MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER RESOURCES DIVISION
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STAFF REPORT

A BIOLOGICAL SURVEY OF THE CENTRAL UPPER PENINSULA WATERSHEDS OF THE AU TRAIN-CHOCOLAY, CEDAR-FORD, ESCANABA, RAPID-WHITEFISH, AND FISH DAM-STURGEON RIVERS
JUNE AND JULY 2010

INTRODUCTION

Staff of the Surface Water Assessment Section (SWAS) assessed the biological, chemical, and physical habitat conditions of the Central Upper Peninsula (CUP) watersheds of the Au Train-Chocolay (HUC 04020201), Cedar-Ford (HUC 04030109), Escanaba (HUC 04030110), Rapid-Whitefish (HUC 04030111), and Fish Dam-Sturgeon (HUC 04030112) Rivers.

The habitat and macroinvertebrate community were qualitatively evaluated at 29 randomly selected monitoring sites (Figure 1) using the SWAS Procedure 51 (MDEQ, 1990; Creal et al., 1996). Specific location information is shown in Table 1.

The specific survey objectives of the monitoring activities included, but were not limited to, the following:

- Evaluate the current biological integrity and physical habitat conditions at randomly selected stations using a probabilistic sampling design in the CUP watersheds.
- Assess the current status and condition of individual water bodies and determine whether Michigan water quality standards (WQS) are being met.

GENERAL WATERSHED HISTORY AND BACKGROUND INFORMATION

Extensive biological and water chemistry monitoring of the CUP watersheds has been conducted by the Michigan Department of Environmental Quality (MDEQ) and Michigan Department of Natural Resources (MDNR) over the last 25 years (Cooper, 2006; Edly, 2008 and 2011; Godby, 2001; Hendrickson et al., 1973; Kohlhepp, 2007; Rippke, 2005a, 2005b, and 2005c; Suppnick, 2007; Taft, 1991a, 1991b, 1996, 2001, and 2006). Fish population monitoring is also regularly conducted within the CUP watersheds by the Hiawatha National Forest staff and biologists from the MDNR, Fisheries Division (Wills et al., [in press]).

The CUP watersheds monitored in 2010 are located in the central section of Michigan's Upper Peninsula. This extensive area drains parts of five Michigan counties. The CUP watersheds are sparsely populated; a high percentage of the land lies within the boundaries of the Michigan state forest system and Hiawatha National Forest. Escanaba, Gladstone, Rapid River, Munising, Ishpeming, and Powers are the primary communities within the CUP watersheds.

The CUP watersheds are located in the Northern Lakes and Forest Ecoregion (Omernick and Gallant, 1988). Much of the land is forested. One exception is the Escanaba watershed, which flows through a large area of iron mining properties in the northern part of the watershed and agriculture/urban development located near the Lake Michigan shoreline. Many of the rivers and streams in the CUP watersheds support cold water fish communities.

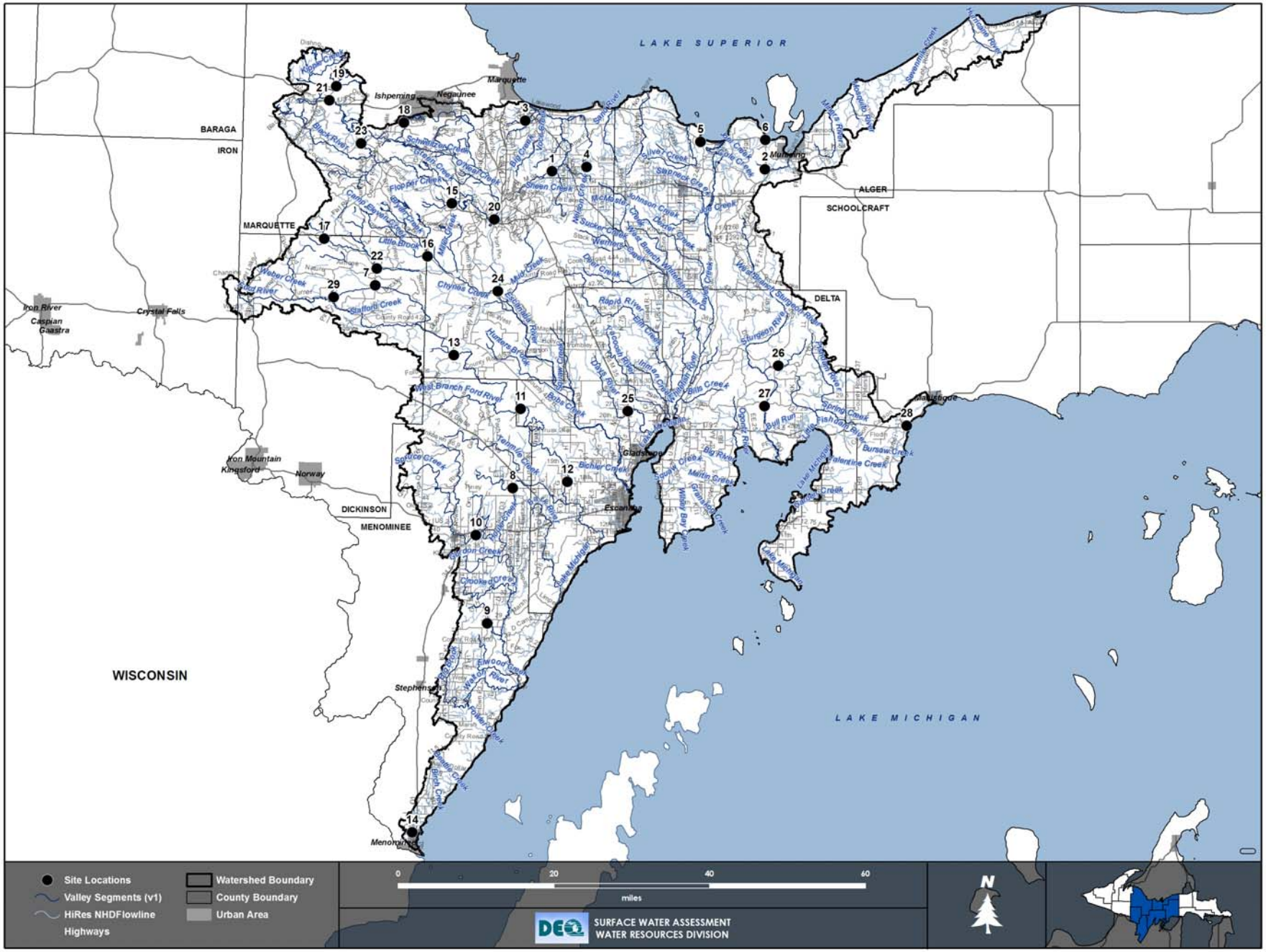

Figure 1. 2010 random sampling locations within the Central Upper Peninsula watersheds.

Table 1. Specific location information on sampling sites within the central Upper Peninsula watersheds monitored in 2010.

STORET	SITE #	SITE	WATER BODY NAME	LOCATION	LATITUDE	LONGITUDE	COUNTY	TRS	TOWNSHIP	8-DIGIT HUC	12-DIGIT HUC	AUID
520420	1	CS5	W B Chocolay River	West Branch Road (u/s sediment trap off County Road 545)	46.37528	-87.28304	MARQUETTE	46N24WS22	West Branch	04020201	040202010101	040202010101-05
020134	2	CS6	Anna River (North Branch)	County Road 577 (downstream Perch Lake Road)	46.38371	-86.71139	ALGER	46N19WS17	Au Train	04020201	040202010202	040202010202-02
520313	3	CS9	Cherry Creek	Cherry Creek Road (41 crossing)	46.46883	-87.35663	MARQUETTE	47N24WS18	Chocolay	04020201	040202010104	040202010104-02
520505	4	CSAlt1	E B LeVasseur	Dalton Road	46.38385	-87.19070	MARQUETTE	46N23WS16	Skandia	04020201	040202010102	040202010102-NA
020162	5	COA1	Unnamed Coastal	M28 (Onota Au Train Road)	46.43393	-86.88463	ALGER	47N21WS36	Onota	04020201	040202010113	040202010113-NA
020163	6	COA4	Gongeau Creek	M28 (Bay Furnace Road)	46.43860	-86.71086	ALGER	47N19WS29	Au Train	04020201	040202010201	040202010201-01
220089	7	CS12	N B Ford River	County Road 581	46.15588	-87.75088	DICKINSON	43N28WS01	West Branch	04030109	04031090103	040301090104-01
550211	8	WS1	Fortyseven Mile	Mott 46 Lane	45.78321	-87.37353	MENOMINEE	39N25WS10	Harris	04030109	040301090403	040301090403-01
550209	9	WS2	Devils Creek	County Road 360	45.53097	-87.43503	MENOMINEE	36N25WS07	Cedarville	04030109	040301090406	040301090406-01
550167	10	WM4	Cedar River (Big)	Hillside Road (H)	45.69472	-87.46931	MENOMINEE	38N26WS13	Spalding	04030109	040301090404	040301090404-02
210316	11	WL1	Ford River	Cedardale 28th Road (E2)	45.93132	-87.35665	DELTA	41N24WS19	Cornell	04030109	040301090202	040301090202-01
210315	12	WL2	Ford River	18th Road (County Road 414 (Riverland))	45.79689	-87.22885	DELTA	39N24WS02	Wells	04030109	040301090204	040301090204-01
520496	13	WL4	Ford River	Ford River Road	46.02941	-87.53679	MARQUETTE	42N26WS15	Wells	04030109	040301090107	040301090107-01
550210	14	COA2	Hay Creek	13th Street	45.13852	-87.62283	MENOMINEE	32N27WS27	Menominee	04030109	040301090502	040301090502-NA
520500	15	CS2	Bear Creek	County Road 565	46.31190	-87.55064	MARQUETTE	45N26WS10	Forsyth	04030110	040301100111	040301100111-01
520498	16	CS4	Big Brook	Kates Grade Road	46.21217	-87.61247	MARQUETTE	44N26WS18	Forsyth	04030110	040301100203	040301100203-01
220142	17	CS7	Schwartz Creek	County Road Coo	46.24073	-87.89066	DICKINSON	44N29WS02	Sagola	04030110	040301100202	040301100202-01
520499	18	CS8	Ely Creek	Cliffs Drive	46.46044	-87.68318	MARQUETTE	47N27WS21	Tilden	04030110	040301100106	040301100106-01
520387	19	CS11	Second River	off Wolf Lake Road	46.52563	-87.86826	MARQUETTE	48N29WS25	Champion	04030110	040301100101	040301100101-01
520502	20	CM1	E B Escanaba River	Iron Street	46.28319	-87.43610	MARQUETTE	45N25WS21	Forsyth	04030110	040301100110	040301100110-01
520503	21	WM1	M B Escanaba River	Wolf Lake Road (US41)	46.49917	-87.88641	MARQUETTE	47N29WS01	Humboldt	04030110	040301100101	040301100101-01
220079	22	WM3	W B Escanaba River	County Road 581 (West Branch Escanaba campground)	46.18782	-87.74768	DICKINSON	44N28WS25	West Branch	04030110	040301100205	040301100205-01
520504	23	WMAlt1	M B Escanaba River	County Road Ch	46.42017	-87.79789	MARQUETTE	46N28WS03	Ely	04030110	040301100105	040301100105-01
520497	24	WVL1	Escanaba River	off Escanaba River Road	46.14973	-87.42269	MARQUETTE	43N25WS03	Ewing	04030110	040301100304	040301100304-01
210200	25	WM2	Days River	M35 (d/s Masonville Crossing)	45.92984	-87.07049	DELTA	41N22WS21	Brampton	04030111	040301110207	040301110207-01
210317	26	CS1	Eighteen Mile Creek	Forest Highway 13	46.01797	-86.67072	DELTA	42N19WS22	Nahma	04030112	040301120204	040301120204-01
210218	27	WL3	Sturgeon River	FF Road 2231 (10-Mile rapids)	45.94258	-86.70679	DELTA	41N19WS17	Nahma	04030112	040301120207	040301120207-01
770074	28	COA3	Thompson Creek	US 2 (d/s of the MDNR Thompson State Fish Hatchery)	45.90732	-86.32734	SCHOOLCRAFT	41N16WS32	Thompson	04030112	040301120101	040301120101-01
220085	29	CS10	N B Ford River	South of Landing Field	46.13300	-87.86167	DICKINSON	43N28WS07	Felch	04030109	040301090103	040301090103-01

Numerous large National Pollutant Discharge Elimination System (NPDES) permitted point source dischargers are found within the CUP watersheds. These facilities include the Empire Iron Mining Partnership, Tilden Mining Co, NewPage Corp-Escanaba Paper Co, Kennecott-Humboldt Mill, Escanaba Wastewater Treatment Plant (WWTP), Gladstone WWTP, Neenah Papers, and the MDNR-Marquette Fish Hatchery.

Forestry, wood products, iron mining, and tourism continue to be the dominant industries in the CUP watersheds. Major recreation activities include winter sports, swimming, fishing, hunting, camping, boating, fall color tours, and sightseeing.

Most of the small watersheds that flow through Delta and northern Menominee Counties drain areas of very thin soils that overlay dolomite bedrock, which outcrops all along the Lake Michigan shoreline. The dolomite bedrock historically was used for iron smelting in the area. This bedrock is so close to the soil surface that it causes very low base stream flows (Dorr and Eschman, 1970). The larger systems like the Escanaba, Ford, Chocolay, and Whitefish Rivers have good groundwater sources in their headwaters, which provide seasonal flow stability during dry periods for most of these systems. The majority of the river miles and lake acreage in the CUP watersheds are attaining WQS (LeSage and Smith, 2008).

Au Train-Chocolay Rivers Watersheds

A large portion of the Au Train-Chocolay Rivers watersheds are managed for tourism, timber, and wildlife as the Hiawatha National Forest, Escanaba River State Forest, and Pictured Rocks National Lakeshore fall within its boundaries. The Pictured Rocks National Lakeshore spans 40 miles along the Lake Superior coastline in Alger County. Several waterfalls are located throughout the area, including the Au Train Falls, Miner's Falls, and Laughing Whitefish Falls. For a description of the geology, soils, climate, and land use of the watershed, refer to Rippke (2005c) and Mechenich et al. (2006).

Figure 2. Ten Mile Creek, a tributary to the Ford River, showing the silurian bedrock outcrop at the surface.

Cedar-Ford Rivers Watersheds

The Cedar-Ford Rivers watersheds drains parts of Delta, Dickinson, and Menominee Counties. At 1,018 square miles, the Cedar-Ford Rivers watersheds are nearly as large as the state of Rhode Island (1,045 square miles) (as indicated by the United States Census) and make up approximately one-third of the CUP watershed. Groundwater input is reduced dramatically in the downstream sections of these watersheds where the bedrock outcrops at the surface near the Lake Michigan shoreline (Figure 2). Numerous tributaries within these watersheds were used extensively for log drives during the 1880s and 1890s.

Rapid/Whitefish Rivers Watersheds

The Rapid/Whitefish Rivers watersheds cover approximately 600 square miles of the central Delta and southern Alger and Marquette Counties, which drain to Little Bay de Noc at Rapid River, Michigan (EPA, 2011a).

The Whitefish River headwaters originate within 10 miles of Lake Superior from large wetlands and glacial till soils that help provide a more predictable base flow as the river flows south. Conversely, the Rapid River headwaters originate from swamps and areas that lack much groundwater infiltration, which makes for unpredictable base flows, and is very dependent on precipitation. Groundwater input is reduced dramatically in the downstream sections of these watersheds where limestone bedrock outcrops at the surface near Lake Michigan. Water temperatures during summer low flow periods become elevated (i.e., 70 degrees F or higher) in both the lower Rapid/Whitefish Rivers watershed sections. This condition forces the native cold water fishes (such as brook trout) to migrate into small tributaries or spring seeps with more suitable summer temperatures.

Figure 3. Escanaba River (Station 24) in southern Marquette County. The river is 210-feet wide at this point.

Escanaba River Watershed

The Escanaba River watershed is one of the largest watersheds in Michigan's Upper Peninsula totaling 924 square miles and has 508 miles of streams that flow year round (EPA, 2011b). This watershed starts in west central Marquette County, north of Lake Michigamme, and flows southeast to Lake Michigan at Little Bay de Noc (Figure 3). The name of this large river system and the community of Escanaba were derived from an Ojibwa (Chippewa) Indian word meaning "flat rock." The majority of the limestone bedrock waterfalls found near Lake Michigan have been impounded for power generation and/or paper making.

Fish Dam-Sturgeon Rivers Watersheds

Most of the Fish Dam-Sturgeon Rivers watersheds lie within the Hiawatha National Forest located in Delta and Schoolcraft Counties. Both watersheds drain to Big Bay de Noc. The landscape is dominated by a variety of forest and wetland types with a limited amount of agricultural land near Highway US-2 along the Lake Michigan shoreline.

RESULTS

The MDEQ, Water Resources Division, has incorporated a stratified random sampling design component into the annual watershed assessments. The purpose of this probabilistic monitoring is to collect biological data for attainment status determination and temporal trend

analysis. Probabilistic sampling allows us to extend the conclusions from a limited number of sampling stations to an entire watershed. The resulting data can be used to infer the condition of the state's waters at site-specific, watershed, or statewide scales.

The MDEQ's Macroinvertebrate Community Status and Trend Monitoring Procedure (MDEQ, 2011 [draft]) is used to estimate the number of river miles supporting the "other indigenous aquatic life and wildlife" designated use specified in R 323.1100(1)(e) of the Michigan WQS. The status and trend program utilizes river valley segments to provide the basic sampling unit. A river valley segment is defined as a stream reach that is relatively homogenous with respect to ecological segments of rivers and streams that share common geologic, flow, and temperature characteristics (MDNR, 1997). The smallest river units (e.g., valley segments) that can be interpreted from large-scale geologic maps are, in reality, relatively large with each segment having its own unique identification number coupled with a known specific length. As such, valley segments provide a randomly selectable sampling unit that can be stratified by size and/or thermal regime.

To develop a statistically-based estimate of attainment status in the CUP watersheds, a total of 29 randomly selected stream/river sites were assessed. Sites were stratified based on size and water temperature. The strata included small cold, medium cold, small warm, medium warm, large warm, very large warm, and coastal streams. Very large and large cold river segments were not sampled in the CUP watersheds as they are not represented. The site locations are described in Table 1.

Figure 4. Hay Creek (Station 14) in Menominee, Michigan.

All 29 probabilistic sites in the 2010 CUP watersheds scored either good or excellent for habitat (Table 3) except for Hay Creek (a small urban stream; Figure 4), which scored marginal. In terms of macroinvertebrate metric scores, 5 wadeable sites rated excellent (+5 or greater) and 24 rated acceptable (e.g., from -4 to +4). The lowest score (-4) occurred in Ely Creek (Station 18) at National Mine in Marquette County. This is a very small swampy lake drainage that averaged only 4 inches in depth and may lack flow during periods of dry weather. Only 14 total taxa were present with 3 caddisflies and no stoneflies present.

The total number of taxa in the wadeable probabilistic sites ranged from 13-35 (Tables 2a and 2b). Based on these data and the probabilistic monitoring methodology, it can be concluded (based on a 95% confidence interval) that between 90 and 100 percent of the total river miles in these watersheds are attaining the "other indigenous aquatic life and wildlife" designated use.

CONCLUSION:

The CUP watersheds appear to be in good shape in spite of the lack of seasonal groundwater inputs, especially for Lake Michigan coastal drainages. The fact that much of the watersheds' area falls within natural and state forest boundries and are forested landscapes is another reason why they attain WQS.

Fieldwork by: Kay Edly, Aquatic Biologist
Matthew Wesener, Aquatic Biologist
William Taft, Aquatic Biologist
Brenda Sayles, Chief, Lake Michigan Unit
Surface Water Assessment Section
Water Resources Division

Report by: William Taft, Aquatic Biologist
Surface Water Assessment Section
Water Resources Division

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Table 2A. Qualitative macroinvertebrate sampling results for streams in the Central UP watersheds, 2010.

TAXA	W B Chocolay River u/s sediment trap off Co Rd 545 6/18/2010 STATION 1	N B Anna River d/s Perch Lake Rd 6/18/2010 STATION 2	Cherry Creek 41 crossing 6/28/2010 STATION 3	E B LeVasser Creek Dalton Rd 6/29/2010 STATION 4
PLATYHELMINTHES (flatworms)				
Turbellaria			1	
ANNELIDA (segmented worms)				
Hirudinea (leeches)			1	1
Oligochaeta (worms)	8	6	6	1
ARTHROPODA				
Crustacea				
Amphipoda (scuds)			88	
Isopoda (sowbugs)			7	
Arachnoidea				
Hydracarina		1	19	
Insecta				
Ephemeroptera (mayflies)				
Baetidae	3	25	27	9
Caenidae	112			
Ephemerellidae	5	5	1	10
Heptageniidae				1
Leptophlebiidae				1
Odonata				
Anisoptera (dragonflies)				
Aeshnidae		1		1
Cordulegastridae		2		12
Gomphidae	1			
Zygoptera (damselflies)				
Calopterygidae				2
Coenagrionidae			1	
Plecoptera (stoneflies)				
Leuctridae		2		13
Nemouridae		72		
Perlidae	1			
Perlodidae		1		
Hemiptera (true bugs)				
Gerridae	1			11
Megaloptera				
Corydalidae (dobson flies)				1
Sialidae (alder flies)	1			2
Trichoptera (caddisflies)				
Brachycentridae	54	3	1	
Glossosomatidae	1	1		1
Hydropsychidae		1		12
Hydroptilidae	3			
Lepidostomatidae	1	3	1	47
Limnephilidae	25	55	4	2
Molannidae				3
Philopotamidae	3	6		79
Rhyacophilidae		3		
Uenoidae		3		9
Coleoptera (beetles)				
Dytiscidae (total)	1		1	
Gyrinidae (adults)				1
Hydrophilidae (total)	1			
Elmidae		1		2
Diptera (flies)				
Ceratopogonidae		5		2
Chironomidae	115	45	292	26
Ptychopteridae				8
Simuliidae	1	44	149	16
Stratiomyidae			1	
Tabanidae		1		
Tipulidae	1	1	2	7
MOLLUSCA				
Gastropoda (snails)				
Ancylidae (limpets)		1		
Lymnaeidae				1
Physidae		2		1
Pelecypoda (bivalves)				
Sphaeriidae (clams)	1	1		4
TOTAL INDIVIDUALS	339	291	602	286

Table 2B. Macroinvertebrate metric evaluation of streams in the Central UP watersheds, 2010.

	W B Chocolay River u/s sediment trap off Co Rd 545 6/18/2010 STATION 1		N B Anna River d/s Perch Lake Rd 6/18/2010 STATION 2		Cherry Creek 41 crossing 6/28/2010 STATION 3		E B LeVasser Creek Dalton Rd 6/29/2010 STATION 4	
METRIC	Value	Score	Value	Score	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	20	0	26	0	17	0	30	1
NUMBER OF MAYFLY TAXA	3	0	2	0	2	-1	4	1
NUMBER OF CADDISFLY TAXA	6	1	8	1	3	0	7	1
NUMBER OF STONEFLY TAXA	1	0	3	1	0	-1	1	0
PERCENT MAYFLY COMP.	35.40	1	10.31	0	4.65	0	7.34	0
PERCENT CADDISFLY COMP.	25.66	0	25.77	0	1.00	-1	53.50	1
PERCENT DOMINANT TAXON	33.92	-1	24.74	0	48.50	-1	27.62	-1
PERCENT ISOPOD, SNAIL, LEECH	0.00	1	1.03	1	1.33	1	1.05	1
PERCENT SURF. AIR BREATHERS	0.88	1	0.00	1	0.33	1	6.99	0
TOTAL SCORE		3		4		-2		4
MACROINV. COMMUNITY RATING		ACCEPT.		ACCEPT.		ACCEPT.		ACCEPT.

Table 2A (cont.). Qualitative macroinvertebrate sampling results for streams in the Central UP watersheds, 2010

TAXA	Unnamed Coastal Onota Au Train Rd 6/29/2010 STATION 5	Gongeau Creek Bay Furnace Rd 6/29/2010 STATION 6	N B Ford River Co Rd 581 6/17/2010 STATION 7	Forty-Seven Mile Creek Mott 46 Ln 6/16/2010 STATION 8
PORIFERA (sponges)		1		
ANNELIDA (segmented worms)				
Hirudinea (leeches)	1		1	2
Oligochaeta (worms)	24	8	3	4
ARTHROPODA				
Crustacea				
Amphipoda (scuds)	1	67	12	4
Decapoda (crayfish)		9	2	18
Isopoda (sowbugs)		19		
Arachnoidea				
Hydracarina	12	1		
Insecta				
Ephemeroptera (mayflies)				
Baetiscidae			1	
Baetidae	2	16	17	9
Caenidae			8	4
Ephemerellidae		3	6	10
Ephemeridae				2
Heptageniidae		2	1	22
Leptophlebiidae	4			
Tricorythidae		15		
Odonata				
Anisoptera (dragonflies)				
Aeshnidae		2	3	
Cordulegastridae	2	1	2	
Gomphidae		1	1	
Zygoptera (damselflies)				
Calopterygidae		1		
Plecoptera (stoneflies)				
Leuctridae	5			2
Nemouridae	3			1
Perlidae		16		
Perlodidae			1	
Hemiptera (true bugs)				
Corixidae			16	
Gerridae	2	6	17	5
Megaloptera				
Corydalidae (dobson flies)				12
Trichoptera (caddisflies)				
Brachycentridae			7	
Glossosomatidae		2		
Helicopsychidae			3	4
Hydropsychidae	2	13	3	
Hydroptilidae			2	
Lepidostomatidae	73	2	8	1
Leptoceridae		1	3	2
Limnephilidae	2	9	14	20
Molannidae		1		
Philopotamidae	3	2		
Phryganeidae	1			
Uenoidae		1		
Coleoptera (beetles)				
Dytiscidae (total)	9	2		
Gyrinidae (adults)		1		
Haliplidae (adults)			3	
Hydrophilidae (total)	2			2
Psephenidae (adults)				1
Dryopidae	1	1		1
Elmidae	1	31	19	2
Diptera (flies)				
Athericidae	1	2		
Ceratopogonidae		1	4	
Chironomidae	17	21	94	146
Empididae		1		
Simuliidae	2	6	22	
Tabanidae		1	2	1
Tipulidae		2		
MOLLUSCA				
Gastropoda (snails)				
Ancylidae (limpets)		1	1	1
Physidae		2	2	1
Planorbidae				2
Pelecypoda (bivalves)				
Sphaeriidae (clams)	21			3
TOTAL INDIVIDUALS	191	271	278	282

Table 2B (cont.). Macroinvertebrate metric evaluation of streams in the Central UP watersheds, 2010

METRIC	Unnamed Coastal Onota Au Train Rd 6/29/2010 STATION 5		Gongeau Creek Bay Furnace Rd 6/29/2010 STATION 6		N B Ford River Co Rd 581 6/17/2010 STATION 7		Forty-Seven Mile Creek Mott 46 Ln 6/16/2010 STATION 8	
	Value	Score	Value	Score	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	23	1	37	1	30	1	27	0
NUMBER OF MAYFLY TAXA	2	0	4	1	5	1	5	1
NUMBER OF CADDISFLY TAXA	5	0	8	1	7	1	4	0
NUMBER OF STONEFLY TAXA	2	1	1	1	1	0	2	1
PERCENT MAYFLY COMP.	3.14	0	13.28	0	11.87	0	16.67	0
PERCENT CADDISFLY COMP.	42.41	1	11.44	0	14.39	0	9.57	0
PERCENT DOMINANT TAXON	38.22	-1	24.72	0	33.81	-1	51.77	-1
PERCENT ISOPOD, SNAIL, LEECH	0.52	1	8.12	0	1.44	1	2.13	1
PERCENT SURF. AIR BREATHERS	6.81	0	3.32	1	12.95	0	2.84	1
TOTAL SCORE		3		5		3		3
MACROINV. COMMUNITY RATING		ACCEPT.		EXCELLENT		ACCEPT.		ACCEPT.

Table 2A (cont.). Qualitative macroinvertebrate sampling results for streams in the Central UP watersheds, 2010.

TAXA	Devils Creek Co Rd 360 6/15/2010 STATION 9	Big Cedar River Hillside Rd H 6/15/2010 STATION 10	Ford River Cedardale 28th Rd (E2) 6/16/2010 STATION 11	Ford River Co Rd 414 (Riverland) 6/16/2010 STATION 12
PORIFERA (sponges)	1			
ANNELIDA (segmented worms)				
Oligochaeta (worms)		10		7
ARTHROPODA				
Crustacea				
Amphipoda (scuds)	14	5		5
Decapoda (crayfish)	16	7	10	3
Arachnoidea				
Hydracarina	8	4	1	
Insecta				
Ephemeroptera (mayflies)				
Baetidae	1	20	31	16
Caenidae	2	1	11	7
Ephemerellidae	1	25	5	11
Ephemeridae			5	2
Heptageniidae	13	28	43	22
Isonychiidae	1	8	2	1
Leptophlebiidae	10	18	5	20
Potamanthidae				8
Odonata				
Anisoptera (dragonflies)				
Aeshnidae	11	1	4	
Gomphidae		1	4	5
Libellulidae	1		1	
Zygoptera (damselflies)				
Coenagrionidae	2	1	5	
Lestidae		1		
Plecoptera (stoneflies)				
Leuctridae	14			
Nemouridae		1		
Perlidae	2	27	16	2
Perlodidae	1	1		
Pteronarcyidae		1		
Hemiptera (true bugs)				
Corixidae	3		2	
Gerridae		1	10	30
Mesoveliidae			2	5
Megaloptera				
Corydalidae (dobson flies)	11	2		
Sialidae (alder flies)			2	
Trichoptera (caddisflies)				
Brachycentridae		30		1
Helicopsychidae	1	2	5	2
Hydropsychidae	6	33	2	15
Hydroptilidae		2	1	
Leptoceridae				1
Limnephilidae	21		1	
Odontoceridae		3		
Uenoidae				2
Coleoptera (beetles)				
Dytiscidae (total)				1
Gyrinidae (adults)				2
Psephenidae (adults)	1			1
Dryopidae	1			
Elmidae	44	12	36	13
Psephenidae (larvae)			1	
Diptera (flies)				
Athericidae				1
Ceratopogonidae	1	5	2	
Chironomidae	30	38	10	19
Dixidae	1		1	
Simuliidae	1			
Stratiomyidae			2	
Tabanidae	2			
Tipulidae		3	2	7
MOLLUSCA				
Gastropoda (snails)				
Ancylidae (limpets)			6	
Hydrobiidae			2	4
Lymnaeidae				2
Physidae	3	2	4	3
Planorbidae	1	1	1	1
Pleuroceridae			1	
Pelecypoda (bivalves)				
Pisidiidae		1		
Sphaeriidae (clams)	52	13	10	10
TOTAL INDIVIDUALS	277	308	246	229

Table 2B (cont.). Macroinvertebrate metric evaluation of streams in the Central UP watersheds, 2010.

METRIC	Devils Creek Co Rd 360 6/15/2010 STATION 9		Big Cedar River Hillside Rd H 6/15/2010 STATION 10		Ford River Cedardale 28th Rd (E2) 6/16/2010 STATION 11		Ford River Co Rd 414 (Riverland) 6/16/2010 STATION 12	
	Value	Score	Value	Score	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	32	1	33	1	35	1	32	1
NUMBER OF MAYFLY TAXA	6	1	6	1	7	1	8	1
NUMBER OF CADDISFLY TAXA	3	0	5	0	4	0	5	0
NUMBER OF STONEFLY TAXA	3	1	4	1	1	0	1	0
PERCENT MAYFLY COMP.	10.11	0	32.47	1	41.46	1	37.99	1
PERCENT CADDISFLY COMP.	10.11	0	22.73	0	3.66	0	9.17	0
PERCENT DOMINANT TAXON	18.77	0	12.34	1	17.48	0	13.10	1
PERCENT ISOPOD, SNAIL, LEECH	1.44	1	0.97	1	5.69	0	4.37	0
PERCENT SURF. AIR BREATHERS	1.44	1	0.32	1	6.50	0	17.03	-1
TOTAL SCORE		5		7		3		3
MACROINV. COMMUNITY RATING		EXCELLENT		EXCELLENT		ACCEPT.		ACCEPT.

Table 2A (cont.). Qualitative macroinvertebrate sampling results for streams in the Central UP watersheds, 2010.

TAXA	Ford River Ford River Rd 6/16/2010 STATION 13	Hay Creek 13th St 6/15/2010 STATION 14	Bear Creek Co Rd 565 6/28/2010 STATION 15	Big Brook Kates Grade Rd 6/17/2010 STATION 16
ANNELIDA (segmented worms)				
Hirudinea (leeches)		3	2	
Oligochaeta (worms)	1	1	17	1
ARTHROPODA				
Crustacea				
Amphipoda (scuds)	1	140	1	3
Decapoda (crayfish)	1		1	1
Isopoda (sowbugs)		240	34	
Arachnoidea				
Hydracarina			1	5
Insecta				
Ephemeroptera (mayflies)				
Baetidae	27		28	66
Caenidae	7			
Ephemerellidae	11			3
Ephemeridae	2			11
Heptageniidae	14		2	
Leptophlebiidae			1	1
Odonata				
Anisoptera (dragonflies)				
Aeshnidae	7		1	1
Cordulegastridae			2	4
Gomphidae	10		1	10
Libellulidae	1			
Zygoptera (damselflies)				
Calopterygidae	4			
Plecoptera (stoneflies)				
Leuctridae				2
Perlidae	10	1		1
Perlodidae				1
Hemiptera (true bugs)				
Corixidae				1
Gerridae	10	8	1	2
Mesoveliidae	21			
Megaloptera				
Corydalidae (dobson flies)	3		1	
Sialidae (alder flies)				10
Trichoptera (caddisflies)				
Brachycentridae	7		10	10
Helicopsychidae	1			
Hydropsychidae	10		7	1
Hydroptilidae	1			
Lepidostomatidae			2	2
Leptoceridae	3	1		2
Limnephilidae	1		7	5
Philopotamidae			4	
Phryganeidae		1		
Polycentropodidae			1	
Uenoidae			1	
Coleoptera (beetles)				
Dytiscidae (total)	1	3		1
Gyrinidae (adults)				1
Hydrophilidae (total)		1	1	1
Psephenidae (adults)	4			
Dryopidae	1			
Elmidae	14		1	18
Diptera (flies)				
Ceratopogonidae				1
Chironomidae	60	1	34	100
Muscidae		1		
Simuliidae			32	6
Tabanidae			1	1
Tipulidae	2			
MOLLUSCA				
Gastropoda (snails)				
Ancylidae (limpets)		1	1	
Hydrobiidae				4
Physidae	1	1	4	2
Planorbidae		1		
Pelecypoda (bivalves)				
Sphaeriidae (clams)	17	4	70	1
Unionidae (mussels)	1			
TOTAL INDIVIDUALS	254	408	269	279

Table 2B (cont.). Macroinvertebrate metric evaluation of streams in the Central UP watersheds, 2010.

	Ford River Ford River Rd 6/16/2010 STATION 13		Hay Creek 13th St 6/15/2010 STATION 14		Bear Creek Co Rd 565 6/28/2010 STATION 15		Big Brook Kates Grade Rd 6/17/2010 STATION 16	
METRIC	Value	Score	Value	Score	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	31	1	16	1	29	1	33	1
NUMBER OF MAYFLY TAXA	5	1	0	-1	3	0	4	0
NUMBER OF CADDISFLY TAXA	6	1	2	-1	7	1	5	0
NUMBER OF STONEFLY TAXA	1	0	1	1	0	-1	3	1
PERCENT MAYFLY COMP.	24.02	1	0.00	-1	11.52	0	29.03	1
PERCENT CADDISFLY COMP.	9.06	0	0.49	-1	11.90	0	7.17	0
PERCENT DOMINANT TAXON	23.62	0	58.82	-1	26.02	0	35.84	-1
PERCENT ISOPOD, SNAIL, LEECH	0.39	1	60.29	-1	15.24	-1	2.15	1
PERCENT SURF. AIR BREATHERS	14.17	-1	2.94	1	0.74	1	2.15	1
TOTAL SCORE		4		-3		1		4
MACROINV. COMMUNITY RATING		ACCEPT.		ACCEPT.		ACCEPT.		ACCEPT.

Table 2A (cont.). Qualitative macroinvertebrate sampling results for streams in the Central UP watersheds, 2010.

TAXA	Schwartz Creek Co Rd Coo 6/26/2010 STATION 17	Ely Creek Cliffs Dr 6/26/2010 STATION 18	Second River Wolf Lake Rd 6/27/2010 STATION 19	E B Escanaba River Iron St 6/28/2010 STATION 20
PORIFERA (sponges)				1
ANNELIDA (segmented worms)				
Hirudinea (leeches)		1	2	1
Oligochaeta (worms)	2	4	3	29
ARTHROPODA				
Crustacea				
Amphipoda (scuds)			1	
Decapoda (crayfish)				2
Isopoda (sowbugs)		130		18
Arachnoidea				
Hydracarina			1	2
Insecta				
Ephemeroptera (mayflies)				
Baetidae	3		10	28
Caenidae				4
Ephemerellidae			1	14
Ephemeridae	6			1
Heptageniidae	1	1	1	
Leptophlebiidae	2		8	
Siphlonuridae				1
Tricorythidae				3
Odonata				
Anisoptera (dragonflies)				
Aeshnidae		1	2	5
Cordulegastridae		3	1	1
Gomphidae				2
Libellulidae			1	
Zygoptera (damselflies)				
Calopterygidae				5
Plecoptera (stoneflies)				
Leuctridae	2			
Perlidae			1	3
Pteronarcyidae	1			1
Hemiptera (true bugs)				
Corixidae			1	14
Gerridae	1	1	4	4
Megaloptera				
Corydalidae (dobson flies)				4
Sialidae (alder flies)	3	1		
Trichoptera (caddisflies)				
Brachycentridae		9		3
Glossosomatidae				2
Hydropsychidae			1	17
Hydroptilidae			1	1
Lepidostomatidae	7		1	
Limnephilidae	13		2	3
Molannidae		1		
Philopotamidae				1
Uenoidae		1		1
Coleoptera (beetles)				
Dytiscidae (total)			3	3
Gyrinidae (adults)			1	
Hydrophilidae (total)				1
Elmidae			3	17
Diptera (flies)				
Ceratopogonidae	1		1	
Chironomidae	344	70	80	24
Culicidae				1
Ptychopteridae	2			
Simuliidae			13	1
Tabanidae	4			1
Tipulidae		1	1	
MOLLUSCA				
Gastropoda (snails)				
Ancylidae (limpets)				1
Hydrobiidae				25
Physidae	1		5	11
Pelecypoda (bivalves)				
Sphaeriidae (clams)	9	38	7	7
Unionidae (mussels)				1
TOTAL INDIVIDUALS	402	262	156	264

Table 2B (cont.). Macroinvertebrate metric evaluation of streams in the Central UP watersheds, 2010.

METRIC	Schwartz Creek Co Rd Coo 6/26/2010 STATION 17		Ely Creek Cliffs Dr 6/26/2010 STATION 18		Second River Wolf Lake Rd 6/27/2010 STATION 19		E B Escanaba River Iron St 6/28/2010 STATION 20	
	Value	Score	Value	Score	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	17	0	14	0	27	1	40	1
NUMBER OF MAYFLY TAXA	4	1	1	-1	4	1	6	1
NUMBER OF CADDISFLY TAXA	2	-1	3	0	4	0	7	1
NUMBER OF STONEFLY TAXA	2	1	0	-1	1	0	2	1
PERCENT MAYFLY COMP.	2.99	-1	0.38	-1	12.82	0	19.32	0
PERCENT CADDISFLY COMP.	4.98	0	4.20	0	3.21	0	10.61	0
PERCENT DOMINANT TAXON	85.57	-1	49.62	-1	51.28	-1	10.98	1
PERCENT ISOPOD, SNAIL, LEECH	0.25	1	50.00	-1	4.49	0	21.21	-1
PERCENT SURF. AIR BREATHERS	0.75	1	0.38	1	5.77	0	8.71	0
TOTAL SCORE		1		-4		1		4
MACROINV. COMMUNITY RATING		ACCEPT.		ACCEPT.		ACCEPT.		ACCEPT.

Table 2A (cont.). Qualitative macroinvertebrate sampling results for streams in the Central UP watersheds, 2010.

TAXA	M B Escanaba River US41 6/27/2010 STATION 21	W B Escanaba River W B Escanaba cmpgrnd 6/17/2010 STATION 22	M B Escanaba River Co Rd Ch 6/26/2010 STATION 23	Escanaba River off Escanaba River Rd 6/17/2010 STATION 24
PORIFERA (sponges)	1		1	
ANNELIDA (segmented worms)				
Hirudinea (leeches)	1		2	
Oligochaeta (worms)		1	36	
ARTHROPODA				
Crustacea				
Amphipoda (scuds)	44		1	
Decapoda (crayfish)	12			1
Isopoda (sowbugs)	25			16
Arachnoidea				
Hydracarina	2	2	3	
Insecta				
Ephemeroptera (mayflies)				
Baetiscidae	1		3	
Baetidae	71	25	5	31
Caenidae	2	2	3	2
Ephemerellidae	5	48	12	24
Ephemeridae	11	1	8	1
Heptageniidae	11	68	3	20
Isonychiidae				1
Leptophlebiidae		6		9
Potamanthidae				3
Siphlonuridae	2		1	
Odonata				
Anisoptera (dragonflies)				
Aeshnidae			2	3
Cordulegastridae			1	
Gomphidae	1	40	7	5
Libellulidae	1			
Zygoptera (damselflies)				
Calopterygidae	8		1	2
Plecoptera (stoneflies)				
Leuctridae		10	18	
Nemouridae				1
Perlidae		10	4	17
Perlodidae		4		1
Pteronarcyidae		2	1	1
Hemiptera (true bugs)				
Belostomatidae		1		
Corixidae	24		1	3
Gerridae	1	2	2	5
Mesoveliidae		1		18
Megaloptera				
Corydalidae (dobson flies)			1	1
Sialidae (alder flies)	2			
Trichoptera (caddisflies)				
Brachycentridae		3	4	2
Helicopsychidae				5
Hydropsychidae		12	2	10
Lepidostomatidae		1		17
Leptoceridae		3	4	2
Limnephilidae	1	7	1	4
Molannidae			1	
Philopotamidae		12		3
Phryganeidae			1	
Polycentropodidae			2	1
Rhyacophilidae		1		
Coleoptera (beetles)				
Dytiscidae (total)	6			
Gyrinidae (adults)	1		1	
Hydrophilidae (total)		2	1	
Dryopidae		1		
Elmidae		30	1	15
Diptera (flies)				
Athericidae		12		
Ceratopogonidae			3	2
Chironomidae	10	8	138	18
Dixidae	1		1	
Empididae		1		
Simuliidae	14	2	2	1
Tabanidae			1	1
Tipulidae				1
MOLLUSCA				
Gastropoda (snails)				
Ancylidae (limpets)	1	4		1
Hydrobiidae	15		7	
Physidae	5	1	3	2
Planorbidae	1			1
Pleuroceridae				1
Pelecypoda (bivalves)				
Sphaeriidae (clams)	6		1	8
TOTAL INDIVIDUALS	286	323	290	260

Table 2B (cont.). Macroinvertebrate metric evaluation of streams in the Central UP watersheds, 2010.

	M B Escanaba River US41 6/27/2010 STATION 21		W B Escanaba River W B Escanaba cmpgrnd 6/17/2010 STATION 22		M B Escanaba River Co Rd Ch 6/26/2010 STATION 23		Escanaba River off Escanaba River Rd 6/17/2010 STATION 24	
METRIC	Value	Score	Value	Score	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	30	1	32	1	40	1	40	1
NUMBER OF MAYFLY TAXA	7	1	6	1	7	1	8	1
NUMBER OF CADDISFLY TAXA	1	-1	7	1	7	1	8	1
NUMBER OF STONEFLY TAXA	0	-1	4	1	3	1	4	1
PERCENT MAYFLY COMP.	36.01	1	46.44	1	12.07	0	35.00	1
PERCENT CADDISFLY COMP.	0.35	-1	12.07	0	5.17	0	16.92	0
PERCENT DOMINANT TAXON	24.83	0	21.05	0	47.59	-1	11.92	1
PERCENT ISOPOD, SNAIL, LEECH	16.78	-1	1.55	1	4.14	0	8.08	0
PERCENT SURF. AIR BREATHERS	11.19	0	1.86	1	1.72	1	10.00	0
TOTAL SCORE		-1		7		4		6
MACROINV. COMMUNITY RATING		ACCEPT.		EXCELLENT		ACCEPT.		EXCELLENT

Table 2A (cont.). Qualitative macroinvertebrate sampling results for streams in the Central UP watersheds, 2010.

TAXA	Days River d/s of Masonville Crossing 6/15/2010 STATION 25	Eighteen Mile Creek Forest Hwy 13 6/18/2010 STATION 26	Sturgeon River 10-Mile rapids 6/18/2010 STATION 27	Thompson Creek d/s Thompson State Fish Hatchery 6/18/2010 STATION 28
PORIFERA (sponges)			1	
PLATYHELMINTHES (flatworms)				
Turbellaria				4
ANNELIDA (segmented worms)				
Hirudinea (leeches)				1
Oligochaeta (worms)	2	10	8	4
ARTHROPODA				
Crustacea				
Amphipoda (scuds)		4		220
Decapoda (crayfish)		4	2	
Isopoda (sowbugs)	4		3	120
Arachnoidea				
Hydracarina	4	3	1	2
Insecta				
Ephemeroptera (mayflies)				
Baetidae	10	10	28	34
Caenidae	2	4	2	
Ephemerellidae	12		10	
Ephemeridae			5	
Heptageniidae	7	2	5	
Leptophlebiidae	3	7	15	
Tricorythidae	2			
Odonata				
Anisoptera (dragonflies)				
Aeshnidae	1	1	10	
Cordulegastridae		3	2	
Gomphidae		2	4	
Zygoptera (damselflies)				
Calopterygidae	1	29	3	
Coenagrionidae		1		
Plecoptera (stoneflies)				
Leuctridae	12	4		
Perlidae	1		3	
Perlodidae			1	
Hemiptera (true bugs)				
Corixidae	2	7	2	
Gerridae	1	4	6	1
Mesoveliidae			56	
Megaloptera				
Corydalidae (dobson flies)	1	2	7	
Trichoptera (caddisflies)				
Brachycentridae		19		
Glossosomatidae			4	2
Helicopsychidae			16	
Hydropsychidae	2	3	6	6
Hydroptilidae	1			
Lepidostomatidae	1		3	
Leptoceridae	1			
Limnephilidae	6	14	15	9
Molannidae		2		
Philopotamidae		1		2
Phryganeidae				1
Polycentropodidae	1	7	2	
Uenoidae	11			
Coleoptera (beetles)				
Dytiscidae (total)	5			
Gyrinidae (adults)	23			
Hydrophilidae (total)		1	1	
Psephenidae (adults)			3	
Elmidae	6	18	14	9
Diptera (flies)				
Athericidae	2		7	
Ceratopogonidae		2		
Chironomidae	123	123	27	23
Dixidae		1		
Simuliidae	1	7		
Tabanidae		5		
Tipulidae		2	10	2
MOLLUSCA				
Gastropoda (snails)				
Ancylidae (limpets)			2	
Hydrobiidae	10			
Lymnaeidae	1			
Physidae	5	20	1	1
Planorbidae	8			
Pleuroceridae			5	
Pelecypoda (bivalves)				
Sphaeriidae (clams)	4	19	22	1
TOTAL INDIVIDUALS	276	341	312	442

Table 2B (cont.). Macroinvertebrate metric evaluation of streams in the Central UP watersheds, 2010.

METRIC	Days River d/s of Masonville Crossing 6/15/2010 STATION 25		Eighteen Mile Creek Forest Hwy 13 6/18/2010 STATION 26		Sturgeon River 10-Mile rapids 6/18/2010 STATION 27		Thompson Creek d/s Thompson State Fish Hatchery 6/18/2010 STATION 28	
	Value	Score	Value	Score	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	34	1	33	1	37	1	18	0
NUMBER OF MAYFLY TAXA	6	1	4	0	6	1	1	-1
NUMBER OF CADDISFLY TAXA	7	1	6	1	6	1	5	0
NUMBER OF STONEFLY TAXA	2	1	1	0	2	1	0	-1
PERCENT MAYFLY COMP.	13.04	0	6.74	0	20.83	0	7.69	0
PERCENT CADDISFLY COMP.	8.33	0	13.49	0	14.74	0	4.52	0
PERCENT DOMINANT TAXON	44.57	-1	36.07	-1	17.95	0	49.77	-1
PERCENT ISOPOD, SNAIL, LEECH	10.14	0	5.87	0	3.53	1	27.60	-1
PERCENT SURF. AIR BREATHERS	11.23	0	3.52	1	21.79	-1	0.23	1
TOTAL SCORE		3		2		4		-3
MACROINV. COMMUNITY RATING		ACCEPT.		ACCEPT.		ACCEPT.		ACCEPT.

Table 2A (cont.). Qualitative macroinvertebrate sampling results for streams in the Central UP watersheds, 2010.

TAXA	N B Ford River South of Landing Field 6/20/2010 STATION 29
ANNELIDA (segmented worms)	
Hirudinea (leeches)	2
Oligochaeta (worms)	12
ARTHROPODA	
Crustacea	
Amphipoda (scuds)	24
Arachnoidea	
Hydracarina	15
Insecta	
Ephemeroptera (mayflies)	
Baetidae	11
Caenidae	12
Ephemerellidae	22
Ephemeridae	3
Odonata	
Anisoptera (dragonflies)	
Gomphidae	1
Libellulidae	2
Hemiptera (true bugs)	
Corixidae	10
Gerridae	3
Mesoveliidae	2
Megaloptera	
Sialidae (alder flies)	8
Trichoptera (caddisflies)	
Hydroptilidae	38
Lepidostomatidae	1
Leptoceridae	4
Limnephilidae	21
Uenoidae	1
Coleoptera (beetles)	
Gyrinidae (adults)	1
Haliplidae (adults)	1
Elmidae	14
Diptera (flies)	
Ceratopogonidae	1
Chironomidae	52
MOLLUSCA	
Gastropoda (snails)	
Hydrobiidae	10
Physidae	1
Planorbidae	3
Pelecypoda (bivalves)	
Unionidae (mussels)	1
TOTAL INDIVIDUALS	276

Table 2B (cont.). Macroinvertebrate metric evaluation of streams in the Central UP watersheds, 2010.

METRIC	N B Ford River South of Landing Field 6/20/2010 STATION 29 Value	Score
TOTAL NUMBER OF TAXA	28	1
NUMBER OF MAYFLY TAXA	4	0
NUMBER OF CADDISFLY TAXA	5	0
NUMBER OF STONEFLY TAXA	0	-1
PERCENT MAYFLY COMP.	17.39	0
PERCENT CADDISFLY COMP.	23.55	0
PERCENT DOMINANT TAXON	18.84	0
PERCENT ISOPOD, SNAIL, LEECH	5.80	0
PERCENT SURF. AIR BREATHERS	6.16	0
TOTAL SCORE		0
MACROINV. COMMUNITY RATING		ACCEPT.

Table 3. Habitat evaluation for streams in the Central UP watersheds, 2010.

HABITAT METRIC	W B Chocolay River u/s sedi trap off Co Rd 545 RIFFLE/RUN STATION 1	N B Anna River d/s Perch Lake Rd RIFFLE/RUN STATION 2	Cherry Creek 41 crossing GLIDE/POOL STATION 3	E B LeVasser Creek Dalton Rd RIFFLE/RUN STATION 4	Unnamed Coastal Onota Au Train Rd RIFFLE/RUN STATION 5
Substrate and Instream Cover					
Epifaunal Substrate/ Avail Cover (20)	3	19	5	16	15
Embeddedness (20)*	2	17		19	19
Velocity/Depth Regime (20)*	8	15		15	10
Pool Substrate Characterization (20)**			6		
Pool Variability (20)**			2		
Channel Morphology					
Sediment Deposition (20)	4	17	0	15	18
Flow Status - Maint. Flow Volume (10)	9	10	10	10	8
Flow Status - Flashiness (10)	9	10	10	10	9
Channel Alteration (20)	18	20	20	20	20
Frequency of Riffles/Bends (20)*	4	20		19	16
Channel Sinuosity (20)**			8		
Riparian and Bank Structure					
Bank Stability (L) (10)	10	10	10	10	10
Bank Stability (R) (10)	10	10	10	10	10
Vegetative Protection (L) (10)	10	10	10	10	10
Vegetative Protection (R) (10)	10	10	10	10	10
Riparian Veg. Zone Width (L) (10)	10	9	10	10	10
Riparian Veg. Zone Width (R) (10)	9	10	10	9	8
TOTAL SCORE (200):	116	187	121	183	173
HABITAT RATING:	GOOD (SLIGHTLY IMPAIRED)	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:	6/18/2010	6/18/2010	6/28/2010	6/29/2010	6/29/2010
Weather:	Sunny	Sunny	Sunny	Cloudy	Sunny
Air Temperature:	80 Deg. F.	79 Deg. F.	Deg. F.	Deg. F.	Deg. F.
Water Temperature:	65 Deg. F.	62 Deg. F.	53 Deg. F.	56 Deg. F.	54 Deg. F.
Ave. Stream Width:	21 Feet	10.5 Feet	27.5 Feet	8 Feet	6 Feet
Ave. Stream Depth:	1.1 Feet	0.62 Feet	2.5 Feet	0.5 Feet	0.3 Feet
Surface Velocity:	0.6 Ft./Sec.	0.7 Ft./Sec.	1.0 Ft./Sec.	1.0 Ft./Sec.	0.8 Ft./Sec.
Estimated Flow:	13.9 CFS	4.6 CFS	68.8 CFS	4.0 CFS	1.4 CFS
Stream Modifications:	Canopy Removal	None	None	None	None
Nuisance Plants (Y/N):	N	N	N	N	N
Report Number:					
STORET No.:	520420	20134	520313	520505	20162
Stream Name:	W B Chocolay River	N B Anna River	Cherry Creek	E B LeVasser Creek	Unnamed Coastal
Road Crossing/Location:	u/s sedi trap off Co Rd 545	d/s Perch Lake Rd	41 crossing	Dalton Rd	Onota Au Train Rd
County Code:	52	02	52	52	02
TRS:	46N24W22	46N19W17	47N24W08	46N23W16	47N21W36
Latitude (dd):	46.37527	46.38372	46.47882	46.38388	46.43393
Longitude (dd):	-87.28491	-86.71142	-87.3388	-87.19058	-86.88463
Ecoregion:	NLAF	NLAF	NLAF	NLAF	NLAF
Stream Type:	Coldwater	Coldwater	Coldwater	Coldwater	Coldwater
USGS Basin Code:	4020201	4020201	4020201	4020201	4020201

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

COMMENTS:

Table 3 (cont.). Habitat evaluation for streams in the Central UP watersheds, 2010.

HABITAT METRIC	Gongeau Creek Bay Furnace Rd RIFFLE/RUN STATION 6	N B Ford River County Road 581 GLIDE/POOL STATION 7	Forty Seven Mile Creek Mott 46 Ln GLIDE/POOL STATION 8	Devils Creek Co Rd 360 RIFFLE/RUN STATION 9	Big Cedar River Hillside Rd H RIFFLE/RUN STATION 10
Substrate and Instream Cover					
Epifaunal Substrate/ Avail Cover (20)	12	17	20	12	18
Embeddedness (20)*	17			18	20
Velocity/Depth Regime (20)*	15			10	11
Pool Substrate Characterization (20)**		11	20		
Pool Variability (20)**		8	13		
Channel Morphology					
Sediment Deposition (20)	10	17	18	20	20
Flow Status - Maint. Flow Volume (10)	10	10	10	9	9
Flow Status - Flashiness (10)	10	10	10	10	8
Channel Alteration (20)	20	20	20	13	20
Frequency of Riffles/Bends (20)*	18				18
Channel Sinuosity (20)**		12	18		
Riparian and Bank Structure					
Bank Stability (L) (10)	10	10	10	10	10
Bank Stability (R) (10)	10	10	10	10	10
Vegetative Protection (L) (10)	10	10	10	10	10
Vegetative Protection (R) (10)	10	10	10	10	
Riparian Veg. Zone Width (L) (10)	10	10	10	5	10
Riparian Veg. Zone Width (R) (10)	10	10	10	7	4
TOTAL SCORE (200):	172	165	189	144	168
HABITAT RATING:	EXCELLENT (NON-IMPAIRED)	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 Ratin describes the general riverine environment at the site(s)

Date:	6/29/2010	6/17/2010	6/16/2010	6/15/2010	6/15/2010
Weather:	Sunny	Partly Cloudy	Cloudy	Rainy	Rainy
Air Temperature:	Deg. F.	64 Deg. F.	68 Deg. F.	59 Deg. F.	60 Deg. F.
Water Temperature:	61 Deg. F.	62 Deg. F.	55 Deg. F.	63 Deg. F.	60 Deg. F.
Ave. Stream Width:	22.5 Feet	22.5 Feet	31 Feet	14 Feet	60 Feet
Ave. Stream Depth:	1.0 Feet	1.6 Feet	1.7 Feet	1.3 Feet	1.3 Feet
Surface Velocity:	1.5 Ft./Sec.	0.5 Ft./Sec.	0.9 Ft./Sec.	1.5 Ft./Sec.	1.5 Ft./Sec.
Estimated Flow:	33.8 CFS	18.0 CFS	47.4 CFS	27.3 CFS	112.5 CFS
Stream Modifications:	None		None	Canopy Removal	None
Nuisance Plants (Y/N):	N	N	N	N	N
Report Number:					
STORET No.:	20163	220089	550211	550209	550167
Stream Name:	Gongeau Creek	N B Ford River	Forty Seven Mile Creek	Devils Creek	Big Cedar River
Road Crossing/Location:	Bay Furnace Rd	County Road 581	Mott 46 Ln	Co Rd 360	Hillside Rd H
County Code:	02	22	55	55	55
TRS:	47N19W29	43N28W01	39N25W15	36N25W07	38N26W12
Latitude (dd):	46.44063	46.15586	45.78321	45.53097	45.69453
Longitude (dd):	-86.70607	-87.75098	-87.37344	-87.43503	-87.46905
Ecoregion:	NLAF	NLAF	NLAF	NLAF	NLAF
Stream Type:	Coldwater	Coldwater	Warmwater	Warmwater	Coldwater
USGS Basin Code:	4020201	4030109	403109	4030109	4030109

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

COMMENTS:

Table 3 (cont.). Habitat evaluation for streams in the Central UP watersheds, 2010.

HABITAT METRIC	Ford River Cedardale 28th Rd (E2) RIFFLE/RUN STATION 11	Ford River Co Rd 414 (Riverland) RIFFLE/RUN STATION 12	Ford River Ford River Rd RIFFLE/RUN STATION 13	Hay Creek 13th St RIFFLE/RUN STATION 14	Bear Creek Co Rd 565 GLIDE/POOL STATION 15
Substrate and Instream Cover					
Epifaunal Substrate/ Avail Cover (20)	15	14	17	3	12
Embeddedness (20)*	19	20	20		
Velocity/Depth Regime (20)*	14	15	15	7	
Pool Substrate Characterization (20)**					10
Pool Variability (20)**					8
Channel Morphology					
Sediment Deposition (20)	14	20	15	18	14
Flow Status - Maint. Flow Volume (10)	9	9	9	7	10
Flow Status - Flashiness (10)	9	9	10	7	10
Channel Alteration (20)	20	18	20	3	20
Frequency of Riffles/Bends (20)*	17	16	12	13	
Channel Sinuosity (20)**					8
Riparian and Bank Structure					
Bank Stability (L) (10)	9	9	9	9	10
Bank Stability (R) (10)	9	9	9	9	10
Vegetative Protection (L) (10)	9	9	10	2	10
Vegetative Protection (R) (10)	9	9	10	2	10
Riparian Veg. Zone Width (L) (10)	8	8	10	1	10
Riparian Veg. Zone Width (R) (10)	8	6	10	1	10
TOTAL SCORE (200):	169	171	176	82	152
HABITAT RATING:	EXCELLENT (NON-IMPAIRED)	EXCELLENT (NON-IMPAIRED)	EXCELLENT (NON-IMPAIRED)	MARGINAL (MODERATELY IMPAIRED)	GOOD (SLIGHTLY 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:	6/16/2010	6/16/2010	6/16/2010	6/15/2010	6/28/2010
Weather:	Partly Cloudy	Cloudy	Cloudy	Rainy	Cloudy
Air Temperature:	60 Deg. F.	50 Deg. F.	68 Deg. F.	60 Deg. F.	Deg. F.
Water Temperature:	61 Deg. F.	59 Deg. F.	61 Deg. F.	60 Deg. F.	57 Deg. F.
Ave. Stream Width:	58 Feet	85 Feet	74 Feet	5 Feet	15 Feet
Ave. Stream Depth:	1.7 Feet	1.3 Feet	1.6 Feet	0.5 Feet	2.0 Feet
Surface Velocity:	2.5 Ft./Sec.	2.5 Ft./Sec.	1.1 Ft./Sec.	1.0 Ft./Sec.	1.0 Ft./Sec.
Estimated Flow:	246.5 CFS	276.3 CFS	130.2 CFS	2.5 CFS	30.0 CFS
Stream Modifications:	Canopy Removal	Canopy Removal	None	Canopy Removal	None
Nuisance Plants (Y/N):	N	N	N	N	N
Report Number:					
STORET No.:	210316	210315	520496	550210	520500
Stream Name:	Ford River	Ford River	Ford River	Hay Creek	Bear Creek
Road Crossing/Location:	Cedardale 28th Rd (E2)	Co Rd 414 (Riverland)	Ford River Rd	13th St	Co Rd 565
County Code:	21	21	52	55	52
TRS:	41N24W19	39N24W02	42N26W15	32N27W27	45N26W10
Latitude (dd):	45.93127	45.79696	46.02974	45.13466	46.31189
Longitude (dd):	-87.35679	-87.22904	-87.53725	-87.61774	-87.55107
Ecoregion:	NLAF	NLAF	NLAF	NLAF	NLAF
Stream Type:	Warmwater	Warmwater	Warmwater		Coldwater
USGS Basin Code:	403109	4030109	403109	403109	4030110

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

COMMENTS:

Table 3 (cont.). Habitat evaluation for streams in the Central UP watersheds, 2010.

HABITAT METRIC	Big Brook Kates Grade Rd GLIDE/POOL STATION 16	Schwartz Creek Co Rd Coo GLIDE/POOL STATION 17	Ely Creek Cliffs Dr GLIDE/POOL STATION 18	Second River Wolf Lake Rd GLIDE/POOL STATION 19	E B Escanaba River Iron St RIFFLE/RUN STATION 20
Substrate and Instream Cover					
Epifaunal Substrate/ Avail Cover (20)		10	15	10	12
Embeddedness (20)*					16
Velocity/Depth Regime (20)*					13
Pool Substrate Characterization (20)**	15	9	12	16	
Pool Variability (20)**	15	11	6	13	
Channel Morphology					
Sediment Deposition (20)	20	13	17	19	15
Flow Status - Maint. Flow Volume (10)	9	10	10	10	10
Flow Status - Flashiness (10)	9	10	10	10	7
Channel Alteration (20)	19	20	20	20	20
Frequency of Riffles/Bends (20)*					12
Channel Sinuosity (20)**	16	10	8	8	
Riparian and Bank Structure					
Bank Stability (L) (10)	10	10	10	10	8
Bank Stability (R) (10)	10	10	10	10	10
Vegetative Protection (L) (10)	10	10	10	8	10
Vegetative Protection (R) (10)	10	10	10	10	9
Riparian Veg. Zone Width (L) (10)	10	10	4	4	7
Riparian Veg. Zone Width (R) (10)	10	10	4	10	10
TOTAL SCORE (200):	163	153	146	158	159
HABITAT RATING:	EXCELLENT (NON-IMPAIRED)	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 Ratir describes the general riverine environment at the site(s)

Date:	6/17/2010	6/26/2010	6/26/2010	6/27/2010	6/28/2010
Weather:	Partly Cloudy	Partly Cloudy	Cloudy	Cloudy	Cloudy
Air Temperature:	64 Deg. F.	Deg. F.	Deg. F.	Deg. F.	Deg. F.
Water Temperature:	56 Deg. F.	58 Deg. F.	62 Deg. F.	64 Deg. F.	64 Deg. F.
Ave. Stream Width:	22 Feet	8 Feet	8 Feet	8 Feet	45 Feet
Ave. Stream Depth:	2.08 Feet	2 Feet	1 Feet	2.25 Feet	3 Feet
Surface Velocity:	0.9 Ft./Sec.	0.5 Ft./Sec.	0.33 Ft./Sec.	0.5 Ft./Sec.	1 Ft./Sec.
Estimated Flow:	41.184 CFS	8 CFS	2.64 CFS	9 CFS	135 CFS
Stream Modifications:	None	None	None	None	None
Nuisance Plants (Y/N):	N	N	N	N	N
Report Number:					
STORET No.:	520498	220142	520499	520387	520502
Stream Name:	Big Brook	Schwartz Creek	Ely Creek	Second River	E B Escanaba River
Road Crossing/Location:	Kates Grade Rd	Co Rd Coo	Cliffs Dr	Wolf Lake Rd	Iron St
County Code:	52	22	52	52	52
TRS:	44N26W18	44N29W02	47N27W21	48N29W36	45N25W21
Latitude (dd):	46.212	46.24078	46.45882	46.51701	46.28336
Longitude (dd):	-87.61227	-87.89068	-87.68204	-87.87463	-87.4367
Ecoregion:	NLAF	NLAF	NLAF	NLAF	NLAF
Stream Type:	Coldwater	Coldwater	Coldwater	Coldwater	Coldwater
USGS Basin Code:	40301110	4030110	4030110	4030110	40301110

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

COMMENTS:

Table 3 (cont.). Habitat evaluation for streams in the Central UP watersheds, 2010.

HABITAT METRIC	M B Escanaba River US41 GLIDE/POOL STATION 21	W B Escanaba River W B Escanaba cmpgrnd RIFFLE/RUN STATION 22	M B Escanaba River Co Rd Ch RIFFLE/RUN STATION 23	Escanaba River off Escanaba River Rd RIFFLE/RUN STATION 24	Days River d/s of Masonville Crossing RIFFLE/RUN STATION 25
Substrate and Instream Cover					
Epifaunal Substrate/ Avail Cover (20)	11	15	16	16	12
Embeddedness (20)*		13	17	19	20
Velocity/Depth Regime (20)*		15	15	13	11
Pool Substrate Characterization (20)**	13				
Pool Variability (20)**	13				
Channel Morphology					
Sediment Deposition (20)	16	12	16	20	20
Flow Status - Maint. Flow Volume (10)	10	10	10	9	9
Flow Status - Flashiness (10)	10	10	10	9	9
Channel Alteration (20)	20	20	20	20	13
Frequency of Riffles/Bends (20)*		14	15	17	13
Channel Sinuosity (20)**	10				
Riparian and Bank Structure					
Bank Stability (L) (10)	10	9	10	10	10
Bank Stability (R) (10)	10	8	10	10	10
Vegetative Protection (L) (10)	10	10	10	10	8
Vegetative Protection (R) (10)	10	10	10	10	9
Riparian Veg. Zone Width (L) (10)	10	10	9	10	6
Riparian Veg. Zone Width (R) (10)	10	7	10	10	10
TOTAL SCORE (200):	163	163	178	183	160
HABITAT RATING:	EXCELLENT (NON-IMPAIRED)	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 Ratii
describes the general riverine environment at the site(s)

Date:	6/27/2010	6/17/2010	6/26/2010	6/17/2010	6/15/2010
Weather:	Cloudy	Cloudy	Cloudy	Sunny	Cloudy
Air Temperature:	Deg. F.	64 Deg. F.	Deg. F.	64 Deg. F.	60 Deg. F.
Water Temperature:	64 Deg. F.	57 Deg. F.	62 Deg. F.	58 Deg. F.	61 Deg. F.
Ave. Stream Width:	40 Feet	35 Feet	50 Feet	213 Feet	23 Feet
Ave. Stream Depth:	2.5 Feet	2.5 Feet	2.3 Feet	1.5 Feet	0.9 Feet
Surface Velocity:	0.3 Ft./Sec.	1.5 Ft./Sec.	1.8 Ft./Sec.	1.7 Ft./Sec.	1.0 Ft./Sec.
Estimated Flow:	25.0 CFS	131.3 CFS	196.9 CFS	543.0 CFS	20.7 CFS
Stream Modifications:	None	None	None	None	Canopy Removal
Nuisance Plants (Y/N):	N	N	N	N	N
Report Number:					
STORET No.:	520503	220079	520504	520497	210200
Stream Name:	M B Escanaba River	W B Escanaba River	M B Escanaba River	Escanaba River	Days River
Road Crossing/Location:	US41	W B Escanaba cmpgrnd	Co Rd Ch	off Escanaba River Rd	d/s of Masonville Crossing
County Code:	52	22	52	52	21
TRS:	47N28W06	44N28W25	46N28W03	43N25W03	40N22W2/3
Latitude (dd):	46.49291	46.188056	46.42016	46.14574	45.895
Longitude (dd):	-87.86711	-87.7475	-87.79804	-87.42352	-86.99233
Ecoregion:	NLAF	NLAF	NLAF	NLAF	NLAF
Stream Type:	Warmwater	Coldwater	Warmwater	Warmwater	Coldwater
USGS Basin Code:	4030110	4030110	4030110	4030110	4030111

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

COMMENTS:

Table 3 (cont.). Habitat evaluation for streams in the Central UP watersheds, 2010

HABITAT METRIC	Eighteen Mile Creek Forest Hwy 13 GLIDE/POOL STATION 26	Sturgeon River 10-Mile rapids GLIDE/POOL STATION 27	Thompson Creek d/s Thompson State Fish Hatchery RIFFLE/RUN STATION 28	N B Ford River South of Landing Field GLIDE/POOL STATION 29
Substrate and Instream Cover				
Epifaunal Substrate/ Avail Cover (20)	11	17	12	10
Embeddedness (20)*			12	
Velocity/Depth Regime (20)*			14	
Pool Substrate Characterization (20)**	14	18		12
Pool Variability (20)**	14	14		13
Channel Morphology				
Sediment Deposition (20)	18	16	14	20
Flow Status - Maint. Flow Volume (10)	9	9	10	9
Flow Status - Flashiness (10)	9	9	10	9
Channel Alteration (20)	18	20	15	20
Frequency of Riffles/Bends (20)*			17	
Channel Sinuosity (20)**	14	10		14
Riparian and Bank Structure				
Bank Stability (L) (10)	9	7		10
Bank Stability (R) (10)	9	7		10
Vegetative Protection (L) (10)	10	10	10	10
Vegetative Protection (R) (10)	10	10	7	10
Riparian Veg. Zone Width (L) (10)	10	10	10	10
Riparian Veg. Zone Width (R) (10)	10	10	5	10
TOTAL SCORE (200):	165	167	136	167
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:	6/18/2010	6/18/2010	6/18/2010	6/20/2010
Weather:	Sunny	Sunny	Sunny	Sunny
Air Temperature:	78 Deg. F.	74 Deg. F.	71 Deg. F.	78 Deg. F.
Water Temperature:	67 Deg. F.	65 Deg. F.	56 Deg. F.	64 Deg. F.
Ave. Stream Width:	15 Feet	57 Feet	15 Feet	19 Feet
Ave. Stream Depth:	1.5 Feet	1.9 Feet	0.8 Feet	1.1 Feet
Surface Velocity:	0.6 Ft./Sec.	0.8 Ft./Sec.	0.9 Ft./Sec.	0.2 Ft./Sec.
Estimated Flow:	13.5 CFS	81.2 CFS	10.8 CFS	4.8 CFS
Stream Modifications:	None	None	Canopy Removal	None
Nuisance Plants (Y/N):	N	N	N	N
Report Number:				
STORET No.:	210317	210218	770074	220085
Stream Name:	Eighteen Mile Creek	Sturgeon River	Thompson Creek	N B Ford River
Road Crossing/Location:	Forest Hwy 13	10-Mile rapids	d/s Thompson State Fish Hatchery	South of Landing Field
County Code:	21	21	77	22
TRS:	42N19W22	41N19W17	41N16W29	43N28W7
Latitude (dd):	46.01797	45.94998	45.91193	46.133
Longitude (dd):	-86.67072	-86.70557	-86.3356	-87.86167
Ecoregion:	NLAF	NLAF	NLAF	NLAF
Stream Type:	Coldwater	Coldwater	Coldwater	Coldwater
USGS Basin Code:	4030112	4030112	4030112	4030109

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

COMMENTS: