MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER RESOURCES DIVISION
JULY 2015

STAFF REPORT

A BIOLOGICAL SURVEY OF THE ONTONAGON, PRESQUE ISLE, BLACK, AND MONTREAL RIVERS WATERSHEDS AND OTHER SELECTED WATERSHEDS IN GOGEBIC, HOUGHTON, IRON, AND ONTONAGON COUNTIES, MICHIGAN JULY-AUGUST 2013

INTRODUCTION

Staff of the Michigan Department of Environmental Quality (MDEQ), Surface Water Assessment Section (SWAS), conducted biological, chemical, and physical habitat surveys during the summer of 2013 throughout the Ontonagon (Hydrologic Unit Code [HUC] 04020102), Presque Isle (HUC 04020101), Black (HUC 04020101), and Montreal (HUC 04010302) (OPBM) Rivers watersheds. Additionally, some streams located in smaller western Lake Superior coastal watersheds were surveyed (Figure 1). The goals of this monitoring were to: (1) assess the current status and condition of individual water bodies and determine whether Michigan Water Quality Standards (WQS) are being met; (2) evaluate biological integrity temporal trends; (3) satisfy monitoring requests submitted by external and internal customers; and (4) identify potential nonpoint source (NPS) pollution problems.

These surveys qualitatively characterized the biotic integrity of macroinvertebrate communities with respect to existing habitat conditions at randomly selected sites throughout the OPBM watersheds region. The results of the surveys are used by the SWAS's Status and Trends Program to estimate the amount of these watersheds that is supporting the other indigenous aquatic life and wildlife designated use component of R 323.1100(1)(e) 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.

BACKGROUND AND HISTORICAL SAMPLING EFFORTS

The OPBM watersheds are located in the extreme west end of Michigan's Upper Peninsula. There are numerous dams in the watersheds, including the Bonds Falls system of the Ontonagon River watershed and several within the Montreal River watershed. This extensive watershed area drains parts of 4 Michigan counties. The Ontonagon River watershed, at 1,348 square miles, is larger than the state of Rhode Island. The OPBM watersheds are sparsely populated, with a high percentage of the land within the boundaries of the Ottawa National Forest and Porcupine State Park. The primary towns include Ironwood, Bessemer, Watersmeet, Wakefield, and Ontonagon (Taft et al., 2011).

Taft et al. (2011) also discussed the following watersheds in their report: the Iron River watershed (named Big Iron River on some maps; contained within the "Black-Presque Isle" HUC [04020101]) and a small portion of the Upper Wisconsin River watershed (HUC 07070001) that is located in Michigan; however, there were no sites monitored by the SWAS in those watersheds in 2013.

The OPBM watersheds are located in the Northern Lakes and Forest ecoregion (Omernik and

Gallant, 1988) and mostly flow through extensively forested landscape prior to entering Lake Superior. Many of the rivers/streams in the OPBM watersheds and HUCs are protected for coldwater fish. Most of the warmwater streams and the agriculture land use in this region are located in central and northern Ontonagon County.

Taft et al. (2011) and Taft (2004a, 2004b) pointed out that the headwaters of the Ontonagon, Black, and Presque Isle Rivers drain primarily sandy soils, which helps provide substantial base flows of cold groundwater to the streams. In the downstream sections of the watersheds, where clay soils (Ontonagon) or clay soils and bedrock (Black and Presque Isle) are dominant, groundwater input is reduced dramatically. The mostly-impervious clay soils and bedrock increase surface runoff to the rivers causing the lower portions of the rivers and many of their downstream tributaries to be turbid and warm during the summer months.

The OPBM watersheds have been impacted by historic copper and iron mining and logging activities. In-stream habitat degradation and NPS pollution associated with historic copper and iron mining and logging practices continue to affect OPBM water quality (Taft, 1990; 1992a; 1998b; 1999; 2004b; and Taft et al., 2011).

Logging of the old growth forest in the OPBM watersheds took place primarily in the late 1800s. Rivers were used to transport logs using methods that resulted in severe degradation of stream and riparian habitat. Land was largely abandoned after logging. Today, the Ottawa National Forest encompasses much of the upper Ontonagon and Presque Isle Rivers subwatersheds, while most of the land in the Montreal River subwatershed is privately owned. Forestry, wood products, and tourism continue to be the dominant industries in the OPBM watersheds. Major recreation/tourism activities include winter sports, fishing, hunting, camping, boating, fall color tours, and sightseeing (Taft et al., 2011).

In April 2002, the western end of the Upper Peninsula experienced a 50-year flood event that impacted many tributaries in the OPBM watersheds. The county road system washed out at numerous points including at several previous biosurvey stations (Taft et al., 2011).

Greater detail about the individual OPBM watersheds and their geology, ecology, history, public lands, land use (past and present, including mining and logging), and previous biological surveys can be found in Taft et al. (2011) and Taft (2004a, 2004b) as well as the earlier documents cited in those reports.

The following list summarizes past biological and water chemistry monitoring that has been conducted in the western Upper Peninsula watersheds by the Michigan Department of Natural Resources (MDNR) and MDEQ over the last 29 years. Also, fish population monitoring is regularly conducted within the OPBM watersheds by Ottawa National Forest and MDNR fisheries biologists (Taft et al., 2011).

Summary of past biological and water chemistry monitoring in the western Upper Peninsula watersheds conducted by the MDNR or MDEQ.

Watershed	Report
● Ontonagon River	Taft (1995) Taft (1998a) Taft (1998b) Taft (2004a) Taft (2005) Taft et al. (2011)
● Presque Isle River ● Black River (including Powder Mill Creek) ● Western Lake Superior Coastal Watersheds o (e.g., [Big] Iron River, Little Iron River, Mineral River, Little Carp River, small coastal tributaries)	Taft (1990) Taft (1992a) Taft (1992b) Taft (1994) Taft (1999) Taft (2000) Taft (2004b) Taft et al. (2011)
● Montreal River	Taft (1999) Taft (2004b) Taft et al. (2011)

METHODS

Biological Community and Habitat Assessment Methods

Two site-selection methods (random and targeted) were used to select 33 stations to be assessed in the OPBM watersheds plus other selected watersheds in the region (Table 1, Figure 1). A probabilistic monitoring approach (MDEQ, 2015; draft) was used to randomly select 22 wadeable sites in 2013 to address statewide and regional questions about water quality. Of the 22 randomly selected stations, 14 were "status" sites (currently selected) and 8 were "trend" sites (previously selected sites that are revisited every 5 years). The data from these sites will be used by the SWAS's Status and Trend Program to estimate the watershed attainment status for the other indigenous aquatic life and wildlife designated use component of R 323.1100(e) of the Michigan WQS, and as a baseline to measure biointegrity temporal trends. Eleven stations were selected for targeted monitoring in 2013 to fulfill specific monitoring requests, assess known or potential areas of concern, and assess attainment of WQS from areas where historic survey information was lacking. Seven of these targeted stations assessed biological and, in some cases, chemical conditions; 4 targeted stations (discussed later) assessed only chemical conditions. (Targeted locations "2E" and "2W," the east side and west side of the Montreal River at station 2, were considered a single station when tabulating the number of stations.)

The biological and physical habitat surveys were conducted at wadeable sites according to the SWAS Procedure 51 (MDEQ, 1990). The macroinvertebrate communities were scored with metrics that rate water bodies from excellent (+5 to +9) to poor (-9 to -5). Fish communities were scored with metrics that rate water bodies from excellent (+5 to +10) to poor (-10 to -5). Scores from -4 to +4 are considered acceptable. A site with a negative acceptable score is tending towards poor, while a site with a positive acceptable score is tending towards excellent (Creal et al., 1996). For designated coldwater streams, the fish metrics do not apply and scores are not calculated. The presence of salmonids at 1 percent or greater in the fish community is interpreted as meeting the coldwater designated use (Creal et al., 1996). Coldwater stream designation is determined by the MDNR Designated Trout Streams for the State of Michigan

(MDNR, 1997), per Michigan's Part 4 Rules. Stream habitat at wadeable sites was qualitatively evaluated at each station using a scoring system that ranged in value from 0 to 135.

Digital photographs were taken upstream and downstream at each of the sites that were surveyed during this investigation, and some representative photographs are included in this report for illustrative purposes. Other photographs are available upon request.

Sediment and Water Chemistry Sampling Methods

At some locations, sediment chemistry or water chemistry samples were collected. At each sediment chemistry station, a single sample of the upper 4 to 5 inches of riverine sediment was collected, by hand, using a stainless steel spoon, taking care to avoid losing any organic matter that had settled on the sediment surface. Samples were taken from a 4 to 5-inch wide representative portion of a depositional area in the margin of the river. Any sheens observed during this sampling process were noted and photographed. Each sample was then placed into a stainless steel bowl, homogenized with the spoon, and subsampled to fill up a wide-mouth 250 milliliter (mL) glass container. At each water chemistry station, samples were collected mid-depth from the stream using 500 mL plastic bottles. Containers for sediment and water samples were preserved, kept on ice in a cooler, and handled according to the MDNR (1994) and MDEQ Environmental Laboratory (2010), and analyzed by the MDEQ Environmental Laboratory guidelines.

SAMPLING RESULTS AND DISCUSSION

Targeted Monitoring Stations

Montreal River

A municipal coal-gasification plant (MGP), referred to here as the Site, is believed to have been operated from 1911 until the late 1950s along a bank of the Montreal River, located between the US-2/Silver Street Bridge and Poplar Street Bridge in Ironwood, Gogebic County, Michigan. The structures at the Site were razed in the 1970s and 1980s, but in recent times the property had been found to be laden with manufacturing process residues, including coal tar. Sampling efforts conducted between 2010-2012 by the MDEQ, Wisconsin Department of Natural Resources, and Weston Solutions of Michigan, Inc. confirmed the presence of contaminants of concern, which included volatile organic compounds, semi-volatile organic compounds (SVOCs), and inorganic constituents at concentrations exceeding relevant criteria at the former MGP site and in sediment along the Montreal River. Cleanup activities took place at the Site between August and October 2012 (Weston Solutions of Michigan, Inc., 2014).

At the request of the Upper Peninsula District Office (MDEQ, Remediation and Redevelopment Division), SWAS biologists conducted Procedure 51 biological monitoring and sediment chemistry sampling at a number of stations in the Montreal River in the vicinity of the former MGP facility and cleanup area (Figure 2). The purpose of this sampling was to try to assess whether ecosystem impairment might exist in this area of the river, post Site cleanup activity, through an evaluation of the benthic macroinvertebrate community and sediment chemistry conditions.

Macroinvertebrate communities and habitats were assessed at 3 stations (1, 3, and 4) on the Montreal River; sediment chemistry was sampled at 6 stations (1, 2E/2W, 3, 4, 5, and 6) (Figure 2, Table 1). Station 1 was considered to be a control (reference) station since it was located approximately 530 feet (0.10 mile) upstream of the location of the former MGP site. Station 2, divided into "2E" (near the east side of the river) and "2W" (near the west side of the

river), was immediately downstream of the Site, and is labeled simply as “2” in Figure 1. Station 3 was approximately 420 feet (0.08 mile) downstream of the downstream end of the Site. Stations 4, 5, and 6 were approximately 4,430 feet (0.84 mile), 4,860 feet (0.92 mile), and 6,490 feet (1.23 mile) downstream of the Site, respectively.

All 3 macroinvertebrate stations (1, 3, and 4) had positive acceptable macroinvertebrate community scores (+1, +1, and +3), which indicated that, based upon biological data (Tables 2A and 2B), the river in these locations was supporting the other indigenous aquatic life and wildlife designated use. Macroinvertebrate communities looked fairly similar between the 3 stations; however, there were some slight differences. For example, the sample at Station 3, the station that was downstream and closest to the Site, lacked (among other things) the small numbers of the stonefly family Perlidae and dobsonfly family Corydalidae that were found at both Stations 1 and 4 as well as the odonate families Aeshnidae (dragonfly) and Calopterygidae (damselfly) that were only observed at Station 1.

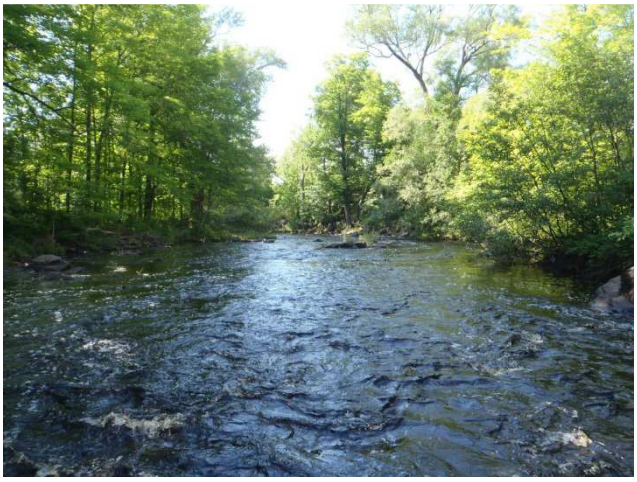
Riverine and riparian conditions at Montreal River stations 1, 3, and 4 ranged from good at Station 3 to excellent at Stations 1 and 4. Habitat scores at Station 3 (i.e., upstream of Norrie Street) were somewhat lower than the other 2 stations primarily due to effects related to the encroachment of urban development and reduced riparian vegetation on the western side of the river and also the artificial armoring of banks and loss of some floodplain on both sides of the river through much of the sampling reach in this location (Table 3). Figure 3 presents representative photographs of stations monitored in this watershed.

Sediment chemistry analyses revealed SVOCs (e.g., polycyclic aromatic hydrocarbons [PAHs], also known as polynuclear aromatic hydrocarbons) to be below detection limits (i.e., non-detect [ND]) in samples collected at the upstream control location (Station 1). SVOC concentrations in the sediment sample collected at Station 2E, a location immediately downstream of the Site near the east edge of the river and which exhibited an odor and sheen when the sample was collected, were higher than at any other location sampled in this study (Table 4). Seventeen PAHs, plus another SVOC (dibenzofuran), were detected in the sediment at Station 2E. Of the 17 PAHs detected at this station, 8 were found to be 8-56 times greater than probable effect concentration (PEC) guidelines described in MacDonald et al. (2000). PECs are concentrations above which harmful effects are likely to be observed and threshold effect concentrations (TEC) are concentrations below which harmful effects are unlikely to be observed (MacDonald et al., 2000)]. Additionally, 1 other PAH (naphthalene) detected at Station 2E was 1.14 times greater than the PEC guidelines. At Station 2W, in a sediment deposit on the river’s edge immediately opposite Station 2E, and also at downstream Stations 3, 4, and 5, PAH concentrations were much lower (albeit still mostly over TEC guidelines) and generally pretty similar to each other. Only 1 PAH (pyrene) was detected at Station 6, the station located approximately 1.23 miles downstream of the Site (Table 4).

A

B

C



D

E

F

Figure 3. Representative photographs taken in the Montreal River watershed in July 2013: (A) Montreal River at Silver Street (a.k.a. site "M1") (Station 1); (B) Montreal River, east side just downstream of remediation site (partially seen in background) (a.k.a. site "M2") (Station 2E); (C) Montreal River upstream of Norrie/Poplar Street (a.k.a. site "M3") (Station 3); (D) Montreal River near cemetery (a.k.a. site "M4") (Station 4); (E) Montreal River near cemetery (a.k.a. Site "M5") (Station 5); and (F) Montreal River off of M-51 (a.k.a. site "M6") (Station 6).

Due to the mostly rocky substrate characteristics and the general scarcity of substantial sediment deposits in this fast flowing stretch of river, the potential for toxic riverine sediments is believed to be small and mostly limited to areas immediately adjacent to and downstream of the former site.

Based on the results of this investigation, there is little evidence that the former MGP site is currently having a significant impact on the macroinvertebrate community. Additional testing including, but not limited to, bulk sediment toxicity testing, would be needed to verify that sediments exceeding PECs are having an impact on WQS.

Gypsy, Lehigh, and Gijik Creeks

At the request of the Upper Peninsula District Office (MDEQ, Water Resources Division), SWAS biologists conducted Procedure 51 biological monitoring and water chemistry sampling in 3 small streams that are direct tributaries to Lake Superior: Gypsy, Lehigh, and Gijik Creeks. The purpose of this sampling was to determine whether WQS were being met in these streams and to gather general background information on their benthic macroinvertebrate community, fish community, habitat, and water chemistry conditions.

According to Upper Peninsula district staff, and based upon the July 17, 2013, biosurvey visit by SWAS biologists, it appears that much of the length of these streams is intermittent or ephemeral, flashy, and largely dries up around June or July. Because of this, sampling needed to take place at the downstream ends of the streams, starting approximately 50 feet upstream of each of their outlets into Lake Superior. Anecdotally, it appeared that there had been some recent rains in the area during some of the days leading up to July 17, so much of the flow that was observed at the downstream end of these streams was likely runoff from recent rains. Rainfalls, as recorded about 18 miles away in nearby downtown Ironwood, Michigan, Gogebic County (NOAA-NCDC, 2015), were 2.1, 0.5, 0.2, 0.1, 0.3, and 0.2 inches on July 7, 8, 9, 11, 14, and 16, respectively. The downstream ends of Gypsy and Gijik Creeks appeared to be perennial sections of stream. The downstream end of Lehigh Creek, however, appeared to be ephemeral (i.e., only having flow due to snow melt and runoff from rains) and very flashy, thus Procedure 51 macroinvertebrate and fish sampling procedures were deemed not appropriate and, therefore, not conducted in that stream.

Macroinvertebrate scores for Gypsy Creek (Station 7) and Gijik Creek (Station 9) were excellent (+6) and acceptable (0), respectively (Tables 2A and 2B). The Gijik Creek station lacked stoneflies, had less than 3 percent caddisflies, and was dominated by blackflies (66 percent) (Table 2B). While fish communities in coldwater designated streams are presently not scored by the MDEQ, community data indicate that the coldwater fish protection designated use set forth in Michigan WQS is being attained at Gypsy Creek (Station 7) due to the presence of >1 percent Salmonidae in the biosurvey (Tables 5A and 5B). In Gijik Creek (Station 9), the survey ran into an unforeseen beaver dam after approximately 200 feet and 25 minutes and had to be stopped early. The required minimum number of fish (at least 50 fish in $\leq$ 45 minutes) (MDEQ, 1990; Creal et al., 1996) could not be collected due to inadequate lotic stream reach length and sampling time (Tables 5A and 5B).

Both stations had habitat that scored as excellent (Table 3) and both appear to be situated in predominately hardwood forest watersheds. Figure 4 presents representative photographs of stations monitored in this watershed.

Gijik Creek had the highest values out of the neighboring streams (Stations 7, 8, and 9) for total organic carbon, total phosphorus, total copper, and iron. No water chemistry parameters measured exceeded Michigan WQS, though copper at Gijik Creek came close (8.1 micrograms

per liter [µg/L]; hardness of 56 milligrams per liter) (Table 6). The corresponding copper WQS are 8.2 µg/L final chronic value and 11.7 µg/L aquatic maximum value. And while there currently is no Michigan WQS for iron, it was somewhat high in Gijik Creek (2400 µg/L) compared to ≤ 520 µg/L in Gypsy Creek and Lehigh Creek (Table 6). MDEQ district staff have pointed out that several of the streams in the vicinity of Gijik Creek were previously impacted when crushed mine tailings were used to build some stream crossings in the area for past mining/logging operations, which may at least partly explain the high copper and iron concentrations measured in the creek. Also, iron is common in many rocks and soils and some groundwaters (USEPA, 1976). In some cases, high levels of iron in water can be detrimental to streams when the iron precipitates out in large quantities as iron hydroxide ("yellow boy"; $Fe(OH)_3$) or as orange/red ferric oxide (Fe_2O_3) and covers stream bottom gravels and other substrates, thereby reducing the amount of in-stream habitat for macroinvertebrates and spawning fish (USEPA, 1976). High levels of iron can also be corrosive to fish gills (MEPBC, 2008). Iron precipitates were not readily observed during the 2013 biosurvey at any of the surveyed sites in Gypsy, Lehigh, and Gijik Creeks.

Status and Trend Monitoring Stations

Black River Watershed

Of the 3 stations that were surveyed in the Black River watershed, 2 stations had acceptable macroinvertebrate communities – both with scores of +4 (Black River, Station 10; Jackson Creek, Station 11) (Tables 1, 2A, and 2B). The third station, Jackson Creek (Station 12), had a community that rated excellent with a score of +5. Stream habitat was rated excellent at all 3 stations, with scores ranging from 157 to 194 (Tables 1 and 3). Riffle/run metrics were used to evaluate habitat at these 3 sites. Figure 5 presents representative photographs of stations monitored in this watershed.

Presque Isle River Watershed

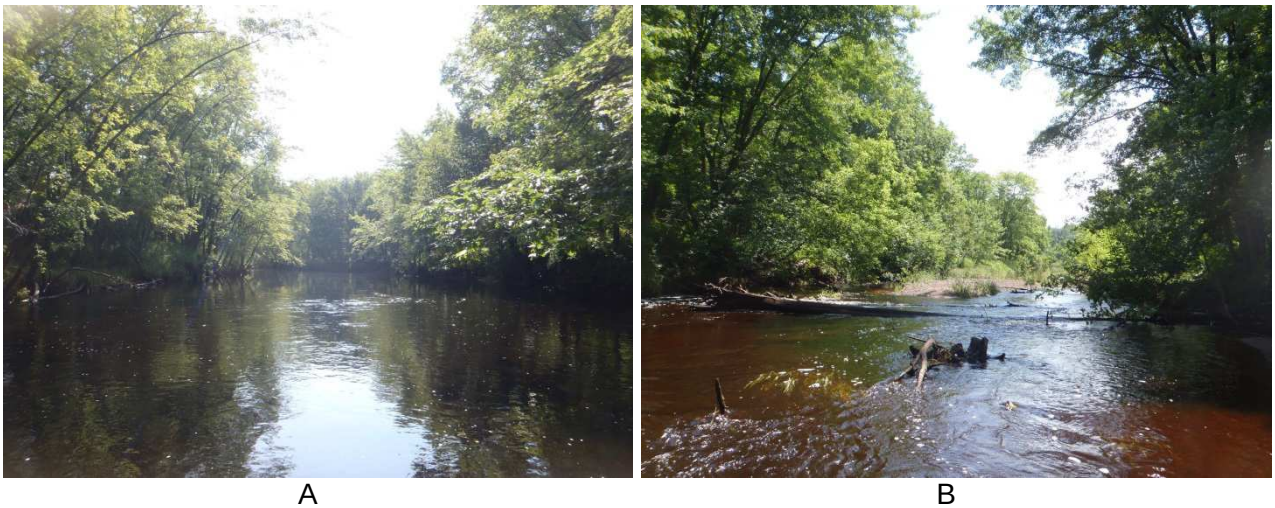
The Presque Isle River site (Station 13) was the only randomly selected location in the watershed to be surveyed in 2013. The macroinvertebrate community was rated as acceptable, with a score of +4 (Tables 1, 2A, and 2B), and the glide/pool habitat was rated as excellent, with a score of 163 (Tables 1 and 3). Figure 6 includes a photograph of Station 13.

Ontonagon River Watershed

Seventeen stations were surveyed in the Ontonagon River watershed. Of those 17 stations, 8 had macroinvertebrate communities that were rated as acceptable and 9 that were rated as excellent (Tables 1, 2A, and 2B). Two sites had negative, but acceptable scores, and are considered to be tending towards poor: Two Mile Creek (Station 23, score: -3) and the Middle Branch Ontonagon River (Station 26, score: -1). The remaining scores were all positive, ranging from +1 to +9. There were 4 stations that had habitat rated as good (scores ranging from 133 to 154); the remaining stations had habitat rated as excellent (scores ranging from 156 to 195) (Tables 1 and 3). Riffle/run metrics were used to score habitat at 10 stations, while glide/pool metrics were used at 7 stations. Figures 7 and 8 presents representative photographs of stations monitored in this watershed.

A B C D

Figure 4. Representative photographs taken at Gypsy, Lehigh, and Gijik Creeks in July 2013: (A) Gypsy Creek (Station 7); (B and C) Lehigh Creek (Station 8); and (D) Gijik Creek (Station 9).



A B

Figure 5. Representative photographs taken in the Black River watershed in July 2013: (A) Black River at Hedberg Road (Station 10) and (B) Jackson Creek at Indianhead Valley Lane (Station 11).

Figure 6. Photograph of the Presque Isle River at Copps Mine Road (County Road 523) (Station 13).

Western Lake Superior Coastal Watersheds

The remaining streams surveyed in this study are located in smaller western Lake Superior coastal watersheds that drain directly to Lake Superior. These smaller watersheds exist within the "Black-Presque Isle" United States Geological Survey HUC 04020101. All 3 stations (Little Carp River [Station 14], Miles Creek [Station 15], and Duck Creek [Station 16]) had acceptable macroinvertebrate communities with scores of +4, -4, and +3, respectively (Tables 1, 2A, and 2B). The score at Miles Creek (-4) is considered to be tending towards poor. Stream habitat was rated excellent at all 3 stations, with scores ranging from 158 to 191 (Tables 1 and 3). Riffle/run metrics were used to evaluate habitat at these 3 sites. Examination of aerial photographs and topographic maps of the Miles Creek area revealed the recent existence of some small ponds (possibly beaver-created) a few hundred feet upstream on the biosurvey reach. This could have resulted in a more lentic-type macroinvertebrate community within the ponds and possibly altered the community immediately downstream of the ponds. Additionally, the upper watershed is located in a region of historical mining operations. A future revisit of Miles Creek is recommended to collect additional data that could help determine why this site had a lower macroinvertebrate community score than nearby streams in this study. Figure 9 presents representative photographs of stations monitored in 2013 in these watersheds.

A B C D E F

Figure 7. Representative photographs taken in the Ontonagon River watershed in July-August 2013: (A) Marshall Creek at M-64 (Station 17); (B) Slate River at US-2 (Station 18); (C) West Branch Ontonagon River at Norwich Road (Station 19); (D) Cascade Creek at NF 400 (Station 20); (E) Tenmile Creek at Old M-28 (Station 21); and (F) Roselawn Creek at Sleepy Hollow Road (Station 24).

A B C D

Figure 8. Representative photographs taken in the Ontonagon River watershed in July-August 2013: (A) Ontonagon River at M-28 (Station 25); (B) Middle Branch Ontonagon River at Old US-2 East (Station 26); (C) East Branch Ontonagon River at Sparrow Rapids (Station 31); and (D) East Branch Ontonagon River downstream of M-28 (Station 33).

Figure 9. Representative photographs taken in smaller western Lake Superior coastal watersheds in July 2013: (A) Little Carp River at Little Carp River Road (Station 14) and (B) Duck Creek at LP Walsh Road (Station 16).

CONCLUSION

Based on the probabilistic monitoring aspect of this watershed survey, 100% ± 19% of the randomly selected "status" sites supported the other indigenous aquatic life and wildlife designated use component of R 323.1100(1)(e) of the Michigan WQS using Procedure 51. Percent attainment was calculated by dividing the number of random "status" sites that met WQS by the total number of random "status" locations (14 / 14 = 1.00). This value is coupled with a 95% confidence interval to provide our estimation of certainty, meaning there is 95% certainty that the true proportion of attainment in the western Upper Peninsula watersheds is within ± 19% of the 100% result based upon sites in the Ontonagon, Black, and Presque Isle watersheds, including some smaller western Lake Superior coastal tributaries. This is encouraging given the extensive historic logging and iron mining legacy issues documented by MDEQ staff (Taft, 1990; 1992a; 1992b; 1994; 2000; and Taft et al., 2011) in the OPBM watershed region.

Among 7 targeted stations assessed for benthic macroinvertebrates, 1 was rated excellent (with a score of 6) and the remaining 6 were rated acceptable (with scores ranging from 0 to 4). The habitat condition was rated excellent at 6 of these targeted stations and was rated good at 1 station. All targeted stations where benthos was monitored were meeting Michigan WQS according to the data that was collected.

Summary of NPS Problems and Other Impacts

No obvious, severe NPS pollution problems were observed or noted during the surveys at the stations described in this report or during travel between stations.

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LITERATURE CITED

Creal, W., S. Hanshue, S. Kosek, M. Oemke, and M. Walterhouse. 1996. Update of GLEAS Procedure 51 Metric Scoring and Interpretation. MDEQ Staff Report #MI/DEQ/SWQ-96/068. Revised May 1998.

MacDonald, D. D., C. G. Ingersoll, and T. A. Berger. 2000. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems. Arch. Environ. Contam. Toxicol. 39: 20–31.

MDEQ. 2015. Macroinvertebrate Community Status and Trend Monitoring Procedure (draft). MDEQ, Water Resources Division, Lansing, Michigan.

MDEQ. 1990. SWAS Procedure WRD-SWAS-051. Qualitative Biological and Habitat Survey Protocols for Wadable Streams and Rivers, April 24, 1990. Revised June 1991, August 1996, January 1997, May 2002, and December 2008. Reformatted May 2014.

MDEQ Environmental Laboratory. 2010. Preservatives (2010) *IN* Bottle Order Form. Environmental Laboratory of the Michigan Department of Environmental Quality. Last viewed on July 9, 2013.
(The link provided was broken and has been removed)

MDNR. 1997. Designated Trout Streams for the State of Michigan. Director's order DFI-101.97. Lansing, Michigan.

MDNR. 1994. Quality Assurance Manual for Water, Sediment, and Biological Sampling. Michigan Department of Natural Resources, Surface Water Quality Division. Staff Report #MI/DEQ/SWQ-98/083.

MEPBC. 2008. Ambient Water Quality Guideline for Iron: Overview Report. Ministry of Environment Province of British Columbia. Report # 978-0-7726-5990-3.

NOAA-NCDC. 2015. Climate Data Online. National Oceanic and Atmospheric Administration (NOAA), National Climatic Data Center (NCDC). Asheville, North Carolina. Last visited on April 17, 2015 at http://www.ncdc.noaa.gov/cdo-web/ .

Omernik, J.M. and A.L. Gallant. 1988. Ecoregions of the Upper Midwest States. United States Environmental Protection Agency, Environmental Research Laboratory, EPA/600/3-88/037.

Taft, W. 1990. A Biological and Water Chemistry Survey of the Mineral River in the Vicinity of the Copper Range - White Pine Mine, Ontonagon County, Michigan, June 14, 1989. Staff Report #MI/DEQ/SWQ-89/159.

Taft, W. 1992a. A Biological Survey of the Mineral and Little Iron River in the Vicinity of Copper Range, Ontonagon County, Michigan, July 18, 1992.

Taft, W. 1992b. A Biological Survey of Powder Mill Creek, Gogebic County, MI. July 20, 1992. Staff Report #MI/DNR/SWQ-92/299.

Taft, W. 1994. A Biological Survey of the Presque Isle River Upstream and Downstream of the Marenisco Township WWTP 001 Outfall, NPDES 0037133, Gogebic County, Michigan, August 3, 1993. Staff Report #MI/DNR/SWQ-94/003.

Taft, W. 1995. A Biological Survey of Bluff Creek Downstream of the Bond Falls Basin Copper District Flume Ontonagon County, Michigan, July 18, 1995. Staff Report #MI/DEQ/SWQ-95/080.

Taft, W. 1998a. A Biological Survey of Adventure Creek Ontonagon County, Michigan, June 3, 1998. Staff Report #MI/DEQ/SWQ-98/037.

Taft, W. 1998b. A Biological Survey of the Ontonagon River Watershed. Ontonagon, Gogebic, and Houghton Counties, Michigan, June and July 1998. Staff Report #MI/DEQ/SWQ-98/082, REVISED July 12, 1999.

Taft, W. 1999. A Biological Survey of the Presque Isle, Black, and Montreal River Watersheds, Ontonagon and Gogebic Counties, Michigan, June and July 1998. DEQ Staff Report #MI/DNR/SWQ-99/006.

Taft, W. 2000. A Biological Survey of Selected Coastal Lake Superior Tributaries in Western Ontonagon and Gogebic Counties, June and July 1998. Staff Report #MI/DEQ/SWQ-99/087, REVISED February 16, 2000.

Taft, W. 2004a. A Biological Survey of the Ontonagon River Watershed, Ontonagon, Gogebic, and Houghton Counties, Michigan, June 2003. Michigan Department of Environmental Protection, Lansing, MI. Staff Report # MI/DEQ/WD-04/035, REVISED March 2005.

Taft, W. 2004b. A Biological Survey of Selected Streams within the Presque Isle, Black, Montreal, and Western Lake Superior Coastal Watersheds, Ontonagon and Gogebic Counties, Michigan, June 2003. MDEQ Staff Report #MI/DEQ/WD-04/064.

Taft, W. 2005. Fish Community Assessment of Bluff Creek Downstream of the Bond Falls Basin Copper Flume Control Structure, Ontonagon County, Michigan, June 18, 2004. Staff Report #MI/DEQ/WB-05/074.

Taft., W., K. Edly, M. Wesener, and S. Wright. 2011. A Biological Survey of the Ontonagon, Presque Isle, Iron, Montreal, and Upper Wisconsin Rivers Watersheds and Other Selected Nonbasin Year Watersheds, Gogebic, Houghton, Iron, and Ontonagon Counties, Michigan, June 2008. MDEQ Staff Report #MI/DEQ/WRD-11/023.

USEPA. 1976. Quality Criteria for Water. United States Environmental Protection Agency, Washington, D.C. Report #EPA 440/9-76/023. 501 pp.

Weston Solutions of Michigan, Inc. (Weston). 2014. Final Letter Report: Ironwood Manufactured Gas Plant (MGP) Site - Removal Action, Ironwood, Gogebic County, Michigan, January 22, 2014. Technical Direction Document No. S05-0001-1207-020, Document Control No. 1917-2A-BITO, Contract No. EP-S5-06-04. Last visited on April 11, 2014 at *(The link provided was broken and has been removed)*.

WESTERN UP WATERSHED
Site Locations
2013

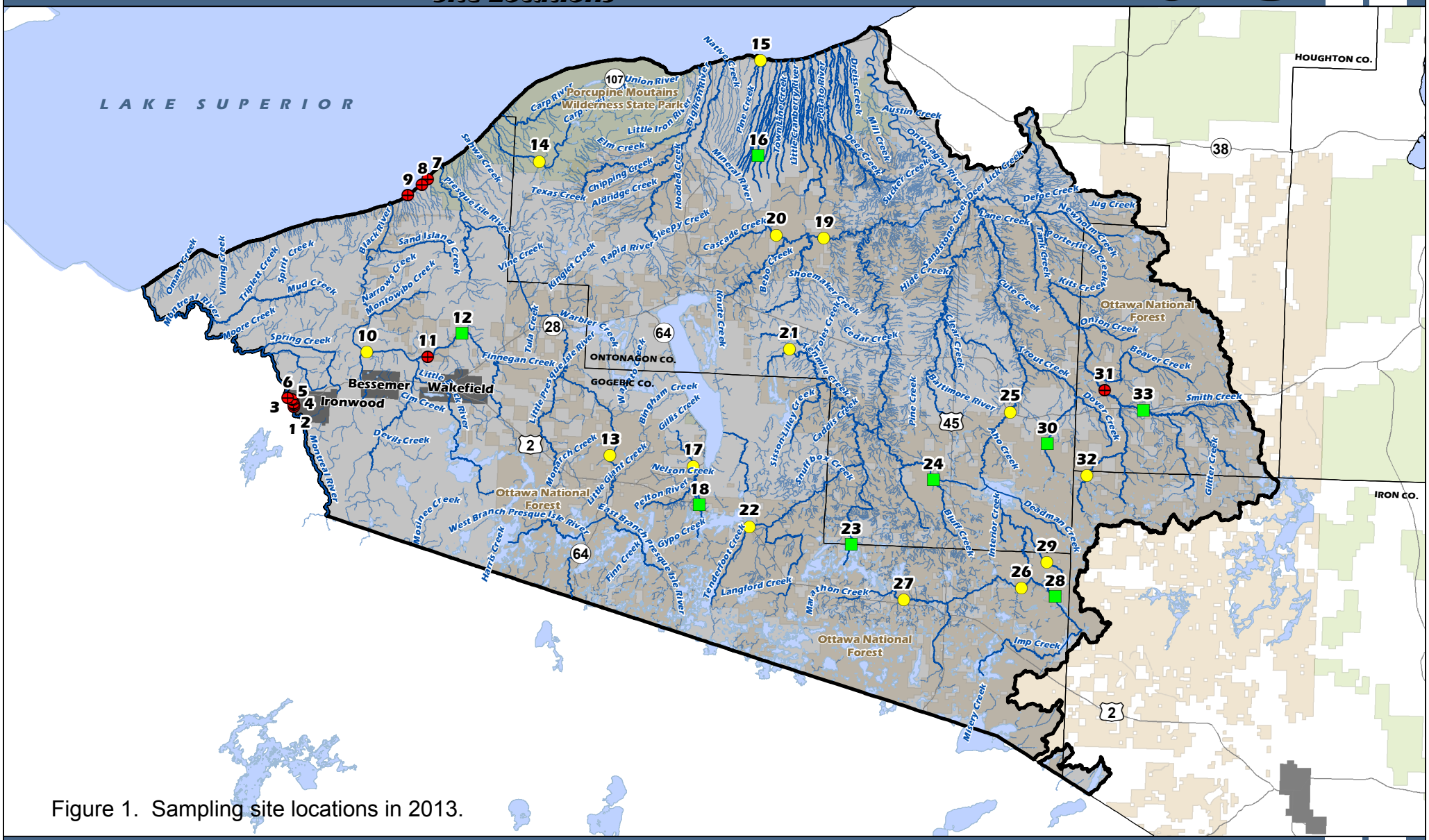

Figure 1. Sampling site locations in 2013.

SiteType

- Status
- Trend
- Targeted

- Valley Segments
- Watershed Boundary
- NHDFlowline (1:24000)

NORTH

0 8 16 24
miles

DEQ Department of Environmental Quality

Figure 2. Montreal River sampling locations. Sampling took place in the river. GPS coordinates were sometimes taken adjacent to the river. Map by Jeff Varricchione; Michigan Department of Environmental Quality; 4/24/2015.

0 0.125 0.25 Miles

Table 1. Monitoring station locations and a summary of biosurvey results in western Upper Peninsula watersheds, 2013. Legend for acronyms is at the end of the table.

Station ID	Site Type	Monitoring Completed	Stream	Survey Location	Macroinvertebrate Community Rating & Score	Habitat Rating & Score (Riffle/Run, Glide/Pool)	County	Latitude	Longtitude
1	Targeted	M, H, SC	Montreal River	Silver St. (control / reference site) (a.k.a. site "M1")	ACCEPTABLE (1)	EXCELLENT (159) (R/R)	Gogebic	46.44977	-90.17830
2E	Targeted	SC	Montreal River	d/s of remediation site; east bank (a.k.a. site "M2")	--	--	Gogebic	46.45176	-90.17869
2W	Targeted	SC	Montreal River	d/s of remediation site; west bank (a.k.a. site "M2W")	--	--	Gogebic	46.45174	-90.17879
3	Targeted	M, H, SC	Montreal River	u/s Norrie/Poplar St. bridge (a.k.a. site "M3")	ACCEPTABLE (1)	GOOD (154) (R/R)	Gogebic	46.45316	-90.17912
4	Targeted	M, H, SC	Montreal River	near cemetery (a.k.a. site "M4")	ACCEPTABLE (3)	EXCELLENT (168) (R/R)	Gogebic	46.45685	-90.18093
5	Targeted	SC	Montreal River	near cemetery (a.k.a. Site "M5")	--	--	Gogebic	46.45750	-90.18232
6	Targeted	SC	Montreal River	off of M-51 (a.k.a. site "M6")	--	--	Gogebic	46.45844	-90.18851
7	Targeted	M, H, F, WC	Gypsy Creek	near the mouth	EXCELLENT (6)	EXCELLENT (172) (R/R)	Gogebic	46.69563	-89.99333
8	Targeted	WC	Lehigh Creek	near the mouth	--	--	Gogebic	46.68980	-90.00121
9	Targeted	M, H, F, WC	Gijik Creek	near the mouth	ACCEPTABLE (0)	EXCELLENT (166) (R/R)	Gogebic	46.67752	-90.02215
10	Status	M, H	Black River	d/s of WWTP at Hedberg Road	ACCEPTABLE (4)	EXCELLENT (172) (R/R)	Gogebic	46.51080	-90.07250
11	Targeted	M, H	Jackson Creek	Indianhead Valley Lane	ACCEPTABLE (4)	EXCELLENT (157) (R/R)	Gogebic	46.50937	-89.97916
12	Trend	M, H	Jackson Creek	Presque Isle Rd.	EXCELLENT (5)	EXCELLENT (194) (R/R)	Gogebic	46.53553	-89.92894
13	Status	M, H	Presque Isle River	Copps Mine Road (County Road 523)	ACCEPTABLE (4)	EXCELLENT (163) (G/P)	Gogebic	46.41519	-89.69585
14	Status	M, H	Little Carp River	Little Carp River Road (South Boundry Road)	ACCEPTABLE (4)	EXCELLENT (191) (R/R)	Ontonagon	46.71984	-89.82437
15	Status	M, H	Miles Creek	M64	ACCEPTABLE (-4)	EXCELLENT (170) (R/R)	Ontonagon	46.83684	-89.49336
16	Trend	M, H	Duck Creek	L P Walsh Rd	ACCEPTABLE (3)	EXCELLENT (158) (R/R)	Ontonagon	46.73700	-89.49100
17	Status	M, H	Marshall Creek	M64	ACCEPTABLE (4)	GOOD (144) (R/R)	Gogebic	46.40803	-89.56873
18	Trend	M, H	Slate River	US 2	ACCEPTABLE (3)	EXCELLENT (176) (R/R)	Gogebic	46.36800	-89.55700
19	Status	M, H	West Branch Ontonagon River	Norwich Road	EXCELLENT (7)	GOOD (133) (G/P)	Ontonagon	46.65321	-89.38530
20	Status	M, H	Cascade Creek	Federal Forest Road 0400 (NF 400)	EXCELLENT (5)	EXCELLENT (156) (G/P)	Ontonagon	46.65434	-89.45822
21	Status	M, H	Ten Mile Creek	Old M28	EXCELLENT (6)	EXCELLENT (159) (R/R)	Ontonagon	46.53477	-89.43042
22	Status	M, H	Tenderfoot Creek	US2	EXCELLENT (7)	EXCELLENT (171) (R/R)	Gogebic	46.34685	-89.47894
23	Trend	M, H	Two Mile Creek	Sucker Lake Rd	ACCEPTABLE (-3)	EXCELLENT (157) (R/R)	Ontonagon	46.33300	-89.32400
24	Trend	M, H	Roselawn Creek	Sleepy Hollow Rd.	ACCEPTABLE (2)	EXCELLENT (182) (G/P)	Ontonagon	46.40430	-89.20321
25	Status	M, H	Ontonagon River	M28 (u/s Agate Falls)	EXCELLENT (6)	EXCELLENT (178) (R/R)	Ontonagon	46.47884	-89.09075
26	Status	M, H	Middle Branch Ontonagon River	Old US2 East	ACCEPTABLE (-1)	GOOD (154) (G/P)	Gogebic	46.29432	-89.06360
27	Status	M, H	Middle Branch Ontonagon River	Russ Road	ACCEPTABLE (1)	EXCELLENT (171) (G/P)	Gogebic	46.27684	-89.24087
28	Trend	M, H	Tamarack River	Forest HWY 3340	EXCELLENT (8)	EXCELLENT (195) (R/R)	Gogebic	46.28700	-89.01200
29	Status	M, H	McGinty Creek	Federal Forest Road 4500	ACCEPTABLE (1)	GOOD (144) (G/P)	Gogebic	46.32242	-89.02621
30	Trend	M, H	Trout Creek	4 Mile Square Road	EXCELLENT (6)	EXCELLENT (181) (R/R)	Ontonagon	46.44700	-89.03300

Table 1.

Station ID	Site Type	Monitoring Completed	Stream	Survey Location	Macroinvertebrate Community Rating & Score	Habitat Rating & Score (Riffle/Run, Glide/Pool)	County	Latitude	Longtitude
31	Targeted	M, H	E. Br. Ontonagon	at Sparrow Rapids, Duncan Twp	ACCEPTABLE (4)	EXCELLENT (183) (R/R)	Houghton	46.50555	-88.94861
32	Status	M, H	West Branch Jumbo River	Federal Forest Road 4580 (Fdr 368)	EXCELLENT (5)	EXCELLENT (172) (G/P)	Iron	46.41505	-88.97108
33	Trend	M, H	E B Ontonagon River	downstream of M-28 at USFS roadside park	EXCELLENT (9)	EXCELLENT (177) (R/R)	Houghton	46.48600	-88.88900

LEGEND

Macroinvertebrate Rating System (Wadeable Stations):
Poor: -9 to -5 Acceptable: -4 to +4 Excellent: +5 to +9
Macroinvertebrate Rating System (Non-Wadeable Stations):
Poor: < 26 Marginal: 26 to 50 Good: 51 to 74 Excellent: 75 to 100
Habitat Rating System (Wadeable Stations):
Poor: < 56 Marginal: 56 to 104 Good: 105 to 154 Excellent: > 154

Monitoring Type
H: Habitat
F: Fish
M: Macroinvertebrates
SC: Sediment Chemistry
WC: Water Chemistry

Other:
N/A: Not Available
u/s: Upstream
d/s: Downstream
Bnk Stbl: Bank Stabilization

Table 2A. Qualitative macroinvertebrate sampling results for

TAXA	Montreal River Silver Street 7/16/2013 STATION 1	Montreal River Norrie Street 7/16/2013 STATION 3	Montreal River near cemetary 7/16/2013 STATION 4	Gypsy Creek near mouth 7/17/2013 STATION 7
ANNELIDA (segmented worms)				
Hirudinea (leeches)				2
Oligochaeta (worms)	9	32	5	7
ARTHROPODA				
Crustacea				
Amphipoda (scuds)	1	2	1	7
Decapoda (crayfish)	17	21	16	
Isopoda (sowbugs)	12	2	2	3
Arachnoidea				
Hydracarina	3		1	
Insecta				
Ephemeroptera (mayflies)				
Baetidae	8	1	16	38
Caenidae	1	1	1	
Ephemerellidae		3		3
Heptageniidae	41	72	59	17
Leptophlebiidae			12	
Tricorythidae		1		2
Odonata				
Anisoptera (dragonflies)				
Aeshnidae	3			2
Cordulegastridae				4
Zygoptera (damselflies)				
Calopterygidae	1			
Plecoptera (stoneflies)				
Leuctridae				5
Perlidae	4		1	1
Hemiptera (true bugs)				
Gerridae	1		1	
Veliidae	19	27	1	
Megaloptera				
Corydalidae (dobson flies)	2		1	4
Sialidae (alder flies)				1
Trichoptera (caddisflies)				
Hydropsychidae	10	10	30	9
Hydroptilidae				10
Limnephilidae	10	1	1	1
Philopotamidae	26	9	4	1
Polycentropodidae				1
Coleoptera (beetles)				
Dytiscidae (total)				2
Dryopidae				1
Elmidae	39	20	22	26
Diptera (flies)				
Ceratopogonidae	3	2	2	4
Chironomidae	38	11	27	13
Simuliidae	4	6	16	24
Tabanidae	4		6	3
Tipulidae				3
MOLLUSCA				
Gastropoda (snails)				
Ancylidae (limpets)			1	
Pelecypoda (bivalves)				
Sphaeriidae (clams)	10	1		
TOTAL INDIVIDUALS	266	222	226	194

Table 2B. Macroinvertebrate metric evaluation of

METRIC	Montreal River Silver Street 7/16/2013 STATION 1 Value	Score	Montreal River Norrie Street 7/16/2013 STATION 3 Value	Score	Montreal River near cemetary 7/16/2013 STATION 4 Value	Score	Gypsy Creek near mouth 7/17/2013 STATION 7 Value	Score
TOTAL NUMBER OF TAXA	23	0	18	0	22	0	27	1
NUMBER OF MAYFLY TAXA	3	0	5	1	4	0	4	1
NUMBER OF CADDISFLY TAXA	3	0	3	0	3	0	5	0
NUMBER OF STONEFLY TAXA	1	0	0	-1	1	0	2	1
PERCENT MAYFLY COMP.	18.80	0	35.14	1	38.94	1	30.93	1
PERCENT CADDISFLY COMP.	17.29	0	9.01	0	15.49	0	11.34	0
PERCENT DOMINANT TAXON	15.41	1	32.43	-1	26.11	0	19.59	0
PERCENT ISOPOD, SNAIL, LEECH	4.51	0	0.90	1	1.33	1	2.58	1
PERCENT SURF. AIR BREATHERS	7.52	0	12.16	0	0.88	1	1.03	1
TOTAL SCORE		1		1		3		6
MACROINV. COMMUNITY RATING		ACCEPT.		ACCEPT.		ACCEPT.		EXCELLENT

Table 2A. Qualitative macroinvertebrate sampling results for

TAXA	Gijik Creek near mouth 7/17/2013 STATION 9	Black River d/s WWTP Hedberg Rd 7/18/2013 STATION 10	Jackson Creek Indianhead Valley Lane 7/18/2013 STATION 11	Jackson Creek Presque Isle Road (Co 519) 7/31/2013 STATION 12
ANNELIDA (segmented worms)				
Hirudinea (leeches)	5			2
Oligochaeta (worms)	1	5	25	28
ARTHROPODA				
Crustacea				
Amphipoda (scuds)	31			
Decapoda (crayfish)		24	5	1
Arachnoidea				
Hydracarina			2	1
Insecta				
Ephemeroptera (mayflies)				
Baetidae	6	2	9	59
Caenidae	12		3	
Ephemerellidae		4		
Ephemeridae		1		
Heptageniidae		54	6	17
Isonychiidae		26	23	17
Leptophlebiidae		1		10
Tricorythidae			1	
Odonata				
Anisoptera (dragonflies)				
Aeshnidae	6	1	5	3
Gomphidae		11	9	10
Zygoptera (damselflies)				
Calopterygidae		1	3	1
Plecoptera (stoneflies)				
Chloroperlidae				1
Leuctridae				3
Perlidae		7	16	9
Hemiptera (true bugs)				
Gerridae	1	1		1
Pleidae	7			
Veliidae	1	4	3	1
Megaloptera				
Corydalidae (dobson flies)		5	2	1
Trichoptera (caddisflies)				
Glossosomatidae				11
Hydropsychidae	7	15	24	19
Hydroptilidae				3
Leptoceridae			1	
Limnephilidae		3	5	1
Philopotamidae	1	1		2
Coleoptera (beetles)				
Dytiscidae (total)	1			
Haliplidae (adults)	1			
Hydrophilidae (total)	2			
Elmidae	1	58	33	28
Diptera (flies)				
Athericidae				17
Ceratopogonidae	5		1	1
Chaoboridae	1			
Chironomidae	7	10	20	13
Culicidae		1		
Empididae				1
Simuliidae	201	1	29	33
Tabanidae		6	30	
Tipulidae			1	2
MOLLUSCA				
Gastropoda (snails)				
Physidae	2	2		
Planorbidae	3			
Pelecypoda (bivalves)				
Sphaeriidae (clams)	1	7	3	
TOTAL INDIVIDUALS	303	251	259	296

Table 2B. Macroinvertebrate metric evaluation of

	Gijik Creek near mouth 7/17/2013 STATION 9		Black River d/s WWTP Hedberg Rd 7/18/2013 STATION 10		Jackson Creek Indianhead Valley Lane 7/18/2013 STATION 11		Jackson Creek Presque Isle Road (Co 519) 7/31/2013 STATION 12	
METRIC	Value	Score	Value	Score	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	22	1	25	0	24	0	29	1
NUMBER OF MAYFLY TAXA	2	1	6	1	5	1	4	0
NUMBER OF CADDISFLY TAXA	2	-1	3	0	3	0	5	0
NUMBER OF STONEFLY TAXA	0	-1	1	0	1	0	3	1
PERCENT MAYFLY COMP.	5.94	0	35.06	1	16.22	0	34.80	1
PERCENT CADDISFLY COMP.	2.64	-1	7.57	0	11.58	0	12.16	0
PERCENT DOMINANT TAXON	66.34	-1	23.11	0	12.74	1	19.93	0
PERCENT ISOPOD, SNAIL, LEECH	3.30	1	0.80	1	0.00	1	0.68	1
PERCENT SURF. AIR BREATHERS	4.62	1	2.39	1	1.16	1	0.68	1
TOTAL SCORE		0		4		4		5
MACROINV. COMMUNITY RATING		ACCEPT.		ACCEPT.		ACCEPT.		EXCELLENT

Table 2A. Qualitative macroinvertebrate sampling results for

TAXA	Presque Isle River off Copps Mine Road 7/19/2013 STATION 13	Little Carp River North of S. Boundry Rd 7/29/2013 STATION 14	Miles Creek M64 7/19/2013 STATION 15	Duck Creek LP Walsh Road 7/18/2013 STATION 16
PLATYHELMINTHES (flatworms)				
Turbellaria	2			
ANNELIDA (segmented worms)				
Hirudinea (leeches)	1		1	2
Oligochaeta (worms)	5	4	1	10
ARTHROPODA				
Crustacea				
Amphipoda (scuds)	11		10	
Decapoda (crayfish)	1			
Isopoda (sowbugs)			117	
Arachnoidea				
Hydracarina	1	3		5
Insecta				
Ephemeroptera (mayflies)				
Baetidae	14	8		7
Caenidae	11			
Ephemerellidae		3		4
Ephemeridae	1			
Heptageniidae	38	25		
Isonychiidae	6			
Leptophlebiidae	6			3
Tricorythidae	2			
Odonata				
Anisoptera (dragonflies)				
Aeshnidae	5		1	9
Cordulegastridae			1	28
Gomphidae	1	2		
Macromiidae	2			
Zygoptera (damselflies)				
Calopterygidae	26			
Plecoptera (stoneflies)				
Leuctridae		4		1
Perlidae	4	1		
Pteronarcyidae		2		
Hemiptera (true bugs)				
Belostomatidae	1			
Gerridae			3	41
Notonectidae	1			
Pleidae	3			
Veliidae			1	
Megaloptera				
Corydalidae (dobson flies)	3	3		
Sialidae (alder flies)	1			1
Trichoptera (caddisflies)				
Brachycentridae			2	9
Glossosomatidae		5		
Helicopsychidae	1			
Hydropsychidae	6	52	3	
Hydroptilidae				1
Lepidostomatidae		1		14
Leptoceridae		4		
Limnephilidae	1	3	1	
Philopotamidae	1	1		
Phryganeidae				2
Polycentropodidae		82		
Uenoidae		1		
Coleoptera (beetles)				
Dytiscidae (total)			2	9
Gyrinidae (adults)				2
Haliplidae (adults)	1		1	
Elmidae	14	5	1	14
Diptera (flies)				
Athericidae		19		
Ceratopogonidae				5
Chironomidae	21	29	12	30
Simuliidae		5	151	8
Tabanidae				17
Tipulidae		1		8
MOLLUSCA				
Gastropoda (snails)				
Ancylidae (limpets)	2			
Physidae			9	4
Planorbidae				1
Pelecypoda (bivalves)				
Sphaeriidae (clams)	76			
TOTAL INDIVIDUALS	269	263	317	235

Table 2B. Macroinvertebrate metric evaluation of

	Presque Isle River off Copps Mine Road 7/19/2013 STATION 13		Little Carp River North of S. Boundry Rd 7/29/2013 STATION 14		Miles Creek M64 7/19/2013 STATION 15		Duck Creek LP Walsh Road 7/18/2013 STATION 16	
METRIC	Value	Score	Value	Score	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	32	1	23	0	17	1	25	1
NUMBER OF MAYFLY TAXA	7	1	3	0	0	-1	3	1
NUMBER OF CADDISFLY TAXA	4	0	8	1	3	0	4	0
NUMBER OF STONEFLY TAXA	1	0	3	1	0	-1	1	1
PERCENT MAYFLY COMP.	29.00	1	13.69	0	0.00	-1	5.96	0
PERCENT CADDISFLY COMP.	3.35	0	56.65	1	1.89	-1	11.06	0
PERCENT DOMINANT TAXON	28.25	-1	31.18	-1	47.63	-1	17.45	0
PERCENT ISOPOD, SNAIL, LEECH	1.12	1	0.00	1	40.06	-1	2.98	1
PERCENT SURF. AIR BREATHERS	2.23	1	0.00	1	2.21	1	22.13	-1
TOTAL SCORE		4		4		-4		3
MACROINV. COMMUNITY RATING		ACCEPT.		ACCEPT.		ACCEPT.		ACCEPT.

Table 2A. Qualitative macroinvertebrate sampling results for

TAXA	Marshall Creek M-64 7/21/2013 STATION 17	Slate River At US-2 7/30/2013 STATION 18	West Br. Ontonagon River Norwich Road 7/21/2013 STATION 19	Cascade Creek d/s from Bridge 7/21/2013 STATION 20
ANNELIDA (segmented worms)				
Oligochaeta (worms)	1		2	2
ARTHROPODA				
Crustacea				
Amphipoda (scuds)			4	
Decapoda (crayfish)	1		1	6
Arachnoidea				
Hydracarina	2	1	1	
Insecta				
Ephemeroptera (mayflies)				
Baetidae	34	11	13	15
Caenidae			1	3
Ephemerellidae	8		21	4
Heptageniidae	9	15	11	21
Isonychiidae			9	88
Leptophlebiidae			4	
Polymitarcyidae			7	
Siphlonuridae		1		
Tricorythidae	18		37	
Odonata				
Anisoptera (dragonflies)				
Aeshnidae	2	1	1	4
Cordulegastridae		5		
Gomphidae	1	4	6	6
Libellulidae			1	
Macromiidae			5	1
Zygoptera (damselflies)				
Calopterygidae	4		2	
Coenagrionidae			1	
Plecoptera (stoneflies)				
Leuctridae	3	2		
Perlidae	6	2	1	2
Perlodidae			14	2
Hemiptera (true bugs)				
Corixidae				1
Gerridae	3	3	19	1
Mesoveliidae			1	
Veliidae			4	11
Megaloptera				
Corydalidae (dobson flies)	4	1		1
Sialidae (alder flies)	1			
Trichoptera (caddisflies)				
Glossosomatidae		60		
Hydropsychidae	82	10	9	52
Hydroptilidae	1		1	6
Leptoceridae			1	1
Limnephilidae	8	2	1	1
Molannidae		1		
Philopotamidae	26	2	1	8
Phryganeidae	1			
Polycentropodidae			16	
Lepidoptera (moths)				
Pyralidae		1		
Coleoptera (beetles)				
Haliplidae (adults)			1	
Hydrophilidae (total)	1			1
Dryopidae				1
Elmidae	16	1	16	30
Diptera (flies)				
Athericidae	6			2
Ceratopogonidae			14	2
Chironomidae	53	3	28	8
Culicidae			1	
Simuliidae	47	3	1	
Tipulidae		1		
MOLLUSCA				
Gastropoda (snails)				
Ancylidae (limpets)		1		
Physidae	1		1	
Planorbidae	1			
Viviparidae			1	
Pelecypoda (bivalves)				
Sphaeriidae (clams)			1	1
TOTAL INDIVIDUALS	340	131	259	281

Table 2B. Macroinvertebrate metric evaluation of

	Marshall Creek M-64 7/21/2013 STATION 17		Slate River At US-2 7/30/2013 STATION 18		West Br. Ontonagon River Norwich Road 7/21/2013 STATION 19		Cascade Creek d/s from Bridge 7/21/2013 STATION 20	
METRIC	Value	Score	Value	Score	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	27	0	22	0	38	1	28	1
NUMBER OF MAYFLY TAXA	4	0	3	0	8	1	5	1
NUMBER OF CADDISFLY TAXA	5	0	5	0	6	1	5	0
NUMBER OF STONEFLY TAXA	2	1	2	1	2	1	2	1
PERCENT MAYFLY COMP.	20.29	0	20.61	0	39.77	1	46.62	1
PERCENT CADDISFLY COMP.	34.71	1	57.25	1	11.20	0	24.20	0
PERCENT DOMINANT TAXON	24.12	0	45.80	-1	14.29	1	31.32	-1
PERCENT ISOPOD, SNAIL, LEECH	0.59	1	0.76	1	0.77	1	0.00	1
PERCENT SURF. AIR BREATHERS	1.18	1	2.29	1	10.04	0	4.98	1
TOTAL SCORE		4		3		7		5
MACROINV. COMMUNITY RATING		ACCEPT.		ACCEPT.		EXCELLENT		EXCELLENT

Table 2A. Qualitative macroinvertebrate sampling results for

TAXA	Ten Mile Creek Old M28 7/19/2013 STATION 21	Tenderfoot Creek US2 7/21/2013 STATION 22	Two Mile Creek Sucker Lake Road 7/31/2013 STATION 23	Roselawn Creek Sleepy Hollow Road 7/30/2013 STATION 24
PORIFERA (sponges)	2		1	
ANNELIDA (segmented worms)				
Hirudinea (leeches)		3		
Oligochaeta (worms)	3	7		5
ARTHROPODA				
Crustacea				
Amphipoda (scuds)		5	3	2
Decapoda (crayfish)		6	1	1
Isopoda (sowbugs)			23	4
Arachnoidea				
Hydracarina	1	5	1	12
Insecta				
Ephemeroptera (mayflies)				
Baetiscidae				2
Baetidae		6	1	29
Caenidae		12	10	
Ephemeridae				1
Heptageniidae	44	23	4	10
Isonychiidae	32	28		
Leptophlebiidae	2	3	2	
Tricorythidae		1		
Odonata				
Anisoptera (dragonflies)				
Aeshnidae	3	1	2	
Cordulegastridae	3	1		1
Gomphidae		3		20
Libellulidae			8	
Macromiidae				1
Zygoptera (damselflies)				
Calopterygidae	2	7	2	2
Coenagrionidae			1	2
Plecoptera (stoneflies)				
Perlidae	7	1		6
Perlodidae		3		
Hemiptera (true bugs)				
Corixidae		7		40
Gerridae	1	2		1
Mesoveliidae	1	1		
Pleidae		2		
Veliidae	2	11		
Megaloptera				
Corydalidae (dobson flies)	10	9		1
Sialidae (alder flies)			5	
Trichoptera (caddisflies)				
Glossosomatidae		2		4
Helicopsychidae				1
Hydropsychidae	29	45		15
Hydroptilidae			1	
Leptoceridae		5		1
Limnephilidae	1	7	2	10
Philopotamidae	3	18		
Phryganeidae		1		
Polycentropodidae				1
Psychomyiidae				4
Uenoidae				12
Coleoptera (beetles)				
Dytiscidae (total)	1			
Gyrinidae (adults)			9	1
Elmidae	17	9		31
Diptera (flies)				
Athericidae		1		
Ceratopogonidae	1		3	
Chironomidae	56	11	198	37
Culicidae	2			
Empididae			1	
Simuliidae	5		7	3
Tabanidae	6		1	3
Tipulidae			1	4
MOLLUSCA				
Gastropoda (snails)				
Ancylidae (limpets)				15
Physidae		2		4
Planorbidae		2	1	2
Pelecypoda (bivalves)				
Sphaeriidae (clams)	30	14	1	
TOTAL INDIVIDUALS	264	264	289	288

Table 2B. Macroinvertebrate metric evaluation of

	Ten Mile Creek Old M28 7/19/2013 STATION 21		Tenderfoot Creek US2 7/21/2013 STATION 22		Two Mile Creek Sucker Lake Road 7/31/2013 STATION 23		Roselawn Creek Sleepy Hollow Road 7/30/2013 STATION 24	
METRIC	Value	Score	Value	Score	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	25	1	35	1	25	0	35	1
NUMBER OF MAYFLY TAXA	3	1	6	1	4	0	4	0
NUMBER OF CADDISFLY TAXA	3	0	6	1	2	-1	8	1
NUMBER OF STONEFLY TAXA	1	1	2	1	0	-1	1	0
PERCENT MAYFLY COMP.	29.55	1	27.65	1	5.88	0	14.58	0
PERCENT CADDISFLY COMP.	12.50	0	29.55	1	1.04	-1	16.67	0
PERCENT DOMINANT TAXON	21.21	0	17.05	0	68.51	-1	13.89	1
PERCENT ISOPOD, SNAIL, LEECH	0.00	1	2.65	1	8.30	0	8.68	0
PERCENT SURF. AIR BREATHERS	2.65	1	8.71	0	3.11	1	14.58	-1
TOTAL SCORE		6		7		-3		2
MACROINV. COMMUNITY RATING		EXCELLENT		EXCELLENT		ACCEPT.		ACCEPT.

Table 2A. Qualitative macroinvertebrate sampling results for

TAXA	Ontonagon River M-28 u/s of Agate Falls 7/20/2013 STATION 25	Middle Br. Ontonagon R Old US2 East 7/22/2013 STATION 26	Middle Br. Ontonagon R. Russ Road 7/22/2013 STATION 27	Tamarack River Forest Highway 3340 7/30/2013 STATION 28
PORIFERA (sponges)			4	
PLATYHELMINTHES (flatworms)				
Turbellaria		1	2	
ANNELIDA (segmented worms)				
Hirudinea (leeches)		1	1	1
Oligochaeta (worms)		2	19	20
ARTHROPODA				
Crustacea				
Amphipoda (scuds)		9	8	
Decapoda (crayfish)		1		
Isopoda (sowbugs)		3	7	
Arachnoidea				
Hydracarina	1	12	3	1
Insecta				
Ephemeroptera (mayflies)				
Baetidae	73	15	6	45
Caenidae		5	4	9
Ephemerellidae	9		1	3
Ephemeridae			1	
Heptageniidae	5	4		43
Tricorythidae		19	1	9
Odonata				
Anisoptera (dragonflies)				
Aeshnidae	1	1	5	4
Cordulegastridae				1
Gomphidae	1	1		8
Libellulidae		1		
Zygoptera (damselflies)				
Calopterygidae		1	5	14
Plecoptera (stoneflies)				
Perlidae	15		1	16
Perlodidae				1
Pteronarcyidae	2			
Hemiptera (true bugs)				
Belostomatidae		1		
Corixidae			1	
Gerridae	1		1	
Veliidae	1		1	1
Megaloptera				
Corydalidae (dobson flies)	1	1		5
Sialidae (alder flies)			1	
Trichoptera (caddisflies)				
Brachycentridae	40			3
Glossosomatidae	23			40
Helicopsychidae		1		1
Hydropsychidae	94	12	9	40
Hydroptilidae		16	10	3
Lepidostomatidae			9	
Leptoceridae	3	18	3	1
Limnephilidae	4	1	1	10
Molannidae				2
Philopotamidae				3
Polycentropodidae				1
Rhyacophilidae	1			
Coleoptera (beetles)				
Dytiscidae (total)				1
Gyrinidae (adults)		1		
Haliplidae (adults)		1	1	
Hydrophilidae (total)			1	1
Elmidae	10	1	6	13
Diptera (flies)				
Athericidae	2			1
Ceratopogonidae		5		1
Chironomidae	10	34	20	21
Culicidae			3	
Simuliidae	63			4
Tabanidae			1	
Tipulidae				8
MOLLUSCA				
Gastropoda (snails)				
Ancylidae (limpets)		11	2	6
Hydrobiidae	1	124	156	
Physidae	2		4	2
Planorbidae		1		
Pelecypoda (bivalves)				
Sphaeriidae (clams)	1	1	3	13
TOTAL INDIVIDUALS	364	305	301	356

Table 2B. Macroinvertebrate metric evaluation of

	Ontonagon River M-28 u/s of Agate Falls 7/20/2013 STATION 25		Middle Br. Ontonagon R Old US2 East 7/22/2013 STATION 26		Middle Br. Ontonagon R Russ Road 7/22/2013 STATION 27		Tamarack River Forest Highway 3340 7/30/2013 STATION 28	
METRIC	Value	Score	Value	Score	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	24	0	31	1	34	1	37	1
NUMBER OF MAYFLY TAXA	3	0	4	0	5	1	5	1
NUMBER OF CADDISFLY TAXA	6	1	5	0	5	0	10	1
NUMBER OF STONEFLY TAXA	2	1	0	-1	1	0	2	1
PERCENT MAYFLY COMP.	23.90	1	14.10	0	4.32	0	30.62	1
PERCENT CADDISFLY COMP.	45.33	1	15.74	0	10.63	0	29.21	0
PERCENT DOMINANT TAXON	25.82	0	40.66	-1	51.83	-1	12.64	1
PERCENT ISOPOD, SNAIL, LEECH	0.82	1	45.90	-1	56.48	-1	2.53	1
PERCENT SURF. AIR BREATHERS	0.55	1	0.98	1	2.66	1	0.84	1
TOTAL SCORE		6		-1		1		8
MACROINV. COMMUNITY RATING		EXCELLENT		ACCEPT.		ACCEPT.		EXCELLENT

Table 2A. Qualitative macroinvertebrate sampling results for

TAXA	McGinty Creek Federal Forest Road 4500 7/22/2013 STATION 29	Trout Creek Four Mile Square Road 8/1/2013 STATION 30	East Br. Ontonagon River Sparrow Rapids 7/20/2013 STATION 31	West Br. Jumbo River Federal Forest Road 4580 7/20/2013 STATION 32
PORIFERA (sponges)			1	1
NEMATOMORPHA (roundworms)	1			
ANNELIDA (segmented worms)				
Hirudinea (leeches)	1			
Oligochaeta (worms)	5	3	1	
ARTHROPODA				
Crustacea				
Amphipoda (scuds)	2	1		4
Decapoda (crayfish)	1			
Arachnoidea				
Hydracarina	5	2	8	3
Insecta				
Ephemeroptera (mayflies)				
Baetidae	4	1	11	18
Caenidae	1		1	
Ephemerellidae		18	15	50
Ephemeridae	3			1
Heptageniidae		8	6	4
Isonychiidae			1	1
Tricorythidae		11		42
Odonata				
Anisoptera (dragonflies)				
Aeshnidae	10	15		
Cordulegastridae	1	5		1
Gomphidae	5	4	1	8
Libellulidae	1			
Zygoptera (damselflies)				
Calopterygidae	9	5		21
Coenagrionidae	5			
Plecoptera (stoneflies)				
Perlidae		9	2	
Pteronarcyidae			63	
Hemiptera (true bugs)				
Corixidae	4			
Gerridae		1		
Mesoveliidae				2
Megaloptera				
Corydalidae (dobson flies)		2		1
Sialidae (alder flies)			1	
Trichoptera (caddisflies)				
Brachycentridae		12	110	22
Glossosomatidae		7		
Helicopsychidae		1		3
Hydropsychidae	31	41	21	30
Hydroptilidae	22			
Lepidostomatidae		7		
Leptoceridae		1		
Limnephilidae	1	3		2
Molannidae				9
Philopotamidae	4	8		18
Phryganeidae	3			1
Polycentropodidae			14	
Rhyacophilidae			1	
Uenoidae		1		
Lepidoptera (moths)				
Pyralidae			1	
Coleoptera (beetles)				
Dytiscidae (total)		1	1	
Gyrinidae (adults)	1			1
Haliplidae (adults)	1			
Hydrophilidae (total)			2	
Dryopidae		1		
Elmidae	37	9	3	11
Gyrinidae (larvae)	1			1
Diptera (flies)				
Athericidae		10	1	
Ceratopogonidae	3	2		
Chironomidae	98	29	28	76
Culicidae	6			
Simuliidae	4	32	22	17
Tabanidae	1	4	7	1
Tipulidae	2	10	3	1
MOLLUSCA				
Gastropoda (snails)				
Ancylidae (limpets)	1			
Physidae		5	1	2
Planorbidae	4	1		
Pelecypoda (bivalves)				
Sphaeriidae (clams)	1			1
TOTAL INDIVIDUALS	279	270	326	353

Table 2B. Macroinvertebrate metric evaluation of

	McGinty Creek Federal Forest Road 4500 7/22/2013 STATION 29		Trout Creek Four Mile Square Road 8/1/2013 STATION 30		East Br. Ontonagon River Sparrow Rapids 7/20/2013 STATION 31		West Br. Jumbo River Federal Forest Road 4580 7/20/2013 STATION 32	
METRIC	Value	Score	Value	Score	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	33	1	34	1	26	0	29	1
NUMBER OF MAYFLY TAXA	3	1	4	0	5	1	6	1
NUMBER OF CADDISFLY TAXA	5	0	9	1	4	0	7	1
NUMBER OF STONEFLY TAXA	0	-1	1	0	2	1	0	-1
PERCENT MAYFLY COMP.	2.87	-1	14.07	0	10.43	0	32.86	1
PERCENT CADDISFLY COMP.	21.86	0	30.00	1	44.79	1	24.08	0
PERCENT DOMINANT TAXON	35.13	-1	15.19	1	33.74	-1	21.53	0
PERCENT ISOPOD, SNAIL, LEECH	2.15	1	2.22	1	0.31	1	0.57	1
PERCENT SURF. AIR BREATHERS	4.30	1	0.74	1	0.92	1	0.85	1
TOTAL SCORE		1		6		4		5
MACROINV. COMMUNITY RATING		ACCEPT.		EXCELLENT		ACCEPT.		EXCELLENT

Table 2A. Qualitative macroinvertebrate sampling results for
East Branch Ontonagon River
Kenton (USFS Roadside Pk)
8/1/2013

TAXA	STATION 33
ANNELIDA (segmented worms)	
Oligochaeta (worms)	1
ARTHROPODA	
Arachnoidea	
Hydracarina	4
Insecta	
Ephemeroptera (mayflies)	
Baetidae	45
Caenidae	4
Heptageniidae	5
Isonychiidae	12
Tricorythidae	7
Odonata	
Anisoptera (dragonflies)	
Aeshnidae	4
Gomphidae	9
Zygoptera (damselflies)	
Calopterygidae	1
Plecoptera (stoneflies)	
Perlidae	11
Pteronarcyidae	18
Hemiptera (true bugs)	
Gerridae	2
Megaloptera	
Corydalidae (dobson flies)	4
Trichoptera (caddisflies)	
Brachycentridae	34
Glossosomatidae	8
Helicopsychidae	1
Hydropsychidae	39
Leptoceridae	1
Limnephilidae	1
Uenoidae	1
Coleoptera (beetles)	
Elmidae	28
Diptera (flies)	
Athericidae	12
Chironomidae	22
Empididae	1
Simuliidae	8
Tipulidae	3
MOLLUSCA	
Gastropoda (snails)	
Ancylidae (limpets)	2
TOTAL INDIVIDUALS	288

Table 2B. Macroinvertebrate metric evaluation of

East Branch Ontonagon River
Kenton (USFS Roadside Pk)
8/1/2013
STATION 33

METRIC	Value	Score
TOTAL NUMBER OF TAXA	28	1
NUMBER OF MAYFLY TAXA	5	1
NUMBER OF CADDISFLY TAXA	7	1
NUMBER OF STONEFLY TAXA	2	1
PERCENT MAYFLY COMP.	25.35	1
PERCENT CADDISFLY COMP.	29.51	1
PERCENT DOMINANT TAXON	15.63	1
PERCENT ISOPOD, SNAIL, LEECH	0.69	1
PERCENT SURF. AIR BREATHERS	0.69	1
TOTAL SCORE		9
MACROINV. COMMUNITY RATING		EXCELLENT

Table 3. Habitat evaluation for	Montreal River Silver Street RIFFLE/RUN STATION 1	Montreal River Norrie Street RIFFLE/RUN STATION 3	Montreal River near cemetary RIFFLE/RUN STATION 4	Gypsy Creek near mouth RIFFLE/RUN STATION 7
HABITAT METRIC				
Substrate and Instream Cover				
Epifaunal Substrate/ Avail Cover (20)	15	15	15	16
Embeddedness (20)*	19	18	19	19
Velocity/Depth Regime (20)*	18	7	15	6
Pool Substrate Characterization (20)**				
Pool Variability (20)**				
Channel Morphology				
Sediment Deposition (20)	18	19	19	20
Flow Status - Maint. Flow Volume (10)	10	10	10	9
Flow Status - Flashiness (10)	7	7	6	4
Channel Alteration (20)	15	15	19	20
Frequency of Riffles/Bends (20)*	18	19	19	18
Channel Sinuosity (20)**				
Riparian and Bank Structure				
Bank Stability (L) (10)	6	9	9	10
Bank Stability (R) (10)	7	9	10	10
Vegetative Protection (L) (10)	9	5	9	10
Vegetative Protection (R) (10)	7	9	9	10
Riparian Veg. Zone Width (L) (10)	5	2	4	10
Riparian Veg. Zone Width (R) (10)	5	10	5	10
TOTAL SCORE (200):	159	154	168	172
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:	7/16/2013	7/16/2013	7/16/2013	7/17/2013
Weather:	Partly Cloudy	Partly Cloudy	Partly Cloudy	Sunny
Air Temperature:	82 Deg. F.	90 Deg. F.	88 Deg. F.	90 Deg. F.
Water Temperature:	74 Deg. F.	76 Deg. F.	77 Deg. F.	73 Deg. F.
Ave. Stream Width:	45 Feet	40 Feet	40 Feet	6 Feet
Ave. Stream Depth:	2.5 Feet	2 Feet	2.5 Feet	0.3 Feet
Surface Velocity:	1 Ft./Sec.	0.9 Ft./Sec.	1.2 Ft./Sec.	0.7 Ft./Sec.
Estimated Flow:	112.5 CFS	72 CFS	120 CFS	1.26 CFS
Stream Modifications:	Bank Stabilization	Bank Stabilization	None	None
Nuisance Plants (Y/N):	N	N	N	N
STORET No.:	270208	270093	270209	270210
Stream Name:	Montreal River	Montreal River	Montreal River	Gypsy Creek
Road Crossing/Location:	Silver Street	Norrie Street	near cemetary	near mouth
County Code:	27	27	27	27
TRS:	47N47W21	47N47W21	47N47W21	50N46W25
Latitude (dd):	46.44977	46.45316	46.45685	46.69563
Longitude (dd):	-90.1783	-90.17912	-90.18093	-89.99333
Ecoregion:	NLAF	NLAF	NLAF	NLAF
Stream Type:	Coldwater	Coldwater	Coldwater	Coldwater
USGS Basin Code:	4010302	4010302	4010302	4020101

* Applies only to Riffle/Run stream Surveys
** Applies only to Glide/Pool stream Surveys

COMMENTS:

Table 3. Habitat evaluation for	Gijik Creek near mouth RIFFLE/RUN STATION 9	Black River d/s WWTP Hedberg Rd RIFFLE/RUN STATION 10	Jackson Creek Indianhead Valley Lane RIFFLE/RUN STATION 11	Jackson Creek Presque Isle Road (Co 519) RIFFLE/RUN STATION 12
HABITAT METRIC				
Substrate and Instream Cover				
Epifaunal Substrate/ Avail Cover (20)	15	17	16	20
Embeddedness (20)*	16	19	17	18
Velocity/Depth Regime (20)*	15	15	17	19
Pool Substrate Characterization (20)**				
Pool Variability (20)**				
Channel Morphology				
Sediment Deposition (20)	15	19	8	20
Flow Status - Maint. Flow Volume (10)	9	10	10	10
Flow Status - Flashiness (10)	6	6	7	10
Channel Alteration (20)	20	19	19	20
Frequency of Riffles/Bends (20)*	14	16	13	19
Channel Sinuosity (20)**				
Riparian and Bank Structure				
Bank Stability (L) (10)	9	7	8	10
Bank Stability (R) (10)	9	8	8	10
Vegetative Protection (L) (10)	9	9	8	10
Vegetative Protection (R) (10)	9	9	8	10
Riparian Veg. Zone Width (L) (10)	10	9	10	8
Riparian Veg. Zone Width (R) (10)	10	9	8	10
TOTAL SCORE (200):	166	172	157	194
HABITAT RATING:	EXCELLENT (NON-IMPAIRED)	EXCELLENT (NON-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:	7/17/2013	7/18/2013	7/18/2013	7/31/2013
Weather:	Sunny	Partly Cloudy	Partly Cloudy	Sunny
Air Temperature:	88 Deg. F.	80 Deg. F.	88 Deg. F.	70 Deg. F.
Water Temperature:	80 Deg. F.	72 Deg. F.	77 Deg. F.	55 Deg. F.
Ave. Stream Width:	3 Feet	50 Feet	45 Feet	26 Feet
Ave. Stream Depth:	0.5 Feet	1.5 Feet	2.5 Feet	0.75 Feet
Surface Velocity:	0.5 Ft./Sec.	1 Ft./Sec.	1.1 Ft./Sec.	1.2 Ft./Sec.
Estimated Flow:	0.75 CFS	75 CFS	123.75 CFS	23.4 CFS
Stream Modifications:	None	None	None	None
Nuisance Plants (Y/N):	N	N	N	N
STORET No.:	270211	270161	270212	270144
Stream Name:	Gijik Creek	Black River	Jackson Creek	Jackson Creek
Road Crossing/Location:	near mouth	d/s WWTP Hedberg Rd	Indianhead Valley Lane	Presque Isle Road (Co 519)
County Code:	27	27	27	27
TRS:	49N46W02	48N46W33	48N45W31	48N45W21
Latitude (dd):	46.67752	46.5108	46.50937	46.53499
Longitude (dd):	-90.02215	-90.0725	-89.97916	-89.92896
Ecoregion:	NLAF	NLAF	NLAF	NLAF
Stream Type:	Coldwater	Coldwater	Coldwater	Coldwater
USGS Basin Code:	4020101	4020101	4020101	4020101

* Applies only to Riffle/Run stream Surveys
** Applies only to Glide/Pool stream Surveys

COMMENTS:

Table 3. Habitat evaluation for	Presque Isle River off Copps Mine Road GLIDE/POOL STATION 13	Little Carp River North of S. Boundry Rd RIFFLE/RUN STATION 14	Miles Creek M64 RIFFLE/RUN STATION 15	Duck Creek LP Walsh Road RIFFLE/RUN STATION 16
HABITAT METRIC				
Substrate and Instream Cover				
Epifaunal Substrate/ Avail Cover (20)	16	15	15	16
Embeddedness (20)*		20	18	16
Velocity/Depth Regime (20)*		16	11	8
Pool Substrate Characterization (20)**	16			
Pool Variability (20)**	14			
Channel Morphology				
Sediment Deposition (20)	16	20	18	11
Flow Status - Maint. Flow Volume (10)	10	10	10	10
Flow Status - Flashiness (10)	9	10	9	9
Channel Alteration (20)	16	20	19	20
Frequency of Riffles/Bends (20)*		20	14	16
Channel Sinuosity (20)**	16			
Riparian and Bank Structure				
Bank Stability (L) (10)	9	10	9	8
Bank Stability (R) (10)	9	10	9	8
Vegetative Protection (L) (10)	9	10	9	8
Vegetative Protection (R) (10)	9	10	9	8
Riparian Veg. Zone Width (L) (10)	10	10	10	10
Riparian Veg. Zone Width (R) (10)	4	10	10	10
TOTAL SCORE (200):	163	191	170	158
HABITAT RATING:	EXCELLENT (NON-IMPAIRED)	EXCELLENT (NON-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:	7/19/2013	7/29/2013	7/19/2013	7/18/2013
Weather:	Sunny	Cloudy	Partly Cloudy	Partly Cloudy
Air Temperature:	75 Deg. F.	70 Deg. F.	75 Deg. F.	90 Deg. F.
Water Temperature:	79 Deg. F.	58 Deg. F.	69 Deg. F.	72 Deg. F.
Ave. Stream Width:	50 Feet	20 Feet	5 Feet	5 Feet
Ave. Stream Depth:	3.5 Feet	1 Feet	0.3 Feet	0.2 Feet
Surface Velocity:	0.5 Ft./Sec.	4 Ft./Sec.	0.5 Ft./Sec.	0.5 Ft./Sec.
Estimated Flow:	87.5 CFS	80 CFS	0.75 CFS	0.5 CFS
Stream Modifications:	None	None	None	None
Nuisance Plants (Y/N):	N	N	N	N
STORET No.:	270197	660122	660180	660171
Stream Name:	Presque Isle River	Little Carp River	Miles Creek	Duck Creek
Road Crossing/Location:	ff Copps Mine Road	North of S. Boundry Rd	M64	LP Walsh Road
County Code:	27	66	66	66
TRS:	47N43W33	50N44W20	51N41W10	50N42W13
Latitude (dd):	46.41519	46.71984	46.8367	46.737
Longitude (dd):	-89.69585	-89.82437	-89.49336	-89.491
Ecoregion:	NLAF	NLAF	NLAF	NLAF
Stream Type:	Coldwater	Coldwater	Warmwater	Warmwater
USGS Basin Code:	4020101	4020101	4020101	4020101

* Applies only to Riffle/Run stream Surveys
** Applies only to Glide/Pool stream Surveys

COMMENTS:

Table 3. Habitat evaluation for	Marshall Creek M-64 RIFFLE/RUN STATION 17	Slate River At US-2 RIFFLE/RUN STATION 18	West Br. Ontonagon River Norwich Road Bridge GLIDE/POOL STATION 19	Cascade Creek d/s from Bridge GLIDE/POOL STATION 20
HABITAT METRIC				
Substrate and Instream Cover				
Epifaunal Substrate/ Avail Cover (20)	15	19	8	13
Embeddedness (20)*	18	13		
Velocity/Depth Regime (20)*	10	13		
Pool Substrate Characterization (20)**			13	15
Pool Variability (20)**			13	13
Channel Morphology				
Sediment Deposition (20)	18	20	10	14
Flow Status - Maint. Flow Volume (10)	5	10	9	9
Flow Status - Flashiness (10)	4	8	6	6
Channel Alteration (20)	18	20	18	19
Frequency of Riffles/Bends (20)*	19	13		
Channel Sinuosity (20)**			11	18
Riparian and Bank Structure				
Bank Stability (L) (10)	5	10	4	6
Bank Stability (R) (10)	5	10	5	8
Vegetative Protection (L) (10)	8	10	9	8
Vegetative Protection (R) (10)	8	10	10	8
Riparian Veg. Zone Width (L) (10)	6	10	7	10
Riparian Veg. Zone Width (R) (10)	5	10	10	9
TOTAL SCORE (200):	144	176	133	156
HABITAT RATING:	GOOD (SLIGHTLY 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:	7/21/2013	7/30/2013	7/21/2013	7/21/2013
Weather:	Partly Cloudy	Cloudy	Partly Cloudy	Partly Cloudy
Air Temperature:	70 Deg. F.	62 Deg. F.	75 Deg. F.	59 Deg. F.
Water Temperature:	64 Deg. F.	Deg. F.	72 Deg. F.	64 Deg. F.
Ave. Stream Width:	15 Feet	25 Feet	70 Feet	9 Feet
Ave. Stream Depth:	0.3 Feet	0.75 Feet	2.5 Feet	3.5 Feet
Surface Velocity:	1.25 Ft./Sec.	1.5 Ft./Sec.	0.5 Ft./Sec.	0.25 Ft./Sec.
Estimated Flow:	5.625 CFS	28.125 CFS	87.5 CFS	7.875 CFS
Stream Modifications:	None	None	None	None
Nuisance Plants (Y/N):	N	N	N	N
STORET No.:	270148	270147	660096	660095
Stream Name:	Marshall Creek	Slate River	West Br. Ontonagon River	Cascade Creek
Road Crossing/Location:	M-64	At US-2	Norwich Road Bridge	d/s from Bridge
County Code:	27	27	66	66
TRS:	46N42W04	46N42W21	49W41W12	49N41W08
Latitude (dd):	46.4089	46.3687	46.65321	46.65434
Longitude (dd):	-89.5686	-89.5564	-89.3853	-89.45822
Ecoregion:	NLAF	NLAF	NLAF	NLAF
Stream Type:	Coldwater	Coldwater	Coldwater	Coldwater
USGS Basin Code:	4020102	4020102	4020102	4020102

* Applies only to Riffle/Run stream Surveys
** Applies only to Glide/Pool stream Surveys

COMMENTS:

Table 3. Habitat evaluation for	Ten Mile Creek Old M28 RIFFLE/RUN STATION 21	Tenderfoot Creek US2 RIFFLE/RUN STATION 22	Two Mile Creek Sucker Lake Road RIFFLE/RUN STATION 23	Roselawn Creek Sleepy Hollow Rd. GLIDE/POOL STATION 24
HABITAT METRIC				
Substrate and Instream Cover				
Epifaunal Substrate/ Avail Cover (20)	15	16	14	16
Embeddedness (20)*	15	18	17	
Velocity/Depth Regime (20)*	10	13	12	
Pool Substrate Characterization (20)**				15
Pool Variability (20)**				18
Channel Morphology				
Sediment Deposition (20)	18	14	14	15
Flow Status - Maint. Flow Volume (10)	10	9	8	10
Flow Status - Flashiness (10)	7	9	5	8
Channel Alteration (20)	16	18	20	20
Frequency of Riffles/Bends (20)*	18	18	9	
Channel Sinuosity (20)**				20
Riparian and Bank Structure				
Bank Stability (L) (10)	9	10	9	10
Bank Stability (R) (10)	9	10	9	10
Vegetative Protection (L) (10)	8	8	10	10
Vegetative Protection (R) (10)	8	8	10	10
Riparian Veg. Zone Width (L) (10)	6	10	10	10
Riparian Veg. Zone Width (R) (10)	10	10	10	10
TOTAL SCORE (200):	159	171	157	182
HABITAT RATING:	EXCELLENT (NON-IMPAIRED)	EXCELLENT (NON-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:	7/19/2013	7/21/2013	7/31/2013	7/30/2013
Weather:	Sunny	Sunny	Sunny	Cloudy
Air Temperature:	75 Deg. F.	72 Deg. F.	70 Deg. F.	70 Deg. F.
Water Temperature:	81 Deg. F.	74 Deg. F.	67 Deg. F.	65 Deg. F.
Ave. Stream Width:	6 Feet	15 Feet	15 Feet	40 Feet
Ave. Stream Depth:	0.7 Feet	1.5 Feet	1 Feet	2 Feet
Surface Velocity:	1.2 Ft./Sec.	1.2 Ft./Sec.	0.25 Ft./Sec.	1.5 Ft./Sec.
Estimated Flow:	5.04 CFS	27 CFS	3.75 CFS	120 CFS
Stream Modifications:	None	Bank Stabilization	None	None
Nuisance Plants (Y/N):	N	N	N	N
Report Number:				
STORET No.:	660181	270213	270199	660172
Stream Name:	Ten Mile Creek	Tenderfoot Creek	Two Mile Creek	Roselawn Creek
Road Crossing/Location:	Old M28	US2	Sucker Lake Road	Sleepy Hollow Rd.
County Code:	66	27	27	66
TRS:	48N41W21	46N41W31	45N40W04	46N39W08
Latitude (dd):	46.53482	46.34685	46.33	46.4043
Longitude (dd):	-89.43056	-89.47894	-89.324	-89.20321
Ecoregion:	NLAF	NLAF	NLAF	NLAF
Stream Type:	Warmwater	Warmwater	Coldwater	Coldwater
USGS Basin Code:	4020102	4020102	4020101	4020101

* Applies only to Riffle/Run stream Surveys
** Applies only to Glide/Pool stream Surveys

COMMENTS:

Table 3. Habitat evaluation for	Ontonagon River M-28 u/s of Agate Falls RIFFLE/RUN STATION 25	Middle Branch Ontonagon R. Old US2 East GLIDE/POOL STATION 26	Middle Branch Ontonagon R. Russ Road GLIDE/POOL STATION 27	Tamarack River Forest Highway 3340 RIFFLE/RUN STATION 28
HABITAT METRIC				
Substrate and Instream Cover				
Epifaunal Substrate/ Avail Cover (20)	16	11	10	20
Embeddedness (20)*	20			20
Velocity/Depth Regime (20)*	14			15
Pool Substrate Characterization (20)**		12	16	
Pool Variability (20)**		2	15	
Channel Morphology				
Sediment Deposition (20)	20	17	19	20
Flow Status - Maint. Flow Volume (10)	10	10	10	10
Flow Status - Flashiness (10)	9	10	9	10
Channel Alteration (20)	20	19	18	20
Frequency of Riffles/Bends (20)*	19			20
Channel Sinuosity (20)**		18	18	
Riparian and Bank Structure				
Bank Stability (L) (10)	10	10	10	10
Bank Stability (R) (10)	10	10	10	10
Vegetative Protection (L) (10)	10	9	8	10
Vegetative Protection (R) (10)	4	9	8	10
Riparian Veg. Zone Width (L) (10)	10	10	10	10
Riparian Veg. Zone Width (R) (10)	6	7	10	10
TOTAL SCORE (200):	178	154	171	195
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:	7/20/2013	7/22/2013	7/22/2013	7/30/2013
Weather:	Sunny	Partly Cloudy	Cloudy	Cloudy
Air Temperature:	75 Deg. F.	79 Deg. F.	64 Deg. F.	60 Deg. F.
Water Temperature:	68 Deg. F.	66 Deg. F.	64 Deg. F.	60 Deg. F.
Ave. Stream Width:	50 Feet	100 Feet	28 Feet	26 Feet
Ave. Stream Depth:	2 Feet	3.5 Feet	3.5 Feet	1 Feet
Surface Velocity:	2 Ft./Sec.	0.3 Ft./Sec.	0.5 Ft./Sec.	2.5 Ft./Sec.
Estimated Flow:	200 CFS	105 CFS	49 CFS	65 CFS
Stream Modifications:	None	None	Bank Stabilization	None
Nuisance Plants (Y/N):	N	N	N	N
STORET No.:	660124	270216	270214	270196
Stream Name:	Ontonagon River	Middle Branch Ontonagon R.	Middle Branch Ontonagon R.	Tamarack River
Road Crossing/Location:	M-28 u/s of Agate Falls	Old US2 East	Russ Road	Forest Highway 3340
County Code:	66	27	27	27
TRS:	47N38W08	45N38W16	45N40W24	45N38W24
Latitude (dd):	46.47884	46.29432	46.27684	46.287
Longitude (dd):	-89.09075	-89.0636	-89.24087	-89.012
Ecoregion:	NLAF	NLAF	NLAF	NLAF
Stream Type:	Coldwater	Coldwater	Coldwater	Coldwater
USGS Basin Code:	4020102	4020102	4020102	4020101

* Applies only to Riffle/Run stream Surveys
** Applies only to Glide/Pool stream Surveys

COMMENTS:

Table 3. Habitat evaluation for	McGinty Creek Federal Forest Road 4500 GLIDE/POOL STATION 29	Trout Creek Four Mile Square Road RIFFLE/RUN STATION 30	East Br. Ontonagon River Sparrow Rapids RIFFLE/RUN STATION 31	West Br. Jumbo River Federal Forest Road 4580 GLIDE/POOL STATION 32
HABITAT METRIC				
Substrate and Instream Cover				
Epifaunal Substrate/ Avail Cover (20)	11	17	16	18
Embeddedness (20)*		18	19	
Velocity/Depth Regime (20)*		15	15	
Pool Substrate Characterization (20)**	13			13
Pool Variability (20)**	8			15
Channel Morphology				
Sediment Deposition (20)	8	13	19	18
Flow Status - Maint. Flow Volume (10)	9	9	10	10
Flow Status - Flashiness (10)	8	9	8	9
Channel Alteration (20)	20	20	20	18
Frequency of Riffles/Bends (20)*		20	18	
Channel Sinuosity (20)**	13			13
Riparian and Bank Structure				
Bank Stability (L) (10)	9	10	9	9
Bank Stability (R) (10)	9	10	9	9
Vegetative Protection (L) (10)	7	10	10	10
Vegetative Protection (R) (10)	9	10	10	10
Riparian Veg. Zone Width (L) (10)	10	10	10	10
Riparian Veg. Zone Width (R) (10)	10	10	10	10
TOTAL SCORE (200):	144	181	183	172
HABITAT RATING:	GOOD (SLIGHTLY IMPAIRED)	EXCELLENT (NON- 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:	7/22/2013	8/1/2013	7/20/2013	7/20/2013
Weather:	Partly Cloudy	Partly Cloudy	Sunny	Sunny
Air Temperature:	70 Deg. F.	62 Deg. F.	63 Deg. F.	70 Deg. F.
Water Temperature:	64 Deg. F.	58 Deg. F.	68 Deg. F.	68 Deg. F.
Ave. Stream Width:	6 Feet	12 Feet	65 Feet	12 Feet
Ave. Stream Depth:	2 Feet	0.5 Feet	0.75 Feet	1.5 Feet
Surface Velocity:	0.3 Ft./Sec.	1 Ft./Sec.	1.75 Ft./Sec.	0.7 Ft./Sec.
Estimated Flow:	3.6 CFS	6 CFS	85.3125 CFS	12.6 CFS
Stream Modifications:	Bank Stabilization	None	None	None
Nuisance Plants (Y/N):	N	N	N	N
STORET No.:	270215	660166	310468	360171
Stream Name:	McGinty Creek	Trout Creek	East Br. Ontonagon River	West Br. Jumbo River
Road Crossing/Location:	Federal Forest Road 4500	Four Mile Square Road	Sparrow Rapids	Federal Forest Road 4580
County Code:	27	66	31	36
TRS:	45N38W02	47N38W23	47N37W04	46N37W06
Latitude (dd):	46.32242	46.46308	46.50555	46.41505
Longitude (dd):	-89.02621	-89.03161	-88.94861	-88.97108
Ecoregion:	NLAF	NLAF	NLAF	NLAF
Stream Type:	Coldwater	Coldwater	Coldwater	Coldwater
USGS Basin Code:	4020102	4020101	4020102	4020102

* Applies only to Riffle/Run stream Surveys
** Applies only to Glide/Pool stream Surveys

COMMENTS:

Table 3. Habitat evaluation for East Branch Ontonagon River
Kenton (USFS Roadside Pk)
RIFFLE/RUN
STATION 33

HABITAT METRIC	
Substrate and Instream Cover	
Epifaunal Substrate/ Avail Cover (20)	17
Embeddedness (20)*	16
Velocity/Depth Regime (20)*	20
Pool Substrate Characterization (20)**	
Pool Variability (20)**	
Channel Morphology	
Sediment Deposition (20)	13
Flow Status - Maint. Flow Volume (10)	10
Flow Status - Flashiness (10)	8
Channel Alteration (20)	18
Frequency of Riffles/Bends (20)*	18
Channel Sinuosity (20)**	
Riparian and Bank Structure	
Bank Stability (L) (10)	10
Bank Stability (R) (10)	9
Vegetative Protection (L) (10)	10
Vegetative Protection (R) (10)	10
Riparian Veg. Zone Width (L) (10)	9
Riparian Veg. Zone Width (R) (10)	9
TOTAL SCORE (200):	177

HABITAT RATING: 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:	8/1/2013	
Weather:	Partly Cloudy	
Air Temperature:	67	Deg. F.
Water Temperature:	60	Deg. F.
Ave. Stream Width:	30	Feet
Ave. Stream Depth:	1	Feet
Surface Velocity:	1.5	Ft./Sec.
Estimated Flow:	45	CFS
Stream Modifications:	Impounded***	
Nuisance Plants (Y/N):	N	
STORET No.:	310404	
Stream Name:	East Branch Ontonagon River	
Road Crossing/Location:	Kenton (USFS Roadside Pk)	
County Code:	31	
TRS:	47N37W11	
Latitude (dd):	46.48693	
Longitude (dd):	-88.88902	
Ecoregion:	NLAF	
Stream Type:	Coldwater	
USGS Basin Code:	4020102	

* Applies only to Riffle/Run stream Surveys
** Applies only to Glide/Pool stream Surveys

COMMENTS: *** Impoundment was located upstream of the biosurvey station.

Table 4. Montreal River (Gogebic County) sediment sampling by DEQ-Water Resources Division, Surface Water Assessment Section staff.

	----------SVOC detections from sampling on July 16th 2013----------								
Station:	**1**	**1-dup**	**2E**	**2W**	**3**	**4**	**5**	**6**	
Field Code:	M1	M1-dup	M2	M2W	M3	M4	M5	M6	
Semi-Volatile Organic Compounds **detected** (***ug/kg*** *dry*)									Notes
2-Methylnaphthalene	ND	ND	720	ND	ND	ND	ND	ND	
Acenaphthene	ND	ND	27000	ND	ND	ND	ND	ND	
Acenaphthylene	ND	ND	1800	ND	ND	ND	ND	ND	
Anthracene	ND	ND	27000	ND	ND	ND	ND	ND	32X's above PEC
Benz[a]anthracene	ND	ND	12000	440	380	260	480	ND	11X's above PEC
Benzo[a]pyrene	ND	ND	11000	ND	480	ND	ND	ND	8X's above PEC
Benzo[b]fluoranthene	ND	ND	9400	550	570	520	550	ND	
Benzo[g,h,i]perylene	ND	ND	3900	ND	ND	ND	ND	ND	
Benzo[k]fluoranthene	ND	ND	3400	ND	ND	ND	ND	ND	
Chrysene	ND	ND	9700	410	390	240	440	ND	8X's above PEC
Dibenz[a,h]anthracene	ND	ND	1100	ND	ND	ND	ND	ND	
Dibenzofuran	ND	ND	1400	ND	ND	ND	ND	ND	
Fluoranthene	ND	ND	26000	790	790	450	840	ND	12X's above PEC
Fluorene	ND	ND	15000	ND	ND	ND	ND	ND	28X's above PEC
Indeno(1,2,3-c,d)pyrene	ND	ND	3200	ND	ND	ND	ND	ND	
Naphthalene	ND	ND	640	ND	ND	ND	ND	ND	Just above PEC
Phenanthrene	ND	ND	65000	550	530	ND	430	ND	56X's above PEC
Pyrene	ND	ND	41000	650	730	440	920	260	27X's above PEC
% Total Solids	63.2	58	83.4	75.3	79.7	82.6	75.1	81.5	
Available Cyanide (***mg/kg*** *dry*)	0.16								
Total Cyanide (***mg/kg*** *dry*)	0.78	0.48	0.46	0.50	0.52		0.28	0.18	
Total Organic Carbon (***mg/kg*** *dry*)	4400	3900	3000	2100	2800	1900	3800	1700	

Above TEC*
Above PEC*
See Notes for how many times above PEC

SVOC = semi-volatile organic compounds
TEC = threshold effect concentration
PEC = probable effect concentration

* = see MacDonald et al. (2000).
ND = compound was part of analysis but not detected

Table 5A. Qualitative fish sampling results for

TAXA	Gypsy Creek near mouth 7/17/2013 STATION 7	Gijik Creek near mouth 7/17/2013 STATION 9
Salmonidae (trouts)		
Salvelinus fontinalis (Brook trout)	1	
Cyprinidae (minnows and carps)		
Semotilus atromaculatus (Creek chub)		1
Pimephales promelas (Fathead minnow)	4	
Phoxinus eos (Northern redbelly dace)		20
Rhinichthys atratulus (Blacknose dace)	8	8
Rhinichthys cataractae (Longnose dace)	23	
Cottidae (sculpins)		
Cottus bairdii (Mottled sculpin)	11	
Ictaluridae (Bullhead, Catfish)		
Ameiurus melas (Black bullhead)	1	
Gasterosteidae (sticklebacks)		
Culaea inconstans (Brook stickleback)		8
Centrarchidae (sunfish)		
Micropterus salmoides (Largemouth bass)	1	
Percidae (perch)		
Percina caprodes (Logperch)	3	
TOTAL INDIVIDUALS	52	37
Number of hybrid sunfish	0	0
Number of anomalies	0	0
Percent anomalies	0.000	0.000
Percent salmonids	1.923	0.000
Reach sampled (ft)	400	200
Area sampled (sq ft)	2,400	600
Density (# fish/sq ft)	0.022	0.062
Gear	bps	bps

Table 5B. Fish metric evaluation of

METRIC	Gypsy Creek near mouth 7/17/2013 STATION 7 Value	Score	Gijik Creek near mouth 7/17/2013 STATION 9 Value	Score
TOTAL NUMBER OF TAXA	8		4	
NO. OF DARTER, SCULPIN, MADTOM TAXA	2		0	
NUMBER OF SUNFISH TAXA	0		0	
NUMBER OF SUCKER TAXA	0		0	
NUMBER OF INTOLERANT TAXA	3		0	
PERCENT TOLERANT	23.08		24.32	
PERCENT OMNIVOROUS TAXA	25.00		24.32	
PERCENT INSECTIVOROUS TAXA	71.15		21.62	
PERCENT PISCIVOROUS TAXA	1.92		0.00	
% SIMPLE LITHOPHILIC SPAWNER TAXA	65.38		21.62	
TOTAL SCORE				
FISH COMMUNITY RATING		Not scored		Not scored **

Comments:

Fish communities in coldwater designated streams are presently not scored by MDEQ. The presence of salmonids at 1% or greater in the fish community is interpreted as meeting the coldwater designated use.

** Comments:

The survey ran into a beaver dam after ~ 200 ft and 25 minutes and had to be stopped early. The required minimum number of fish (50) for P-51 could not be collected due to inadequate reach length and sampling time.

Table 6. Water chemistry data from sites on Gypsy, Lehigh, and Gijik Creeks, Gogebic County, Michigan, collected on July 17, 2013. Metal values given are as total metals.

Site:	Gypsy Creek (near mouth)	Gypsy Creek (near mouth) *field duplicate*	Gypsy Creek (near mouth) *field blank*	Lehigh Creek (near mouth)	Gijik Creek (near mouth)		
Station:	7	7	7	8	9		
Analyte	**Result**	**Result**	**Result**	**Result**	**Result**	**RL**	**Units**
Total Organic Carbon	11	11	--	16	19	0.5	mg/L
Total Phosphorus	0.021	0.022	--	0.023	0.056	0.01	mg/L
Arsenic	ND	ND	ND	ND	ND	1.0	µg/L
Barium	25	25	ND	47	34	5.0	µg/L
Cadmium	0.2	ND	ND	ND	ND	0.2	µg/L
Calcium	16	16	ND	22	16	1.0	mg/L
Chromium	ND	1.1	ND	ND	ND	1.0	µg/L
Copper	2.3	2.5	ND	4.9	8.1	1.0	µg/L
Hardness - Calculated	57	57	ND	73	56	4.6	mg/L
Iron	510	520	ND	330	2400	20	µg/L
Lead	ND	ND	ND	ND	ND	1.0	µg/L
Magnesium	4.0	4.0	ND	4.7	3.7	0.5	mg/L
Mercury	ND	ND	ND	ND	ND	0.2	µg/L
Selenium	ND	ND	ND	ND	ND	1.0	µg/L
Silver	ND	ND	ND	ND	ND	0.2	µg/L
Zinc	ND	ND	ND	ND	ND	5.0	µg/L

NA Not Applicable
ND Indicates compound was part of analysis but not detected
RL Reporting Limit