous owner.

The Geraldine 3-35 is located just 100 feet from the headwaters of the North Branch. It is an object lesson in the threats inherent in drilling oil and gas wells near surface waters.



*The Geraldine 3-35 oil well south of Gaylord is one of the most polluted oil wells in the Au Sable River watershed. Leaky oil tanks polluted the site. Those tanks were removed and 4,500 cubic yards of contaminated soil was excavated. A large plume of contaminated groundwater remains. Photo by Jeff Alexander*



*This satellite image of the Geraldine 3-35 oil well (large white area in middle of image) shows its close proximity to the North Branch of the Au Sable River. Image courtesy of Google maps.*

## THE CONTEXT OF OIL & GAS WELL DANGERS

The Geraldine 3-35 is one of 2,828 active oil and natural gas wells in the Au Sable River watershed, according to state data. There are 2,519 natural gas wells and 309 oil wells.

Only a fraction of oil and gas wells in the watershed are located near the main branches of the Au Sable River. But many of the oil and gas wells, including some with recent pollution problems, are near headwater streams that give rise to the Au Sable and its tremendous fishery.

An oil or brine leak into a headwaters stream could harm

water quality and threaten the health of fish and other aquatic life in the Au Sable River system.

Oil and brine, the saltwater that comes to the surface with oil and natural gas, contain a variety of toxins that can injure humans, fish, insects and other aquatic life.

Crude oil contains numerous toxins, some of which can cause cancer and a variety of other health problems for humans and wildlife.

Brine produced by oil and gas wells in the region often contains high levels of chloride along with

lead, arsenic and radium — compounds that can cause everything from brain damage to cancer, according to a 2006 oil industry study.

“Chloride and other brine constituents are known to be toxic to aquatic organisms and plant life, including wetland and aquatic plants,” environmental consultant Christopher Grobbel said in a 2008 report about oil and gas exploration in the region. **(Christopher Grobbel Report to Lake Louise Christian Community, November 2008)**

Oil pipelines, because of the



## OIL & GAS WELLS

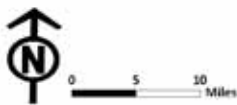
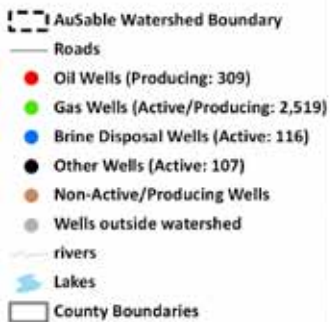
sheer volume of oil they carry, pose a far greater ecological threat to the Au Sable River than oil wells, gas wells or natural gas pipelines. A rupture in oil pipelines could cause catastrophic damage to the river system, according to geologists familiar with the region.

Think of the situation this way: An oil spill from a broken pipeline could be the ecological equivalent of a massive heart attack for the river. Sporadic, less severe pollution at oil and gas wells in the watershed is more like a periodic cold that, under the right circumstances, could esca-

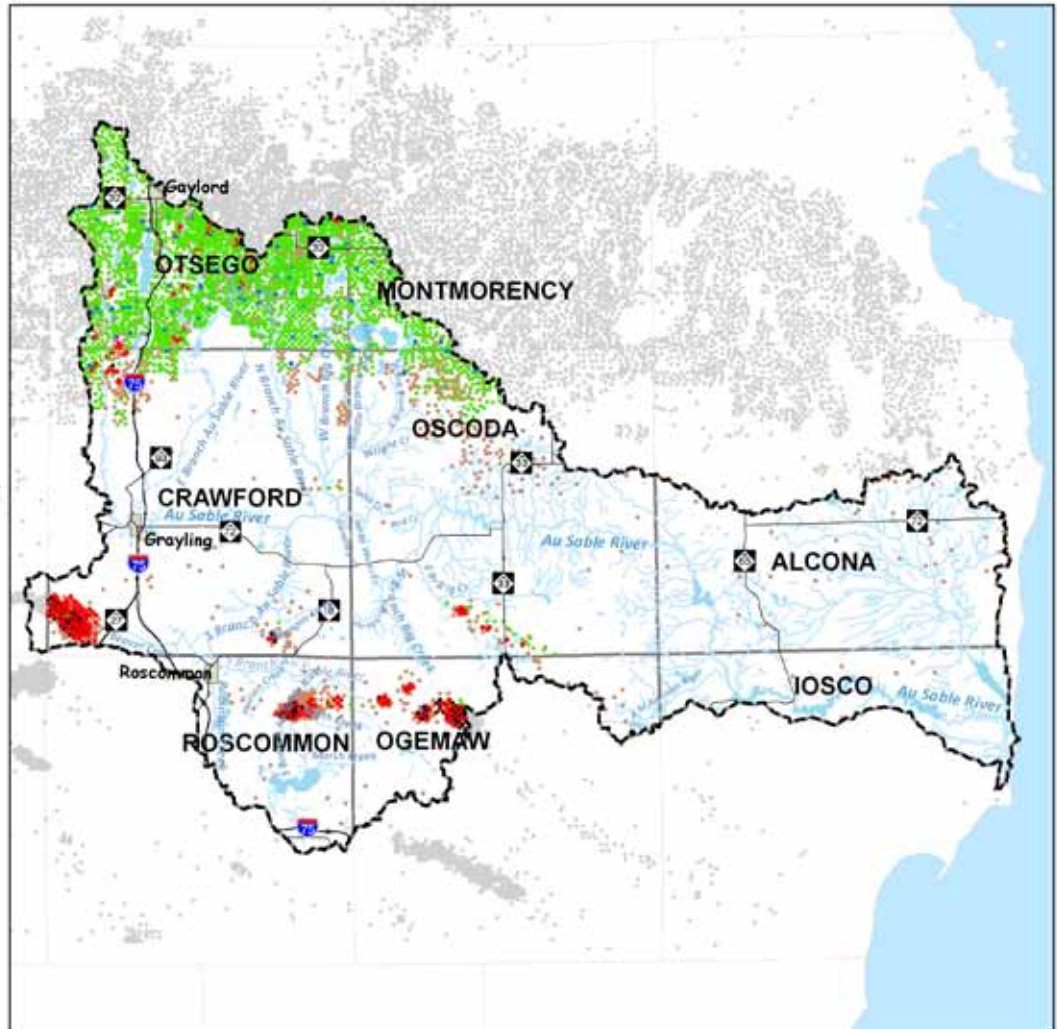
late into a potentially dangerous case of pneumonia.

The ecological heart attack must be avoided at all cost. An ecological cold also should be avoided if possible, because repeated bouts could weaken the river's health over time.

### OIL & GAS WELLS in the AuSable River Watershed



December 2010



*There are 2,519 active natural gas wells and 309 active oil wells in the Au Sable River watershed. Oil wells are denoted with red dots; natural gas wells are in green. The map is based on data provided by the Michigan Department of Natural Resources and Environment.*

State officials said the vast majority of wells in the Au Sable River basin extract oil and natural gas from underground geologic formations without harming the

environment.

“When you look at the total number of wells we have in this area and the number of spills, we have pretty good compliance,”

said Rick Henderson, the Gaylord district supervisor for the Department of Natural Resources and Environment’s Office of Geologic Survey. Henderson’s district cov-



ers most of the Au Sable River watershed.

Henderson said rules governing how oil and gas producers operate and deal with pollution have been strengthened over the past two decades.

Yet government records that Anglers of the Au Sable obtained through the Freedom of Information Act showed that soil pollution is a recurrent problem at several oil and gas wells and associated facilities in the watershed. Oil and brine contamination that seeps into soils and contaminates groundwater could ultimately threaten water quality and aquatic life in the river.

Violations of environmental laws are also common at oil and gas wells in the watershed.

Between 1990 and 2010, DNRE officials recorded more than 1,500 violations at oil and gas wells and processing facilities in the watershed. Those violations included such things as pipes and

drilling equipment leaking oil or brine on the ground, well blow-outs and vegetation that posed a fire hazard because it was too close to an oil or gas well, according to state records.

Over the past two decades, state inspectors logged nearly 3,000 incidents of oil and brine leaks contaminating soils in Otsego, Crawford, Oscoda and Roscommon counties. State data indicated that most of the leaks and spills were small.

But it is important to remember that even small spills of oil or brine, if not remedied quickly, could pollute groundwater — the lifeblood of the Au Sable and other coldwater rivers.

It doesn't take a large oil spill to cause significant water pollution. One gallon of crude oil can pollute one million gallons of water, according to the U.S. Environmental Protection Agency.

The Geraldine 3-35 may be a dramatic example of an oil or gas

well polluting soils and groundwater in the Au Sable River watershed. But it is not the only one.

Over the past two years, state officials have issued dozens of violations to Houston-based BreitBurn Energy for leaky wells that contaminated soils.

BreitBurn's 2009 annual report characterized environmental problems at its facilities across the U.S. as minor in scope.

"We believe that we are in substantial compliance with all existing environmental laws and regulations applicable to our current operations and that our continued compliance with existing requirements will not have a material adverse impact on our financial condition and results of operations," the company said in the annual report. "For instance, we did not incur any material capital expenditures for remediation or pollution control activities for the year ended December 31, 2009."

Oil-soaked and brine-stained soils are a recurring problem at oil and gas wells in the Au Sable River watershed, according to state records.

In March 2010, for instance, state officials found an oil well near Hickey Creek leaking at the wellhead, on pivot arms, on the pumping rig and from three 55-gallons drum at the site. Hick-

ey Creek flows into the South Branch of the Au Sable.

The state ordered a soil clean-up at the site and the company complied.

In May 2010, oil leaks contaminated soils at a well near Kolke Creek, prompting crews to excavate five feet of soil around storage tanks at the site. The crews dug until they no longer

saw oil-stained soils.

Henderson said new rules adopted over the past two decades, which required companies to install secondary containment pits around oil and gas wells and pressure test flow lines, have significantly reduced soil and water pollution at oil wells and processing facilities.

But state records showed that

## RECURRING PROBLEMS

numerous oil wells still lack secondary containment, even though it has been required since the 1980s and is one of the best ways to limit damage from oil or brine spills.

The Office of Geological Survey, a branch of the Michigan Department of Natural Resources and Environment, regulates oil and gas exploration in the state. The OGS is largely funded by the industry it regulates.

In fiscal 2010, 77 percent of the Office of Geological Survey budget came from fees levied on oil and natural gas producers, said Hal Fitch, chief of the Office of Geological Survey.

Andy Girard, an independent geologist and environmental consultant, said the DNRE's oversight of pollution and cleanups at oil and gas wells is less stringent than it is at factories, gas stations and hundreds of other types of businesses in the state.

"The oil industry isn't policed

hardly at all when compared to the hoops that a gas station owner has to jump through just to stay in business," Girard said.

Fitch disputed claims that his office is somehow beholden to the oil industry or that oil and gas drillers are held to less stringent cleanup standards than other industries. He said:

*"Oil and gas operators are held to the same cleanup standards as any other operation. However, the oversight and first response procedures for oil and gas operations may differ in some respects: Staff of the Office of Geological Survey (OGS) conduct regular inspections of drilling and production operations and often identify potential problems at an early stage rather than just responding to complaints or after-the-fact reports; when a spill occurs, OGS requires immediate recovery of impacted soils, followed by sampling and additional remediation as needed, rather than requiring*

*testing and evaluation before any recovery is initiated."*

But there is a difference in how the Office of Geological Survey and other branches of the DNRE handle pollution cleanups.

Instead of using the state's toughest cleanup regulations, the Office of Geological Survey often uses the less-stringent Supervisor of Wells Act to guide cleanup activities at polluted oil and gas wells, according to environmental consultant Christopher Grobbel, who worked for what is now the DNRE for seven years.

"Perhaps more astonishing, remedial activities overseen by the Office of Geological Survey are generally guided by visual evidence of contamination, versus reliance on discrete soil and/or groundwater samples collected in accordance with MDNRE/U.S. EPA methods, transported under chain of custody and analyzed by a MDNRE-licensed laboratory," Grobbel said in a 2008 report.

## WHEN POLLUTION PROBLEMS LINGER

Even though it is one of the most polluted wells in the Au Sable River watershed, the Geraldine 3-35 well near Gaylord isn't listed on the state's inventory of known pollution sites (<http://www.deq.state.mi.us/part201>).

According to the current Part 201 list, there are no pollution sites in the Au Sable River watershed that resulted from oil or

natural gas extraction. Petroleum refining is responsible for one pollution site in the watershed, in Roscommon County, and just 35 contamination sites statewide, according to state data.

The DNRE's own records show that the state's inventory of pollution sites is inaccurate. The absence of the Geraldine 3-35 well on the Part 201 list is proof

of that.

Fitch said the DNRE has a separate system of ranking contamination sites caused by oil and gas operations.

The Office of Geological Survey also gives oil and gas companies a chance to clean up polluted sites before placing them on the state's list of contamination sites.

“We do not post a site on the Part 201 List of Contaminated Sites unless the responsible party is not undertaking reasonable voluntary cleanup efforts or it otherwise appears likely that the DNRE may have to undertake cleanup actions directly,” Fitch said.

In the mid-1990s the administration of former Gov. John Engler abolished the state’s comprehensive inventory of pollution sites.

At the time, the state’s inventory of pollution sites included nearly 2,000 contaminated oil and gas wells and associated facilities. That figure dropped to less than 200 after the Engler Admin-

istration and the Legislature abolished the list of pollution sites and relaxed cleanup standards. The result: The number of pollution sites in Michigan decreased dramatically.

Grobbel said groundwater poisoned by Merit Energy’s Hayes 22 central production facility in Otsego County was a classic example of a serious pollution problem that lingered too long.

“That plume of contaminated groundwater had been there for 20 years,” Grobbel said. The state’s approval of Merit Energy’s plan to pipe treated groundwater from its production facility, across 1.3 miles of state land and

then discharge it into Kolke Creek sparked a lawsuit by Anglers of the Au Sable.

The Anglers objected to Merit discharging up to 1.5 million gallons of treated groundwater daily into Kolke Creek, which ultimately flows into the mainstream of the Au Sable River.

That lawsuit challenged the right of oil companies to use the headwaters of Michigan’s lakes and streams as dumping grounds for treated wastewater.

The Kolke Creek case was also a poignant reminder of the long-term impacts and costs — to all parties involved — of pollution that isn’t quickly cleaned up.

## **PURSUIT OF RICHES IN UNTAPPED GAS RESERVES SPARKS CONCERN ABOUT WATER LOSSES, POLLUTION**

At a five-acre clearing in the Pere Marquette State Forest, about 10 miles north of Lake City, the oil and gas industry’s version of a Christmas tree stands guard over a geologic treasure buried nearly two miles underground.

The so-called Christmas tree is a stack of metal pipes, valves and gauges that rises several feet above the ground. It sits atop the first well in Michigan to successfully tap natural gas in the Collingwood shale, a 40-foot-thick horizontal vein of rock that spans much of northern lower Michigan — including the upper half of the Au Sable River watershed.

Drilled in 2010 by a subsidiary of Canadian energy giant Encana Corp., the Pioneer well unleashed a modern day gold rush in Michigan. It has become a symbol of newfound economic prosperity and potential environmental problems.

News that the Pioneer well hit pay dirt in the previously untapped Collingwood formation sparked a frenzy of interest that resulted in a record-breaking mineral rights auction.



*A so-called Christmas tree sits atop the Pioneer well in Missaukee County. The collection of valves will remain in place until well owner Encana Corp. begins extracting the well’s bounty of deep shale gas. Photo by Circle of Blue Water News*





*This aerial photo shows the Pioneer gas well in Missaukee County during a flare test in 2009. It was the first well in Michigan to successfully tap the Collingwood shale gas formation. The lined pits adjacent to the well stored clean water that was mixed on-site with fracking chemicals and then injected into the well. Dirty water that returned to the surface was stored in metal tanks before being hauled to deep disposal wells off-site.*

*Photo courtesy of Michigan Department of Natural Resources and Environment*

In May 2010, oil and gas companies paid \$178 million for state-owned minerals beneath 120,000 acres of land spread across 20 counties in northern Michigan. That sum nearly equaled the \$190 million that oil and gas companies had paid over the previous 81 years for the right to drill for state-owned oil and gas.

A subsequent mineral lease auction in October 2010 netted just \$10 million. Drillers didn't bother to bid on nearly half of the minerals that were up for grabs. Some observers claimed the tepid response was a sign that the race to drill for shale gas in the Collingwood formation had run out of steam.

The exact opposite may have been true for the Au Sable River watershed.

The October 2010 auction marked Encana Corp.'s foray into the Au Sable River watershed.

Encana is a Canadian-based energy giant and one of the leading drillers of deep shale gas in North America. The company's willingness to spend \$1 million for the right to extract oil and gas from 33,417 acres of state-owned minerals near Grayling likely was an indication that the upper Au Sable River watershed will remain a hotbed of oil and gas interest and exploration for the foreseeable future.

The new October wave of leases in the watershed is one of many reasons that Anglers of the Au Sable and other groups dedicated to protecting this magnificent river must remain vigilant.

The Pioneer well has fueled speculation that Michigan could be a major new player in a barrage of controversial shale gas drilling that has swept across 31 states. That could have significant implications for the Au Sable River watershed, for two reasons:

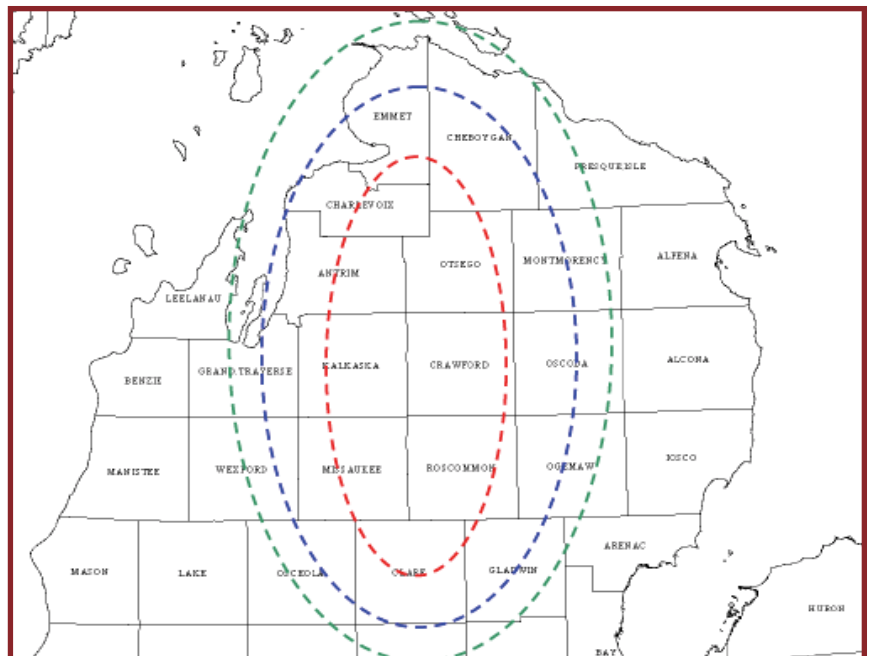
- The headwaters region of the Au Sable and Manistee rivers — in Otsego, Crawford and Roscommon counties — sit atop what are believed to

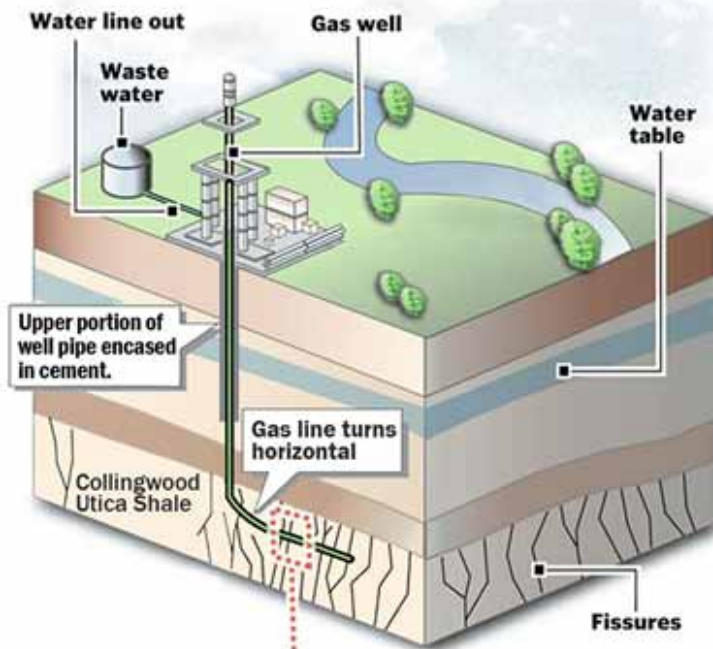
## HYDRAULIC FRACTURING



**OILSHALEGAS.COM**

*These maps produced by the Michigan Department of Natural Resources and Environment show areas of northern Michigan believed to have the largest deposits of Collingwood shale gas. The map at right indicates that Otsego, Crawford and Roscommon counties — all of which lie in the upper Au Sable River watershed — sit atop the thickest deposits.*



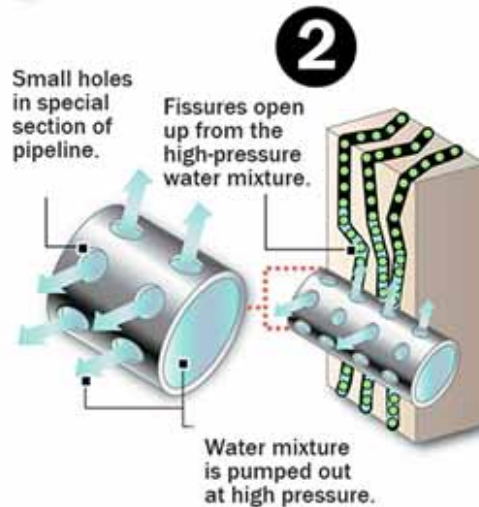


## Hydraulic Fracturing

### A new way of drilling for natural gas



**1. Drilling for maximum effect**  
The drilling turns horizontal at about 9,000 feet, hitting multiple fissures and increasing the volume of available natural gas.



**2. Putting the Pressure On**  
A mixture of water, sand and chemicals is pumped into the pipe-line, which has small holes through which the mixture is forced.



**3. Increase Gas Flow**  
The small fissures are widened by the pressure. The water mixture is pumped back out of the well and natural gas follows back up the pipeline to the wellhead.

*This diagram shows how hydraulically fracturing a well — by injecting a blend of water, chemicals and sand under high pressure — fractures the shale, allowing natural gas to rise to the surface.*



be large deposits of Collingwood shale gas, according to state data.

- The drilling of hydraulically fractured wells could heighten environmental threats to the Au Sable River. New wells drilled into the Collingwood shale formation would require large groundwater withdrawals in the watershed and the use of toxic chemicals in fracking fluids would increase the risk of surface and groundwater contamination. The fracking of deep shale wells has polluted groundwater, surface waters and drinking water wells in several states.

At the October 2010 auction Encana paid \$1 million to lease 33,417 acres of state-owned minerals in Crawford County, according to government records. Most of the leased minerals lie below two large swaths of land: One is southwest of Frederic, in Frederic Township; the other is located southeast of Grayling, in Grayling Township.

The mineral leases Encana acquired in Frederic Township are located on both sides of the Au Sable and Manistee Rivers and adjoin both rivers. The leases in Grayling Township are largely south of M-72 but also surround Wakeley Lake and Wakeley Creek, according to state records.

Another firm, Midland-based Bayside Energy, paid \$1.6 million to lease 33,399 acres of state owned minerals south of St. Helen, in eastern Roscommon

County. Much of the area where Bayside leased minerals lies in the southwest portion of the Au Sable River watershed, according to DNRE data.

Leasing mineral rights gives companies the right to extract oil and natural gas from state-owned reserves. The October 2010 minerals auction didn't guarantee that Encana or Bayside would use hydraulically fractured wells to pursue deep shale gas in Roscommon or Crawford counties — but it did increase the likelihood of those types of gas wells being drilled in the Au Sable River watershed at some point in the future.

Fewer than 10 drills had been drilled into the Collingwood formation by the end of 2010 and none were in the Au Sable River watershed, according to state records.

But oil companies have already leased 300,000 acres of state-owned minerals in northern Michigan.

Encana, which drilled the Pioneer well, spent two years and \$37 million acquiring the rights to drill for Collingwood shale gas beneath natural gas leases on 250,000 acres of land in northern Michigan.

The prospect of companies sinking more wells has many people asking whether Michigan can reap the financial benefits of deep shale gas extraction, using a controversial technique called hydraulic fracturing, without severely compromising treasured natural resources.

To hydraulically fracture a well, drillers inject millions of gallons of water mixed with sand and thousands of gallons of toxic chemicals into the well under extremely high pressure. The process creates tiny fractures in the shale, releasing natural gas from the rock.

State officials said hydraulic fracturing is safe and effective.

“Hydraulic fracturing ... is an exceedingly common, effective and well regulated process in Michigan,” said Tom Wellman, mineral and land manager with the Forest Management Division of the Michigan DNRE, in an e-mail to Anglers of the Au Sable. “The regulatory requirements and geological conditions in Michigan ensure that hydraulic fracturing continues to be done safely.”

But an incident in February 2011 showed that Michigan is not immune to the risks associated with the practice of hydraulically fracturing deep shale wells.

The DNRE shut down operations at a well in Benzie County's Joyfield Township after a deep shale well sprung a leak at the surface. State officials said the spill, caused by a faulty well casing, dumped a mixture of water and fracking chemicals on a small area around the wellhead.

That spill marked the first time a hydraulically fractured gas well had leaked in Michigan, according to state officials.

Critics contend the practice, which has caused numerous pollution problems in other states but

is exempt from most water protection laws, should be more tightly regulated.

“Even if industry does everything right and there aren’t any spills of fracking fluids, these wells are still going to leave a big footprint near some of the best hunting and fishing areas,” said Elizabeth Maclin, a vice president at Trout Unlimited who monitors the fracking controversy. “Transportation is also a big concern — there have been a lot of accidents to date.”

An investigation by the non-profit news organization ProPublica documented more than 1,000 problems at hydraulically fractured deep shale gas wells in states other than Michigan. Among the problems:

- Cracked well casings have allowed methane gas to contaminate groundwater and residential water wells;
- Spills of fracking fluids have poisoned streams and killed animals that drank the toxic brew;
- Methane gas has traveled long distances through the fractured rock. In one case, leaking methane triggered an explosion that leveled a house in Ohio.
- In September 2009, 8,000 gallons of fracking fluid spilled at a well in Dimock, Pa. The chemical-laced water drained into a nearby stream, causing a minor fish kill. Most of the dead fish were minnows; no trout were affected.

- Encana, which has leased thousands of acres of state-owned minerals near Grayling, has paid \$1.5 million in fines over the past four years for violating environmental laws in Colorado, Pennsylvania and other states besides Michigan, according to company data provided to The Times Leader newspaper in Wilkes-Barre, Pa. (*“Company defends its environmental record: EnCana’s hydraulic fracturing has never impacted a water well, spokeswoman says,” The Times Leader, Wilkes-Barre, Pa., May 2010*)

Encana was fined 57 times between 2006 and 2009, according to Encana officials.

The Colorado Oil & Gas Conservation Commission fined Encana a record \$371,000 after one of the company’s hydraulically fractured gas wells, which was sealed improperly, leaked a cancer-causing chemical into a creek in 2004.

Encana officials said the company’s gas wells have never polluted a drinking water well. They said the 2004 incident in Colorado was the result of a mistake. (*“Company defends its environmental record: EnCana’s hydraulic fracturing has never impacted a water well, spokeswoman says,” The Times Leader, Wilkes-Barre, Pa., May 2010*)

“We made a mistake. We moved too fast. But we worked with the commission to modify and improve the cementing procedure in Colorado,” Encana spokes-

woman Wendy Wiedenbeck told The Times-Leader newspaper in Wilkes-Barre, Pa. “Since then, we’ve drilled hundreds of wells in Colorado without incident. But (the Divide Creek incident) is part of the reason why we’re taking a very thoughtful and measured approach to our operations in Luzerne County, (Pa.)”

Several states have tightened regulations on hydraulic fractured wells and the U.S. Environmental Protection Agency in 2010 launched a national study to determine whether hydraulically fracturing is safe. That study, slated for release in 2011, was a follow up to a 2004 EPA study that said hydraulic fracturing didn’t threaten nearby groundwater supplies.

“The 2004 report was used by the Bush administration and Congress to justify legislation exempting hydraulic fracturing from oversight under the Safe Drinking Water Act,” according to ProPublica. “The exemption came to be known in some quarters as the ‘Halliburton loophole’ and has inhibited federal regulators ever since.”

Halliburton is one of the leading producers of fracking fluids. The company’s former CEO, Dick Cheney, was vice president when President Bush and Congress made fracking exempt from the Safe Drinking Water Act.

As part of its study, the EPA asked several companies to disclose the chemicals in fracking fluids. Most did.

Corporate records showed that fracking fluids contain doz-

ens of toxic chemicals, including hydrochloric acid and other acids, ethylene glycol and alcohol, to name just a few. Fracking fluids can also contain benzene, a human carcinogen, and deep shale wells can bring naturally occurring radioactive materials to the surface.

In Michigan, drillers must store fracking fluids in sealed tanks before the wastewater is trucked to a deep well disposal facility.

State officials said hydraulically fracturing gas wells is safer here because the state has tougher regulations on well casings. Wellman said Michigan's geology is also better suited to hydraulic fracturing because there is a much thicker layer of rock between the Collingwood shale and aquifers that provide the water for lakes, streams and drinking water.

"While I can't dispute that some of the reported cases (of water pollution in other states) circulated in the media could have

been caused by hydraulic fracturing, in Michigan there are several circumstances to make this very unlikely," Wellman said.

Most groundwater in Michigan is found far above where companies would tap deep shale gas reserves, Wellman said. That decreases the risk of a troubled well leaking fracking fluids or natural gas into groundwater aquifers that feed lakes and streams and are commonly tapped for drinking water wells.

## NEW USE FOR OLD TECHNOLOGY SPARKS DEBATE

Fracking isn't a new technology — drillers have hydraulic fractured tens of thousands of oil and natural gas wells in Michigan and elsewhere.

What's new, and controversial, is the use of hydraulic fracturing to extract natural gas from deep shale formations like the Collingwood, which is roughly 10,000 feet underground.

Thousand of gas wells drilled into the Antrim shale in the 1990s were hydraulically fractured but none caused groundwater contamination, according to state officials. Those same officials pointed to the success of the Antrim development as proof that wells can be hydraulically fractured without harming nearby water resources.

The difference was that Antrim shale wells ranged between 1,000 feet and 2,500 feet deep and required the use of far less water and fracking chemicals.

Fracking deeper wells requires using more water and more chemicals, some of which are capable of causing cancer and other health problems in humans.

Conservation groups fear the loss of millions of gallons of groundwater to natural gas wells that are hydraulically fractured could harm rivers, lakes, wetlands and drinking water wells that are fed by underground aquifers.

Drillers typically use between 3 million and 8 million gallons of water over the course of two or three weeks to hydraulically fracture a gas well. About 70 percent of the water remains in the rock formation around the well bore.

Crews trucked in 5.5 million gallons of groundwater to fracture shale in the Pioneer well. About 4 million gallons of that water remained deep underground and was no longer available to aquifers that recharge lakes and rivers; the rest of the water returned to

the surface and was hauled away.

Most water used to fracture deep shale wells is trucked in from sources off-site of the drilling operation. The result is a loss of water from aquifers or surface waters that are tapped for fracking operations.

The Pioneer well resulted in the loss of 5.5 million gallons of water from the aquifer that was tapped for that project. That's equivalent to the volume of water in eight Olympic-sized swimming pools.

Pumping that quantity of water out of the ground near the headwaters of trout streams could harm rivers if not carefully regulated, said Maclin of Trout Unlimited. She said flow reductions in headwater streams can result in less aquatic life, a problem that can then be magnified downstream.

Michigan regulates large water withdrawals, like those at in-



dustrial facilities, farms and the Nestle's Ice Mountain water bottling facility near Big Rapids. As part of those regulations, the state developed a Water Withdrawal Assessment Tool to evaluate whether a large water withdrawal would harm nearby coldwater streams.

But there is a gaping loophole in the regulations: Oil and gas wells are exempt from the state's water withdrawal law.

As the law now stands, drillers can extract unlimited quantities of groundwater or surface water provided it is used to develop an oil or gas well.

Jim Olson, a Traverse City-based attorney and expert on water law, said the state made a huge error by auctioning off 120,000 acres of mineral leases in 2010 without first studying whether water withdrawals for fracking would harm rivers, lakes or aquifers.

"In effect the state turned over our land and water to the oil and gas industry for fracking before it fully understood the massive amounts of water required or the potential for harm," Olson said in an essay published in the Detroit Free Press. "The concern for land and water, and the impacts to landowners, businesses and citizens have been largely ignored because of the smell of money."

Officials at the Michigan DNRE's Office of Geological Survey, which regulates oil and gas exploration, have said the agency would voluntarily use the

state's water withdrawal assessment tool (found at <http://www.miwwat.org>) to ensure that deep shale wells don't harm coldwater streams. But that didn't happen with the Pioneer well.

The reason: The Pioneer well wasn't located near any "sensitive waters," said Hal Fitch, chief of the DNRE's Office of Geological Survey.

"Five millions gallons sounds like a lot of water but to put it in perspective that's about how much water is used to grow eight-to-ten acres of corn in a season," Fitch said. "We don't believe it (water withdrawals for fracking) is going to be a big threat."

The difference between farming and fracking is that much of the water used to grow crops soaks into the ground and returns to its source. Water pumped out of the ground or a pond for fracking a deep shale well is gone forever from that body of water.

Allowing oil and gas companies to divert unlimited quantities of a publicly owned resource — groundwater — for private gain is wrong, Olson said.

"The foundation of our state's quality of life and economy are at stake," Olson said, "and the premature transfer of the public's interest in water and land for private extraction violates the public trust."

Olson called on state lawmakers to impose a moratorium on deep shale wells until concerns about fracking were addressed. His call for action was met with

silence in the halls of state government.

Fitch said the DNRE would hold drillers of deep shale wells to the same environmental standards as other large water users, even though there is no law to back up that pledge. "We're not going to allow a water withdrawal that has a significant impact on our water resources," he said.

Maclin said a major problem with hydraulically fracturing wells is that most states lack the personnel needed to effectively regulate the process.

"State officials in Pennsylvania claim they have all the regulations needed to address any issues related to fracking, yet there is very little enforcement because the state doesn't have the manpower needed to keep up," Maclin said.

Michigan's Office of Geological Survey has 44 employees keeping tabs on the 14,000 active oil and natural gas wells in the state. There are 26 field inspectors and another 18 geologists, technicians, legal staff and supervisors who work with the field inspectors, Fitch said.

In November 2010, a coalition of Michigan conservation groups called on the DNRE to impose tougher regulations on hydraulic fracturing. The groups recommended the state:

- Require use of the state's water withdrawal assessment tool for all water withdrawals related to the fracking of deep shale wells.

## HYDRAULIC FRACTURING

- Make water withdrawals for oil and gas wells subject to the same regulations applied to other large water users.
- Require public disclosure of the chemicals used during the well fracturing process.
- Require seismic monitoring to prevent the well fracking process from triggering earthquakes.
- Make companies monitor and report the volume of fracking

fluids (water, sand and chemicals) that flow back to the surface.

Environmental consultant Christopher Grobbel said he believes the greatest risk of pollution problems at hydraulically fractured wells will be at the surface, not underground where the gas is extracted.

“I don’t think the upward migration of fracking fluids and gas is the big threat,” Grobbel said. “I think the trucking and surface

handling of fracking fluids, along with fragmentation of the landscape to make all of this drilling happen will be the big issues.”

A recent incident in Pennsylvania illustrated Grobbel’s point.

On Oct. 9, 2010, a truck hauling fracking fluids sprung a leak while traveling along a highway near Hughesville, Pa. The spill extended 35 miles, forcing police to close a section of the highway until the mess was cleaned up.

## POTENTIAL FOR PROFITS & PROBLEMS

Michigan is in the early stages of extracting natural gas from its deep shale, the Collingwood formation. Only a few exploratory have been drilled and at least one company has stopped negotiating leases needed to place drilling rigs on private property.

That doesn’t mean the Collingwood shale will go untapped in Michigan.

The Pioneer well initially produced 2.5 million cubic feet of natural gas daily for 30 days, which made it the largest single source of natural gas in Michigan. The well’s production dropped back to 800,000 cubic feet of natural gas per day — not a gusher but still a substantial well by Michigan standards. (*“Typical Michigan Oil and Gas Lease Auction Casts Doubt on Collingwood Shale Formation,” Nov. 9, 2010, Circle of Blue WaterNews, accessed at*

*[www.circleofblue.org/waternews](http://www.circleofblue.org/waternews)*)

Increasing national demand for natural gas could help drive new drilling in the Collingwood formation.

Because natural gas burns cleaner than coal, it is viewed as a bridge fuel to renewable energy sources, such as wind, solar and geothermal. State and federal legislation aimed at curbing greenhouse gas emissions are expected to further increase demand for natural gas.

There is also new evidence that the U.S. is sitting atop huge reserves of shale gas. The U.S. Energy Information Administration in December 2010 said that shale gas reserves in the U.S. were twice as large as previously thought.

The EIA said the U.S. has the technical capability to produce 827 trillion cubic feet of shale gas reserves, up from the 2009 estimate

of 474 trillion cubic feet.

Texas oil magnate T. Boone Pickens said the revised EIA estimate showed that the U.S. is now the “Saudi Arabia of natural gas.” (*“EIA projects huge growth in U.S. shale,” UPI, Dec. 17, 2010, accessed at <http://bit.ly/gNK7k6>*)

Grobbel said Michigan has a chance to enact stricter regulations that could prevent many of the problems that hydraulic fracking operations have caused in other states. But he doubts that will happen.

“This is a front burner issue and Michigan has a chance to be proactive about it,” Grobbel said. “But because we have this very cozy relationship in Michigan between the regulators and industry, I’d be surprised if we get ahead of this and do the right thing.”

**FRACTURING FLUID ADDITIVES, MAIN COMPOUNDS, AND COMMON USES.**

<b>Additive Type</b>	<b>Main Compound(s)</b>	<b>Purpose</b>	<b>Common Use of Main Compound</b>
Diluted Acid (15%)	Hydrochloric acid or muriatic acid	Help dissolve minerals and initiate cracks in the rock	Swimming pool chemical and cleaner
Biocide	Glutaraldehyde	Eliminates bacteria in the water that produce corrosive byproducts	Disinfectant; sterilize medical and dental equipment
Breaker	Ammonium persulfate	Allows a delayed break down of the gel polymer chains	Bleaching agent in detergent and hair cosmetics, manufacture of household plastics
Corrosion Inhibitor	N,n-dimethyl formamide	Prevents the corrosion of the pipe	Used in pharmaceuticals, acrylic fibers, plastics
Crosslinker	Borate salts	Maintains fluid viscosity as temperature increases	Laundry detergents, hand soaps, and cosmetics
Friction Reducer	Polyacrylamide	Minimizes friction between the fluid and the pipe	Water treatment, soil conditioner
	Mineral oil		Make-up remover, laxatives, and candy
Gel	Guar gum or hydroxyethyl cellulose	Thickens the water in order to suspend the sand	Cosmetics, toothpaste, sauces, baked goods, ice cream
Iron Control	Citric acid	Prevents precipitation of metal oxides	Food additive, flavoring in food and beverages; Lemon Juice ~ 7% Citric Acid
KCI	Potassium chloride	Creates a brine carrier fluid	Low sodium table salt substitute
Oxygen Scavenger	Ammonium bisulfite	Removes oxygen from the water to protect the pipe from corrosion	Cosmetics, food and beverage processing, water treatment
pH Adjusting Agent	Sodium or potassium carbonate	Maintains the effectiveness of other components, such as crosslinkers	Washing soda, detergents, soap, water softener, glass and ceramics
Proppant	Silica, quartz sand	Allows the fractures to remain open so the gas can escape	Drinking water filtration, play sand, concrete, brick mortar
Scale Inhibitor	Ethylene glycol	Prevents scale deposits in the pipe	Automotive antifreeze, household cleansers, and deicing agent
Surfactant	Isopropanol	Used to increase the viscosity of the fracture fluid	Glass cleaner, antiperspirant, and hair color

Note: The specific compounds used in a given fracturing operation will vary depending on company preference, source water quality and site-specific characteristics of the target formation. The compounds shown above are representative of the major compounds used in hydraulic fracturing of gas shales.



# RECOMMENDATIONS FOR FOLLOW-UP ACTION

by Anglers of the Au Sable

*The recommendations below are based on the conclusions of this report. As of this writing (January 2011), the recommendations below have not been approved by the Anglers of the Au Sable board or its committees and thus do not constitute official Anglers of the Au Sable policy. The recommendations below are subdivided into four main categories — oil pipelines, gas pipelines, existing oil and gas wells, and hydraulic fracturing —consistent with the main body of the report.*

## OIL PIPELINES

**1. DETERMINE THE EXISTING BOUNDARIES OF 'HIGH CONSEQUENCE AREAS' AND SEEK EXPANSION OF THOSE AREAS WHERE NECESSARY:** Only pipelines in "high consequence areas" such as population centers and environmentally sensitive zones require strict federal oversight and vigilant inspection. Numerous areas of extreme importance to Anglers of the Au Sable may not be considered "high consequence areas." These unregulated areas may include critical headwaters areas of the Au Sable and its tributaries and the Deward area, where Markwest Energy's 250-mile long pipeline crosses the main-stream of the Manistee River but is not currently inspected or monitored by any state or federal regulators. Anglers should attempt to work with Enbridge and Markwest to obtain detailed maps that would allow us to determine whether all critical headwaters areas

of the Au Sable and Manistee rivers are included in existing High Consequence Areas.

**2. COMMUNICATE & COLLABORATE WITH ENBRIDGE:** Continue the positive momentum developed between Anglers of the Au Sable board members and Enbridge officials at the October 2010 and January 2011 meetings. Follow up meetings should include guided float trips so Enbridge officials can experience the recreational bounty of the Au Sable region

**3. ASSIST WITH ENBRIDGE'S ONGOING DISASTER PLANNING:** Enbridge has pledged to hold a "live" cleanup exercise in the Au Sable corridor in summer 2011. Anglers representatives should attend and assist. Likewise, Anglers should assist Enbridge in developing in-depth relations with emergency management personnel through the Au Sable corridors downstream of Line 5's crossing of tributaries and the

Main Branch.

**4. INCREASE ENBRIDGE'S ATTENTION TO TRIBUTARY CROSSINGS:** After the October meeting, Anglers requested that Enbridge study its numerous Au Sable tributary crossings and report back to Anglers regarding any potential problems. Anglers should continue to stress the need to understand these tributary crossings, assure they are structurally sound, and work with local emergency management officials to assure they are knowledgeable about the crossings and have consistent and adequate access to the crossings in the case of mishaps.

**5. CONTINUE TO SEEK ADDITIONAL ENBRIDGE DOCUMENTATION:** Anglers should continue efforts to receive all pertinent Line 5 inspection reports from PHM-SA and the company. Likewise, Anglers should monitor ongoing progress in the Kalamazoo River cleanup and

## ACTION

investigation and obtain any significant reports emanating from that ongoing Kalamazoo River work.

- 6. ENCOURAGE ADDITIONAL PIPELINE SAFETY INFRASTRUCTURE:** Anglers should enthusiastically applaud Enbridge's pledge to install an additional

remote-controlled shut-off valve on the south side of the Au Sable, work with the company in whatever helpful ways possible to execute the installation and also better understand valve and protection measures near tributary crossings to better protect the water bodies in the event of pipeline

ruptures.

- 7. SEEK COLLABORATIVE DISCUSSION WITH MARKWEST:** With the Enbridge relationship as a model, Anglers should seek positive discussions with Markwest to better understand the oil pipeline crossing under the Manistee River in Deward.

## NATURAL GAS PIPELINES

- 1. REVIEW RECORDS UNDER FOIA:** Anglers should pay the requested \$889 FOIA records fee and proceed with review of all inspection reports for MichCon pipelines in the Au Sable watershed. Otherwise, Anglers has no documentation on which to assess regulators' blanket

claims that the public has no reason for any concern about the structural integrity of natural gas pipelines in the Au Sable region.

- 2. COMMUNICATE & COLLABORATE WITH INDUSTRY:** Reach out to natural gas pipeline companies

operating in the Au Sable region in the same way Anglers has reached out to Enbridge. Understand industry concerns, offer to collaborate in mock disaster exercises and to serve as a liaison between distant pipeline operators and local emergency management officials.

## EXISTING OIL & GAS WELLS

- 1. EXPAND POLLUTION INVESTIGATION AT OIL WELL:** Ask the MDNRE to widen its investigation of groundwater contamination at the Geraldine 3-35 oil well, near Gaylord, to ensure that the volume of toxins that may be entering the Au Sable's North Branch meet state water quality standards.
- 2. STAY ON TOP OF STATE INSPECTIONS:** Assign one or more members of the Anglers' Oil and Gas Committee to monitor the state's inspection reports for oil and gas

wells in the watershed. Those inspections are the first line of defense against soil and water pollution and are a valuable source of information on contaminated wells that are the subject of ongoing cleanup activity.

- 3. SEEK MEMBERSHIP ON MICHIGAN'S OIL & GAS ADVISORY COMMITTEE:** Currently, the oil and gas industry constitutes most membership on this state advisory group. The committee advises the DNRE on policy, rules and orders related to

oil and gas exploration. Given the burgeoning concerns about hydraulically fractured gas wells in Michigan, it seems timely to add another member of the public or a representative from a conservation group to the DNRE's Oil and Gas Advisory Committee. Anglers of the Au Sable should seek membership in this group to both serve as a river advocate and to build more understanding and collaborative relationships with the oil and gas industry and its regulators.

## HYDRAULIC FRACTURING (“FRACKING”)

### 1. MONITOR ONGOING

**LEASE ACTIVITY:** Closely monitor the state’s mineral lease auctions each May and October to assess new activity in the Au Sable and Manistee river corridors.

### 2. COLLABORATE WITH OTHER GROUPS ON FRACKING CONCERNS:

Anglers should work closely with the greater conservation/environmental communities in Michigan to foster greater oversight of hydraulic fracturing within the river corridors. Several Michigan conservation groups recently called on state agencies to tighten regulations on the fracking of deep shale wells. The Anglers of the Au Sable should support that effort. Several particular

measures could be enacted to better protect Michigan’s natural resources from the potential negative impacts of hydraulically fractured gas wells:

- **Make companies that hydraulically fracture natural gas wells subject to Michigan’s water withdrawal law.** Fracking one deep shale gas well uses up to 8 million gallons of water, which could harm Michigan’s lakes, streams and wetlands if not properly regulated. Relying on the goodwill of state employees who contend that voluntary guidelines are adequate to keep fracking operations from harming natural resources would

be naïve.

- **Require oil and gas companies to disclose the chemical contents of fracking fluids.** Those companies should also be required to disclose the volume of fracking fluids that flow back to the surface after a well is drilled, as well as where those fracking fluids are sent for disposal.
- **Encourage federal officials to regulate fracking under the Clean Water Act and Safe Drinking Water Act.** Those laws are powerful deterrents to pollution and could protect Michigan from the kinds of problems that fracking has caused in other states.

## FOIA SUMMARY: DOCUMENTS USED IN THIS REPORT

This report was based largely on thousands of pages of government documents the author obtained from state and federal

agencies. Some of the information would only be provided in response to a Freedom of Information Act (FOIA) request.

Below is a summary of FOIA requests the author filed with state and federal agencies and the documents provided as a result.

### THE MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT:

- Filed a FOIA request seeking the compliance history for oil and gas wells in the Au Sable River watershed. Eventually, the DNRE pro-

vided a database of inspection reports for oil and gas wells in the watershed. The database contained summaries of 59,000 well

inspections conducted between 1991 and 2010 in Crawford, Otsego, Oscoda and Roscommon counties.



## THE MICHIGAN PUBLIC SERVICE COMMISSION:

- Requested state records that documented the age, condition and compliance history of all intrastate natural gas pipelines in the Au Sable River watershed. The PSC said the Anglers would have to pay nearly \$14,000 to obtain those documents. The Anglers declined to pay and the records were never provided.
- Filed a narrower FOIA request seeking records that documented the compliance history of intrastate natural gas pipelines that MichCon owned in the Au Sable River watershed. The PSC said it would cost the Anglers nearly \$900 to obtain those documents. Negotiations continue.

## THE U.S. DEPARTMENT OF TRANSPORTATION'S PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION:

- Requested the five most recent inspection reports on Enbridge Energy Partners' Line 5, the pipeline that carries oil from Superior, Wis., to Sarnia, Ontario. Also requested copies of any and all correspondence (including e-mails) between officials at the Pipeline and Hazardous Materials Safety Administration and Enbridge Energy Partners related to Enbridge Energy Partners' Line 5.
- Officials at PHMSA provided a disc with thousands of pages of documents related to Enbridge's operation of its Lakehead pipeline system, which includes the Line 5 pipeline that crosses the Au Sable River. Those documents included the 2002 inspection of Line 5. The documents did not include results of the 2006 inspection of Line 5, which PHMSA withheld because those records are part of the agency's ongoing investigation of the Kalamazoo River oil spill.



## Anglers of the Au Sable

P.O. Box 200  
Grayling, MI 49738

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### EDITORIAL OFFICES

The RIVERWATCH  
P.O. Box 300  
Luzerne, MI 48636  
**Email:**  
[tombuhr@prodigy.net](mailto:tombuhr@prodigy.net)

### EDITORIAL STAFF

Thomas Buhr, Editor  
  
Mercy Huizar, Graphic Designer  
Email: [oppllc@gmail.com](mailto:oppllc@gmail.com)

### CALENDAR - WINTER 2011

**February 19, 2011** – Anglers Board Meeting, Gates Lodge, 10 am.

**March 12 & 13** – Midwest Fly Fishing Expo (Warren)

**April 1, 2011** – Opener for New Gear Restricted Waters: Wakeley to McMasters; Mio to McKinley

**April 30, 2011** – Opening Day!  
(New Years Day north of M-55)

**June 4, 2011** – Anglers Board Meeting, Gates Lodge, 10 am

**September 10, 2011** – Annual Cleanup, Gates Lodge, 10 am

**September 11, 2011** – Anglers Annual Meeting & Board Meeting, Board Room, 10 am

### CONTRIBUTORS

**Jeff Alexander**, Reporter/Author of Special Report on Oil & Gas

**John Bebow**, Director, Editor of Special Report on Oil & Gas

**Thomas Buhr**, RIVERWATCH Editor

Our organization is officially affiliated with the Federation of Fly Fishers (FFF). We strongly encourage you to join the FFF. Since 1965, FFF and its Councils have been and continue to be the only organized national and regional advocates for fly fishing. Five dollars of your FFF dues are returned to the FFF Great Lakes Council (GLC) to be used for local efforts.

**FEDERATION OF  
FLY FISHERS**

