

Menominee River Watershed Report

Water Resources Division
Surface Water Assessment Section

John Matousek

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List of Acronyms

A

- AIS
Aquatic Invasive Species, 15
- AOC
Area of Concern, 9

B

- BMP
Best Management Practice, 15

C

- CLMP
Cooperative Lakes Monitoring Program, 24
- CMI
Clean Michigan Initiative, 15
- CWA
Clean Water Act, 11

D

- DDE
Dichlorodiphenyldichloroethylene, 33

F

- FCMP
Fish Contaminant Monitoring Program, 34

G

- GLWQA
Great Lakes Water Quality Agreement, 9

H

- HUC
Hydrologic Unit Code, 6

L

- LWQA
Lake Water Quality Assessment Monitoring Program,
24

M

- MDEQ

- Michigan Department of Environmental Quality, 6
- MDHHS
Michigan Department of Health and Human Services,
12
- MDNR
Michigan Department of Natural Resources, 23
- MiCorps
Michigan Clean Water Corps, 24
- MISIN
Midwest Invasive Species Information Network, 15
- MRW
Menominee River Watershed, 6
- MSU
Michigan State University, 24

N

- NLA
National Lakes Assessment, 24
- NPDES
National Pollutant Discharge Elimination System, 12
- NPS
Nonpoint Source, 11

P

- PAH
Polyaromatic Hydrocarbons, 10
- PCB
Polychlorinated Biphenyls, 12

S

- STORET
STORage and RETrieval, 28
- SWAS
Surface Water Assessment Section, 6

T

- TMDLs
Total Maximum Daily Load, 12

U

- UP
Upper Peninsula, 6
- USEPA
United States Environmental Protection Agency, 10

USGS

United States Geological Survey, 6

W

WCMP

Water Chemistry Monitoring Program, 28

WMP

Watershed Management Plan, 15

WQS

Water Quality Standards, 12

WWTP

Waste Water Treatment Plant, 12

MENOMINEE RIVER WATERSHED REPORT

1 INTRODUCTION

1.1 Purpose

Many Michigan Department of Environmental Quality (MDEQ) water quality monitoring and water pollution control programs are implemented according to a five-year rotating watershed cycle to promote program integration and effective watershed management. In line with this approach, water quality monitoring within this five-year cycle occurs two years prior to National Pollution Discharge Elimination System (NPDES) watershed permit review. Status and trends are also determined using approximately 900 statewide probabilistically chosen river and stream locations over the five-year basin cycle period.

Michigan has 57 major watersheds based on the United States Geological Survey's (USGS) eight-digit Hydrologic Unit Codes (HUC). Water quality assessment efforts focus on a subset of these major watersheds each year.

Environmental monitoring within these major watersheds is an essential component of the MDEQ mission. Monitoring in this and other watersheds helps facilitate the main goals of the MDEQ, Surface Water Assessment Section (SWAS), which are to:

1. Assess the current status and condition of waters of the state and determine whether water quality standards (WQS) are being met.
2. Measure spatial and temporal water quality trends.
3. Evaluate the effectiveness of water quality restoration and protection programs.
4. Identify new and emerging water quality problems.

The purpose of this report is to summarize the biological and habitat data collected during the 2012 targeted watershed survey, as well as additional chemical, biological, and physical monitoring data generated by the MDEQ and its partners in recent years. This report covers the following eight-digit HUCs:

04030106 Iron/Brule/Paint

04030107 Michigamme

04030108 Menominee

This area is referred to as the Menominee River Watershed (MRW) throughout this document.

The watershed includes waters in Baraga, Dickenson, Iron, Marquette, and Menominee Counties in the Upper Peninsula (UP) within the Northern Lakes and Forest ecoregion (Albert, 1995). This large watershed originates near Mount Curwood (1978 feet above sea level) in central Baraga County and flows south through the Peshekee and Michigamme River systems to Lake Michigan near the border of Wisconsin (Figure 1).

2 WATERSHED DESCRIPTION

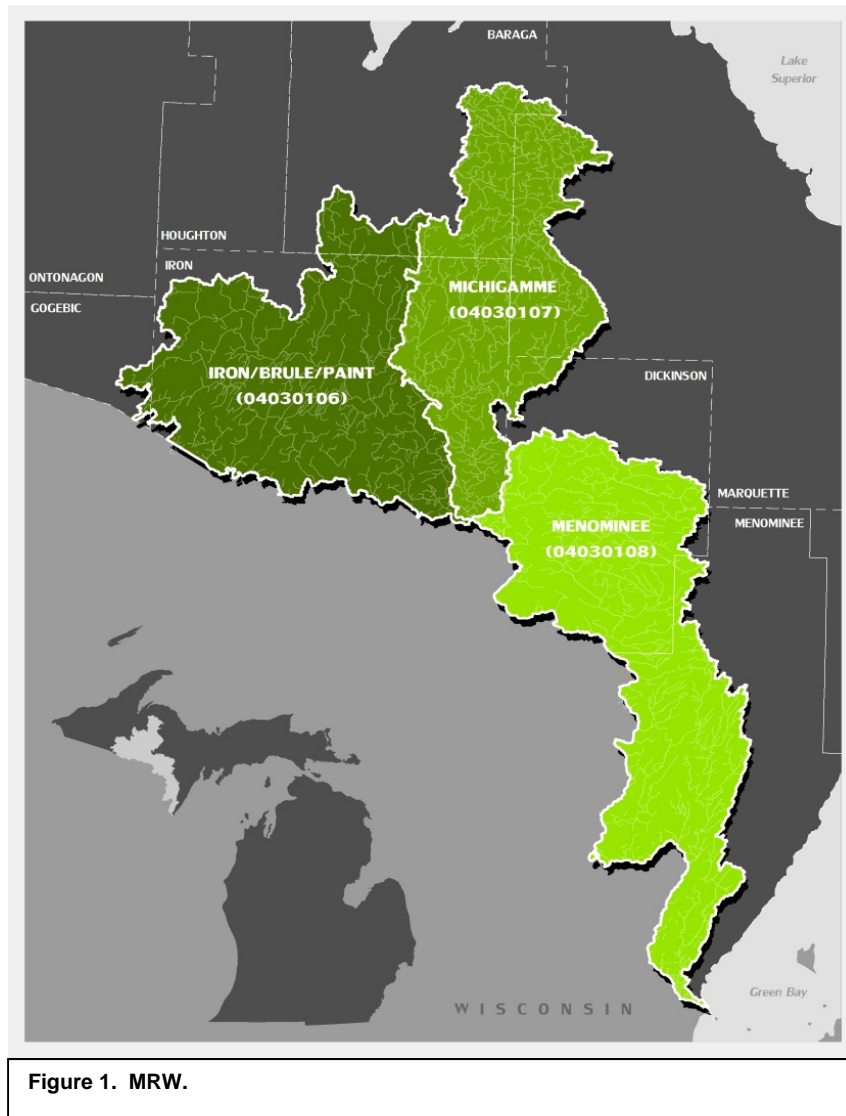


Figure 1. MRW.

2.1 Natural Features

Much of the topography of the region consists of steep bedrock knobs, which rise 200 feet or more from the surrounding outwash plains. Jack pine barrens and white and red pine forests grow on both shallow soils of the bedrock knobs and on the broad outwash plains within the Michigamme and Menominee watersheds. In the area of the Brule and Paint Rivers, deposits of sand and gravel are often covered by a silt cap resulting in vegetation dominated by northern hardwoods. The climate in the area is intermediate with some areas being moderated by Lake Michigan. Winters typically consist of extremely cold temperatures and heavy snowfalls (Albert, 1995).

Many of the UP's "blue ribbon" trout streams are located in the MRW (Figure 2) where the majority of flowing waters are protected for coldwater fish. Many streams in the MRW originate in sedge and forested wetlands or shallow kettle lakes, which cause the water to appear stained due to the tannins released by the decaying plant material.

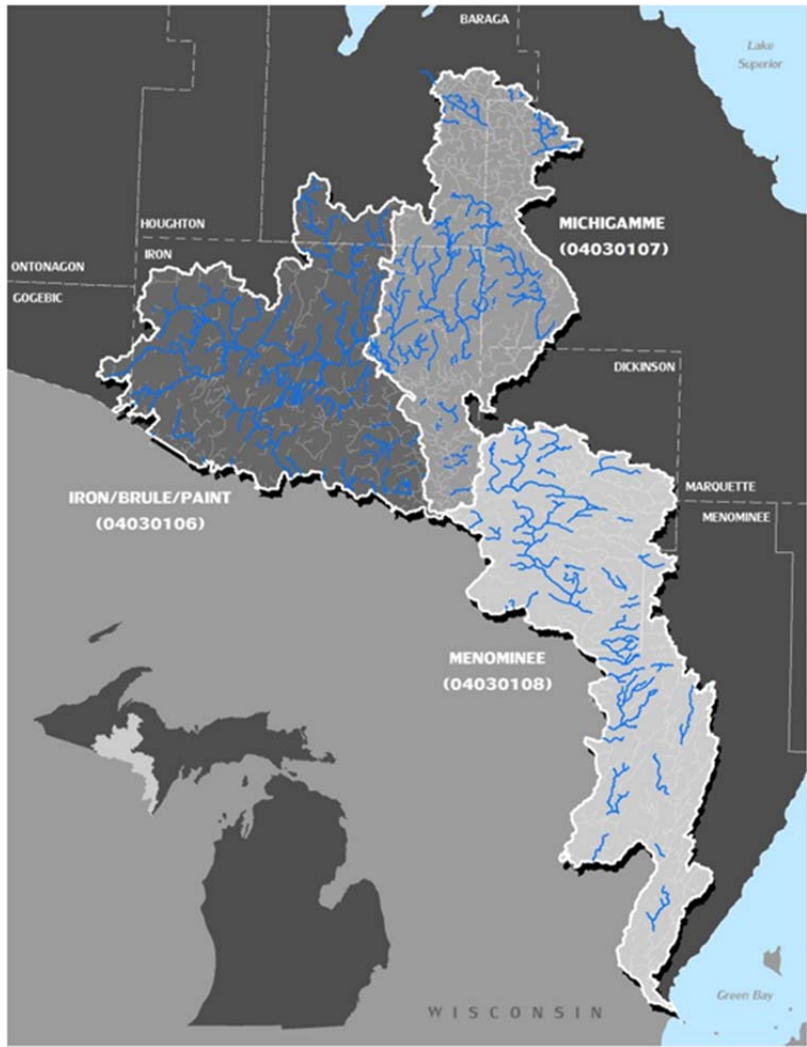


Figure 2. Designated trout streams for the MRW (MDNR, 2008).

2.2 Land Use

Logging during the 1880s and 1890s was extensive throughout the MRW. The rivers and streams in the region were used to transport logs to lumber mills located in Menominee and Marinette in Green Bay. To facilitate this, they were cleared of natural snags and debris. This, along with vegetation removal right up to the river/stream bank, created erosion and sand deposit issues that are still visible today.

Iron ore deposits were discovered in the region in the 1850s on the western edge of the Menominee Iron Range and numerous mines opened shortly thereafter near the town of Iron Mountain. The iron mines were often short-lived although a few continued operation in the mid-20th century. Concentrated discharges of dissolved iron from abandoned mines in the Brule and Iron River subwatersheds, evident as a heavy precipitate, have caused problems in some watershed locations.

Current land cover (Figure 3) in the MRW is heavily forested with much of the forested lands owned by private forest products companies. Forestry, wood products, and tourism are the dominant industries in the MRW with some agricultural activity growing hay and potatoes (Jin et al., 2013).

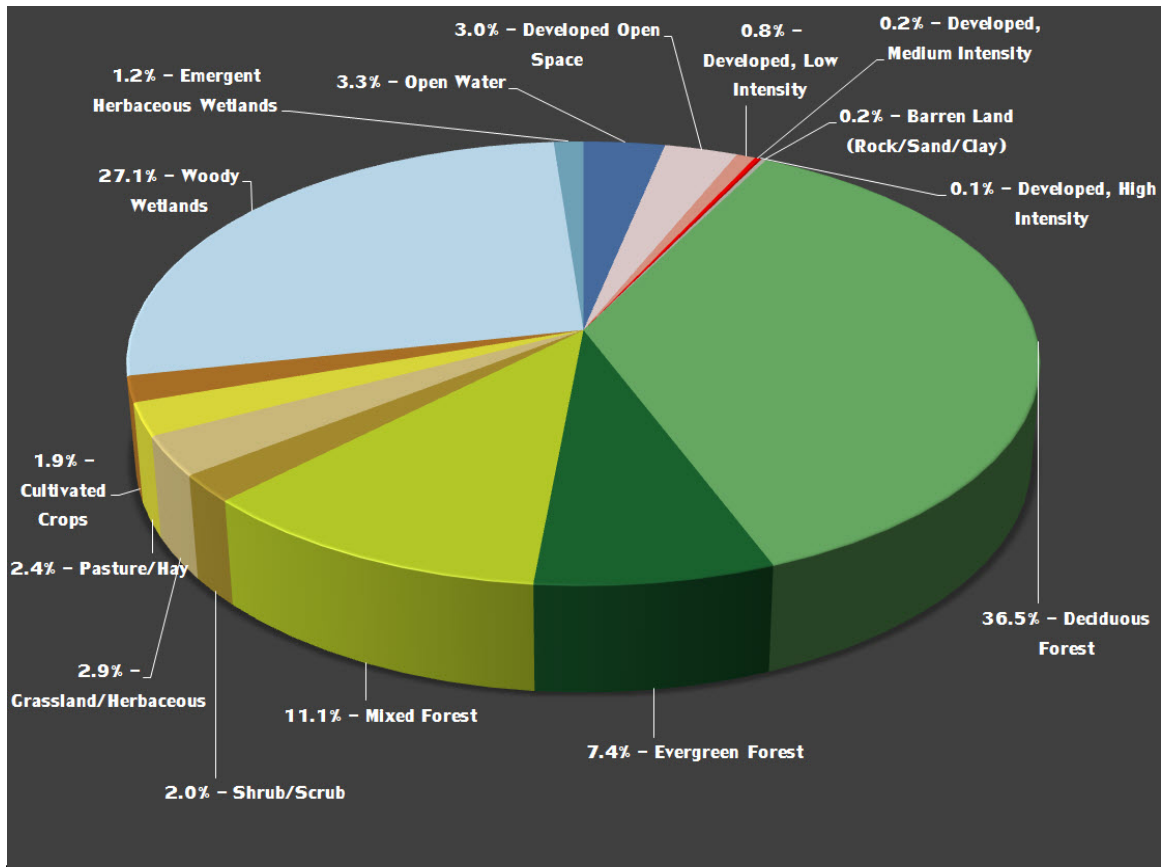


Figure 3. Current land use in the MRW (Jin et al., 2013).

2.3 Area of Concern (AOC)

The Great Lakes form a portion of the international boundary between the United States and Canada, and both countries have jurisdiction over their protection and restoration. The Great Lakes Water Quality Agreement between the United States and Canada was developed in 1972 and established objectives and criteria for the protection, restoration, and enhancement of water quality in the Great Lakes system. The United States and Canadian governments identified 43 locations on the Great Lakes that had serious water quality problems known to cause beneficial use impairment of the shared aquatic resources. These areas have been formally designated by the two governments as AOCs. The Menominee River AOC is 1 of 14 AOCs in Michigan. Cleaning up these degraded areas is the first step toward restoring the chemical, physical, and biological integrity of the lakes as required by the Great Lakes Water Quality Agreement.

The Menominee River AOC includes the lower three miles of the river from the Upper Scott Dam (Park Mill Dam) to the river's mouth and extending north of the river mouth to John Henes

Park and south of the river mouth past Seagull Bar along Green Bay. The AOC is a shared responsibility with the state of Wisconsin (Figure 4).

Of the 14 potential beneficial use impairments, the Menominee River was identified as impaired for 6, including: restrictions on fish and wildlife consumption, degradation of benthos, restrictions on dredging activities, restrictions on recreational contact (beach closings), degradation of fish and wildlife populations, and loss of fish and wildlife habitat. The restrictions on recreational contact beneficial use impairment was removed in 2011. The Menominee River became an AOC primarily due to arsenic-contaminated sediments found in the turning basin portion of the lower river resulting from industrial processes and discharges by the Anslul Fire Protection Company (now TYCO). Most of the use impairments were influenced by the presence of contaminated sediments. Arsenic, paint sludge, and coal tar (polyaromatic hydrocarbons [PAH]) were identified as the three most significant contaminants, although other more minor sediment contaminants exist. Lumbering, log driving, urbanization, invasive species, habitat fragmentation, and combined sewer/storm water discharges also contributed to the use impairments (Wisconsin Department of Natural Resources [WDNR] and MDEQ, 2011 and 2012).

Additional information, including links to reports and the status of the Menominee River AOC, can be found on the MDEQ (MDEQ, 2014) and United States Environmental Protection Agency (USEPA, 2014) Web sites at *(The link provided was broken and has been removed)* and *(The link provided was broken and has been removed)*, respectively.



Figure 4. The Lower Menominee River AOC as delineated by the USEPA.

2.4 Attainment Status

The Federal Water Pollution Control Act (PL 92-500), also known as the Clean Water Act (CWA), requires states to provide the USEPA with an assessment of water quality. The MDEQ currently fulfills these reporting requirements through the submission of a biennial Integrated Report, which describes the attainment status of Michigan's surface waters relative to the designated uses specified in Michigan's WQS (see text box for description of designated uses).

Designated Uses

All surface waters of the state are designated and protected at a minimum for all of the following designated uses: agriculture, navigation, industrial water supply, warmwater fishery, other indigenous aquatic life and wildlife, partial body contact recreation, and fish consumption (R 323.1100[1][a]-[g] of the Part 4 Rules, WQS, promulgated under Part 31, Water Resources Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended). In addition, all surface waters of the state are designated and protected for total body contact recreation from May 1 to October 1 (R 323.1100[2]). Specific rivers and inland lakes as well as all Great Lakes and specific Great Lakes Connecting Channels are designated and protected for coldwater fisheries (R 323.1100[4]-[7]). Several specific segments or areas of inland waters, Great Lakes, Great Lakes bays, and Connecting Channels are designated and protected as public water supply sources (R 323.1100[8]).

The Integrated Report includes a chapter on assessment methodology (Chapter 4), which describes the data and information used to determine designated use support, explains how these data and information are used to determine designated use support for surface waters of the state, and describes how surface water resources are reported using five categories: fully supporting, partially supporting, not supporting, insufficient information, or not assessed. Waters that do not support their designated uses or meet WQS are considered impaired and require the development of a Total Maximum Daily Load (TMDL), unless it is determined the impairment is not caused by a pollutant (e.g., channelization) or other approved pollution control mechanisms (e.g. contaminated sediment cleanup) are in place and are expected to result in designated use attainment.

2.4.1 TMDLs

When a lake or stream does not meet WQS for a pollutant, a study must be completed to determine the amount of a pollutant that a water body can receive from point sources and nonpoint sources (NPS) and still meet WQS, including a margin of safety. A TMDL is a document that describes the process used to determine how much pollutant load a lake or stream can assimilate and allocates the loads to sources. The purpose of the TMDL is to gather data, identify pollutant sources, and develop appropriate goals and reasonable assurance that will ensure WQS are met and designated uses are restored (MDEQ, 2014d) (Michigan.gov/egle/about/Organization/Water-Resources/tmdls/statewide-mercury-tmdl).

The MRW does not currently have any completed and approved TMDLs (MDEQ, 2014e) (Michigan.gov/egle/about/Organization/Water-Resources/tmdls/epa-approved-tmdls). Statewide TMDLs for Polychlorinated Biphenyls (PCB) and mercury have been (PCBs), or will be (mercury) submitted to the USEPA for approval. These TMDLs will address inland water bodies listed as not attaining WQS in the MRW due to these two contaminants.

According to attainment results in the 2014 Integrated Report (MDEQ, 2014g), all river and stream sites surveyed in 2012 for biological attainment using a macroinvertebrate rapid

assessment procedure met the WQS for the other indigenous aquatic life and wildlife designated use (n=15). This calculates to all stream miles meeting this use with a 95% confidence interval of 81-100%.

Several water bodies are listed as not supporting the designated use of other indigenous aquatic life and wildlife due to ambient water concentrations of mercury and PCBs, which exceed WQS. These water bodies will be addressed by statewide mercury and PCB TMDLs that are currently being developed by the MDEQ (MDEQ, 2014d).

The MRW has several water bodies that are listed as not supporting designated uses of fish consumption due to the bioaccumulation of chemicals in fish tissue.

2.4.2 FISH CONSUMPTION ADVISORIES

In addition to the statewide fish consumption advisory for mercury and PCBs, the Michigan Department of Health and Human Services (MDHHS) has placed specific consumption advisories on sections of the Menominee River (Dickinson and Menominee Counties). PCBs and mercury are the driving contaminants of these advisories. DDT has also been cited as a cause for the advisory. Species collected for analysis include: Black Crappie, Bluegill, Carp, Northern Pike, Rock Bass, Smallmouth Bass, Sucker Species, Walleye, and Yellow Perch. Specific water body information can be found on the MDHHS Web site (MDHHS, 2014).

2.5 Permitted Discharges

The NPDES permit process was initiated by the federal Water Pollution Control Act amendments of 1972. The purpose of the program is to control the discharge of pollutants into surface waters by imposing effluent limitations on point source discharges to protect human health and the environment (MDEQ, 2015). Currently, authority for NPDES permit issuance rests with the MDEQ. All NPDES permits are written to ensure that surface waters that receive discharges will meet WQS. Michigan's WQS are designed to not only protect for aquatic life ("fishable") and recreation ("swimmable") uses, but also protect for other uses of the receiving waters, including agriculture, public and industrial water supply, and navigation.

There are 43 NPDES permits impacting surface water in the MRW: 7 municipal, 9 industrial, and 27 storm water only. Locations of permitted facilities are presented in Figure 5 and additional information regarding specific permits can be found in Table 1 and on the MDEQ Web site (MDEQ, 2015) (Michigan.gov/egle/about/organization/water-resources/npdes). Some general activities that are permitted include Wastewater Treatment Plants (WWTP), mining discharges, and industrial discharges.

Table 1. NPDES permits located in the MRW.

Permit No	Facility Name	Township Name	HUC Name	Latitude	Longitude	Type
MIS410449	James Spicer Inc	Iron River	Brule	46.09139	-88.65944	Storm Water Only
MIS410579	Raymond Iron Inc	Stambaugh	Brule	46.07105	-88.64009	Storm Water Only
MIS410465	Hebert Construction Co	Iron River	Brule	46.09139	-88.67472	Storm Water Only
MI0043281	West Iron Co SA WWTP	Stambaugh	Brule	46.05528	-88.62833	Municipal
MI0045063	PolyOne Corp-Dober Mine Cpx	Stambaugh	Brule	46.07278	-88.63444	Industrial
MIS410065	NewPage-Iron River Woodyard	Iron River	Brule	46.07500	-88.64000	Storm Water Only
MIS410268	Northeastern Pro Corp-Caspian	Stambaugh	Brule	46.05833	-88.62500	Storm Water Only
MIS410298	Connor Sports Flooring-Amasa	Iron River	Brule	46.19583	-88.42083	Storm Water Only
MIS410299	Magiglide Inc-Crystal Falls	Crystal Falls	Brule	46.19583	-88.42083	Storm Water Only
MIG580252	Republic Twp WWSL	Republic	Michigamme	46.38250	-87.97417	Municipal
MIS410281	Coreys Auto Salvage-Ingalls	Stephenson	Menominee	45.38583	-87.60806	Storm Water Only
MI0042170	Verso Quinnesec LLC-Quinnesec	Breitung	Menominee	45.79569	-87.96158	Industrial
MI0023205	Iron Mountain-Kingsford WWTP	Breitung	Menominee	45.78556	-88.08500	Municipal
MI0053601	FibreK-Menominee	Menominee	Menominee	45.10250	-87.60028	Industrial
MI0057428	Ford/Kingsford Site GWCU	Breitung	Menominee	45.79417	-88.10333	Industrial
MIS410277	Twin Co Airport-Menominee	Menominee	Menominee	45.12083	-87.62917	Storm Water Only
MIS410304	Performance Lumber Corp-Carney	Nadeau	Menominee	45.57917	-87.56250	Storm Water Only
MIS410654	Northern Coatings and Chemical	Menominee	Menominee	45.10389	-87.61056	Industrial
MIS410275	Ruleau Bros Inc-Stephenson	Cedarville	Menominee	45.40833	-87.60833	Storm Water Only
MI0020214	Norway WWTP	Norway	Menominee	45.77889	-87.90583	Municipal
MIS410523	FedEx Freight-Quinnesec	Breitung	Menominee	45.80292	-87.97762	Storm Water Only
MIG570221	Stephenson WWTP	Stephenson	Menominee	45.41167	-87.61583	Municipal
MIG250231	Northern Coatings and Chemical	Menominee	Menominee	45.10389	-87.61056	Industrial
MIG250227	MCC-Norway NCCW	Norway	Menominee	45.78312	-87.91489	Industrial
MIG250407	Ruleau Brothers Inc	Mellen	Menominee	45.41056	-87.45972	Industrial
MI0000060	Clearwater Paper-Menominee	Menominee	Menominee	45.09861	-87.59667	Industrial
MI0025631	Menominee WWTP	Menominee	Menominee	45.10233	-87.61755	Municipal
MIS410264	Bacco Const-Plt 12-Iron Mtn	Breitung	Menominee	45.80000	-88.05000	Storm Water Only
MIS410266	Wallys Auto Salvage-Iron Mtn	Breitung	Menominee	45.80389	-87.96889	Storm Water Only
MIS410273	Forte Industries-Stephenson	Stephenson	Menominee	45.40583	-87.60972	Storm Water Only
MIS410285	Escanaba and Lake Superior RR	Sagola	Menominee	45.79000	-87.90639	Storm Water Only
MIS410287	Great Lakes Wood Preservers	Nadeau	Menominee	45.60000	-87.55000	Storm Water Only
MIS410289	Northern Star Industries Inc	Breitung	Menominee	45.92500	-88.04583	Storm Water Only
MIS410291	US Special Delivery Inc	Breitung	Menominee	45.80972	-88.04861	Storm Water Only
MIS410293	Nelson Paint Co	Breitung	Menominee	45.80417	-88.06667	Storm Water Only
MIS410294	Grede LLC	Breitung	Menominee	45.79694	-88.07000	Storm Water Only
MIS410295	Custom Heat Treat-Kingsford	Breitung	Menominee	45.79583	-88.05833	Storm Water Only
MIS410297	Eagle Tool Co-Kingsford	Breitung	Menominee	45.80833	-88.06667	Storm Water Only
MIS410301	Wendricks Truss-Hermansville	Meyer	Menominee	45.73806	-87.62694	Storm Water Only
MIS410302	Don Machald and Sons Fence Co	Mellen	Menominee	45.34750	-87.61528	Storm Water Only
MIG580310	Meyer Twp Sewer Dist	Menominee	Menominee	45.69587	-87.61434	Municipal
MIS410064	United Abrasive-Vulcan	Norway	Menominee	45.76667	-87.85000	Storm Water Only
MIS410286	Superior Cedar Prod-Carney	Nadeau	Menominee	45.58389	-87.55444	Storm Water Only

*List does not include Groundwater or No Exposure permits

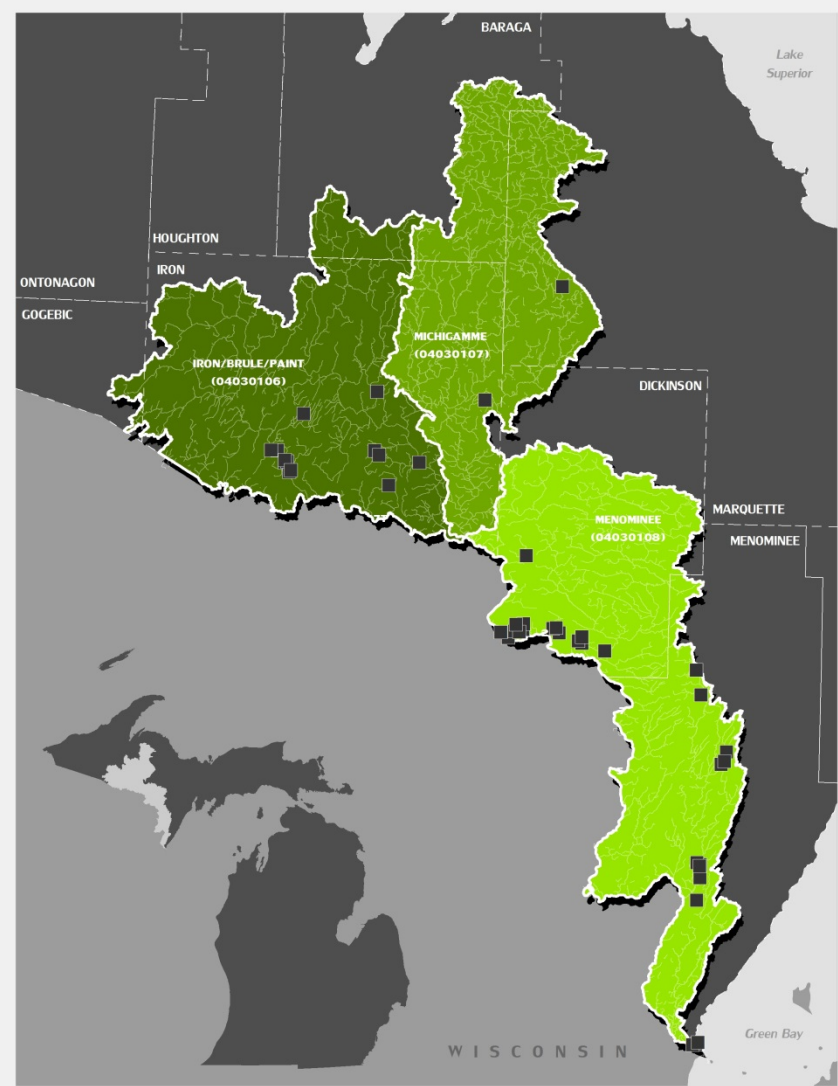


Figure 5. Location of NPDES permitted facilities within the MRW.

2.3 Invasive Species

An invasive species is defined as a species that is not native and whose introduction causes, or is likely to cause, economic or environmental harm, or harm to human health. Michigan's aquatic ecosystems are experiencing significant negative effects from aquatic invasive species (AIS) that are currently present in the state and are continually threatened by new invasions (MDEQ, 2014g).

To assist with the tracking of currently established AIS and the potential discovery of undocumented species, MDEQ biologists currently include an AIS survey component into their site assessments. The AIS survey conducted at each site is not exhaustive and it is possible that certain species may have been present and not observed. These surveys are compiled by SWAS AIS staff and the data are entered into the Midwest Invasive Species Information Network (MISIN). Additional species information as well as distribution information can be found on the MISIN Web site (MISIN, 2014) (<https://www.misin.msu.edu/>).

2.4 Watershed Management Plans (WMP)

A WMP serves as a guide for communities to protect and improve water quality and considers all uses, pollutant sources, and impacts within a drainage area. More than 150 WMPs have been developed across Michigan at the local level utilizing MDEQ grants awarded by the NPS Program. Grant funding for implementation of best management practices (BMP) identified within the WMPs is available through the federal CWA as well as the Clean Michigan Initiative (CMI) NPS Pollution Control Grant Program. The MWR contains four (Figure 6) approved or pending WMPs (MDEQ, 2013a). More information can be found on the MDEQ's Web site under the NPS Section (MDEQ, 2014b). These WMPs were approved under the CMI administrative rules and were funded under Section 319 of the CWA (MDEQ, 2013a).

2.4.1 FUMEE CREEK

Fumee Creek Watershed Project (Dickinson County) is a 24,500-acre watershed in Dickinson County, which flows into the Menominee River. Eight of the nine streams within the MRW are warmwater streams and Fumee Creek is a coldwater stream. A significant portion of the watershed is urban and 48% is forested. Suspected pollutants are sediments, nutrients, and toxics.

A copy of the approved WMP is available upon request.

2.4.2 HAMILTON CREEK

Hamilton Creek Watershed Project (Dickinson County) is an 18,322-acre watershed, which flows into the Sturgeon River. The area includes 12 lakes and 6 creeks.

A copy of the approved WMP is available upon request.

2.4.3 IRON RIVER WATERSHED

The Iron River Watershed Project is located in the UP within Iron County and consists of 38 miles of streams draining 61,445 acres. Of this area, 57% is forested, 16% is urban, 12% is agricultural, 7% is wetland, and the remaining 8% falls under other categories. This project was initiated by concerned citizens of Iron County and has been successful in installing numerous BMPs that reduced sediment, phosphorous, and nitrogen from reaching the Iron River.

A copy of the approved WMP is available upon request.

2.4.4 PINE CREEK WATERSHED

The Pine Creek watershed consists of approximately 47,350 acres in Dickinson County. The Pine Creek watershed is approved under the CMI administrative rules and was funded under Section 319. This largely forested watershed has been subjected to excessive sediment deposition, which negatively affects fish habitat. Sediment, nutrients, and pesticides from agricultural sources were reduced to improve the quality of the water.

A copy of the approved WMP is available upon request.

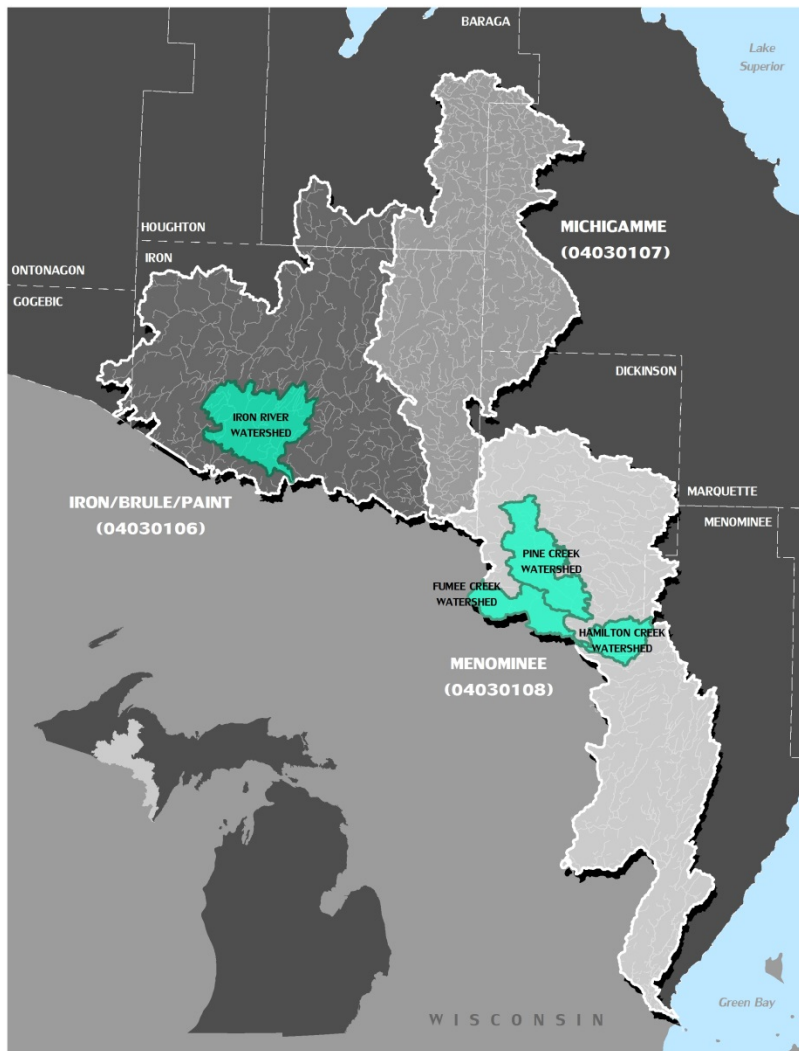


Figure 6. WMPs within the MRW.

2.5 NPS Projects

Although no NPS projects are currently active, several have been implemented in the MRW since 1995 (Table 2). These projects have addressed watershed issues such as failing road crossings, sedimentation/erosion issues, and public education. Success stories are available for projects conducted within the MRW on Fitzgerald Creek (White Water Associates, 2013), Fumee Creek (White Water Associates, 2013a), White Creek (MDEQ, 2012a), Pine Creek, Deer River, and Porterfield Creek (MDEQ, 2014a). More project-specific information can be found in the project fact sheets located on the MDEQ Web site (MDEQ, 2014c) (Michigan.gov/egle/about/Organization/Water-Resources/nonpoint-source/Project-Summaries).

Table 2. MDEQ NPS Program Projects in the MRW.

HUC	Project Name	Project Description	End Date	Funding source
04030108	Pine Creek	This multi-year project addresses the issue of variable flow volume resulting from sediment deposition related to abusive land use practices such as near-stream land development, stream bank erosion, poorly constructed road crossings, agricultural land use practices, and silvicultural management and harvest activities in the Pine Creek watershed located in the central UP (Dickinson County).	6/30/1995	319
04030108	Pine Creek	Pine Creek (Dickinson County) watershed is located in a primarily forested area. The creek has been impacted by soil eroding from forestlands, agricultural operations, and road crossings. The project is focusing on the implementation of agricultural, forestry, and transportation BMPs to decrease the amount of soil reaching Pine Creek. Public education is aimed at increasing awareness of erosion problems. The project has set up forestry BMP demonstration sites for educational purposes. This project was funded for additional years to complete their goals. See contract/project 1998-0012 and 1999-0032.	9/30/2000	319
04030108	Pine Creek #2	Pine Creek (Dickinson County) watershed is located in a primarily forested area. The creek has been impacted by soil eroding from forestlands, agricultural operations, and road crossings. The project is focusing on the implementation of agricultural, forestry, and transportation BMPs to decrease the amount of soil reaching Pine Creek. Public education is aimed at increasing awareness of erosion problems. The project is in the process of setting up forestry BMP demonstration sites for educational purposes.	6/30/2000	319
04030108	Pine Creek #3	Pine Creek (Dickinson County) watershed is located in a primarily forested area. The creek has been impacted by soil eroding from forestlands, agricultural operations, and road crossings. The project is focusing on the implementation of agricultural, forestry, and transportation BMPs to decrease the amount of soil reaching Pine Creek. Public education is aimed at increasing awareness of erosion problems. The project is in the process of setting up forestry BMP demonstration sites for educational purposes (April 1, 1999-March 31, 2000).	9/30/2000	319
04030108	District 5 Road Bridge	Request for funds to replace an existing bridge over the Pine Creek (on District 5 Road), a designated second quality coldwater trout stream. The existing structure is a single span concrete deck on steel stringers, 45 feet long by 24 feet wide. The Pine Creek WMP identifies sediment as the primary pollutant for the watershed, and ranks the sources (road crossing ranks as #5 contributing source). The existing structure has load limitations, which prohibit logging trucks from using this route to get to and from the Copper County State Forest. Loaded log trucks are required to use an alternative route, which has a culvert structure as a bridge over the Pine Creek and is being crushed by the heavy trucks. The District 5 Road is identified as a direct source of sediment into the Pine Creek in the WMP, and as an indirect source, since its load limits require trucks to use an alternate crossing, which also contributes sediment into the creek.	12/31/2004	CMI NPS
04030108	Pine Creek	Project will address sedimentation and nutrient concerns from numerous sources within the watershed. Proposed activities include: stabilization of 12 road stream crossings; stabilize 7 sites of streambank erosion; install 3 livestock exclusion systems; install BMPs at 5 forest access road stream crossings; remediate 4 recreational trails; and install 5 animal waste systems.	1/30/2004	CMI NPS

HUC	Project Name	Project Description	End Date	Funding source
04030108	Hamilton Creek Watershed Planning	Hamilton Creek watershed project (Dickinson County) is an 18,322-acre watershed, which flows into the Sturgeon River. The area includes 12 lakes and 6 creeks. Pollutants of concern are nutrients, bacteria, and sedimentation from agricultural areas. Hamilton Lake has been listed on the MDEQ TMDL list as a mercury lake.	3/31/2003	CWA
04030108	Pine Creek	The Pine Creek watershed consists of approximately 47,350 acres in Dickinson County. This largely forested watershed has been subjected to excessive sediment deposition, which affects fish habitat. Under our current CMI grant, BMPs will be implemented at approximately 15 sites identified in the Pine Creek WMP. This project will compliment those efforts by providing information and education on the use and effectiveness of BMPs, and to nurture public involvement and stewardship activities.	1/16/2004	319
04030108	Hamilton Creek Watershed Implementation	The Hamilton Creek watershed covers approximately 18,500 acres in southeastern Dickinson County and empties into the Menominee River. The watershed includes several trout streams and 11 lakes and ponds. The majority of the watershed is forested (65%) with some agriculture (21.7%) and a small urban area (1.3%). The remaining area is non-forested (4.8%), wetland (5.1%), and water (2.1%). The entire watershed is used for outdoor recreation, including fishing, boating, hunting, and snowmobiling. Water is also used for agricultural purposes. Approximately 75% of the population lives on the water, the impacts of which include increased nutrient and sediment loads. Some parts of the watershed have been experiencing algal blooms, low oxygen levels, and high biological oxygen demand. The watershed is also recovering from historic uses of mining and clear-cutting that occurred at the turn of the century.	9/30/2009	CMI NPS
04030108	Fumee Creek Watershed	The Fumee Creek watershed is a tributary of the Menominee River and covers the urban southwestern portion of Dickinson County. Composed of 19 lakes and 6 creeks, 9 subwatersheds drain the 24,500-acre Fumee Creek watershed. Even though this watershed is the most urban and heavily populated area in Dickinson County, the watershed remains 48% forested. Other watershed land uses are 24% urban, 5% agriculture, 2% wetland, and 21% other.	9/30/2009	CMI NPS
04030106	Iron River Planning	Iron River 604(b) watershed project will develop a WMP to protect and restore the Iron River, a coldwater trout stream. The primary pollutant is sediment.	3/31/2001	604b
04030106	Iron River Watershed - Physical Improvements	The Iron River watershed consists of 38 miles of streams draining 61,445 acres in southwestern Iron County. Of this area, 12% is used for agricultural purposes, 16% is urban, 57% forested, 7% wetland, with the remaining 8% falling under other classifications. The Iron River watershed project is an endeavor initiated by concerned citizens of Iron County who recognized the importance of the Iron River as a blue ribbon brook trout stream. Over the years, acid mine drainage, wastewater treatment effluent, and most recently sediment and polluted runoff have all contributed toward negatively impacting the Iron River.	10/31/2004	CMI NPS
04030106	Iron River Watershed - Non-Physical Improvements	The Iron River watershed consists of 38 miles of streams draining 61,445 acres in southwestern Iron County. Of this area, 12% is used for agricultural purposes, 16% is urban, 57% forested, 7% wetland, with the remaining 8% falling under other classifications. The Iron River watershed project is an endeavor initiated by concern citizens of Iron County who recognized the importance of the Iron River as a blue ribbon brook trout stream. Over the years, acid mine drainage, wastewater treatment effluent, and most recently sediment and polluted runoff have all contributed toward negatively impacting the Iron River.	10/31/2004	CWA
04030106	Fumee Creek Watershed Information and Education	The Fumee Creek watershed education project covers a 24,500-acre watershed in southwestern Dickinson County, Michigan, and complements a CMI NPS pollution control grant (2002-0079). Its 19 lakes, 6 creeks and 9 subwatersheds drain to top quality warmwater Menominee River. Although 48% forested, it is the most urban (24%), heavily populated area in Dickinson County. Remaining land uses: 5% agriculture, 2% wetland, and 21% other. Sediment pollution from storm water was the primary concern identified in the WMP. Factors are significant development, highly erodible soils, and lack of local ordinances. Five governmental units, 3 school districts, 26,000 residents and many tourists are targeted. Adoption of local storm water ordinances is a primary goal. School highlights include "Know Your Watershed" field trips, plus development of a 20-acre outdoor classroom featuring stream channel restoration. U.S. Highway 1/141 runs through the watershed and increases project visibility.	6/29/2007	319

3 MONITORING

3.1 River and Stream Biological Surveys

Monitoring by MDEQ SWAS biologists generally follows a 5-year rotating cycle, and the results are summarized in watershed reports such as this. Previous reports for the MRW were completed in 2007 (MDEQ, 2008) and 2002 (MDEQ, 2003). Invertebrate assessment scores from status and trend sites assessed in 2007 and 2012 are presented in Table 3.

Other monitoring activities in the MRW since 2007 include sampling on Fumee Creek (White Water Associates, 2013a), Fitzgerald Creek (White Water Associates, 2013), Brule Lake (MDEQ, 2007a), Fence Lake (MDEQ, 2007), White Creek (MDEQ, 2012a), Menominee River (MDEQ, 2011), and Iron River (White Water Associates, 2008). The objectives of these targeted monitoring efforts include dam removal impact assessment, lake water quality investigations, contaminant investigations, and assessment of restoration activities. Results are discussed later in this section (3.1.2).

Biological and physical habitat conditions of selected streams located in the MRW were assessed by the MDEQ in 2012. Qualitative macroinvertebrate community surveys were performed using Procedure 51 (MDEQ, 2008a) on wadeable streams at 23 locations and Procedure 22 (MDEQ, 2013b) on nonwadeable rivers at 3 locations. Sample locations are presented in Figure 7.

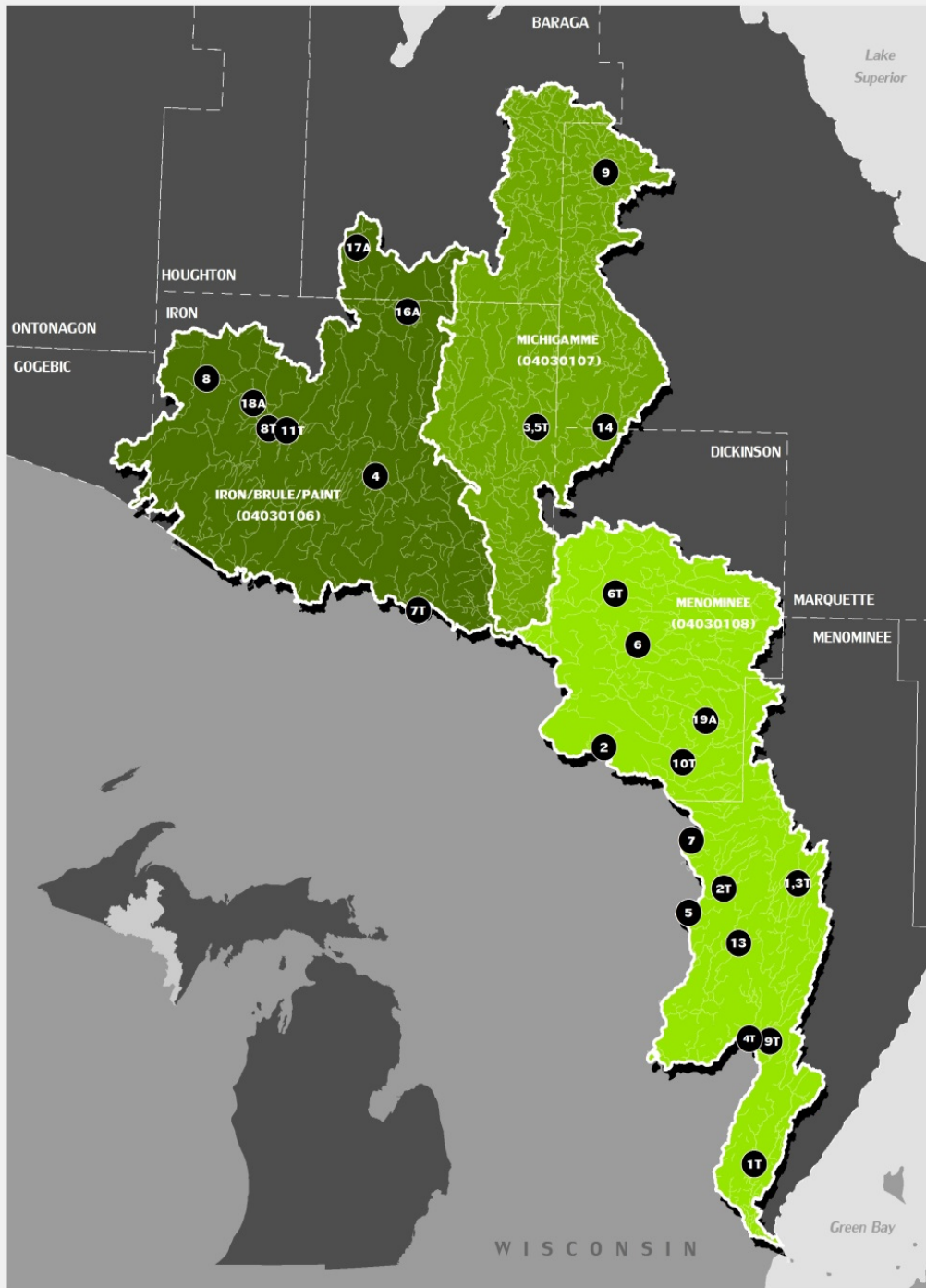


Figure 7. MDEQ stream/river biosurvey sampling locations in 2012.

Eleven trend sites were identified to determine watershed and statewide water quality trends. These sites will be monitored every five years to determine water quality trends within the watershed. Fifteen sites were selected using a stratified random selection process with the goal of addressing statewide and watershed-specific water quality concerns and attainment status.

The specific water bodies and the type of sampling performed at each are presented in Table 3. Goals of the monitoring were to:

- Qualitatively assess current biological, chemical, and physical habitat conditions.
- Evaluate water quality trends.
- Determine whether stream segments are attaining or not attaining Michigan WQS.
- Identify sources of water quality impairment.

Table 3. Location and scores of water bodies monitored in 2007 and 2012 by the MDEQ in the MRW.

SITE ID	STORET	WATER BODY NAME	LATITUDE	LONGITUDE	COUNTY	HABITAT SCORE 2012 ¹	INVERT SCORE 2012 ²	INVERT SCORE 2007 ²	COMMENTS
1	550124	Holmes Creek	45.60901	-87.57492	Menominee	124	3	--	Status
2		Menominee River	45.79513	-87.99670	Dickinson	-- ³	85 ⁴	--	Status
3	360146	Fence River	46.24520	-88.15964	Iron	181	8	5	Status
4	360166	Paint River	46.16902	-88.50449	Iron	176	4	--	Status
5		Menominee River	45.56370	-87.80650	Menominee	-- ³	54 ⁴	--	Status
6	220145	Mitchell Creek	45.94166	-87.92921	Dickinson	137	0	--	Status
7		Menominee River	45.66624	-87.80446	Menominee	-- ³	38 ⁴	--	Status
8	360158	North Branch Paint River	46.29864	-88.87677	Iron	155	0	2	Status
9	520511	Peshekee River	46.60953	-88.02228	Marquette	179	4	--	Status
13	550217	Little Shakey Creek	45.52258	-87.69837	Menominee	144	-2	--	Status
14	520512	Michigamme River	46.24811	-88.01042	Marquette	163	3	--	Status
16A	360168	East Branch Net River	46.40352	-88.44583	Iron	188	3	--	Status
17A	70139	West Branch Net River	46.49204	-88.55970	Baraga	174	1	--	Status
18A	360167	Bush Creek	46.26643	-88.77394	Iron	181	-1	--	Status
19A	220146	Cassidy Creek	45.83646	-87.77876	Dickinson	139	-1	--	Status
1T	550191	Kelley Creek	45.20980	-87.65670	Menominee	149	0	0	Trend
2T	550140	DeHaas Creek	45.59900	-87.73250	Menominee	159	5	2	Trend
3T	550124	Holmes Creek	45.58750	-87.58160	Menominee	124	3	4	Trend
4T	550134	Phillips Creek	45.38720	-87.67220	Menominee	130	-3	--	Trend
5T	360146	Fence River	46.24540	-88.15990	Iron	181	8	5	Trend
6T	220131	W B Sturgeon River	46.01340	-87.97980	Dickinson	153	4	-3	Trend
7T	360154	Brule River	45.98110	-88.40370	Iron	159	4	--	Trend
8T	360157	S B Paint River	46.23160	-88.73870	Iron	183	5	4	Trend
9T	550110	Little Cedar River	45.38470	-87.62820	Menominee	164	4	4	Trend
10T	220001	Sturgeon River	45.77710	-87.82699	Dickinson	166	8	--	Trend
11T	360124	Paint River	46.22950	-88.70023	Iron	174	6	6	Trend

¹Habitat scores (>154-Excellent, 105-154-Good, 56-104-Marginal, <56-Poor)

²Invertebrate assessment scores (+5 to +9-Excellent, +4 to -4-Acceptable, -5 to -9-Poor)

³Habitat assessment scoring is not available for nonwadeable locations

⁴Nonwadeable invertebrate assessment score (>100-Excellent, 50 to 100-Good, 25 to 50-Marginal, <25-Poor)

3.1.1 STATUS AND TREND SITE DETAILS

For benthic invertebrates, 4 of the 21 sites scored Excellent; 12 scored in the upper half of the Acceptable range; and only 5 were in the lower Acceptable range. No sites scored as Poor. In addition, stream habitat was Excellent at 14 locations and Good at 7 others. No sites were rated Fair or Poor for habitat.

Eight trend sites (Table 3) were resampled using Procedure 51 during 2012, all locations scored within 3 points of the previous sampling effort (2007), which is within typical margins of variation.

3.1.1.1 04030106 IRON/BRULE/PAINT

Five status locations (4, 8, 16A, 17A, and 18A) and 3 trend locations (7T, 8T, and 11T) were scored in this portion of the MRW in 2012 (Figure 7).

Invertebrates at the South Branch Paint River (8T) and the Paint River (11T) scored in the excellent range while all other locations scored in the middle to upper range of acceptable. Bush Creek (18A) held the lowest invertebrate score (-1) and was noted as having minimal flow and borderline lentic habitat. These conditions are likely the cause for the lower score. Habitat at all locations in this HUC scored in the excellent range.

3.1.1.2 04030107 MICHIGAMME

Three status locations (3, 9, and 14) and one trend location (5T) were assessed in this portion of the MRW (Figure 7). Location 3 and 5T happened to be the same location and was only sampled once.

Invertebrates in the Fence River (5T) scored in the excellent range while the Michigamme River (14) and Peshekee River (9) scored in the higher end of acceptable. All locations scored excellent for habitat. No particular issues were noted at any of the locations.

3.1.1.3 04030108 MENOMINEE

Four status locations (1, 6, 13, and 19A) and 7 trend locations (1T, 2T, 3T, 4T, 6T, 9T, and 10T) were assessed in this portion of the MRW (Figure 7). Locations 1 and 3T happened to be the same location and were only sampled once.

The DeHass Creek (2T) and Sturgeon River (10T) locations scored in the excellent range for invertebrates. All other locations scored in the acceptable range. Phillips Creek (4T) scored at the bottom of the acceptable range (-3) and had high proportions of amphipods and chironomids, which are generally tolerant taxa. The available habitat at Phillips Creek was impacted by sand and low flow, which likely contributed to the lower score. Little Shakey Creek (13) also scored in the lower range of acceptable (-2) and was possibly impacted by heavy detritus along the banks and low water levels/flow. No particular issues were noted at other locations. Habitat scores were in the excellent range for all sites in this HUC except the West Branch Sturgeon (6T), Phillips Creek (4T), Holmes Creek (1, 3T), Cassidy Creek (19A), and Little Shakey Creek (13); those sites scored in the upper end of acceptable.

3.1.1.4 NONWADEABLE LOCATIONS

Three locations in the MRW were considered nonwadeable (Table 3) and were sampled using Procedure 22 (MDEQ, 2013b). These locations were surveyed by a contractor with results reported to the MDEQ.

All three locations (2, 5, and 7) were on the Menominee River (Figure 7) and invertebrate scores ranged from marginal to excellent (Table 3). Reported data can be found in Appendix A.

3.1.2 TARGETED MONITORING

3.1.2.1 BRULE RIVER

A fisheries habitat improvement project was implemented on the Brule River by use of whole trees, which were dropped by helicopter into the river during 2009, 2010, and 2011. Biological and habitat (Procedure 51) assessments around this improvement as well as upstream (control) were requested by the Michigan Department of Natural Resources (MDNR). The upstream location (189 Road Crossing) and the downstream location (Scott Lake Road) within the habitat improvement were very similar in score (4 and 5, respectively) and species composition (36 taxa at both locations). The project added stable fisheries habitat to the stream but Procedure 51 scores did not reflect a substantial difference in invertebrate assemblage.

3.1.2.2 FUMEE CREEK

Fumee Creek was the subject of a stream morphology study, as well as Procedure 51 benthic macroinvertebrate and habitat assessments, conducted after the installation of a BMP involving erosion control, grade stabilization structures, and storm water diversion channels. The surveys indicated a significant improvement in stream quality due to the BMP installation. Details of the assessment are contained in a separate report (White Water Associates, 2013a).

3.1.2.3 FITZGERALD CREEK

Procedure 51 biological and habitat assessments, as well as a stream morphology survey, were requested for a section of Fitzgerald Creek to assess a BMP involving a rock-lined crossing and cattle exclusion project on the stream. Scores recorded after completion of the project were substantially higher than before the project was completed. Details of the assessment are contained in a separate report (White Water Associates, 2013).

3.1.2.4 IRON RIVER AT BUCK MINE

Procedure 51 biological and physical habitat surveys were conducted on the Iron River in Caspian, Michigan, upstream and downstream of the historic Buck Iron Mine in southwestern Iron County at Brady Road and immediately downstream of the Buck Mine effluent discharge point. Water chemistry samples of the marsh discharge were also collected. The purpose of this monitoring was to assess the effectiveness of BMPs implemented to facilitate the precipitation of metals prior to discharging into the Iron River. The monitoring concluded that the treatment system is working but may require periodic maintenance to continue functioning properly.

Details of the assessment can be found in a separate report (MDEQ, 2012).

3.1.3 INVASIVE SPECIES

In 2009, as part of a 2-year project, 50 sites across the MRW were monitored for presence of zebra and quagga mussels as well as native mussel species. This study was a one-time effort funded by the WDNR. As part of a companion project, the MDEQ initiated monitoring in 2011 for zebra and quagga mussels as well as native mussels in lakes in the MRW. Eight native mussel species as well as zebra mussels were identified during the study. No quagga mussels were documented. Zebra mussels were found in only 3 of the 50 (6%) sampling locations. The zebra mussel lakes included Chicagon Lake and Lake Emily in Iron County and Lake Antoine in Dickinson County (White Water Associates, 2011).

3.1.4 MDNR RIVER AND STREAM MONITORING

The MDNR, Fisheries Division, staff has conducted several fish collections on the rivers and tributaries (Table 4) in the MRW since 2010. These collections are spread throughout the MRW and are conducted for various purposes including stocking evaluations and population estimates. Completed water body reports (MDNR, 2014) and survey-specific information can be requested through MDNR staff (MDNR, 2014a).

Table 4. Rivers and Tributaries Surveyed by the MDNR, Fisheries Division, in the MRW since 2010.

River/Tributary	Year	County	Location	Purpose
Brule River	2010	Iron	41N31W16	Special Study
Chalk Hills Impoundment	2010	Menominee	36N29W17	Stocking Evaluation
Cooks Run	2010	Iron	44N36W28	General Survey
Crystal Falls Impoundment	2011		43N32W20	General Survey
East Branch Sturgeon River	2014	Iron	41N28W27	Status and Trends
West Branch Sturgeon River	2010	Dickinson	41N28W27	Status and Trends
Pine Creek		Dickinson	40N29W34	General Survey
South Branch Paint River	2011	Iron	44N35W08	Population Estimate

3.2 Lakes

3.2.1 LAKE MONITORING

From 2001-2010, with assistance from the USGS, the MDEQ monitored 729 public access lakes greater than 25 acres in size as part of the Lake Water Quality Assessment (LWQA) program. The MRW contained 45 of these lakes (Figure 8,

Table 5). The primary objectives of the LWQA program were to determine trophic conditions, identify waters of high and low quality, determine changes over time, identify emerging issues, and protect inland lake quality. Data are stored in the USGS National Water Information System (USGS, 2014).

In 2007 and 2012, the USEPA and its state, tribal, federal, and other partners implemented a survey of the nation's lakes, ponds, and reservoirs. The National Lakes Assessment (NLA) was designed to estimate the percentage of lakes that are in good, fair, or poor condition. The survey examined ecological, water quality, and recreational indicators with the goal of assessing how widespread key stressors (nitrogen, phosphorus, and acidification) are impacting the nation's lakes. Five lakes in the MRW were surveyed in 2007 and 2012 during the NLA effort (Figure 8,

Table 5). Specific information can be found on the USEPA Web site (USEPA, 2014).

The Cooperative Lakes Monitoring Program (CLMP) is a volunteer monitoring program, which helps citizens monitoring indicators of water quality in their lake and to document changes over time. Twelve lakes (Figure 8,

Table 5) have been monitored in the MRW and specific data can be located on the Michigan Clean Water Corps (MiCorps) Web site (MiCorps, 2014).

Witch Lake, in Marquette County (Figure 8,

Table 5) was sampled in 2002 as part of the Michigan State University (MSU) sediment coring project funded through a grant by the MDEQ. Mercury concentrations were found to peak in the 1950s followed by a decrease until the late 1990s and then increase until the surface (Parsons et al., 2006). Sediment concentration profiles in Witch Lake appeared to be greatly influenced by large inputs of terrestrial materials that are enriched with copper, possibly due to mining activities in the region. Peak copper concentrations in Witch Lake were significantly higher than in any of the other study lakes (Yohn et al., 2004).

The MDNR, Fisheries Division, staff has conducted several fish collections on 24 lakes (

Table 5) in the MRW since 2010. These collections are spread throughout the MRW (Figure 8) and are conducted for various purposes including stocking evaluations and population estimates.

Completed water body reports (MDNR, 2014) and survey-specific information can be requested through MDNR staff (MDNR, 2014a)

(*The link provided was broken and has been removed*).

Table 5. List of Lakes Sampled by the MDEQ and its partners in the MRW.

Monitoring Effort	Year	Lake Name	County	Latitude	Longitude	Trophic status
NLA 2007	2007	Blomgreen Marsh	Dickinson	45.87353	-87.80091	eutrophic
NLA 2007	2007	Silver Lake	Iron	46.15238	-88.82991	oligotrophic
NLA 2007	2007	Keewaydin, Lake	Marquette	46.60078	-88.11748	mesotrophic
NLA 2007	2007	Fence Lake	Baraga	46.47582	-88.19211	oligotrophic
NLA 2007	2007	Lotto Lake	Marquette	46.25517	-88.0902	mesotrophic
NLA 2012	2012	Silver Lake	Iron	46.15219	-88.8296	oligotrophic
NLA 2012	2012	Lake Mary	Menominee	45.45211	-87.75742	mesotrophic
NLA 2012	2012	Unnamed Lake	Marquette	46.27678	-88.06319	mesotrophic
NLA 2012	2012	Lake Alice	Baraga	46.69753	-88.08188	mesotrophic
NLA 2012	2012	South Pond	Dickinson	45.94918	-87.98362	oligotrophic
LWQA	2002	Lake Keewaydin	Baraga	46.59973	-88.12	mesotrophic
LWQA	2002	Ruth Lake	Baraga	46.56056	-88.21445	mesotrophic
LWQA	2002	Rock Lake	Dickinson	45.91056	-87.92973	mesotrophic
LWQA	2002	Bass Lake	Dickinson	45.8525	-88.06778	mesotrophic
LWQA	2002	Hamilton Lake	Dickinson	45.75584	-87.78278	eutrophic
LWQA	2002	Silver Lake	Dickinson	46.20361	-88.01723	mesotrophic
LWQA	2002	Ottawa Lake	Iron	46.08334	-88.76362	oligotrophic
LWQA	2002	Emily Lake	Iron	46.11278	-88.50084	eutrophic
LWQA	2002	Indian Lake	Iron	46.04237	-88.49639	oligotrophic
LWQA	2002	Buck Lake	Iron	46.03278	-88.41306	mesotrophic
LWQA	2002	Gibson Lake	Iron	46.19862	-88.4425	mesotrophic
LWQA	2002	Golden Lake	Iron	46.17223	-88.88751	oligotrophic
LWQA	2002	Winslow Lake	Iron	46.34445	-88.76112	mesotrophic

Monitoring Effort	Year	Lake Name	County	Latitude	Longitude	Trophic status
LWQA	2002	Michigamme Reservoir	Iron	46.16445	-88.23	mesotrophic
LWQA	2002	Michigamme Lake	Marquette	46.50889	-88.04889	mesotrophic
LWQA	2002	Witch Lake	Marquette	46.27917	-88.00334	oligotrophic
LWQA	2002	Arfelin Lake	Marquette	46.62917	-88.05778	oligotrophic
LWQA	2002	Horseshoe Lake	Marquette	46.27917	-88.04723	mesotrophic
LWQA	2007	Antoine Lake	Dickinson	45.83806	-88.03195	mesotrophic
LWQA	2007	Carney Lake	Dickinson	45.89667	-87.93334	mesotrophic
LWQA	2007	Mary Lake	Dickinson	45.75056	-87.82028	oligotrophic
LWQA	2007	Edey Lake	Dickinson	46.20084	-88.06334	mesotrophic
LWQA	2007	Six mile Lake	Dickinson	46.02306	-87.93667	eutrophic
LWQA	2007	Chicagon Lake	Iron	46.06306	-88.49728	oligotrophic
LWQA	2007	Sunset Lake	Iron	46.1325	-88.59667	mesotrophic
LWQA	2007	Swan Lake	Iron	46.16723	-88.39362	mesotrophic
LWQA	2007	Hagerman Lake	Iron	46.05834	-88.77612	oligotrophic
LWQA	2007	Fire Lake	Iron	46.19139	-88.46723	mesotrophic
LWQA	2007	Long Lake	Iron	46.12084	-88.45084	oligotrophic
LWQA	2007	Mary Lake	Iron	46.05834	-88.22834	oligotrophic
LWQA	2007	Runkle Lake	Iron	46.10195	-88.29889	mesotrophic
LWQA	2007	Bass Lake	Iron	46.04445	-88.77139	hypereutrophic
LWQA	2007	Brule Lake	Iron	46.05611	-88.83612	eutrophic
LWQA	2007	Cable Lake	Iron	46.35223	-88.58889	eutrophic
LWQA	2007	Camp Lake	Iron	46.04195	-88.71473	oligotrophic
LWQA	2007	Deer Lake	Iron	46.32917	-88.32528	mesotrophic
LWQA	2007	First Fortune Lake	Iron	46.08834	-88.42417	oligotrophic
LWQA	2007	Iron Lake	Iron	46.13973	-88.65834	mesotrophic
LWQA	2007	James Lake	Iron	46.19973	-88.88751	oligotrophic
LWQA	2007	Stanley Lake	Iron	46.05834	-88.74917	mesotrophic
LWQA	2007	Long Lake	Menominee	45.42112	-87.82306	mesotrophic
LWQA	2008	Beaufort Lake	Baraga	46.53556	-88.18695	mesotrophic
LWQA	2008	Ellen Lake	Iron	46.1725	-88.15195	oligotrophic
LWQA	2008	Stager Lake	Iron	45.98501	-88.33223	oligotrophic
LWQA	2008	Squaw Lake	Marquette	46.30028	-88.06695	oligotrophic
CLMP	1980	Six mile	Dickinson	46.02306	-87.93667	oligotrophic
CLMP	1980	Michigamme	Marquette	46.50889	-88.04889	oligotrophic
CLMP	1980	Ann	Menominee	45.4561	-87.75024	oligotrophic
CLMP	1982	Resort	Menominee	45.42196	-87.82559	oligotrophic
CLMP	1984	Brule	Iron	46.05612	-88.83612	oligotrophic
CLMP	1991	Helen	Marquette	46.32417	-87.92278	oligotrophic
CLMP	1991	Squaw	Marquette	46.30028	-88.06695	oligotrophic

Monitoring Effort	Year	Lake Name	County	Latitude	Longitude	Trophic status
CLMP	2002	Swan	Iron	46.16628	-88.39276	mesotrophic
CLMP	2006	Cowboy Lake	Dickinson	45.81188	-88.12098	oligotrophic
CLMP	2006	Crystal	Dickinson	45.81165	-88.07762	oligotrophic
CLMP	2011	Louise	Dickinson	45.7495	-87.8081	oligotrophic
CLMP	2012	Antoine	Dickinson	45.83806	-88.03195	oligotrophic
DNR	2010	Brule River	Iron	45.9525	-88.1986	N/A
DNR	2010	Chalk Hills Impoundment	Menominee	45.5141	-87.8019	N/A
DNR	2010	Cooks Run	Iron	46.1818	-88.8211	N/A
DNR	2011	Crystal Falls Impoundment		46.1087	-88.3359	N/A
DNR	2014	East Branch Sturgeon River	Iron	45.9207	-87.7866	N/A
DNR	2010	West Branch Sturgeon River	Dickinson	45.9254	-87.7976	N/A
DNR	2010	Pine Creek	Dickinson	45.8179	-87.8777	N/A
DNR	2011	South Branch Paint River	Iron	46.2308	-88.719	N/A
DNR	2010	Dragon Pond	Iron	46.3169	-88.9839	N/A
DNR	2010	Edey Lake	Dickinson	46.1983	-88.0558	N/A
DNR	2010	Fire Lake	Iron	46.1882	-88.4622	N/A
DNR	2010	Hagerman Lake	Iron	46.0607	-88.7784	N/A
DNR	2010	Indian Lake	Iron	46.0428	-88.4956	N/A
DNR	2010	Island Lake	Dickinson	45.9682	-87.999	N/A
DNR	2010	Runkle Lake	Iron	46.1025	-88.3022	N/A
DNR	2010	Winslow Lake	Iron	46.3453	-88.7641	N/A
DNR	2011	Fire Lake	Iron	46.1882	-88.4622	N/A
DNR	2011	Genes Pond	Dickinson	46.0653	-87.8564	N/A
DNR	2011	Hagerman Lake	Iron	46.0607	-88.7784	N/A
DNR	2011	Indian Lake	Iron	46.0428	-88.4956	N/A
DNR	2011	Lake Ottawa	Iron	46.089	-88.7553	N/A
DNR	2011	Runkle Lake	Iron	46.1025	-88.3022	N/A
DNR	2011	Swan Lake	Iron	46.1587	-88.3984	N/A
DNR	2011	Winslow Lake	Iron	46.3453	-88.7641	N/A
MSU Sediment	2002	Witch Lake	Marquette	46.27915	-88.00314	N/A

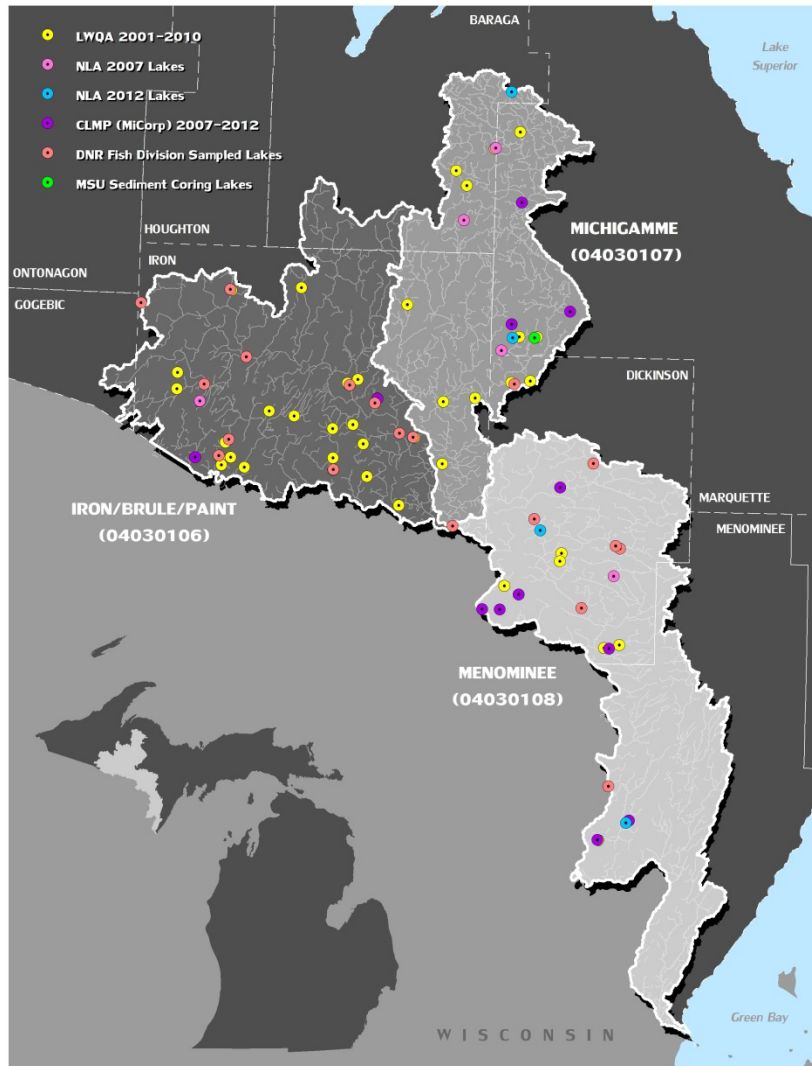


Figure 8. Lake sampling locations for the LWQA; NLA; CLMP; MSU sediment coring; and MDNR, Fisheries Division.

3.3 Contaminants

3.3.1 WATER CHEMISTRY MONITORING PROGRAM (WCMP)

The MDEQ WCMP collects water samples across the state for the purpose of assessing current conditions, determining if WQS are being met, measuring spatial and temporal trends, evaluating program effectiveness, and identifying emerging issues.

The MRW has two locations (Menominee River and Paint River) that were sampled as part of the fixed station tributary monitoring from 2000-2013. The Menominee River location was sampled yearly, and the Paint River location was sampled every 5 years. The MRW also has several locations that are sampled as part of the probabilistic (random) design project of the WCMP, which is ongoing (Figure 9). Location descriptions and STorage and RETrieval (STORET) numbers for WCMP locations within the MRW are located in Table 6. Summarized

data below is focused on data collected from 2005-2012 (Figure 10, 11, and 12). A map showing the locations of the sampled locations is presented in Figure 9.

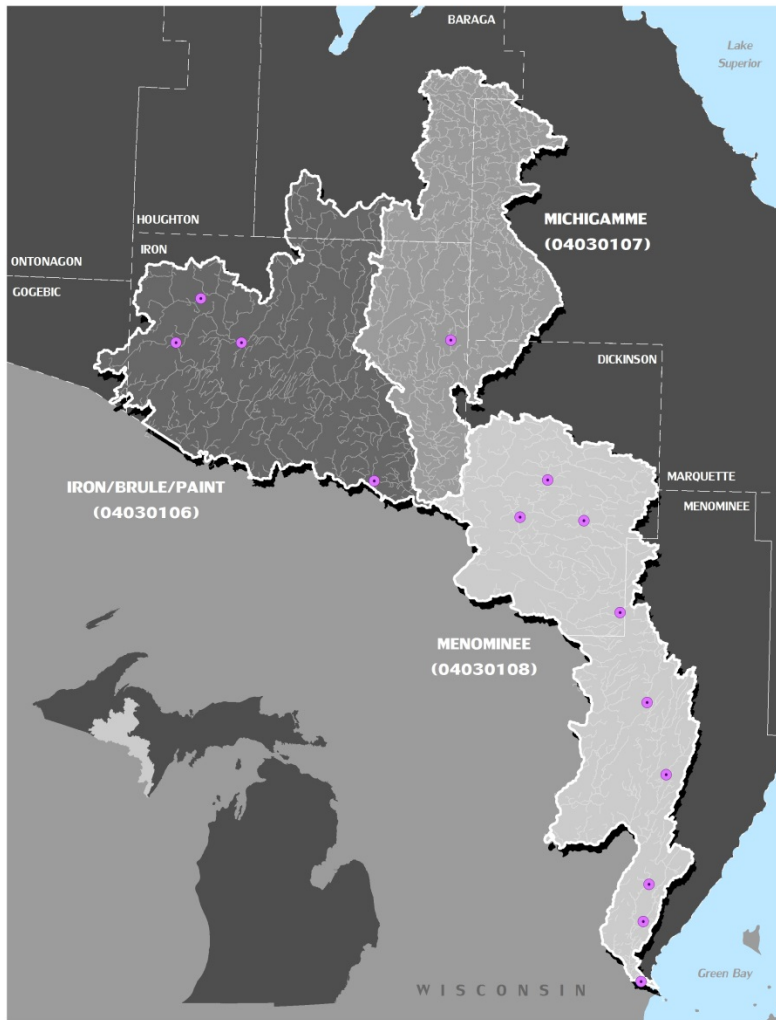


Figure 9. Probabilistic and fixed station sampling locations for the WCMP program in the MRW.

Table 6. WCMP location descriptions, STORET numbers, and types (Probabilistic/Fixed) in the MRW.

STORET	Prob/Fixed	River Name	Latitude	Longitude	Location/Township
360124	Fixed	Paint	46.22945	-88.70008	Iron River Twp
360147	Probabilistic	South Branch Paint	46.22533	-88.8685	d/s Federal Forest Rd. 3270
360148	Probabilistic	North Branch Paint	46.30626	-88.8089	u/s Gibbs City Rd.
360153	Probabilistic	Stager Creek	45.98972	-88.3472	Mastodon Twp
360146	Probabilistic	Fence River	46.2454	-88.1604	Mansfield Twp
220125	Probabilistic	Pine Creek	45.93225	-87.97015	Norway Twp
220131	Probabilistic	West Branch Sturgeon River	45.9999	-87.9017	Felch Twp
220144	Probabilistic	West Branch Sturgeon River	45.92849	-87.80672	Waucedah Twp
550038	Fixed	Menominee River	45.10625	-87.63556	Menominee City
550187	Probabilistic	Little Cedar River	45.60568	-87.63508	Nadeau Twp
550212	Probabilistic	Little River	45.2139	-87.6331	Menominee Twp
550213	Probabilistic	Kelley Creek	45.28064	-87.62038	Menominee Twp
550214	Probabilistic	Hays Creek	45.4776	-87.5826	Daggett Twp

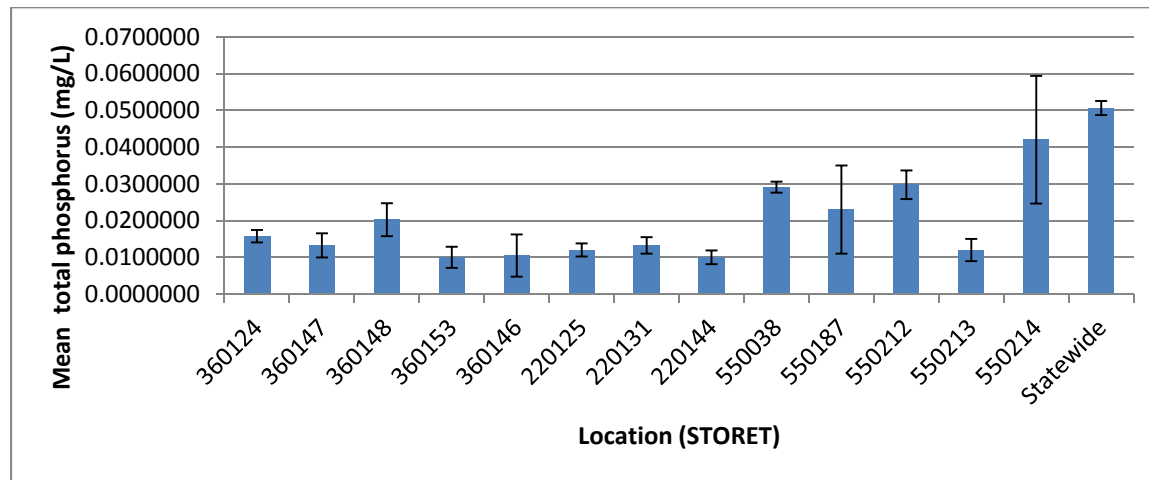


Figure 10. Mean total phosphorus concentrations (2005-2012) statewide and for individual locations (Table 6) in the MRW. Values include +/- 1 standard error.

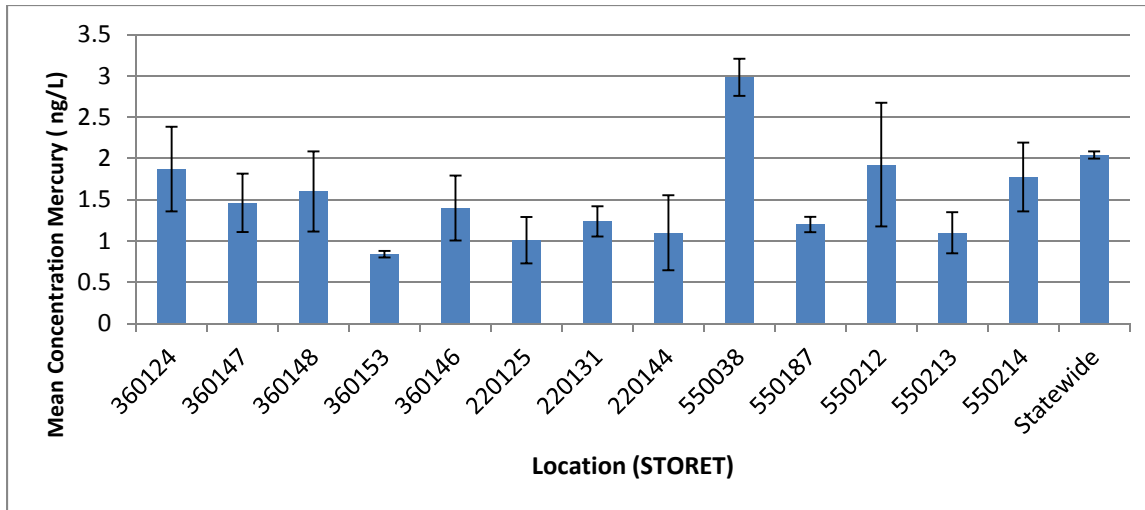


Figure 11. Mean concentration of mercury concentrations (2005-2012) statewide and for individual locations (Table 6) in the MRW. Values include +/- 1 standard error.

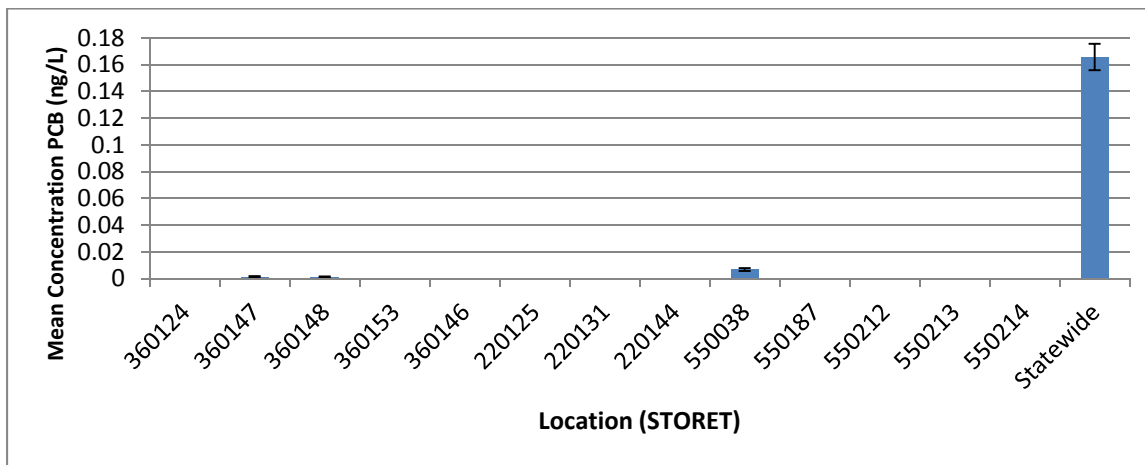


Figure 12. Mean concentration of PCBs (2005-2012) statewide and for individual locations (Table 6) in the MRW. Values include +/- 1 standard error.

Mean concentrations of total phosphorus at most sites in the MRW sampled from 2005-2012 are well below the statewide average (Figure 10).

Mean mercury values from 2005-2012 at all WCMP sites in the MRW are lower than the statewide average with the exception of location 550038 (Figure 11). Location 550038 is a fixed site at the mouth of the Menominee River (Table 6), which therefore reflects all upstream mercury sources. While higher than the statewide average, the mean value at this location is comparable to other values found in the same ecoregion (MDEQ, 2013).

PCB concentration analysis was limited across the MRW sites (2005-2012) to only three locations (360147, 360148, and 550038) (Figure 12, Table 6). Concentrations were significantly below the statewide average.

Links to additional data and reports can be found on the MDEQ Web site (MDEQ, 2014f).

3.3.2 WILDLIFE CONTAMINANTS

The MDEQ monitors the productivity and contaminant levels in fish-eating (piscivorous) wildlife as an indicator of the health of the Great Lakes ecosystem. Herring gull eggs and bald eagle plasma/feathers are analyzed for persistent bioaccumulative contaminants of concern such as mercury, PCBs, and chlorinated pesticides. Reports can be found on the MDEQ Web site (MDEQ, 2014h).

No monitored herring gull colonies are located in the MRW.

The MRW contains 96 known bald eagle territories (Figure 13). From 2005-2012, plasma from 32 eaglets were sampled in this area. Seventeen were located in HUC 04030108 (Menominee), 3 in HUC 04030107 (Michigamme), and 12 in HUC 04030106 (Iron/Brule/Paint).

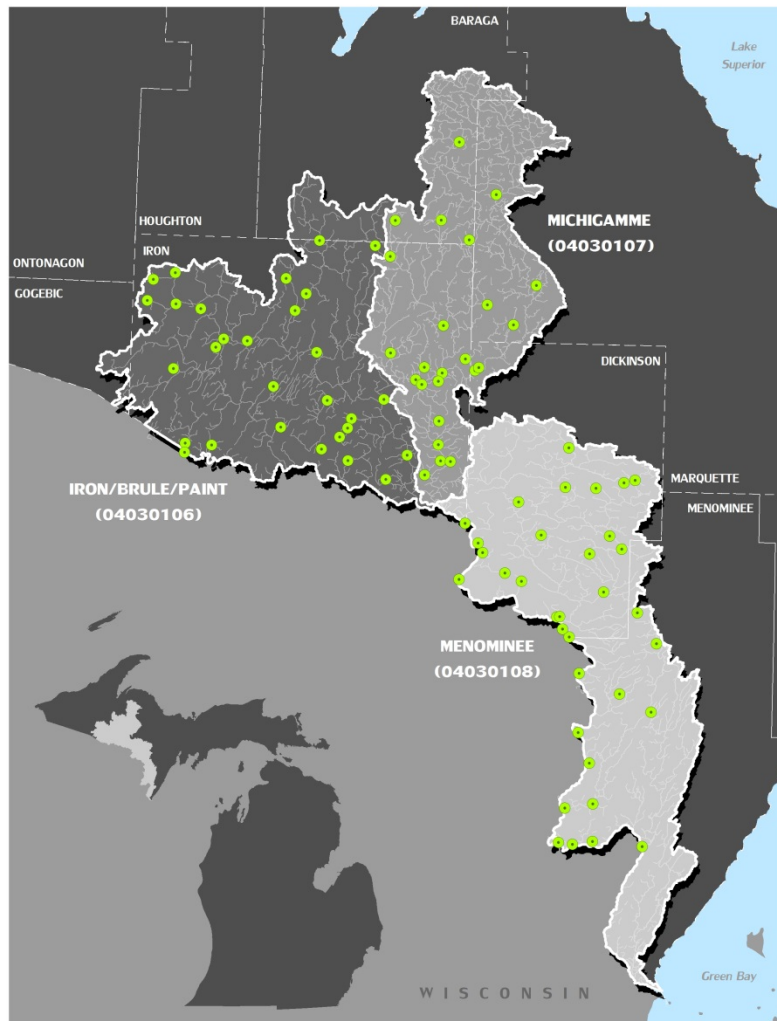


Figure 13. Bald Eagle Territories in the MRW.

Mercury concentrations in bald eagles in HUC 04030106 (Iron/Brule/Paint) were comparable to the statewide average, while HUCs 4030107 (Michigamme) and 04030108 (Menominee) had higher mean values (Figure 14).

Mean concentrations of PCBs (Figure 15) and Dichlorodiphenyldichloroethylene (DDE) (Figure 16) were below the statewide average in all three MRW HUCs for 2005-2012.

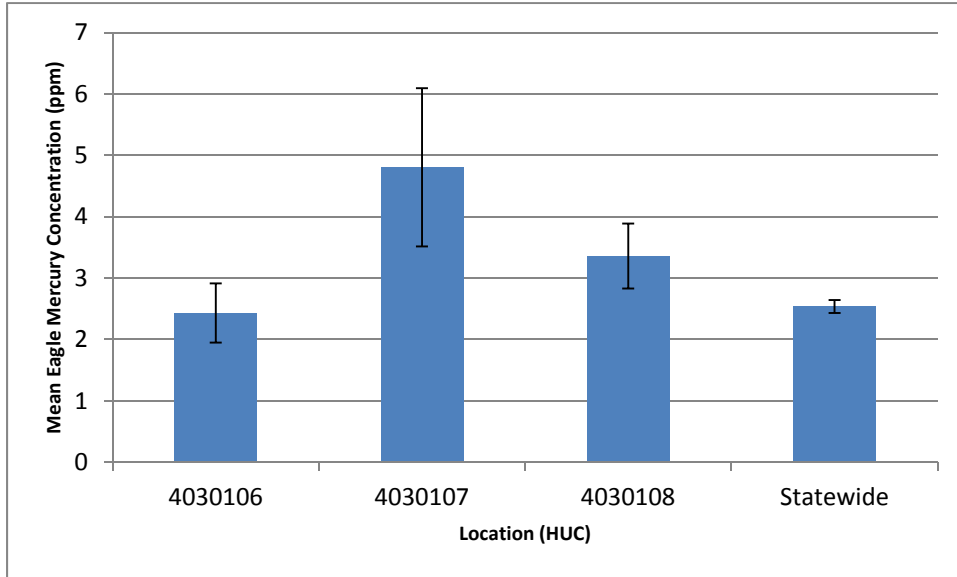


Figure 14. Mean mercury concentration (parts per million) found in bald eagles located in the 3 HUCs of the MRW compared to the statewide mean concentration for years 2005-2012. Values are +/- 1 standard error.

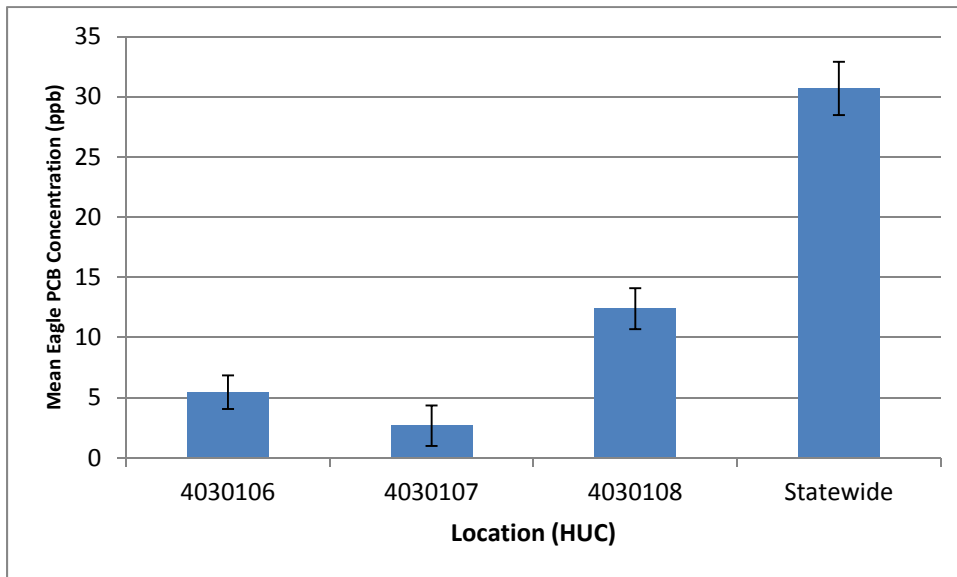


Figure 15. Mean PCB concentration (parts per billion) found in bald eagles located in the 3 HUCs of the MRW compared to statewide mean concentration for years 2005-2012. Values are +/- 1 standard error.

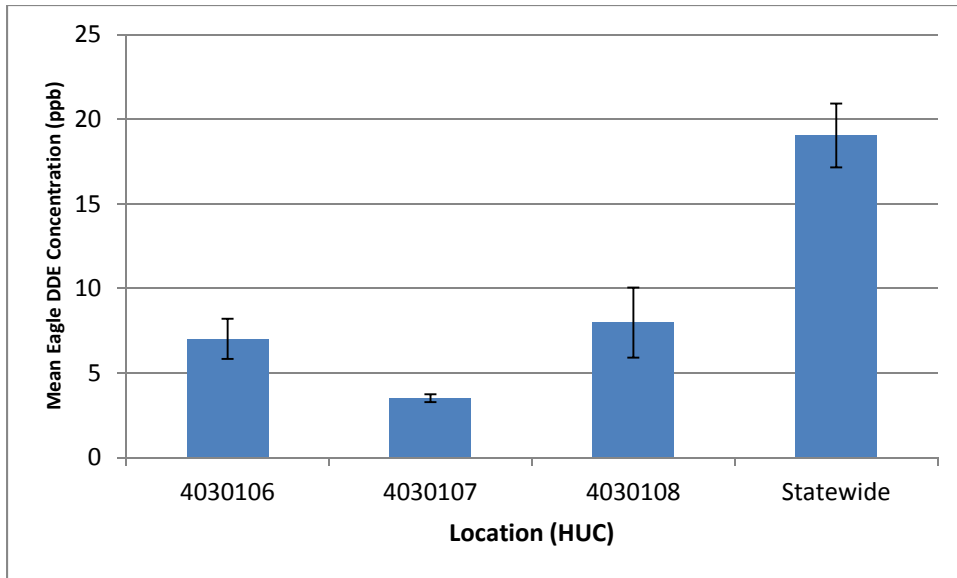


Figure 16. Mean DDE concentration (parts per billion) found in bald eagles located in the 3 HUCs of the MRW compared to statewide mean concentration for years 2005-2012. Values are +/- 1 standard error.

3.3.3 MDEQ FISH CONTAMINANT MONITORING PROGRAM (FCMP)

Fish have been collected in the MRW as part of the MDEQ's FCMP. The FCMP program has been in existence since 1980 and allows for assessment of chemical contamination in fish from the state's surface waters.

Twenty-six locations have been sampled within the MRW as part of the FCMP program (Figure 17). Eight species of fish have been analyzed for several contaminants, including organo-pesticides, PCBs, mercury, and dioxins. More information and links to reports regarding the FCMP program can be found on the MDEQ's Web site (Bohr, 2012) (*The link provided was broken and has been removed*).

Additionally, specific water body information can be found on the MDHHS Web site (MDHHS, 2014) Michigan.gov/mdhhs.

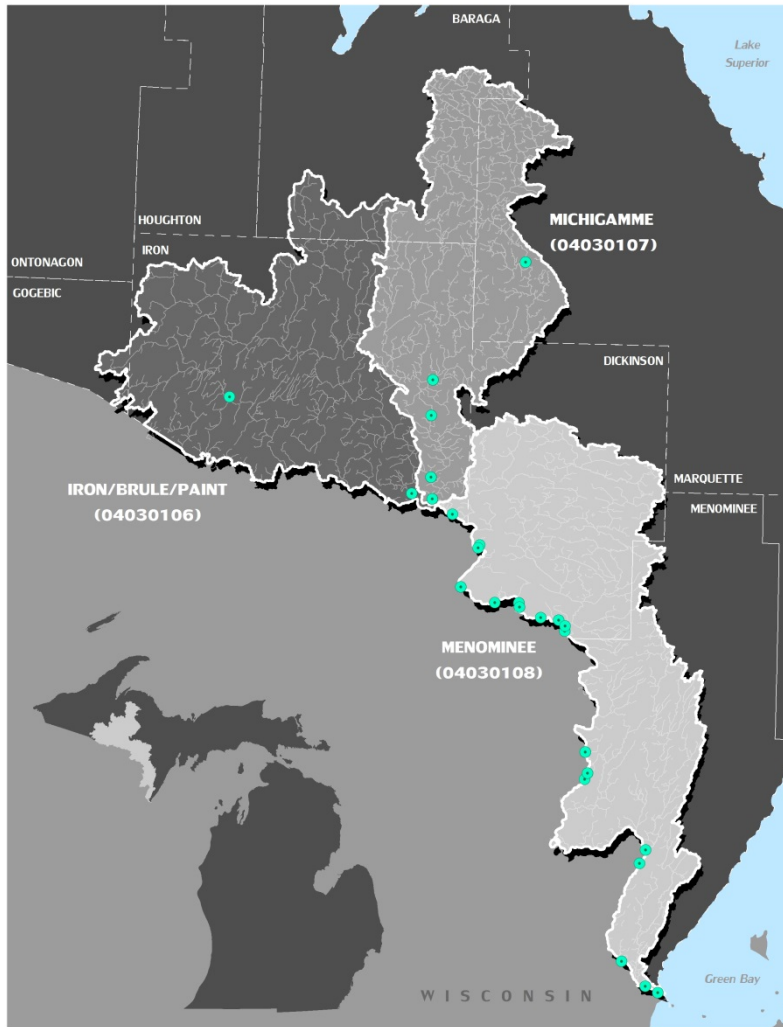


Figure 17. FCMP collection locations within the MRW.

When recently collected walleye fillet data (2005-2012) are compared to statewide concentrations, mercury levels (Figure 18) are slightly higher in the MRW while PCB tissue concentration (Figure 19) was well below the statewide average. These results are based on fish collected from HUC 04030108 (mercury and PCBs) and HUC 04030107 (mercury only).

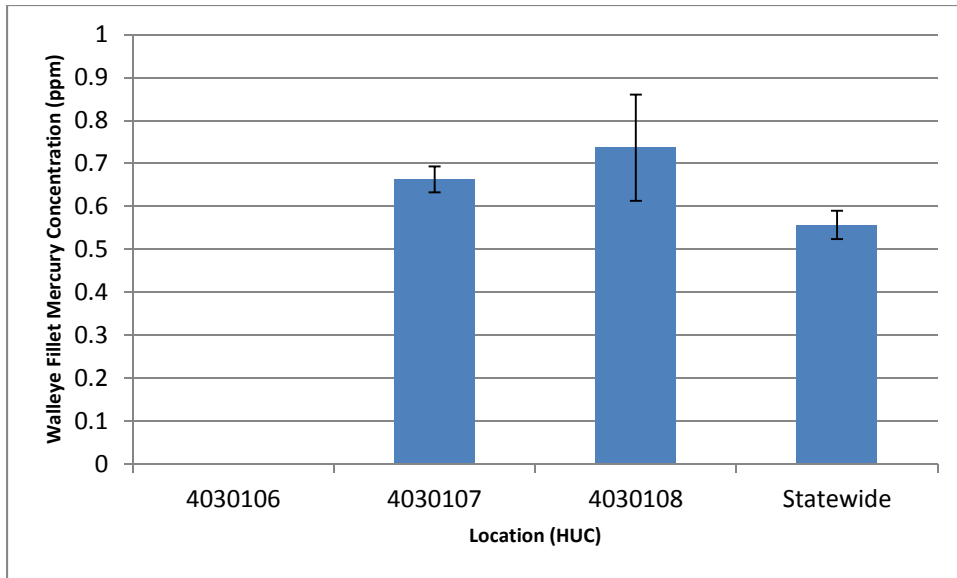


Figure 18. Mercury concentrations (parts per million) in walleye fillets collected from the MRW and statewide (2005-2012). Values are +/- 1 standard error.

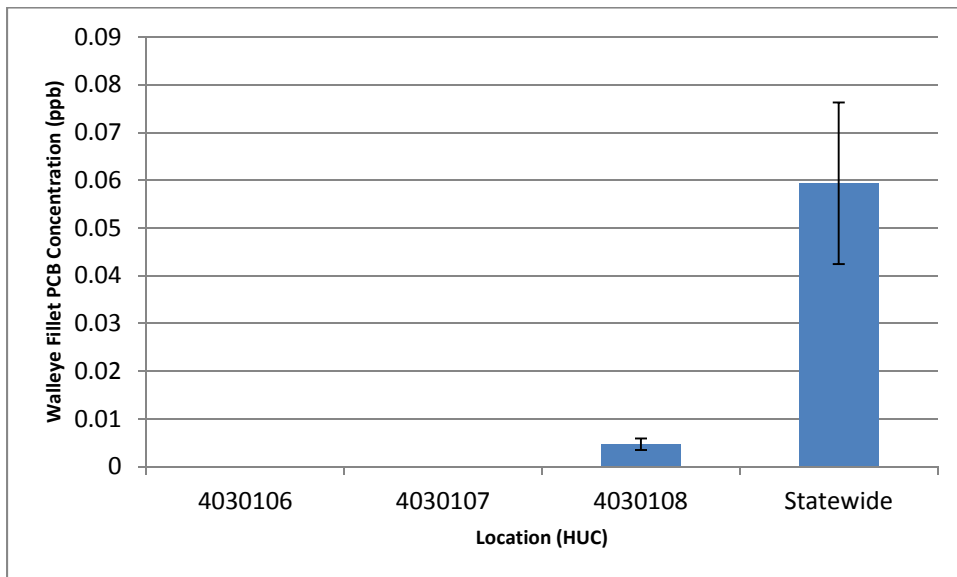


Figure 19. PCB concentrations (parts per billion) in walleye fillets collected from the MRW and statewide (2005-2012). Values are +/- 1 standard error.

4 DATA SUMMARY

Based on recent data, overall water quality in the Menominee River watershed appears to be quite good. The 2012 benthic invertebrate probabilistic monitoring component of the watershed survey found that 100% +/-18% of the randomly selected sites (Table 3) supported the other indigenous aquatic life and wildlife designated use component of R323.1100(1)(e) of the

Michigan WQS using Procedure 51. Percent attainment was calculated by dividing the number of random sites that met WQS by the total number of random locations. This value is coupled with 95% confidence intervals to provide our estimation of certainty, meaning there is 95% certainty of the true proportion of attainment in the MRW. For benthic invertebrates, 4 of the 21 sites scored Excellent; 12 scored in the upper half of the Acceptable range; and only 5 were in the lower Acceptable range. No sites scored as Poor. In addition, stream habitat was Excellent at 14 locations and Good at 7 others. No sites were rated Fair or Poor for habitat.

Eight trend sites (Table 3) were resampled using Procedure 51 during 2012, all locations scored within 3 points of the previous sampling effort (2007), which is within typical margins of variation. In addition to the generally high-quality benthic invertebrate and stream habitat scores, contaminant levels were generally lower in this watershed than the statewide averages. For example, concentrations of total phosphorus, mercury, and PCBs in the water all were below the statewide average, with the exception of mercury at the mouth of the Menominee River. Similarly, PCB and DDE levels in fish and bald eagles from the MRW were substantially lower than statewide averages.

Of the 67 lakes in the MRW for which trophic status was able to be calculated, 46.3% were found to be oligotrophic, 43.3% were mesotrophic, 9% were eutrophic, and 1.5% hypereutrophic (

Table 5).

Despite the generally good water quality described above, the primary exception to this pattern is mercury. In addition to the high concentrations in water at the mouth of the Menominee River, elevated mercury levels were in fish tissues and bald eagle feathers.

FCMP sampling shows mercury levels to be higher than the statewide average, while PCB levels are well below the statewide average. Wildlife concentrations of mercury were also found to be higher in the MRW when compared to the statewide average. DDE concentration in bald eagles was found to be below the statewide average. Samples collected by both programs were somewhat limited in the MRW during the recent time frame (2005-2012).

5 FUTURE MONITORING NEEDS/RECOMMENDATIONS

- Status and trend monitoring will continue in the next round of sampling in 2017.
- Requests for targeted monitoring will be solicited prior to the 2017 watershed survey. The lead biologist should consult with NPDES; NPS; FCMP; AOC; and MDNR, Fisheries Division, staff to identify monitoring needs.
- Follow-up monitoring of the Buck Mine discharge location on the Iron River (3.1.2.4) should be conducted to confirm continued function of the treatment ponds.
- AIS monitoring should continue to track currently established AIS and identify undocumented species.

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Appendix A

1 MACROINVERTEBRATE DATA

TAXA	Little Shakey Creek	Michigamme River	East Branch Net River	Peshekee River
	Hockbein Lane (off of 577)	M-95 Bridge	Lukes Road	Peshekee Grade (North)
	7/26/2012 Station 13	6/17/2012 Station 14	6/14/2012 Station 16A	6/17/2012 Station 9
PORIFERA (sponges)				1
ANNELIDA (segmented worms)				
Hirudinea (leeches)	1			
Oligochaeta (worms)	1	1		11
ARTHROPODA				
Crustacea				
Amphipoda (scuds)	220	38	3	3
Decapoda (crayfish)		5	1	9
Arachnoidea				
Hydracarina	1	2	1	1
Insecta				
Ephemeroptera (mayflies)				
Baetidae	2	14	52	84
Caenidae		20	2	
Ephemerellidae		51	3	
Ephemeridae		2		
Heptageniidae		10	7	50
Isonychiidae		1		
Leptophlebiidae				20
Tricorythidae				1
Odonata				
Anisoptera (dragonflies)				
Aeshnidae	2	2	1	3
Cordulegastridae	1		1	1
Gomphidae		11	3	23
Libellulidae		7		
Zygoptera (damselflies)				
Calopterygidae			3	2
Coenagrionidae		12		
Plecoptera (stoneflies)				
Leuctridae			1	2
Perlidae			9	6
Hemiptera (true bugs)				
Corixidae			4	
Gerridae	2	1	1	6
Notonectidae		1		
Veliidae				12
Megaloptera				
Corydalidae (dobson flies)			1	1
Sialidae (alder flies)	5	1		
Trichoptera (caddisflies)				
Brachycentridae			1	
Glossosomatidae	2			
Hydropsychidae			26	18
Hydroptilidae				2
Lepidostomatidae	15			
Leptoceridae		9		
Limnephilidae	4	1	4	4
Philopotamidae			5	8
Phryganeidae	1			
Polycentropodidae		8		
Coleoptera (beetles)				
Dytiscidae (total)	3			
Gyrinidae (adults)		3	1	
Halplidae (adults)		9		
Hydrophilidae (total)				1
Elmidae	1	1	4	12
Psephenidae (larvae)			2	
Diptera (flies)				
Athericidae			5	7
Ceratopogonidae		10	4	2
Chaoboridae			17	
Chironomidae	29	9		12
Dixidae	1			
Simuliidae			28	20
Tabanidae	1	1		
Tipulidae				1
MOLLUSCA				
Gastropoda (snails)				
Hydrobiidae		50	9	
Lymnaeidae		9		
Physidae	1	7	2	
Planorbidae		14		
Pelecypoda (bivalves)				
Sphaeriidae (clams)	7	5	3	1
TOTAL INDIVIDUALS	300	315	204	324

	Little Shakey Creek Hockbein Lane (off of 577) 7/26/2012 Station 13		Michigamme River M-95 Bridge 6/17/2012 Station 14		East Branch Net River Lukes Road 6/14/2012 Station 16A		Peshekee River Peshekee Grade (North) 6/17/2012 Station 9	
METRIC	Value	Score	Value	Score	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	20	0	31	1	30	1	30	1
NUMBER OF MAYFLY TAXA	1	-1	6	1	4	0	4	0
NUMBER OF CADDISFLY TAXA	4	0	3	0	4	0	4	0
NUMBER OF STONEFLY TAXA	0	-1	0	-1	2	1	2	1
PERCENT MAYFLY COMP.	0.67	-1	31.11	1	31.37	1	47.84	1
PERCENT CADDISFLY COMP.	7.33	0	5.71	0	17.65	0	9.88	0
PERCENT DOMINANT TAXON	73.33	-1	16.19	1	25.49	0	25.93	0
PERCENT ISOPOD, SNAIL, LEECH	0.67	1	25.40	-1	5.39	0	0.00	1
PERCENT SURF. AIR BREATHERS	1.67	1	4.44	1	11.27	0	5.86	0
TOTAL SCORE		-2		3		3		4
MACROINV. COMMUNITY RATING		ACCEPT.		ACCEPT.		ACCEPT.		ACCEPT.

	Holmes Creek County Rd 374 6/26/2012 Station 3T	West Branch Sturgeon Upstream Groveland 6/27/2012 Station 6T	Little Cedar River 18.5 Lane 6/25/2012 Station 9T	Sturgeon River Upstream U.S. 2 6/26/2012 Station 10T
TAXA				
PORIFERA (sponges)		1	1	
PLATYHELMINTHES (flatworms)				
Turbellaria			1	
ANNELIDA (segmented worms)				
Hirudinea (leeches)	1		1	
Oligochaeta (worms)	1		18	2
ARTHROPODA				
Crustacea				
Amphipoda (scuds)	155	9	84	20
Decapoda (crayfish)		5	14	2
Isopoda (sowbugs)			3	
Arachnoidea				
Hydracarina		6	1	9
Insecta				
Ephemeroptera (mayflies)				
Baetidae	8	37	4	8
Caenidae		2	14	2
Ephemerellidae				1
Ephemeridae			1	
Heptageniidae		5	15	43
Isonychiidae		1		5
Potamanthidae				17
Tricorythidae		7	2	
Odonata				
Anisoptera (dragonflies)				
Aeshnidae	15	7	4	4
Cordulegastridae	4	1		
Gomphidae		1		10
Zygoptera (damselflies)				
Calopterygidae		12		2
Coenagrionidae			1	
Plecoptera (stoneflies)				
Perlidae	5	1	8	25
Pteronarcyidae				3
Hemiptera (true bugs)				
Belostomatidae			1	
Corixidae		1	1	
Gerridae	8	1	1	1
Nepidae			1	
Veliidae				1
Megaloptera				
Corydalidae (dobson flies)		1	4	1
Sialidae (alder flies)		1	1	
Trichoptera (caddisflies)				
Brachycentridae	1	3		1
Helicopsychidae	1	1	1	1
Hydropsychidae	1	2	29	33
Hydroptilidae			3	
Lepidostomatidae	10			
Leptoceridae	4	7	5	2
Limnephilidae	7	1	3	1
Philopotamidae	2	1		3
Phryganeidae	1			
Coleoptera (beetles)				
Dytiscidae (total)	1	1		
Gyrinidae (adults)	3	1		1
Halplidae (adults)		1	1	
Hydrophilidae (total)		1	2	
Dryopidae	5			
Elmidae	5	39	65	38
Psephenidae (larvae)			8	1
Diptera (flies)				
Ceratopogonidae		5	2	
Chironomidae	16	23	60	11
Culicidae		2		
Dixidae		1		
Simuliidae		1		5
Tabanidae	7	1		
Tipulidae		1	1	2
MOLLUSCA				
Gastropoda (snails)				
Ancylidae (limpets)		3	3	6
Hydrobiidae		39		1
Physidae	8	15	14	2
Planorbidae		9	2	
Viviparidae				1
Pelecypoda (bivalves)				
Sphaeriidae (clams)	2	1	20	1
Unionidae (mussels)		1		
TOTAL INDIVIDUALS	271	259	400	266

	Holmes Creek		West Branch Sturgeon		Little Cedar River		Sturgeon River	
	County Rd 374		Upstream Groveland		18.5 Lane		Upstream U.S. 2	
	6/26/2012		6/27/2012		6/25/2012		6/26/2012	
	Station 3T		Station 6T		Station 9T		Station 10T	
METRIC	Value	Score	Value	Score	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	24	1	42	1	38	1	35	1
NUMBER OF MAYFLY TAXA	1	0	5	1	5	1	6	1
NUMBER OF CADDISFLY TAXA	8	1	6	1	5	0	6	1
NUMBER OF STONEFLY TAXA	1	1	1	0	1	0	2	1
PERCENT MAYFLY COMP.	2.95	-1	20.08	0	9.00	0	28.57	1
PERCENT CADDISFLY COMP.	9.96	0	5.79	0	10.25	0	15.41	0
PERCENT DOMINANT TAXON	57.20	-1	15.06	1	21.00	0	16.17	1
PERCENT ISOPOD, SNAIL, LEECH	3.32	1	25.48	-1	5.75	0	3.76	1
PERCENT SURF. AIR BREATHERS	4.43	1	3.09	1	1.75	1	1.13	1
TOTAL SCORE		3		4		3		8
MACROINV. COMMUNITY RATING		ACCEPT.		ACCEPT.		ACCEPT.		EXCELLENT

	South Branch Paint River West off County Rd 657 6/13/2012	Paint River County Road 657 6/13/2012	Kelly Creek 6.5 Lane 6/25/2012	De Haas Creek Co Rd 577 6/26/2012
TAXA	STATION 8T	STATION 11T	STATION 1T	STATION 2T
ANNELIDA (segmented worms)				
Oligochaeta (worms)	18	11	1	2
ARTHROPODA				
Crustacea				
Amphipoda (scuds)	1	17	130	72
Decapoda (crayfish)	2	10	18	
Isopoda (sowbugs)			39	
Arachnoidea				
Hydracarina	6	1		2
Insecta				
Ephemeroptera (mayflies)				
Baetidae	52	24	11	24
Caenidae	1	8		
Ephemerellidae	11	7		2
Ephemeridae	5	4		2
Heptageniidae	31	69	2	11
Isonychiidae	50	7		
Leptophlebiidae		48		
Potamanthidae		1		
Siphonuridae			3	
Tricorythidae	12	5		
Odonata				
Anisoptera (dragonflies)				
Aeshnidae	2		4	5
Cordulegastridae				1
Gomphidae	5	10		1
Libellulidae			4	
Zygoptera (damselflies)				
Calopterygidae	2	1		17
Coenagrionidae			1	
Plecoptera (stoneflies)				
Chloroperlidae		2		
Perlidae	7	14	6	3
Pteronarcyidae				1
Hemiptera (true bugs)				
Belostomatidae			1	
Corixidae	13	25	1	
Gerridae	3	1	5	1
Notonectidae			1	
Veliidae		2		
Megaloptera				
Corydalidae (dobson flies)	4	2		6
Trichoptera (caddisflies)				
Brachycentridae	8			1
Glossosomatidae	10			9
Helicopsychidae	20	1		2
Hydropsychidae	9	6		1
Hydroptilidae		1	3	
Lepidostomatidae				2
Leptoceridae		1	1	8
Limnephilidae	2	4	1	11
Molannidae	1			
Philopotamidae	1	2		6
Polycentropodidae		1		1
Psychomyiidae		1		
Uenoidae	19	2		
Coleoptera (beetles)				
Dytiscidae (total)	1	1	1	
Gyrinidae (adults)			1	
Halplidae (adults)			3	
Hydrophilidae (total)				1
Elmidae	28	30	2	9
Psephenidae (larvae)				1
Diptera (flies)				
Athericidae	1			1
Ceratopogonidae	2	1	1	1
Chironomidae	22	20	43	33
Dixidae		1		
Simuliidae	5		1	2
Tipulidae	5	1		
MOLLUSCA				
Gastropoda (snails)				
Ancylidae (limpets)	3	1	1	
Hydrobiidae	53	2	1	6
Physidae	4			13
Planorbidae	6			
Pelecypoda (bivalves)				
Pisidiidae			1	
Sphaeriidae (clams)	2		2	
TOTAL INDIVIDUALS	427	345	289	258

	South Branch Paint River		Paint River		Kelly Creek		De Haas Creek	
	West off County Rd 657		County Road 657		6.5 Lane		Co Rd 577	
	6/13/2012		6/13/2012		6/25/2012		6/26/2012	
	STATION 8T		STATION 11T		STATION 1T		STATION 2T	
METRIC	Value	Score	Value	Score	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	38	1	38	1	29	1	33	1
NUMBER OF MAYFLY TAXA	7	1	9	1	3	0	4	0
NUMBER OF CADDISFLY TAXA	8	1	9	1	3	0	9	1
NUMBER OF STONEFLY TAXA	1	0	2	1	1	0	2	1
PERCENT MAYFLY COMP.	37.94	1	50.14	1	5.54	0	15.12	0
PERCENT CADDISFLY COMP.	16.39	0	5.51	0	1.73	-1	15.89	0
PERCENT DOMINANT TAXON	12.41	1	20.00	0	44.98	-1	27.91	-1
PERCENT ISOPOD, SNAIL, LEECH	15.46	-1	0.87	1	14.19	-1	7.36	0
PERCENT SURF. AIR BREATHERS	3.98	1	8.41	0	4.50	1	0.78	1
TOTAL SCORE		5		6		-1		3
MACROINV. COMMUNITY RATING		EXCELLENT		EXCELLENT		ACCEPT.		ACCEPT.

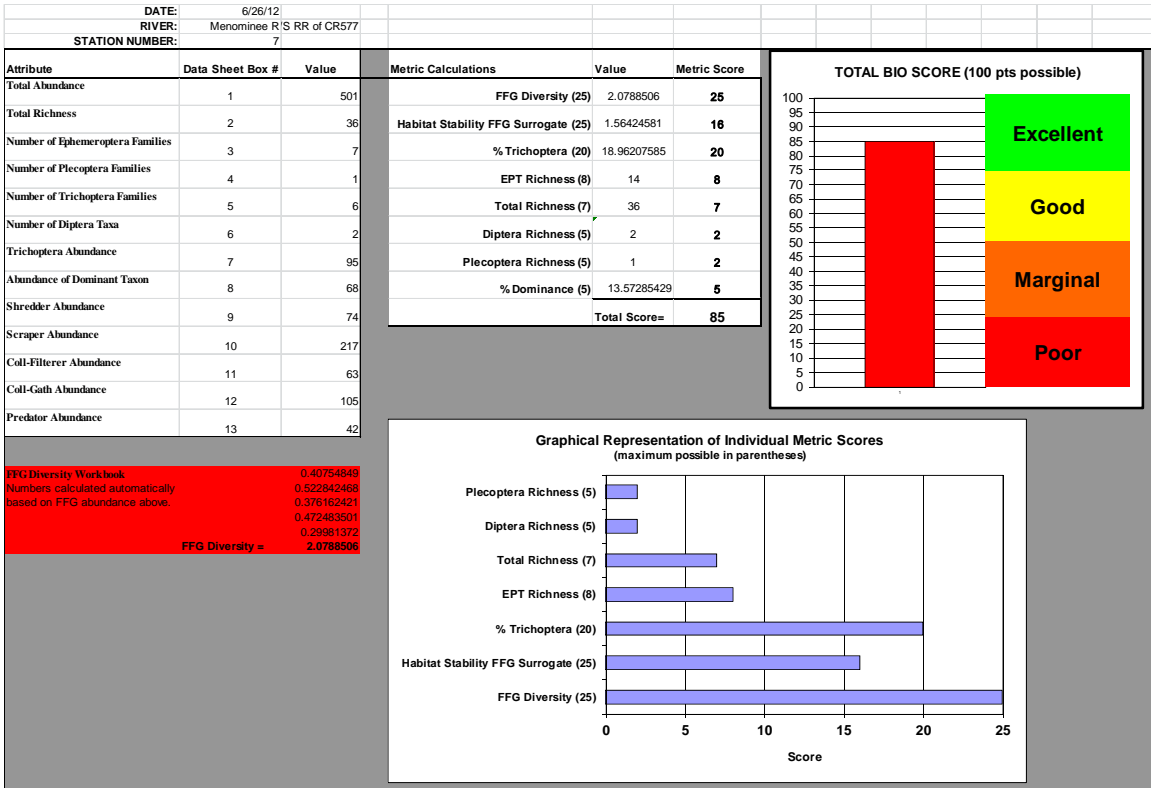
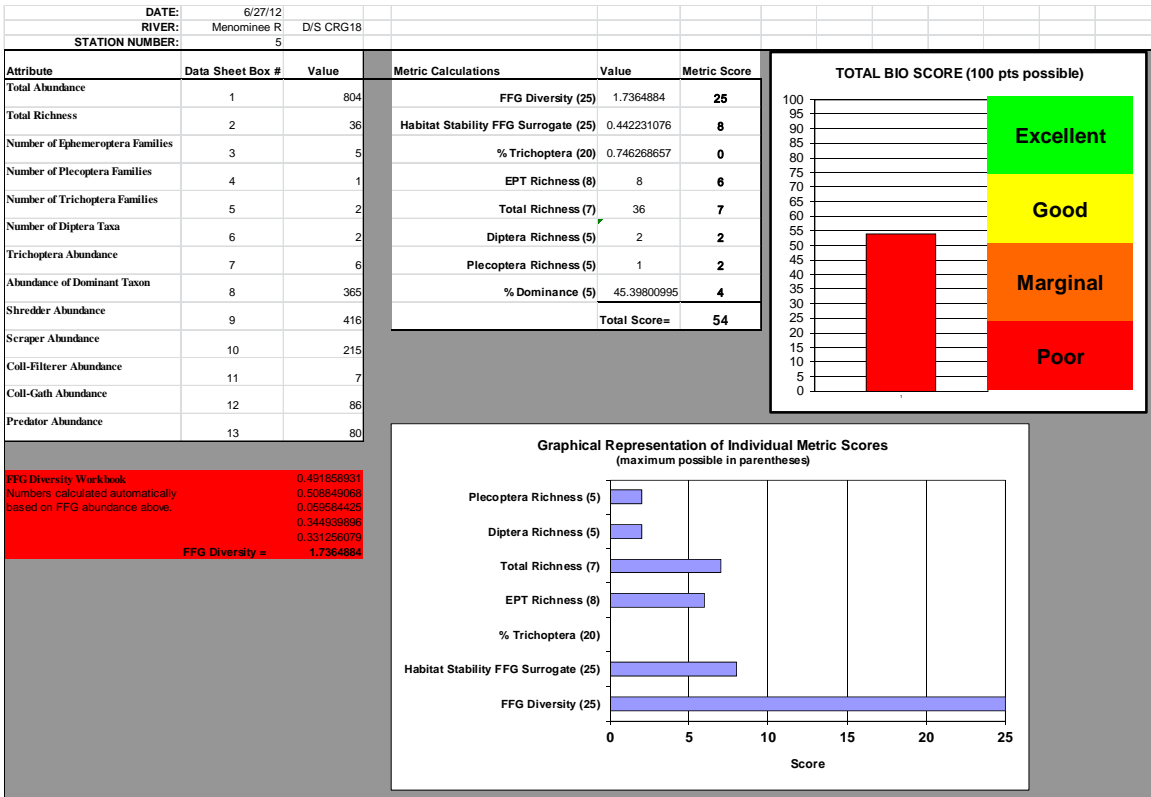
	Cassidy Creek	West Branch Net River	Mitchell Creek	North Branch Paint River
	Cassidy Creek Road	Pit Road	Calumet Mine Road	FF Road 16
	6/26/2012	6/16/2012	6/27/2012	6/13/2012
TAXA	STATION 19A	STATION 17A	STATION 6	STATION 8
PORIFERA (sponges)	1		1	
ANNELIDA (segmented worms)				
Hirudinea (leeches)		1		
Oligochaeta (worms)			5	3
ARTHROPODA				
Crustacea				
Amphipoda (scuds)	51	5	2	4
Decapoda (crayfish)	3	2		1
Isopoda (sowbugs)		34		
Arachnoidea				
Hydracarina		5	3	15
Insecta				
Ephemeroptera (mayflies)				
Baetidae	3	9	4	2
Caenidae	2	10		6
Ephemerellidae		1	1	1
Ephemeridae			1	3
Heptageniidae	4	2		1
Isonychiidae			1	
Leptophlebiidae			4	
Siphonuridae			1	
Tricorythidae				8
Odonata				
Anisoptera (dragonflies)				
Aeshnidae	5	1	3	1
Cordulegastridae	4			
Gomphidae	1	1		
Libellulidae			8	1
Zygoptera (damselflies)				
Calopterygidae	2	1	3	1
Coenagrionidae	3			
Hemiptera (true bugs)				
Belostomatidae				1
Corixidae	8		1	3
Gerridae		2	1	2
Veliidae		1	1	1
Megaloptera				
Corydalidae (dobson flies)	2			
Sialidae (alder flies)			1	
Trichoptera (caddisflies)				
Helicopsychidae				4
Hydropsychidae		28	12	
Hydroptilidae		6	2	
Lepidostomatidae		4		
Leptoceridae	1		16	
Limnephilidae	23	4		14
Molannidae				1
Philopotamidae	1	2	1	
Phryganeidae			1	
Polycentropodidae	1	3		
Uenoidae				6
Coleoptera (beetles)				
Dytiscidae (total)	1			
Gyrinidae (adults)				2
Elmidae	37	9	13	5
Diptera (flies)				
Ceratopogonidae		4	1	11
Chironomidae	95	129	61	24
Culicidae	1		1	2
Simuliidae		51		
Tipulidae		1		
MOLLUSCA				
Gastropoda (snails)				
Ancyliidae (limpets)	11	1	1	
Hydrobiidae	3		89	171
Lymnaeidae				2
Physidae	12	1	15	
Planorbidae	1	2	8	11
Pelecypoda (bivalves)				
Sphaeriidae (clams)	2	1	6	2
TOTAL INDIVIDUALS	278	321	268	309

	Cassidy Creek		West Branch Net River		Mitchell Creek		North Branch Paint River	
	Cassidy Creek Road		Pit Road		Calumet Mine Road		FF Road 16	
	6/26/2012		6/16/2012		6/27/2012		6/13/2012	
	STATION 19A		STATION 17A		STATION 6		STATION 8	
METRIC	Value	Score	Value	Score	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	26	0	29	1	31	1	30	1
NUMBER OF MAYFLY TAXA	3	0	4	0	6	1	6	1
NUMBER OF CADDISFLY TAXA	4	0	6	1	5	0	4	0
NUMBER OF STONEFLY TAXA	0	-1	0	-1	0	-1	0	-1
PERCENT MAYFLY COMP.	3.24	0	6.85	0	4.48	0	6.80	0
PERCENT CADDISFLY COMP.	9.35	0	14.64	0	11.94	0	8.09	0
PERCENT DOMINANT TAXON	34.17	-1	40.19	-1	33.21	-1	55.34	-1
PERCENT ISOPOD, SNAIL, LEECH	9.71	0	12.15	0	42.16	-1	59.55	-1
PERCENT SURF. AIR BREATHERS	3.60	1	0.93	1	1.49	1	3.56	1
TOTAL SCORE		-1		1		0		0
MACROINV. COMMUNITY RATING		ACCEPT.		ACCEPT.		ACCEPT.		ACCEPT.

	Brule River	Phillips Creek	Fence River	Paint River
	Two track off Prairie Road	Co. 577	Two track off Sport Lake Road	Bates Amasa Road
	6/14/2012	6/25/2012	6/27/2012	6/14/2012
TAXA	STATION 7T	STATION 4T	STATION 5T	STATION 4
PORIFERA (sponges)		1		1
PLATYHELMINTHES (flatworms)				
Turbellaria		1		
ANNELIDA (segmented worms)				
Hirudinea (leeches)	1	1		
Oligochaeta (worms)	5		4	6
ARTHROPODA				
Crustacea				
Amphipoda (scuds)	16	302	4	37
Decapoda (crayfish)	8	9	1	20
Isopoda (sowbugs)		13		
Insecta				
Ephemeroptera (mayflies)				
Baetidae	54		13	11
Caenidae	1		2	3
Ephemerellidae	11		5	2
Ephemeridae	5		1	
Heptageniidae	26	2	20	23
Isonychiidae			1	2
Leptophlebiidae	1		7	7
Polymitarcyidae				1
Siphonuridae			3	
Tricorythidae	8		12	
Odonata				
Anisoptera (dragonflies)				
Aeshnidae	2	8	4	
Cordulegastridae			1	
Gomphidae	8		30	16
Libellulidae		1		
Zygoptera (damselflies)				
Calopterygidae	4		3	1
Coenagrionidae			1	1
Plecoptera (stoneflies)				
Capniidae		1		
Perlidae	7	1	11	4
Hemiptera (true bugs)				
Belostomatidae	1	1		
Corixidae	10	1		15
Gerridae	2	2		5
Nepidae		1		
Veliidae				8
Megaloptera				
Corydalidae (dobson flies)	2	1	1	1
Trichoptera (caddisflies)				
Brachycentridae	1		14	
Glossosomatidae			9	1
Helicopsychidae	7	1	3	
Hydropsychidae	1		26	9
Lepidostomatidae	1		2	
Leptoceridae			7	
Limnephilidae	5	2	1	4
Philopotamidae			14	
Polycentropodidae	2		4	1
Uenoidae	1			2
Coleoptera (beetles)				
Haliplidae (adults)		2		
Elmidae	9		28	17
Psephenidae (larvae)				1
Diptera (flies)				
Athericidae			1	
Ceratopogonidae			1	1
Chironomidae	29	45	12	17
Empididae	1			
Simuliidae	28		1	
Tabanidae	2		1	
MOLLUSCA				
Gastropoda (snails)				
Ancyliidae (limpets)	1		3	2
Hydrobiidae	70	1	3	
Lymnaeidae			1	
Physidae	10	1	3	3
Planorbidae			1	
Pelecypoda (bivalves)				
Sphaeriidae (clams)	13		15	15
TOTAL INDIVIDUALS	353	398	274	237

	Brule River		Phillips Creek		Fence River		Paint River	
	Two track off Prairie		Co. 577		Two track off Sport Lake		Bates Amasa Road	
	6/14/2012		6/25/2012		6/27/2012		6/14/2012	
	STATION 7T		STATION 4T		STATION 5T		STATION 4	
METRIC	Value	Score	Value	Score	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	35	1	22	0	40	1	31	1
NUMBER OF MAYFLY TAXA	7	1	1	-1	9	1	7	1
NUMBER OF CADDISFLY TAXA	7	1	2	-1	9	1	5	0
NUMBER OF STONEFLY TAXA	1	0	2	1	1	0	1	0
PERCENT MAYFLY COMP.	30.03	1	0.50	-1	23.36	1	20.68	0
PERCENT CADDISFLY COMP.	5.10	0	0.75	-1	29.20	0	7.17	0
PERCENT DOMINANT TAXON	19.83	0	75.88	-1	10.95	1	15.61	1
PERCENT ISOPOD, SNAIL, LEECH	23.23	-1	4.02	0	4.01	0	2.11	1
PERCENT SURF. AIR BREATHERS	3.68	1	1.76	1	0.00	1	11.81	0
TOTAL SCORE		4		-3		6		4
MACROINV. COMMUNITY RATING		ACCEPT.		ACCEPT.		EXCELLENT		ACCEPT.

	Bush Creek	
	FH 3350	
	6/13/2012	
TAXA	STATION 18A	
ANNELIDA (segmented worms)		
Hirudinea (leeches)		3
Oligochaeta (worms)		3
ARTHROPODA		
Crustacea		
Amphipoda (scuds)		15
Decapoda (crayfish)		1
Arachnoidea		
Hydracarina		12
Insecta		
Ephemeroptera (mayflies)		
Baetidae		35
Caenidae		7
Ephemerellidae		3
Ephemeridae		2
Odonata		
Anisoptera (dragonflies)		
Aeshnidae		1
Gomphidae		2
Libellulidae		5
Zygoptera (damselflies)		
Calopterygidae		8
Hemiptera (true bugs)		
Corixidae		11
Gerridae		1
Trichoptera (caddisflies)		
Hydroptilidae		2
Leptoceridae		3
Limnephilidae		7
Molannidae		1
Coleoptera (beetles)		
Elmidae		5
Diptera (flies)		
Ceratopogonidae		23
Chironomidae		9
Tabanidae		3
Tipulidae		1
MOLLUSCA		
Gastropoda (snails)		
Ancylidae (limpets)		1
Hydrobiidae		130
Planorbidae		11
Pelecypoda (bivalves)		
Sphaeriidae (clams)		1
TOTAL INDIVIDUALS		306



2 HABITAT DATA

	Little Shakey Creek	Michigamme River	East Branch Net River	Peshekee River
	Hockbein Lane (off of 577)	M-95 Bridge	Lukes Road	Peshekee Grade (North)
	GLIDE/POOL	GLIDE/POOL	RIFFLE/RUN	RIFFLE/RUN
	Station 13	Station 14	Station 16A	Station 9
HABITAT METRIC				
Substrate and Instream Cover				
Epifaunal Substrate/ Avail Cover (20)	9	12	17	19
Embeddedness (20)*			20	17
Velocity/Depth Regime (20)*			14	12
Pool Substrate Characterization (20)**	8	15		
Pool Variability (20)**	5	13		
Channel Morphology				
Sediment Deposition (20)	11	19	19	15
Flow Status - Maint. Flow Volume (10)	6	9	10	8
Flow Status - Flashiness (10)	9	9	10	10
Channel Alteration (20)	20	18	18	20
Frequency of Rifles/Bends (20)*			20	19
Channel Sinuosity (20)**	19	10		
Riparian and Bank Structure				
Bank Stability (L) (10)	9	10	10	10
Bank Stability (R) (10)	9	10	10	9
Vegetative Protection (L) (10)	10	10	10	10
Vegetative Protection (R) (10)	10	10	10	10
Riparian Veg. Zone Width (L) (10)	10	9	10	10
Riparian Veg. Zone Width (R) (10)	9	9	10	10
TOTAL SCORE (200):	144	163	188	179
HABITAT RATING:	Good	Excellent	Excellent	Excellent
Note: Individual metrics may better describe conditions directly affecting the biological community while the Habitat Rating describes the general riverine environment at the site(s).				
Date:	7/26/2012	6/17/2012	6/14/2012	6/17/2012
Weather:	Sunny	Sunny	Rainy	Sunny
Air Temperature:	63 Deg. F.	73 Deg. F.	66 Deg. F.	60 Deg. F.
Water Temperature:	51 Deg. F.	67 Deg. F.	62 Deg. F.	65 Deg. F.
Ave. Stream Width:	9 Feet	60 Feet	20 Feet	36 Feet
Ave. Stream Depth:	0.4 Feet	1.8 Feet	0.6 Feet	18 Feet
Surface Velocity:	0.5 Ft./Sec.	1 Ft./Sec.	2 Ft./Sec.	0.38 Ft./Sec.
Estimated Flow:	1.8 CFS	108 CFS	24 CFS	246.24 CFS
Stream Modifications:	None	None		None
Nuisance Plants (Y/N):	N	N	N	N
Report Number:				
STORET No.:	550217	520512	360168	520511
Stream Name:	Little Shakey Creek	Michigamme River	East Branch Net River	Peshekee River
Road Crossing/Location:	Hockbein Lane (off of 577)	M-95 Bridge	Lukes Road	Peshekee Grade (North)
County Code:	55	52	36	52
TRS:	36N27W07	45N30W36	46N33W09	49N30W26
Latitude (dd):	45.52485	46.24829	46.40375	46.60964
Longitude (dd):	-87.69686	-88.01025	-88.44455	-88.02213
Ecoregion:	NLAF	NLAF	NLAF	NLAF
Stream Type:	Warmwater	Warmwater	Coldwater	Warmwater
USGS Basin Code:	4030108	4030107	4030106	4030107
* Applies only to Riffle/Run stream Surveys				
** Applies only to Glide/Pool stream Surveys				

	Holmes Creek	West Branch Sturgeon River	Little Cedar River	Sturgeon River
	County Rd 374	Upstream Groveland Mine Road	18.5 Lane	Upstream U.S. 2
	GLIDE/POOL Station 3T	GLIDE/POOL Station 6T	RIFFLE/RUN Station 9T	RIFFLE/RUN Station 10T
HABITAT METRIC				
Substrate and Instream Cover				
Epifaunal Substrate/ Avail Cover (20)	7	10	13	16
Embeddedness (20)*			15	18
Velocity/Depth Regime (20)*			14	15
Pool Substrate Characterization (20)**	8	13		
Pool Variability (20)**	4	15		
Channel Morphology				
Sediment Deposition (20)	7	10	15	16
Flow Status - Maint. Flow Volume (10)	5	9	9	9
Flow Status - Flashiness (10)	7	9	9	8
Channel Alteration (20)	18	16	18	16
Frequency of Riffles/Bends (20)*			15	18
Channel Sinuosity (20)**	15	18		
Riparian and Bank Structure				
Bank Stability (L) (10)	9	10	9	8
Bank Stability (R) (10)	9	10	9	9
Vegetative Protection (L) (10)	9	8	9	8
Vegetative Protection (R) (10)	9	8	9	9
Riparian Veg. Zone Width (L) (10)	9	7	10	7
Riparian Veg. Zone Width (R) (10)	8	10	10	9
TOTAL SCORE (200):	124	153	164	166
HABITAT RATING:	GOOD (SLIGHTLY IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)	EXCELLENT (NON-IMPAIRED)	EXCELLENT (NON-IMPAIRED)
Note: Individual metrics may better describe conditions directly affecting the biological community while the Habitat Rating describes the general riverine environment at the site(s).				
Date:	6/26/2012	6/27/2012	6/25/2012	6/26/2012
Weather:	Sunny	Sunny	Sunny	Sunny
Air Temperature:	76 Deg. F.	65 Deg. F.	71 Deg. F.	80 Deg. F.
Water Temperature:	62 Deg. F.	65 Deg. F.	66 Deg. F.	73 Deg. F.
Ave. Stream Width:	5 Feet	25 Feet	40 Feet	50 Feet
Ave. Stream Depth:	0.3 Feet	2 Feet	1.3 Feet	1 Feet
Surface Velocity:	0.7 Ft./Sec.	0.7 Ft./Sec.	1.2 Ft./Sec.	1.2 Ft./Sec.
Estimated Flow:	1.05 CFS	35 CFS	62.4 CFS	60 CFS
Stream Modifications:	None	None	None	None
Nuisance Plants (Y/N):	N	N	N	N
Report Number:				
STORET No.:	550124	220131	550110	220001
Stream Name:	Holmes Creek	West Branch Sturgeon River	Little Cedar River	Sturgeon River
Road Crossing/Location:	County Rd 374	Upstream Groveland Mine	18.5 Lane	Upstream U.S. 2
County Code:	55	22	55	22
TRS:	37N27W24	42N29W30	35N27W34	39N29W13
Latitude (dd):	45.58748	46.01361	45.3848	45.7771
Longitude (dd):	-87.58191	-87.98023	-87.62865	-87.82699
Ecoregion:	NLAF	NLAF	NLAF	NLAF
Stream Type:	Coldwater	Coldwater	Warmwater	Warmwater
USGS Basin Code:	4030108	4030108	4030108	4030108
* Applies only to Riffle/Run stream Surveys				
** Applies only to Glide/Pool stream Surveys				

	South Branch Paint River West off County Rd 657 RIFFLE/RUN Station 8T	Paint River County Road 657 GLIDE/POOL Station 11T	Kelly Creek 6.5 Lane GLIDE/POOL Station 1T	De Haas Creek Co Rd 577 RIFFLE/RUN Station 2T
HABITAT METRIC				
Substrate and Instream Cover				
Epifaunal Substrate/ Avail Cover (20)	16	18	12	15
Embeddedness (20)*	15			15
Velocity/Depth Regime (20)*	15			14
Pool Substrate Characterization (20)**		16	16	
Pool Variability (20)**		15	10	
Channel Morphology				
Sediment Deposition (20)	20	20	16	11
Flow Status - Maint. Flow Volume (10)	10	9	9	7
Flow Status - Flashiness (10)	10	10	8	9
Channel Alteration (20)	18	15	15	18
Frequency of Riffles/Bends (20)*	19			16
Channel Sinuosity (20)**		11	16	
Riparian and Bank Structure				
Bank Stability (L) (10)	10	10	9	9
Bank Stability (R) (10)	10	10	9	9
Vegetative Protection (L) (10)	10	10	8	9
Vegetative Protection (R) (10)	10	10	8	9
Riparian Veg. Zone Width (L) (10)	10	10	5	9
Riparian Veg. Zone Width (R) (10)	10	10	8	9
TOTAL SCORE (200):	183	174	149	159
HABITAT RATING:	EXCELLENT (NON- IMPAIRED)	EXCELLENT (NON- IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)	EXCELLENT (NON- IMPAIRED)
Note: Individual metrics may better describe conditions directly affecting the biological community while the Habitat Rating describes the general riverine environment at the site(s).				
Date:	6/13/2012	6/13/2012	6/25/2012	6/26/2012
Weather:	Sunny	Sunny	Sunny	Sunny
Air Temperature:	70 Deg. F.	53 Deg. F.	52 Deg. F.	50 Deg. F.
Water Temperature:	67 Deg. F.	59 Deg. F.	67 Deg. F.	55 Deg. F.
Ave. Stream Width:	54 Feet	63 Feet	15 Feet	12 Feet
Ave. Stream Depth:	0.9 Feet	1.3 Feet	1.5 Feet	0.9 Feet
Surface Velocity:	2 Ft./Sec.	0.8 Ft./Sec.	0.4 Ft./Sec.	0.9 Ft./Sec.
Estimated Flow:	97.2 CFS	65.52 CFS	9 CFS	9.72 CFS
Stream Modifications:		None	None	None
Nuisance Plants (Y/N):	N	N	N	N
Report Number:				
STORET No.:	360170	360124	550191	550140
Stream Name:	South Branch Paint River	Paint River	Kelly Creek	De Haas Creek
Road Crossing/Location:	West off County Rd 657	County Road 657	6.5 Lane	Co Rd 577
County Code:	36	36	55	55
TRS:	44N35W08	44N35W08	33N27W32	37N28W14
Latitude (dd):	46.2317	46.22952	45.21007	45.59852
Longitude (dd):	-88.71807	-88.70103	-87.65707	-87.73268
Ecoregion:	NLAF	NLAF	NLAF	NLAF
Stream Type:	Coldwater	Warmwater	Coldwater	Warmwater
USGS Basin Code:	4030106	4030106	4030108	4030108
* Applies only to Riffle/Run stream Surveys				
** Applies only to Glide/Pool stream Surveys				

	Cassidy Creek	West Branch	Mitchell Creek	North Branch
	Cassidy Creek	Net River	Calumet Mine	Paint River
	Road	Pit Road	Road	FF Road 16
	GLIDE/POOL	RIFFLE/RUN	GLIDE/POOL	GLIDE/POOL
	Station 19A	Station 17A	Station 6	Station 8
HABITAT METRIC				
Substrate and Instream Cover				
Epifaunal Substrate/ Avail Cover (20)	7	16	5	12
Embeddedness (20)*		18		
Velocity/Depth Regime (20)*		15		
Pool Substrate Characterization (20)**	11		11	13
Pool Variability (20)**	11		11	10
Channel Morphology				
Sediment Deposition (20)	10	20	7	15
Flow Status - Maint. Flow Volume (10)	8	8	9	10
Flow Status - Flashiness (10)	9	10	9	10
Channel Alteration (20)	18	20	16	15
Frequency of Riffles/Bends (20)*		7		
Channel Sinuosity (20)**	11		11	10
Riparian and Bank Structure				
Bank Stability (L) (10)	9	10	10	10
Bank Stability (R) (10)	9	10	10	10
Vegetative Protection (L) (10)	8	10	9	10
Vegetative Protection (R) (10)	8	10	9	10
Riparian Veg. Zone Width (L) (10)	10	10	10	10
Riparian Veg. Zone Width (R) (10)	10	10	10	10
TOTAL SCORE (200):	139	174	137	155
HABITAT RATING:	GOOD	EXCELLENT	GOOD	EXCELLENT
	(SLIGHTLY	(NON-	(SLIGHTLY	(NON-
	IMPAIRED)	IMPAIRED)	IMPAIRED)	IMPAIRED)
Note: Individual metrics may better describe conditions directly affecting the biological community while the Habitat Rating describes the general riverine environment at the site(s).				
Date:	6/26/2012	6/16/2012	6/27/2012	6/13/2012
Weather:	Sunny	Partly Cloudy	Sunny	Sunny
Air Temperature:	80 Deg. F.	67 Deg. F.	55 Deg. F.	63 Deg. F.
Water Temperature:	66 Deg. F.	63 Deg. F.	58 Deg. F.	59 Deg. F.
Ave. Stream Width:	12 Feet	33 Feet	12 Feet	14.5 Feet
Ave. Stream Depth:	1 Feet	0.57 Feet	2 Feet	1 Feet
Surface Velocity:	0.3 Ft./Sec.	1.33 Ft./Sec.	0.1 Ft./Sec.	0.7 Ft./Sec.
Estimated Flow:	3.6 CFS	25.0173 CFS	2.4 CFS	10.15 CFS
Stream Modifications:	Impounded	None	Impounded	None
Nuisance Plants (Y/N):	N	N	N	N
Report Number:				
STORET No.:	220146	70139	220145	360158
Stream Name:	Cassidy Creek	West Branch	Mitchell Creek	North Branch
Road Crossing/Location:	Cassidy Creek	Net River	Calumet Mine	Paint River
County Code:	Road	Pit Road	Road	FF Road 16
TRIS:	22	07	22	36
Latitude (dd):	45.83646	46.49205	46.94166	46.29866
Longitude (dd):	-87.77876	-88.55971	-87.92921	-88.87678
Ecoregion:	NLAF	NLAF	NLAF	NLAF
Stream Type:	Warmwater	Coldwater	Coldwater	Coldwater
USGS Basin Code:	430108	4030106	4030108	4030106
* Applies only to Riffle/Run stream Surveys				
** Applies only to Glide/Pool stream Surveys				

	Brule River	Phillips Creek	Fence River	Paint River
	Two track off Prairie Road	Co. 577	Two track off Sport Lake Road	Bates Amasa Road
	GLIDE/POOL	GLIDE/POOL	RIFFLE/RUN	RIFFLE/RUN
	Station 7T	Station 4T	Station 5T	Station 4
HABITAT METRIC				
Substrate and Instream Cover				
Epifaunal Substrate/ Avail Cover (20)	11	7	18	16
Embeddedness (20)*			18	13
Velocity/Depth Regime (20)*			16	11
Pool Substrate Characterization (20)**	13	7		
Pool Variability (20)**	15	10		
Channel Morphology				
Sediment Deposition (20)	19	6	16	20
Flow Status - Maint. Flow Volume (10)	10	8	9	10
Flow Status - Flashiness (10)	10	8	10	10
Channel Alteration (20)	15	16	20	20
Frequency of Riffles/Bends (20)*			18	19
Channel Sinuosity (20)**	8	16		
Riparian and Bank Structure				
Bank Stability (L) (10)	9	8	9	10
Bank Stability (R) (10)	9	8	9	10
Vegetative Protection (L) (10)	10	9	9	10
Vegetative Protection (R) (10)	10	9	9	9
Riparian Veg. Zone Width (L) (10)	10	9	10	9
Riparian Veg. Zone Width (R) (10)	10	9	10	9
TOTAL SCORE (200):	159	130	181	176
HABITAT RATING:	EXCELLENT (NON- IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)	EXCELLENT (NON- IMPAIRED)	EXCELLENT (NON- IMPAIRED)
Note: Individual metrics may better describe conditions directly affecting the biological community while the Habitat Rating describes the general riverine environment at the site(s).				
Date:	6/14/2012	6/25/2012	6/27/2012	6/14/2012
Weather:	Partly Cloudy	Sunny	Sunny	Rainy
Air Temperature:	58 Deg. F.	70 Deg. F.	83 Deg. F.	64 Deg. F.
Water Temperature:	60 Deg. F.	65 Deg. F.	62 Deg. F.	63 Deg. F.
Ave. Stream Width:	135 Feet	20 Feet	Feet	Feet
Ave. Stream Depth:	2 Feet	1 Feet	Feet	Feet
Surface Velocity:	0.4 Ft./Sec.	0.25 Ft./Sec.	Ft./Sec.	Ft./Sec.
Estimated Flow:	108 CFS	5 CFS	CFS	CFS
Stream Modifications:		None		None
Nuisance Plants (Y/N):	N	N	N	N
Report Number:				
STORET No.:	360154	550134	360146	360166
Stream Name:	Brule River	Phillips Creek	Fence River	Paint River
Road Crossing/Location:	Two track off Prairie Road	Co. 577	Two track off Sport Lake Road	Bates Amasa Road
County Code:	36	55	36	36
TRS:	41N33W02	35N27W32	44N31W03	44N34W36
Latitude (dd):	45.9811	45.38725	46.2452	46.1689
Longitude (dd):	-88.4037	-87.67274	-88.15964	-88.50404
Ecoregion:	NLAF	NLAF	NLAF	NLAF
Stream Type:	Coldwater	Coldwater	Coldwater	Warmwater
USGS Basin Code:	4030106	4030108	4030107	4030106
* Applies only to Riffle/Run stream Surveys				
** Applies only to Glide/Pool stream Surveys				

	Bush Creek						
	FH 3350						
	GLIDE/POOL						
	Station 18A						
HABITAT METRIC							
Substrate and Instream Cover							
Epifaunal Substrate/ Avail Cover (20)	18						
Embeddedness (20)*							
Velocity/Depth Regime (20)*							
Pool Substrate Characterization (20)**	19						
Pool Variability (20)**	18						
Channel Morphology							
Sediment Deposition (20)	18						
Flow Status - Maint. Flow Volume (10)	10						
Flow Status - Flashiness (10)	10						
Channel Alteration (20)	18						
Frequency of Riffles/Bends (20)*							
Channel Sinuosity (20)**	10						
Riparian and Bank Structure							
Bank Stability (L) (10)	10						
Bank Stability (R) (10)	10						
Vegetative Protection (L) (10)	10						
Vegetative Protection (R) (10)	10						
Riparian Veg. Zone Width (L) (10)	10						
Riparian Veg. Zone Width (R) (10)	10						
TOTAL SCORE (200):		181					
HABITAT RATING:		EXCELLENT					
		(NON-					
		IMPAIRED)					
<p>Note: Individual metrics may better describe conditions directly affecting the biological community while the Habitat Rating describes the general riverine environment at the site(s).</p>							
Date:	6/13/2012						
Weather:	Sunny						
Air Temperature:	71 Deg. F.						
Water Temperature:	69 Deg. F.						
Ave. Stream Width:	21 Feet						
Ave. Stream Depth:	2 Feet						
Surface Velocity:	0.1 Ft./Sec.						
Estimated Flow:	4.2 CFS						
Stream Modifications:	Impounded						
Nuisance Plants (Y/N):	N						
Report Number:							
STORET No.:	360167						
Stream Name:	Bush Creek						
Road Crossing/Location:	FH 3350						
County Code:	36						
TRS:	45N36W25						
Latitude (dd):	46.26661						
Longitude (dd):	-88.77402						
Ecoregion:	NLAF						
Stream Type:	Coldwater						
USGS Basin Code:	4030106						
* Applies only to Riffle/Run stream Surveys							
** Applies only to Glide/Pool stream Surveys							