

# Macroinvertebrate and Stream Habitat Surveys Central Upper Peninsula Watersheds, Michigan

July-September 2020 and September 2022

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## INTRODUCTION

Michigan has over 76,000 miles of rivers and streams. Understanding the quality of those waters is an important part of the Michigan Department of Environment, Great Lakes, and Energy’s (EGLE) mission to protect Michigan’s environment and public health by managing air, water, land, and energy resources. All of Michigan’s watersheds are surveyed once every five years. As part of that effort, the central Upper Peninsula watersheds were sampled in 2020 and 2022; this report includes the information collected as part of that survey.

Water quality can be measured different ways including sampling macroinvertebrate and fish communities and collecting water or sediment samples. EGLE biologists sample macroinvertebrates and fish living in our rivers and streams because some are more sensitive to pollution than others. In general, macroinvertebrate and fish communities in healthy streams include those sensitive to pollution.

Looking at the quality of the physical habitat is helpful in understanding what may be limiting the kinds of life in a stream. Habitat includes the wood, rocks, gravel, silt, and sand in the stream or river and the vegetation in the water and along the shore. Typically, a range of habitats provides for diverse types of macroinvertebrates and fish.

Sometimes water or sediment samples are collected as indicators of potential pollution. Chemicals analyzed from these samples can be compared to levels expected and determined to be safe and helps to provide additional clues to possible water quality problems. Michigan has developed [Water Quality Standards](#) (WQS) to help with this comparison process; the WQS are Rules that tell us the levels of various pollutants and other water quality conditions necessary for our rivers, streams, wetlands, and lakes to function properly.

All surface waters in Michigan are protected for “designated uses” such as swimming and wading, warmwater fish communities, eating fish, aquatic life, and wildlife. All rivers, streams, lakes, ponds, drains, creeks, and the Great Lakes must be clean enough and meet WQS to support these uses. Most of the central Upper Peninsula watersheds are also protected for coldwater fish since many streams are cold enough for trout and salmon. These streams are designated on the online [Watershed Monitoring Story Map](#). All sites surveyed are used to assess the ability to support designated uses through the [Integrated Report process](#).

## **WATERSHED INFORMATION**

A [watershed](#) is all the land that drains to a lake or stream. The central Upper Peninsula watersheds monitored in 2020 are located in the central section of Michigan’s Upper Peninsula (Figure 1). This extensive area drains parts of five Michigan counties. The central Upper Peninsula 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 central Upper Peninsula watersheds.

## **LAND USE**

Land use in a watershed is important to water quality. Here is an [example of a publication](#) that can be found online to explain the connection between land use and water quality. The central Upper Peninsula watersheds are located in the Northern Lakes and Forest Ecoregion (Omernik 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 central Upper Peninsula watersheds support coldwater fish communities. 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.

## **HISTORIC SAMPLING EFFORTS**

Table 1 is a summary of the reports available from the last two decades. For more information about older reports and results or for any other questions about this watershed,

please contact the watershed biologist by finding their contact information on the [Watershed Monitoring Story Map](#).

**Table 1. Historical EGLE biosurvey reports available for the Central Upper Peninsula watershed.**

Survey Year	Report Citation Report Number	Finding/Comments
2015	Parker, A. and J. Varrichione, 2017 #MI/DEQ/WRD-17/006	<ul style="list-style-type: none"> <li>Macroinvertebrate community samples collected at 32 wadeable stations throughout central Upper Peninsula with ratings of poor to excellent.</li> <li>Habitat ratings ranged from marginal to excellent.</li> </ul>
2010	Taft, W., 2011 # MI/DEQ/WRD-11/032	<ul style="list-style-type: none"> <li>Macroinvertebrate community samples collected at 29 wadeable stations throughout central Upper Peninsula with ratings of acceptable to excellent.</li> <li>Habitat ratings ranged from marginal to excellent.</li> </ul>
2005	Edly, K., 2012 #MI/DEQ/WRD-12/017	<ul style="list-style-type: none"> <li>Macroinvertebrate community samples collected at 31 stations in Au Train-Chocolay watershed with ratings of excellent or acceptable.</li> <li>Habitat ratings ranged from marginal to excellent.</li> <li>Water chemistry data including metals and nutrients was collected at 14 stations and WQS were met at all stations.</li> </ul>
2005	Kohlhepp, G., 2007 #MI/DEQ/WB-07/087	<ul style="list-style-type: none"> <li>Macroinvertebrate community samples collected at 21 stations throughout central Upper Peninsula with ratings of poor to excellent.</li> <li>Habitat ratings ranged from marginal to excellent.</li> <li>Selenium concentration in Warner Creek exceeded WQS.</li> </ul>
2005	Cooper, J., 2006 # MI/DEQ/MI-06/063	<ul style="list-style-type: none"> <li>Macroinvertebrate community samples collected at 13 stations in the Days, Rapid, Tacoosh, and Whitefish watersheds with ratings of acceptable to excellent.</li> <li>Habitat ratings ranged from good to excellent.</li> <li>No exceedances of WQS were found.</li> </ul>
2005	Edly, K. 2008 # MI/DEQ/WB-08/028	<ul style="list-style-type: none"> <li>Macroinvertebrate community samples collected at 11 stations in the Fishdam-Sturgeon watershed with ratings of acceptable to excellent.</li> <li>Habitat ratings ranged from good to excellent.</li> <li>No exceedances of WQS were found.</li> </ul>
2000	Rippke, M., 2005a #MI/DEQ/WB-05/038	<ul style="list-style-type: none"> <li>Macroinvertebrate community samples collected at 12 stations in the Big Cedar, Bark, and Ford watersheds with ratings of acceptable to excellent.</li> <li>Habitat ratings ranged from fair to excellent.</li> <li>No exceedances of WQS were found.</li> </ul>

Survey Year	Report Citation Report Number	Finding/Comments
2000	Rippke, M., 2005b #MI/DEQ/WB-05/051	<ul style="list-style-type: none"> <li>• Macroinvertebrate community samples collected at 21 stations in the Au Train-Chocolay watershed with ratings of poor to excellent.</li> <li>• Habitat ratings ranged from poor to excellent.</li> <li>• No exceedances of WQS were found.</li> </ul>
2000	Godby, N. 2002 # MI/DEQ/SWQ-01/010	<ul style="list-style-type: none"> <li>• Macroinvertebrate community samples collected at 11 stations in the Escanaba watershed with ratings of acceptable to excellent.</li> <li>• Habitat ratings ranged from fair to excellent.</li> <li>• No exceedances of WQS were found at 17 sites.</li> </ul>

**Sampling Goals:**

1. Assess the current condition of individual rivers, streams, and lakes and determine whether Michigan WQS and Designated Uses are being met.
2. Evaluate water quality trends across the state and over time.
3. Satisfy targeted monitoring requests.
4. Identify [nonpoint sources](#) of water quality pollution.

**SITE SELECTION/METHODS**

In July and September 2020, 19 sites were sampled in the central Upper Peninsula watersheds. In September 2022, three sites were sampled in the Middle Branch Escanaba River.

[Procedure 51: Qualitative Biological and Habitat Survey Protocols for Wadeable Streams and Rivers](#) was used to collect habitat, fish community, and macroinvertebrate community information.

Three types of site-selection methods were used in the Central Upper Peninsula watersheds in 2020 and 2022. These include:

- (1) Status sites: Randomly selected across Michigan so statewide water quality summaries can be made. The random selection resulted in 11 sites from the central Upper Peninsula watersheds to support the statewide condition portion of the Surface Water Assessment Section (SWAS) Status and Trend Program (Michigan Department of Environmental Quality [MDEQ], 2015).
- (2) Trend sites: Eight sites, originally selected from a random group, became trend sites that are sampled every five years. These sites will be used for a separate statewide trend report following analysis of 2006-2020 data.
- (3) Targeted sites: Three targeted sites were selected because sampling was requested through our [targeted monitoring request process](#). More information can be found on EGLE-WRD [Biological Assessment Web page](#).

Procedure 51 is used in streams and rivers that can be safely waded (MDEQ, 2014 and Creal et al., 1996). This procedure evaluates macroinvertebrate communities based on several characteristics and combines all results into a one-number score that ranges from +9 to -9 (Table 2). Using the [Procedure 51](#) score the macroinvertebrate community is rated as Excellent, Acceptable, or Poor. Habitat is rated as Excellent, Good, Marginal, or Poor based on measures that describe the habitat in the stream and along the banks of the stream.

**Table 2. EGLE Procedure 51 macroinvertebrate and habitat scoring and rating system.**

Macroinvertebrate Score	Macroinvertebrate Rating	Habitat Score	Habitat Rating
5 to 9	Excellent	> 154	Excellent
-4 to 4	Acceptable	105 to 154	Good
-5 to -9	Poor	56 to 104	Marginal
		<56	Poor

Macroinvertebrate community scores are one component used to evaluate the aquatic life and wildlife designated use. Habitat scores are used to help better understand what might influence the fish and macroinvertebrate scores. More information on the metrics and scoring can be found in the [Procedure 51 Scoring Document](#).

## **MONITORING FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS**

**Goal 1: Determine the condition of individual waters of the state and if Michigan WQS are being met.**

All sampled stations had macroinvertebrate community ratings that were acceptable or excellent (Tables 4 and 6, Figure 1). Therefore, the other indigenous aquatic life and wildlife designated use was being supported at all stations. The fish communities at three stations in the Middle Branch Escanaba River scored poor. Those stations are not attaining their coldwater fishery designation.

### **Ford River**

The Ford River, which is a fourth order stream in Delta County, was sampled at two status sites. Wetland and forest are the predominant land types in the watershed upstream of both sites.

At I Road, both the macroinvertebrate community and habitat rated excellent (scores of 6 [Table 10] and 175 [Table 17], respectively). Thirty-five different taxa were collected, of which, 17 were in the orders Ephemeroptera, Plecoptera, and Trichoptera (EPT). The

substrate was approximately 90 percent (%) bedrock. Large woody debris and macrophytes were sparsely available as habitat and all other habitat types such as undercut banks and rootwads were absent. Staff who sampled this site noted that the current was swift and the sampled reach was about 90% riffle habitat. No evidence of flashy flow conditions were noted. The immediate riparian area was diminished by residential lots.

At 18<sup>th</sup> Road, in Delta County, the macroinvertebrate community and habitat rated excellent (scores of 6 [Table 10] and 191 [Table 17], respectively; Table 4). Forty different taxa were collected, of which, 17 were EPT. Cobble and gravel made up about 75% of the substrate. All other habitat types such as large woody debris, undercut banks, and rootwads were only sparsely available. Parts of the immediate riparian area are diminished by residential lots. Stream bank vegetation was intact, and no evidence of flashiness was noted.

### **Bark River**

The Bark River watershed is in Menominee and Delta Counties with predominant land use consisting of wetlands and agriculture. Biosurveys were performed at three different sites in the Bark River.

At E 5 Lane the Bark River is a third order stream. The macroinvertebrate community and habitat rated excellent (scores of 6 [Table 10] and 188 [Table 17], respectively; Table 4). Forty-three different taxa were collected, of which, 19 were EPT. The substrate was an even mixture of cobble, gravel, and sand. Overhanging vegetation was moderately available as habitat; however, all other habitat types such as large woody debris and undercut banks were only sparsely available. The cobble and gravel at this site likely provided most of the available habitat. Large trees are present immediately along the stream, which provide good canopy cover. However, the riparian area is diminished by agricultural land on both sides of the stream. The stream banks were intact with minimal evidence of flashy flow conditions.

At D Road, Bark River is a second-order stream. The macroinvertebrate community rated acceptable and habitat rated excellent (scores of 1 [Table 11] and 169 [Table 18], respectively; Table 4). This site has been sampled several times before, starting in 1990, with similar scores to 2020 (Table 3). Twenty-seven different taxa were collected, 13 of which were Ephemeroptera or Trichoptera. Amphipoda was the dominant taxa. Approximately half of the substrate was silt, followed by ~25% sand and ~20% gravel. Aquatic macrophytes and overhanging vegetation were heavily available as habitat. Other habitat types such as large woody debris and undercut banks were only sparsely available. Large trees are present along the stream banks, which provide good canopy cover. However, the riparian area is diminished by agricultural and residential lots. The stream bank was intact and did not show evidence of flashy flow conditions.

**Table 3. Past biosurvey scores for Bark River at D Road compared to 2020 scores.**

Year	1990	2000	2005	2020
Report	Taft (1991)	Rippke (2005)	Taft (2006)	This report
Macroinvertebrate rating (score)	Fair*	Acceptable*	Acceptable (2)	Acceptable (1)
Habitat rating (score)	Fair*	Fair*	Excellent (158)	Excellent (169)

\*Different scoring methodology used.

At 9<sup>th</sup> Road the Bark River is a third-order stream. The macroinvertebrate community rated acceptable, and habitat rated excellent (scores of 3 [Table 10] and 166 Table 17], respectively; Table 4). Thirty-eight different taxa were collected, 12 of which were Ephemeroptera or Trichoptera. The substrate was ~95% silt and heavy organic matter deposits were also noted. Overhanging vegetation was heavily available as habitat and undercut banks and rootwads were moderately available. The riparian area appears to be mostly wetland with minimal evidence of stream flashiness.

### **Bryan Creek**

Bryan Creek was sampled at Charlie Lakes Road where it is a third-order stream. The upstream land use is mostly forest and wetland. Google Earth images show logging around Bryan Creek over the last three decades. The macroinvertebrate community and habitat both rated excellent (scores of 6 [Table 11] and 167 [Table 18], respectively; Table 4). Thirty-one different taxa were collected, of which 13 were EPT. The substrate was estimated to be ~90% sand and the remaining substrate silt. Overhanging vegetation was heavily available as habitat and large woody debris, undercut banks, and rootwads were moderately available. The riparian area consisted of intact forest with no evidence of flashy flow conditions.

### **Chander Brook**

Chander Brook was sampled at County Road 438 where it is a third-order stream. The upstream land use is mostly forest and wetland. The macroinvertebrate community and habitat both rated excellent (scores of 6 [Table 11] and 182 [Table 18], respectively; Table 4). Thirty-eight different taxa were collected, of which 19 were EPT. Undercut banks and overhanging vegetation were heavily available as habitat and rootwads were moderately available. The substrate was ~60% sand, but small amounts of bedrock, boulders, and cobble were also present. The riparian area consists of intact forest and wetland with no evidence of flashy flow conditions.

### Dexter Creek

Dexter Creek was sampled at M 67 where it is a third-order stream. The upstream land use is mostly forest and wetland. The macroinvertebrate community and habitat both rated excellent (scores of 6 [Table 11] and 193 [Table 18], respectively; Table 4). Thirty-four different taxa were collected, of which 13 were EPT. The substrate was ~50% cobble followed by ~20% bedrock and ~15% gravel. Overhanging vegetation was moderately available; however, other habitat types such as large woody debris and undercut banks were sparsely available. The riparian area consists of intact forest and wetland with no evidence of flashy flow conditions.

### West Branch Whitefish River

West Branch Whitefish River was sampled at Lawson Road where it is a third-order stream. The upstream land use is mostly forest and wetland. The habitat rated good and the macroinvertebrate community rated acceptable (Scores of 147 [Table 18] and 3 [Table 12], respectively; Table 4). Twenty-six different taxa were collected, of which only seven were Ephemeroptera and Trichoptera. Amphipoda and Chironomidae were the dominant taxa. The sediment consisted of ~70% silt with the remaining sediment consisting of sand. Heavy organic matter deposits were also noted. Rootwads and overhanging vegetation were moderately available; however, other habitat types such as large woody debris and undercut banks were only sparsely available or absent. The landscape at this site was a low gradient and flow was slow (average velocity 0.4 feet/second), which may explain the heavy silt and organic matter accumulation. This site was near a road intersection, which diminished the riparian area. There was no evidence of flashy flow conditions.

### Days River

Days River was sampled at Saint Nicholas/31st Road where it is a third-order stream. Forest and wetland make up the majority of the land use in the watershed. The habitat rated excellent and the macroinvertebrate community rated acceptable (Scores of 173 [Table 18] and 2 [Table 12], respectively; Table 4). Twenty-seven different taxa were collected, of which only eight were Ephemeroptera and Trichoptera. Only 130 individual organisms were collected in total. However, over ten fat mucket (*Lampsilis siliquoidea*) mussels were observed by field staff in the stream. The substrate contained an even amount of bedrock, cobble, and gravel (~15%) and ~5% boulders. However, sand made up approximately 40% of the substrate and silt ~10%. Aquatic macrophytes were absent; however, all other habitat types such as large woody debris and undercut banks were moderately available. Some evidence of stream flashiness was observed.

## Southwest Branch Fishdam River

The Southwest Branch Fishdam River was sampled at KK Road, within the Hiawatha National Forest, where it is a second-order stream. The watershed upstream of KK Road is ~90% undeveloped. The habitat rated excellent, and the macroinvertebrate community rated acceptable (Scores of 171 [Table 12] and 3 [Table 19], respectively; Table 4). Twenty-nine different taxa were collected, of which 12 were Ephemeroptera and Trichoptera. Chironomidae was the dominant taxa. The substrate was ~90% sand with the remaining sediment consisting of silt. Large woody debris was moderately available as habitat; however, all other habitat types such as undercut banks and rootwads were only sparsely available. The riparian area consists of intact forest and heavy canopy cover is present over the stream.

**Goal 2: Evaluate water quality trends across the state and over time.**

### Trend Sites

#### Eighteen Mile Creek

Eighteen Mile Creek was sampled downstream of Forest Highway 13, within the Hiawatha National Forest, where it is a third-order stream. The watershed above this site is over 90% undeveloped. Both the habitat and macroinvertebrate community rated excellent (Scores of 167 [Table 19] and 7 [Table 12], respectively; Table 4). Thirty-seven different taxa were collected, 15 of which were EPT. Undercut banks, overhanging vegetation, and rootwads were moderately available but large woody debris and aquatic macrophytes were sparse. The substrate was estimated to be ~70% sand with the remaining substrate being silt. The riparian area consists of intact forest, which provides good canopy cover. The habitat scores at this site have remained consistent since 2010 and macroinvertebrate community scores have increased (Table 5).

#### Bear Creek

Bear Creek was sampled at County Road 565 where it is a third-order stream. The watershed above this site is over 95% undeveloped. The habitat scored good and the macroinvertebrate community scored acceptable (Scores of 153 [Table 19] and 0 [Table 13], respectively; Table 4). Twenty-eight different taxa were collected, of which nine were EPT. Isopoda and Simuliidae were the dominant taxa. Overhanging vegetation, aquatic macrophytes, and rootwads were moderately available but large woody debris and undercut banks were sparse. The substrate was mostly sand (~50%) and silt (~40%). This is a slow-flowing section of Bear Creek (measured velocity at sampling: 1.2 feet/second) with mostly wetland riparian

area, which may explain why EPT taxa are not more abundant. Both habitat and macroinvertebrate scores have remained consistent at this site since 2010 (Table 5).

### **West Branch Chocolay River**

West Branch Chocolay River was sampled about 400 feet upstream of County Road 545, where it is a fourth-order stream. The upstream watershed is mostly forest and wetland. The habitat scored excellent, and the macroinvertebrate community scored acceptable (Scores of 167 [Table 19] and 3 [Table 13], respectively; Table 4). Twenty-six different taxa were collected, of which half were EPT; however, Chironomidae made up 67% of the individuals. Sand made up the majority of the substrate (~60%) but some gravel (~25) and coble (~5%) were present. Aquatic macrophytes were sparse; however, all other habitat types such as large woody debris and undercut banks were moderately available. The immediate riparian area consisted of intact forest and there was no evidence of stream flashiness.

Several sediment traps have been placed in different parts of the Chocolay River system in an attempt to reduce sedimentation to rock and gravel habitat. In 2015 the West Branch Chocolay River was sampled immediately upstream of County Road 545 and within the sand trap because of an erroneous field note. In 2020 the site was sampled in the correct location, upstream of the sand trap. Therefore, the habitat scores in Table 5 are not comparable. Interestingly, macroinvertebrate community scores have been consistent, despite very different habitat being sampled in 2015 (Table 5). In 2015 similar numbers of taxa and EPT were collected and Chironomidae were the dominant family present (Parker and Varricchione, 2017). Extensive sampling of Michigan rivers that have had sand traps installed have found that the traps have no significant effects on geomorphological features in the rivers (Zorn and Wills, 2012; Hessianauer et al., 2019).

### **East Branch Escanaba River**

East Branch Escanaba River was sampled upstream of Iron Street, at Farquar-Metsa Tourist Park, where it is a fourth-order stream. The upstream watershed is mostly forested; however, large iron mining operations make up over 10% of it. The habitat scored excellent, and the macroinvertebrate community scored acceptable (Scores of 155 [Table 19] and 0 [Table 13], respectively; Table 4). Thirty-one different taxa were collected, of which ten were EPT. Gastropods and surface breathing invertebrates also made up a large percentage of the invertebrates found (17% and 21%, respectively). The substrate was mostly sand (~65%) with some gravel and cobble (~25% and 5%, respectively). Rootwads were moderately available as habitat, but all other habitat types such as large woody debris and undercut banks were sparse. The immediate riparian area is mostly forested; however, it is diminished

by the park and campground. Some evidence of stream flashiness was present. The habitat scores have remained consistent. The latest macroinvertebrate community score was lower than in previous years (Table 5).

### **Fortyseven Mile Creek**

Fortyseven Mile Creek was sampled at Mott Lane, where it is a second-order stream. The upstream watershed consists of mostly forest and wetland. Both habitat and the macroinvertebrate community scored excellent (Scores of 182 [Table 20] and 6 [Table 13], respectively; Table 4). Forty different taxa were collected, of which 18 were EPT. Large woody debris was moderately available as habitat, but other habitat types such as undercut banks and rootwads were only sparsely available. Silt made up about half of the substrate and heavy deposits of organic matter and detritus were present. The section of stream sampled was very sinuous with deep pools, runs, and riffles. Gravel, cobble, and some boulders were also present. The riparian area is intact forest and no evidence of stream flashiness was observed. In 2010 the macroinvertebrate community at this site scored acceptable (3), then excellent (6) in 2015. Habitat has scored excellent the last three cycles (Table 5).

### **Ford River**

The Ford River was sampled at 28<sup>th</sup>/Cedardale Road, where it is a fourth-order stream. Both the macroinvertebrate community and habitat scored excellent (6 [Table 14] and 187 [Table 20], respectively). The watershed upstream of this site is mostly forest and wetland. Thirty-six different taxa were collected, 15 of which were EPT. All habitat types such as large woody debris and undercut banks were only sparsely available. The substrate consisted of a combination of bedrock, boulders, cobble, and gravel, which likely provided most of the macroinvertebrate habitat. The riparian area is mostly forested, although residential lots diminish some areas. The macroinvertebrate community scored acceptable (3) in 2010 and has scored excellent the last two cycles. Habitat has scored excellent the last three cycles (Table 5).

### **Escanaba River**

The Escanaba River was sampled off Little West Road, where it is a fifth-order river. Forest and wetland make up the majority of the watershed upstream of this site. Both the macroinvertebrate community and habitat scored excellent (5 [Table 14] and 184 [Table 20], respectively). Thirty-three different taxa were collected, of which 16 were EPT. Large woody debris and undercut banks were absent and other habitat types such as aquatic macrophytes

and rootwads were only sparsely available. The substrate was mostly a combination of bedrock, boulders, cobble, and gravel, which likely made up for the lack of other habitat. The riparian area consists of intact forest and no evidence of flashiness was apparent. A two-track entering both sides of the river appears to still be in use, which likely causes localized erosion. Both habitat and macroinvertebrate communities have scored excellent the last three cycles (Table 5).

### **Middle Branch Escanaba River**

The Middle Branch Escanaba River was sampled at US 41 where it is a third-order stream. The watershed upstream of this site is mostly forest and wetland. The macroinvertebrate community scored acceptable (3; Table 14) and habitat scored excellent (160; Table 20). Thirty-six different taxa were collected, 12 of which were EPT. Overhanging vegetation, rootwads, and aquatic macrophytes were moderately available. Large woody debris and undercut banks were sparse. The sediment was mostly sand and silt (approximately 50% and 25%, respectively) with gravel and some cobble making up the remaining substrate. This site has a United States Geological Survey (USGS) gage located at it. Besides discharge, this gage collects continuous specific conductance, pH, temperature, and dissolved oxygen data. The discharge and specific conductance data show that this section of river has an inverse relationship between discharge and specific conductance indicating that it is primarily run-off fed. Based on Baker's (2006) classification criteria, this section of river would be classified as a cool-water stream with high temperature variability. The surrounding riparian area is mostly forested with some residential lots. There was no evidence of flashiness. Previous macroinvertebrate community scores in 2010 and 2015 were low acceptable (-1; Table 5). Habitat scores have remained consistent the last three cycles (Table 5).

**Table 4. Procedure 51 sampling results for stations sampled in the central Upper Peninsula watersheds, 2019. Unless otherwise noted, stations are sampled upstream of road crossings.**

Station	Stream Name	Road Crossing	STORET	Latitude	Longitude	Date 2020	Habitat Rating	Habitat Score <sup>1</sup>	Bug Rating	Bug Score <sup>2</sup>	Station Type <sup>3</sup>
1	Ford River	I Road	210330	45.75522	-87.20262	9/27	Excellent	175	Excellent	6	S
2	Ford River	18th Road	210331	45.79689	-87.22884	9/27	Excellent	191	Excellent	6	S
3	Bark River	E 5 Lane	210332	45.65071	-87.27526	9/18	Excellent	188	Excellent	6	S
4	Bark River	D Road	210190	45.75456	-87.30535	9/17	Excellent	169	Acceptable	1	S
5	Bark River	9th Road	210194	45.66665686	-87.28942	9/27	Excellent	166	Acceptable	3	S
6	Bryan Creek	Charlie Lakes Road	520571	46.25691	-87.66834	7/28	Excellent	167	Excellent	6	S
7	Chander Brook	Country Road 438	520573	46.18735042	-87.53202	9/27	Excellent	183	Excellent	6	S
8	Dexter Creek	M67	020005	46.22017	-86.92822	9/26	Excellent	193	Excellent	6	S
9	West Branch Whitefish River	Lawson Road	520572	46.34662	-87.13706	7/29	Good	147	Acceptable	3	S
10	Days River	Saint Nicholas 31st Road	210333	45.98541312	-87.14057	7/30	Excellent	173	Acceptable	2	S
11	Southwest Branch	KK Road	210334	45.97264	-86.62095	7/31	Excellent	171	Acceptable	3	S

<sup>1</sup> **Habitat Scoring** Poor < 56, Marginal 56-104, Good 105-154, Excellent >154

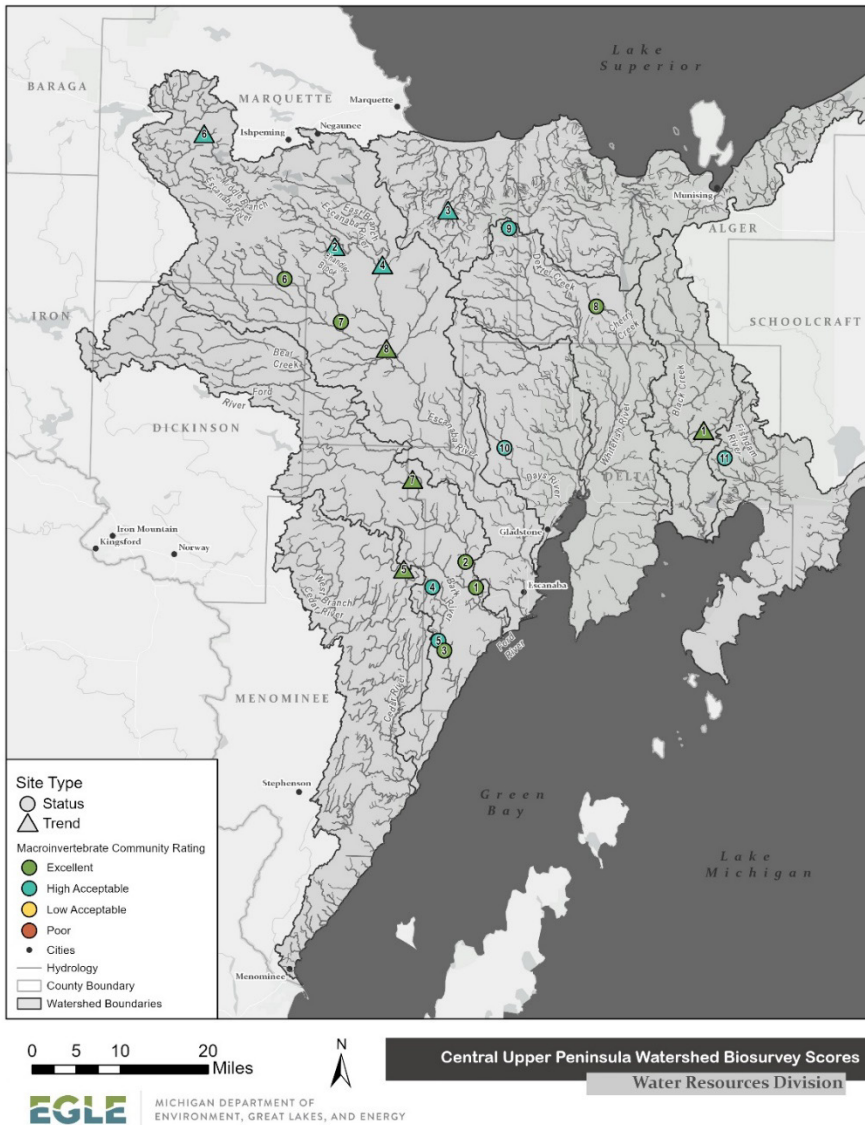
<sup>2</sup> **Macroinvertebrate Scoring** Poor -9 to -5, Acceptable -4 to 4, Excellent 5-9

<sup>3</sup> **Tr=Trend, T= Targeted, S= Status**

**Central Upper Peninsula Watersheds  
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Station	Stream Name	Road Crossing	STORET	Latitude	Longitude	Date 2020	Habitat Rating	Habitat Score <sup>1</sup>	Bug Rating	Bug Score <sup>2</sup>	Station Type <sup>3</sup>
	Fishdam River										
12	Eighteen Mile Creek	D/S Forest Highway 13	210317	46.01797	-86.67072	7/31	Excellent	167	Excellent	7	Tr
13	Bear Creek	CR 565	520500	46.31119	-87.55064	7/27	Good	153	Acceptable	0	Tr
14	West Branch Chocolay River	CR 545 (West Branch Road)	520420	46.37528	-87.28304	7/29	Excellent	167	Acceptable	3	Tr
15	East Branch Escanaba River	Iron Street	520502	46.28336	-87.4367	7/28	Excellent	155	Acceptable	0	Tr
16	Fortyseven Mile Creek	Mott 46 Lane/ Mott LN	550211	45.78321	-87.37353	9/17	Excellent	182	Excellent	6	Tr
17	Ford River	Cedardale 28th Road	210316	45.93132	-87.35665	9/26	Excellent	187	Excellent	6	Tr
18	Escanaba River	two-track off Little West Rd/CR SW	520497	46.14574	-87.42352	9/26	Excellent	184	Excellent	5	Tr
19	Middle Branch Escanaba River	US 41	520503	46.49291	-87.86711	7/27	Excellent	160	Acceptable	3	Tr

**Figure 1. Macroinvertebrate ratings for stations sampled in the central Upper Peninsula watersheds, July-September 2020.**



**Central Upper Peninsula Watersheds  
Macroinvertebrate and Stream Habitat Surveys: July-September 2020**

**Table 5. Procedure 51 sampling results for trend stations sampled in the central Upper Peninsula watersheds compared to previous years.**

<b>Water Body</b>	<b>Eighteen Mile Creek</b>			
Year		2010	2015	2020
Report		Taft (2011)	Parker and Varrichione (2017)	This report
Macroinvertebrate rating (score)		Acceptable (2)	Acceptable (4)	Excellent (7)
Habitat rating (score)		Excellent (165)	Excellent (171)	Excellent (167)
<b>Water Body</b>	<b>Bear Creek</b>			
Year		2010	2015	2020
Report		Taft (2011)	Parker and Varrichione (2017)	This report
Macroinvertebrate rating (score)		Acceptable (1)	Acceptable (0)	Acceptable (0)
Habitat rating (score)		Good (152)	Excellent (161)	Good (153)
<b>Water Body</b>	<b>West Branch Chocolay River</b>			
Year	2005	2010	2015	2020
Report	Edly (2012)	Taft (2011)	Parker and Varrichione (2017)	This report
Macroinvertebrate rating (score)	Acceptable*	Acceptable (3)	Acceptable (3)	Acceptable (3)
Habitat rating (score)	Good (149)	Good (116)	Good (112)	Excellent (167)
<b>Water Body</b>	<b>East Branch Escanaba River</b>			
Year		2010	2015	2020
Report		Taft (2011)	Parker and Varrichione (2017)	This report
Macroinvertebrate rating (score)		Acceptable (4)	Acceptable (4)	Acceptable (0)
Habitat rating (score)		Excellent (159)	Excellent (162)	Excellent (155)

\*Different scoring methodology used.

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<b>Water Body</b>	<b>Fortyseven Mile Creek</b>		
Year	2010	2015	2020
Report	Taft (2011)	Parker and Varrichione (2017)	This report
Macroinvertebrate rating (score)	Acceptable (3)	Excellent (6)	Excellent (6)
Habitat rating (score)	Excellent (189)	Excellent (168)	Excellent (182)
<b>Water Body</b>	<b>Middle Branch Escanaba River</b>		
Year	2010	2015	2020
Report	Taft (2011)	Parker and Varrichione (2017)	This report
Macroinvertebrate rating (score)	Acceptable (-1)	Acceptable (-1)	Acceptable (3)
Habitat rating (score)	Excellent (163)	Excellent (159)	Excellent (160)
<b>Water Body</b>	<b>Ford River</b>		
Year	2010	2015	2020
Report	Taft (2011)	Parker and Varrichione (2017)	This report
Macroinvertebrate rating (score)	Acceptable (3)	Excellent (6)	Excellent (6)
Habitat rating (score)	Excellent (169)	Excellent (158)	Excellent (187)
<b>Water Body</b>	<b>Escanaba River</b>		
Year	2010	2015	2020
Report	Taft (2011)	Parker and Varrichione (2017)	This report
Macroinvertebrate rating (score)	Excellent (6)	Excellent (5)	Excellent (5)
Habitat rating (score)	Excellent (183)	Excellent (171)	Excellent (184)

**Goal 3: Satisfy targeted monitoring requests.**

In 2022 a targeted monitoring request was submitted to monitor the Middle Branch Escanaba River upstream and downstream of the Humboldt Mill facility. Fish and macroinvertebrate biosurveys were performed at a snowmobile trail about 0.5 river miles below the Humboldt Mill discharge, at County Road FX, about 0.1 river miles upstream of the discharge and at a snowmobile trail about four river miles upstream of the discharge (Table 6). The Humboldt Mill discharge is located a little over one river mile from US 41, which is coincidentally a trend site that has been sampled for macroinvertebrates since 2010 (Tables 4 and 5).

The Middle Branch Escanaba River is a third-order stream with land use that is primarily forest and wetland at all three of the abovementioned sites. Based on USGS gauge data, the trend site at US 41 is mostly run-off fed and is considered to be a cool-water river with high temperature variation. Most (75%) of the streams in the Upper Peninsula are primarily run-off fed (Baker, 2006).

The sites at the snowmobile trails upstream and downstream of the Humboldt Mill discharge have had fish and macroinvertebrate Procedure 51 biosurveys performed since 2014 by Advanced Ecological Management (AEM) as part of the Mill's permit requirements (AEM, 2014; 2017; 2018; 2019; 2020; 2021; 2022). No biosurveys had been performed at County Road FX prior to 2022 to our knowledge.

At County Road FX, the macroinvertebrate community scored acceptable (1; Table 15), the fish community is not attaining its coldwater fishery designated use because less than 50 fish were collected after 45 minutes of electrofishing effort and no Salmonids were collected (Table 16), and habitat scored good (150; Table 21). Twenty-nine different macroinvertebrate taxa were collected, of which 11 were Ephemeroptera and Trichoptera. Simuliidae were the dominant taxa, which can be indicative of moderate organic matter and/or nutrient inputs (Voshell 2002). Moderate amounts of both coarse and fine particulate organic matter were observed at this site. Only 12 individual fish, representing seven species, were collected. A small beaver dam was located at the upstream extent of the survey. Half (6) of the total fish that were collected came out of the plunge pool below the dam. Water chemistry data did not indicate that the low fish collections were a result of high conductivity reducing electrofishing effectiveness (Table 9). Aquatic macrophytes were moderately available as habitat, however, other habitat types such as large woody debris and undercut banks were sparse. The substrate was approximately 50% sand with the remaining sediment consisting of silt and gravel with small amounts of cobble. A low-head dam is located immediately below County Rd FX, resulting in slow flow at this site (measured surface velocity 0.6 ft/sec). The riparian area was mostly wetland. Two small structures on both sides of the river and a gravel road on

the right side diminished some of the riparian area. There was no evidence of stream flashiness.

**Table 6. Procedure 51 sampling results for targeted monitoring request stations sampled in the Middle Branch Escanaba River, 2022.**

Type	STORET	Waterbody	Location	Latitude	Longitude	County	Habitat score	Habitat rating	Macro score	Macro rating	Fish rating
TMR	520587	M B Escanaba River	Snowmobile trail D/S mine	46.49765	-87.877347	MARQUETTE	162	Excellent	0	Acceptable	Not meeting CWF DU*
TMR	520005	M B Escanaba River	County Road FX	46.499196	-87.886533	MARQUETTE	150	Good	1	Acceptable	Not meeting CWF DU*
TMR	520588	M B Escanaba River	Snowmobile trail U/S mine	46.527285	-87.911919	MARQUETTE	168	Excellent	1	Acceptable	Not meeting CWF DU*

\*Fish community rating Poor because less than 50 fish were collected after 45 minutes effort and/or <1% Salmonids collected.

At the snowmobile trail downstream of Humboldt Mill the macroinvertebrate community scored acceptable (0; Table 15), the fish community is not attaining its coldwater fishery designated use because less than 50 fish were collected after 45 minutes of electrofishing effort and no Salmonids were collected (Table 16) and the habitat scored excellent (162; Table 21). The macroinvertebrate and fish community results from our surveys were consistent with several years of consultant data (Tables 7 and 8). Water chemistry data did not indicate that the low fish collections were a result of high conductivity reducing electrofishing effectiveness (Table 9). When raw fish community data from previous surveys were available, the communities were also assessed. Twenty-six different macroinvertebrate taxa were collected, of which ten were EPT. Simuliidae was the dominant taxon which can be indicative of moderate organic matter and/or nutrient inputs (Voshell 2002). Moderate amounts of coarse and fine particulate organic matter were observed at that site.

Only seven individual fish representing five species were collected (Table 8). Bullen (1976) performed a fish survey at US 41, slightly downstream of this site, in August 1976 and also reported fish data from a previous survey done in 1958. The 1958 and 1976 surveys were performed to assess the success of previous Rainbow Trout (*Oncorhynchus mykiss*) and Brook Trout (*Salvelinus fontinalis*) stocking efforts. In 1958, Rainbow and Brook Trout made up only 10% of the fish collected despite 2550 Rainbow, Brook, and Brown Trout (*Salmo trutta*) being stocked in 1957 and earlier in 1958. In 1975 and 1976, 3000 Brown Trout were stocked in the Middle Branch Escanaba River at US 41, however no trout were collected in the survey later. There are no additional records of trout stocking in the Middle Branch Escanaba River above US 41 after 1979 in the MDNR fish stocking website (<https://www.michigandnr.com/fishstock/>).

Second River, a second-order stream that is a tributary to the Middle Branch Escanaba River, entering between the upstream snowmobile trail site and County Rd FX, was stocked with Brook Trout from 1992 to 2008. However, a survey by the MDNR Fisheries Division found low numbers of stocked Brook Trout and little evidence of natural reproduction. The small size of the stream and lack of habitat were cited as possible reasons for the lack of retention and reproduction. The Brook Trout stocking in Second River was ended after 2008 because of low angler usage (Darren Kramer, MDNR Fisheries Division, personal communication).

Undercut banks and aquatic macrophytes were moderately available as habitat, but other habitat types such as large woody debris and rootwads were sparse. The substrate was approximately half sand with the remaining sediment consisting of silt, gravel, and some cobble. The stream banks appeared to be stable and there were not signs of stream flashiness. The riparian area is mostly wetland with few trees to provide canopy cover. The snowmobile trail berm and a residential lot diminish some of the riparian area.

At the snowmobile trail upstream of the Mill, the Middle Branch Escanaba River macroinvertebrate community scored acceptable (1; Table 15), the fish community is not attaining its coldwater fishery designated use because less than 50 fish were collected after 45 minutes of electrofishing effort and no Salmonids were collected (Table 16), and habitat scored excellent (168; Table 21). Twenty-four different taxa were collected, ten of which were EPT. Leptophlebiidae and Calopterygidae were the most abundant, although not in high numbers (Leptophlebiidae made up 28% of macroinvertebrates collected). Leptophlebiidae are somewhat sensitive to stressors and Calopterygidae are tolerant to facultative (Voshell 2006). Only 16 individual fish were collected at this site. This result was consistent with the majority of fish surveys performed by a consulting firm since 2014 (Table 8). Water chemistry data did not indicate that the low fish collections were a result of high conductivity reducing electrofishing effectiveness (Table 9). Undercut banks and aquatic macrophytes were moderately available as habitat, but other habitat types such as large woody debris and rootwads were sparse. Sand made up over half of the substrate with the remaining sediment consisting of silt, gravel and some cobble. The immediate riparian area consisted of wetlands with upland forested area further from the river. The stream banks were stable and there was no evidence of flashiness.

**Table 7. Macroinvertebrate results upstream and downstream of Humboldt Mill from consultant and EGLE biosurveys. Procedure 51 (P-51).**

		Snowmobile Trail Upstream Mill	Snowmobile Trail Upstream Mill		Snowmobile Trail Downstream Mill	Snowmobile Trail Downstream Mill
Year	Sampling organization	P-51 Macroinvertebrate score	P-51 macroinvertebrate rating		P-51 Macroinvertebrate score	P-51 macroinvertebrate rating
2014	AEM	1	Acceptable		0	Acceptable
2016	AEM	-1	Acceptable		-4	Acceptable
2017	AEM	2	Acceptable		1	Acceptable
2018	AEM	1	Acceptable		2	Acceptable
2019	AEM	3	Acceptable		4	Acceptable
2020	AEM	3	Acceptable		-2	Acceptable
2021	AEM	-1	Acceptable		1	Acceptable
2022	EGLE	1	Acceptable		0	Acceptable
2022	AEM	3	Acceptable		2	Acceptable

**Table 8. Fish results upstream and downstream of Humboldt Mill from consultant and EGLE biosurveys.**

		Snowmobile Trail Upstream of Mill (MBER 2)	Snowmobile Trail Upstream of Mill (MBER 2)	Snowmobile Trail Downstream of Mill/US 41 (MBER 1)	Snowmobile Trail Downstream of Mill/US 41 (MBER 1)
Year	Sampling organization	Number of fish	P-51 fish rating	Number of fish	P-51 fish rating
1958	MDNR	.	.	134	Meet CWF DU
1976	MDNR	.	.	6	Non-CWF DU*
2014	AEM	19	Non-CWF DU*	17	Non-CWF DU*
2016	AEM	21	Non-CWF DU*	5	Non-CWF DU*
2017	AEM	14	Non-CWF DU*	6	Non-CWF DU*
2018	AEM	34	Non-CWF DU*	42	Non-CWF DU*
2019	AEM	30	Non-CWF DU*	23	Non-CWF DU*
2020	AEM	40	Non-CWF DU*	80	Non-CWF DU*
2021	AEM	58	Meet CWF DU	161	Non-CWF DU*
2022	EGLE	16	Non-CWF DU*	7	Non-CWF DU*
2022	AEM	10	Non-CWF DU*	36	Non-CWF DU*

\*Fish community rating Poor because less than 50 fish were collected after 45 minutes effort.

**Table 9. Chemistry data collected at Middle Branch Escanaba River sites.**

Parameter	Snowmobile trail upstream Mill	County Rd FX	Snowmobile trail downstream mill
Total Alkalinity (mg/l)	37	51	56
Chloride (mg/l)	2	8.9	14
Conductivity $\mu$ mhos/cm)	66.6	125	234

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Parameter	Snowmobile trail upstream Mill	County Rd FX	Snowmobile trail downstream mill
Fluoride (mg/l)	ND	ND	0.41
pH	7.1	7.1	7.2
Sulfate (mg/l)	ND	5	39
TDS-calculated (mg/l)	43.3	81.1	152
Total Dissolved Solids (mg/l)	48	96	150
Total Suspended Solids (mg/l)	2	2	2
Turbidity (NTU)	5.7	10.9	11.6

**Goal 4: Identify potential nonpoint and other sources of water quality impairment.**

During the writing of this report, EGLE staff observed significant changes to a tributary stream, just upstream of a biosurvey site, while using Google Earth. Based on a review of aerial images over time, shortly upstream of the confluence to the biosurvey stream, significant removal of riparian vegetation has occurred along the tributary. After the riparian vegetation was removed, the stream was artificially widened by vehicles driving through it as evidenced by numerous tire tracks in and along the stream. This activity has likely caused severe erosion and downstream sedimentation and is directly harming benthic fauna. A resource complaint was submitted to MiEnviro. At the time of this writing, a site evaluation by District staff is pending. District staff will work with the landowner to restore areas that were impacted within the six-year statute of limitations and inform them about permit application requirements for future activities that may impact the stream.

At the Escanaba River site off Little West Road, vehicles are crossing through the river via two tracks entering it on both sides. This is likely causing localized erosion and sedimentation and directly harming benthic fauna during the crossings.

**RECOMMENDATIONS**

During the 2025 watershed cycle, we should consider resampling fish and macroinvertebrates in the Middle Branch Escanaba River at the same three sites above US 41, as well as consider sampling other similar-size, cold-transitional streams in the Upper Peninsula. to compare to Middle Branch Escanaba River results.

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**BIOSURVEY TABLES**

Table 10. Qualitative macroinvertebrate sampling results for central Upper Peninsula

TAXA	Ford River at I Road 9/27/2020 STATION 1	Ford River at 18th Road 9/27/2020 STATION 2	Bark River 9th Rd 9/27/2020 STATION 3	Bark River at East 5 Lane 9/18/2020 STATION 4
<b>PLATYHELMINTHES (flatworms)</b>				
Turbellaria				1
<b>ANNELIDA (segmented worms)</b>				
Hirudinea (leeches)			1	
Oligochaeta (worms)	1	1		5
<b>ARTHROPODA</b>				
<b>Crustacea</b>				
Amphipoda (scuds)		4	38	23
Decapoda (crayfish)		1	1	1
<b>Arachnoidea</b>				
Hydracarina	1	6	12	3
<b>Insecta</b>				
<b>Ephemeroptera (mayflies)</b>				
Baetiscidae	2	1	1	1
Baetidae	15	12	6	23
Caenidae	4	1	13	6
Ephemerellidae	77	20	21	30
Heptageniidae	34	55	11	61
Isonychiidae	2	7		1
Leptophlebiidae	33	18	63	31
Potamanthidae	1	6		
Tricorythidae (Leptohiphidae)		1		1
<b>Odonata</b>				
<b>Anisoptera (dragonflies)</b>				
Aeshnidae	1	1	1	1
Cordulegastridae			1	
Gomphidae	1	3		
<b>Zygoptera (damselflies)</b>				
Calopterygidae		1	11	12
Coenagrionidae	1			
<b>Plecoptera (stoneflies)</b>				
Perlidae	20	18		1
Perlodidae		1		
Taeniopterygidae	1			
<b>Hemiptera (true bugs)</b>				
Belostomatidae		1	1	
Corixidae	2	11	1	2
Gerridae				1
Nepidae		1	1	
Notonectidae			10	

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Pleidae		1		
<b>Megaloptera</b>				
Corydalidae (dobson flies)	1			1
Sialidae (alder flies)			1	3
<b>Trichoptera (caddisflies)</b>				
Brachycentridae	2	1	1	11
Goeridae	2			
Helicopsychidae	1	3	1	11
Hydropsychidae	30	55	4	79
Hydroptilidae	1	2		
Lepidostomatidae			1	
Leptoceridae		1		1
Limnephilidae		3	1	1
Molannidae				1
Odontoceridae	1			
Philopotamidae	1			9
Phryganeidae			11	1
Polycentropodidae				10
Rhyacophilidae				1
<b>Coleoptera (beetles)</b>				
Dytiscidae (total)	3	1	4	1
Gyrinidae (adults)			1	
Haliplidae (adults)			1	
Dryopidae				1
Elmidae	12	19	4	42
Psephenidae (larvae)	4	7		2
<b>Diptera (flies)</b>				
Athericidae	3	6	1	6
Ceratopogonidae	1	1	3	1
Chironomidae	10	9	31	17
Simuliidae	1	1	1	6
Syrphidae		4		
Tabanidae	1	1	1	2
Tipulidae	1	1	2	7
<b>MOLLUSCA</b>				
<b>Gastropoda (snails)</b>				
Ancylidae (limpets)			8	5
Bithyniidae	1	2		
Physidae		1	1	1
Planorbidae			1	
<b>Pelecypoda (bivalves)</b>				
Pisidiidae	1		1	6
<b>TOTAL INDIVIDUALS</b>	<b>273</b>	<b>289</b>	<b>273</b>	<b>430</b>

**Central Upper Peninsula Watersheds**  
**Macroinvertebrate and Stream Habitat Surveys: July-September 2020**

Table 10 continued. Macroinvertebrate metric evaluation of central Upper Peninsula watersheds

METRIC	Ford River at I Road 9/27/2020		Ford River at 18th Road 9/27/2020		Bark River 9th Rd 9/27/2020		Bark River at East 5 Lane 9/18/2020	
	STATION 1		STATION 2		STATION 3		STATION 4	
	Value	Score	Value	Score	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	35	1	40	1	38	1	43	1
NUMBER OF MAYFLY TAXA	8	1	9	1	6	1	8	1
NUMBER OF CADDISFLY TAXA	7	1	6	1	6	1	10	1
NUMBER OF STONEFLY TAXA	2	1	2	1	0	-1	1	0
PERCENT MAYFLY COMPOSITION	61.54	1	41.87	1	42.12	1	35.81	1
PERCENT CADDISFLY COMPOSITION	13.92	0	22.49	0	6.96	0	29.07	0
PERCENT DOMINANT TAXON	28.21	-1	19.03	0	23.08	0	18.37	0
PERCENT ISOPOD, SNAIL, LEECH	0.37	1	1.04	1	4.03	0	1.40	1
PERCENT SURFACE AIR BREATHERS	1.83	1	6.57	0	6.96	0	0.93	1
TOTAL SCORE	6		6		3		6	
MACROINVERTEBRATE COMMUNITY RATING	Excellent		Excellent		Acceptable		Excellent	

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Table 11. Qualitative macroinvertebrate sampling results for central Upper Peninsula

TAXA	Bark River	Bryan Creek	Chander Brook	Dexter Creek
	D Rd 9/17/2020 STATION 5	Charlie Lakes Road 7/28/2020 STATION 6	County Road 438 9/27/2020 STATION 7	M-67 Bridge 9/26/2020 STATION 8
<b>ANNELIDA (segmented worms)</b>				
Hirudinea (leeches)			2	3
Oligochaeta (worms)		5	2	1
<b>ARTHROPODA</b>				
<b>Crustacea</b>				
Amphipoda (scuds)	110		10	5
Decapoda (crayfish)	5			1
<b>Arachnoidea</b>				
Hydracarina		3		
<b>Insecta</b>				
<b>Ephemeroptera (mayflies)</b>				
Baetiscidae			1	
Baetidae	27	5	10	12
Caenidae				
Ephemerellidae	11	7	11	34
Heptageniidae	24	6	5	17
Isonychiidae			1	6
Leptophlebiidae	2	22	87	47
Metretopodidae			1	
Tricorythidae (Leptohiphidae)		1		
<b>Odonata</b>				
<b>Anisoptera (dragonflies)</b>				
Aeshnidae	3	12	2	1
Cordulegastridae		3		
Gomphidae		5	1	3
<b>Zygoptera (damselflies)</b>				
Calopterygidae	26	2	5	2
<b>Plecoptera (stoneflies)</b>				
Capniidae				4
Leuctridae		8		
Nemouridae		4	10	
Perlidae			8	15
Perlodidae			1	
Pteronarcyidae		3	1	
Taeniopterygidae				3
<b>Hemiptera (true bugs)</b>				
Belostomatidae				1
Corixidae			1	
Gerridae	1	3		
Mesoveliidae			1	1
Nepidae			1	1
Notonectidae				1

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Megaloptera				
Corydalidae (dobson flies)		1	1	3
Sialidae (alder flies)				
Trichoptera (caddisflies)				
Brachycentridae	3	27	12	
Helicopsychidae	2		1	
Hydropsychidae	7	18	15	49
Lepidostomatidae	1			
Leptoceridae			1	
Limnephilidae	3	6	1	2
Molannidae	1			
Philopotamidae			8	10
Phryganeidae	1	5	3	1
Polycentropodidae		25	6	
Uenoidae				1
Coleoptera (beetles)				
Dytiscidae (total)			6	2
Gyrinidae (adults)		1		
Haliplidae (adults)				
Hydrophilidae (total)	1	3		
Elmidae	25		6	10
Psephenidae (larvae)				1
Diptera (flies)				
Athericidae	1	3		1
Ceratopogonidae	1	3	1	1
Chironomidae	17	57	10	10
Simuliidae	1	3	22	1
Tabanidae		3		
Tipulidae		2	9	1
MOLLUSCA				
Gastropoda (snails)				
Ancylidae (limpets)	6			2
Physidae	11	7	2	
Planorbidae			1	
Pelecypoda (bivalves)				
Pisidiidae	1	8	1	
<b>TOTAL INDIVIDUALS</b>	<b>291</b>	<b>261</b>	<b>267</b>	<b>253</b>

**Central Upper Peninsula Watersheds  
Macroinvertebrate and Stream Habitat Surveys: July-September 2020**

Table 11 continued. Macroinvertebrate metric evaluation of central Upper Peninsula

METRIC	Bark River D Rd 9/17/2020		Bryan Creek at Charlie Lakes Road 7/28/2020		Chander Brook at County Road 438 9/27/2020		Dexter Creek at M-67 Bridge 9/26/2020	
	STATION 5		STATION 6		STATION 7		STATION 8	
	Value	Score	Value	Score	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	27	0	31	1	38	1	34	1
NUMBER OF MAYFLY TAXA	4	0	5	1	7	1	5	1
NUMBER OF CADDISFLY TAXA	9	1	5	0	8	1	5	0
NUMBER OF STONEFLY TAXA	0	-1	3	1	4	1	3	1
PERCENT MAYFLY COMPOSITION	21.84	1	15.71	0	43.45	1	45.85	1
PERCENT CADDISFLY COMPOSITION	6.83	0	31.03	1	17.60	0	24.90	0
PERCENT DOMINANT TAXON	37.54	-1	21.84	0	32.58	-1	19.37	0
PERCENT ISOPOD, SNAIL, LEECH	5.80	0	2.68	1	1.87	1	1.98	1
PERCENT SURFACE AIR BREATHERS	0.68	1	2.68	1	3.37	1	2.37	1
TOTAL SCORE	1		6		6		6	
MACROINVERTEBRATE COMMUNITY RATING	Acceptable		Excellent		Excellent		Excellent	

**Central Upper Peninsula Watersheds  
Macroinvertebrate and Stream Habitat Surveys: July-September 2020**

Table 12. Qualitative macroinvertebrate sampling results for central Upper Peninsula watersheds

	West Branch Whitefish River  at Lawson Road 7/29/2020  STATION 9	Days River at Saint Nicholas 31st Road/County Road 430 7/30/2020  STATION 10	Southwest Branch Fishdam River  at KK Road 7/31/2020  STATION 11	Eighteen Mile Creek downstream Forest Highway 13 7/31/2020  STATION 12
TAXA				
<b>ANNELIDA (segmented worms)</b>				
Hirudinea (leeches)	2		1	
Oligochaeta (worms)	8	1	2	7
<b>ARTHROPODA</b>				
<b>Crustacea</b>				
Amphipoda (scuds)	110		1	1
Decapoda (crayfish)		4	2	1
<b>Arachnoidea</b>				
Hydracarina	2			7
<b>Insecta</b>				
<b>Ephemeroptera (mayflies)</b>				
Baetidae	2	4	6	9
Caenidae		4	9	11
Ephemerellidae				1
Ephemeridae		6		
Heptageniidae	1	57	36	9
Leptophlebiidae	16	2	6	4
<b>Odonata</b>				
<b>Anisoptera (dragonflies)</b>				
Aeshnidae	1	3	15	3
Cordulegastridae	1		3	1
Corduliidae	1	3		1
Gomphidae		2	9	2
<b>Zygoptera (damselflies)</b>				
Calopterygidae	1	4	39	18
<b>Plecoptera (stoneflies)</b>				
Leuctridae				1
Pteronarcyidae				1
<b>Hemiptera (true bugs)</b>				
Corixidae				1
Gerridae	3	1		2
Veliidae	1	3	5	1
<b>Megaloptera</b>				
Corydalidae (dobson flies)		1	3	
Sialidae (alder flies)	6	1		1
<b>Trichoptera (caddisflies)</b>				
Brachycentridae			17	68
Dipseudopsidae	12			
Hydropsychidae			28	24

**Central Upper Peninsula Watersheds  
Macroinvertebrate and Stream Habitat Surveys: July-September 2020**

Leptoceridae			4	1
Limnephilidae	21	2	6	10
Molannidae	1	1	3	1
Philopotamidae			11	1
Phryganeidae	2		2	4
Polycentropodidae		1	4	15
<b>Coleoptera (beetles)</b>				
Dytiscidae (total)		1		
Hydrophilidae (total)	2			
Elmidae	6	3	2	7
Psephenidae (larvae)		4		
<b>Diptera (flies)</b>				
Athericidae				3
Ceratopogonidae		1	3	1
Chironomidae	66	12	51	56
Dixidae	1			
Ptychopteridae				1
Simuliidae	7		3	13
Tabanidae	1	6		3
Tipulidae		1	3	
<b>MOLLUSCA</b>				
<b>Gastropoda (snails)</b>				
Ancylidae (limpets)	1			
Hydrobiidae			1	
Physidae	1			2
<b>Pelecypoda (bivalves)</b>				
Pisidiidae	1	1	5	2
Unionidae (mussels)		1		
<b>TOTAL INDIVIDUALS</b>	<b>277</b>	<b>130</b>	<b>280</b>	<b>294</b>

**Central Upper Peninsula Watersheds  
Macroinvertebrate and Stream Habitat Surveys: July-September 2020**

Table 12 continued. Macroinvertebrate metric evaluation of central Upper Peninsula watersheds

METRIC	West Branch Whitefish River  at Lawson Road 7/29/2020		Days River at Saint Nicholas 31st Road/County Road 430 7/30/2020		Southwest Branch Fishdam River  at KK Road 7/31/2020		Eighteen Mile Creek  downstream Forest Highway 13 7/31/2020	
	STATION 9		STATION 10		STATION 11		STATION 12	
	Value	Score	Value	Score	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	26	1	27	0	29	1	37	1
NUMBER OF MAYFLY TAXA	3	1	5	1	4	0	5	1
NUMBER OF CADDISFLY TAXA	4	1	3	0	8	1	8	1
NUMBER OF STONEFLY TAXA	0	-1	0	-1	0	-1	2	1
PERCENT MAYFLY COMPOSITION	6.86	0	56.15	1	20.36	0	11.56	0
PERCENT CADDISFLY COMPOSITION	13.00	0	3.08	0	26.79	0	42.18	1
PERCENT DOMINANT TAXON	39.71	-1	43.85	-1	18.21	0	23.13	0
PERCENT ISOPOD, SNAIL, LEECH	1.44	1	0.00	1	0.71	1	0.68	1
PERCENT SURFACE AIR BREATHERS	2.17	1	3.85	1	1.79	1	1.70	1
TOTAL SCORE	3		2		3		7	
MACROINVERTEBRATE COMMUNITY RATING	Acceptable		Acceptable		Acceptable		Excellent	

**Central Upper Peninsula Watersheds  
Macroinvertebrate and Stream Habitat Surveys: July-September 2020**

Table 13. Qualitative macroinvertebrate sampling results for central Upper Peninsula watersheds

	Bear Creek County Road 565 7/27/2020	West Branch Chocolay River County Road 545 (West Branch Road) 7/29/2020	East Branch Escanaba River Iron Street 7/28/2020	Forty-Seven Mile Creek Mott 46 Lane/Mott Lane 9/17/2020
TAXA	STATION 13	STATION 14	STATION 15	STATION 16
<b>PLATYHELMINTHES (flatworms)</b>				
Turbellaria	2			
<b>ANNELIDA (segmented worms)</b>				
Oligochaeta (worms)	19	6	8	1
<b>ARTHROPODA</b>				
<b>Crustacea</b>				
Amphipoda (scuds)			3	1
Decapoda (crayfish)			2	1
Isopoda (sowbugs)	91		24	
<b>Arachnoidea</b>				
Hydracarina		3	1	1
<b>Insecta</b>				
<b>Ephemeroptera (mayflies)</b>				
Baetiscidae			2	
Baetidae	4	18	3	8
Caenidae		1		9
Ephemerellidae		4		36
Ephemeridae			1	14
Heptageniidae	6	1	2	29
Leptophlebiidae		11		59
Tricorythidae (Leptohiphidae)			10	
<b>Odonata</b>				
<b>Anisoptera (dragonflies)</b>				
Aeshnidae	1		5	4
Cordulegastridae	2			
Corduliidae	1			
Gomphidae	2	1	8	1
<b>Zygoptera (damselflies)</b>				
Calopterygidae	1		10	16
<b>Plecoptera (stoneflies)</b>				
Leuctridae		1		
Nemouridae	1	10		
Perlidae			24	4
Perlodidae		3		
Pteronarcyidae		1		
<b>Hemiptera (true bugs)</b>				
Belostomatidae				1
Corixidae			57	10

**Central Upper Peninsula Watersheds  
Macroinvertebrate and Stream Habitat Surveys: July-September 2020**

Gerridae	1	1		1
Nepidae				1
Veliidae		1	4	
<b>Megaloptera</b>				
Corydalidae (dobson flies)	2		4	4
Sialidae (alder flies)		1		4
<b>Trichoptera (caddisflies)</b>				
Brachycentridae	5	29		1
Goeridae		1		
Helicopsychidae			1	1
Hydropsychidae	10	26	6	13
Lepidostomatidae				6
Leptoceridae			3	5
Limnephilidae	2	2		3
Molannidae				3
Odontoceridae				1
Philopotamidae	4			2
Phryganeidae	3		1	1
Polycentropodidae	2			5
<b>Coleoptera (beetles)</b>				
Dytiscidae (total)		1		
Gyrinidae (adults)	1			
Hydrophilidae (total)	1		2	1
Elmidae	10	4	58	5
Psephenidae (larvae)			1	
<b>Diptera (flies)</b>				
Athericidae	1			1
Ceratopogonidae		9		6
Chironomidae	39	293	23	23
Dixidae				1
Simuliidae	44	6		2
Tabanidae	1		1	
Tipulidae		2	4	3
<b>MOLLUSCA</b>				
<b>Gastropoda (snails)</b>				
Ancylidae (limpets)			12	1
Hydrobiidae			1	
Physidae	4		13	
<b>Pelecypoda (bivalves)</b>				
Pisidiidae	2	2	1	

TOTAL INDIVIDUALS

262

438

295

289

**Central Upper Peninsula Watersheds  
Macroinvertebrate and Stream Habitat Surveys: July-September 2020**

Table 13 continued. Macroinvertebrate metric evaluation central Upper Peninsula watersheds

METRIC	Bear Creek County Road 565 7/27/2020		West Branch Chocolay River County Road 545 (West Branch Road) 7/29/2020		East Branch Escanaba River  Iron Street 7/28/2020		Forty-Seven Mile Creek  Mott 46 Lane/Mott Lane 9/17/2020	
	STATION 13		STATION 14		STATION 15		STATION 16	
	Value	Score	Value	Score	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	28	1	26	0	31	1	40	1
NUMBER OF MAYFLY TAXA	2	-1	5	1	5	1	6	1
NUMBER OF CADDISFLY TAXA	6	1	4	0	4	0	11	1
NUMBER OF STONEFLY TAXA	1	0	4	1	1	0	1	0
PERCENT MAYFLY COMPOSITION	3.82	0	7.99	0	6.10	0	53.63	1
PERCENT CADDISFLY COMPOSITION	9.92	0	13.24	0	3.73	0	14.19	0
PERCENT DOMINANT TAXON	34.73	-1	66.89	-1	19.66	0	20.42	0
PERCENT ISOPOD, SNAIL, LEECH	36.26	-1	0.00	1	16.95	-1	0.35	1
PERCENT SURFACE AIR BREATHERS	1.15	1	0.68	1	21.36	-1	4.84	1
TOTAL SCORE	0		3		0		6	
MACROINVERTEBRATE COMMUNITY RATING	Acceptable		Acceptable		Acceptable		Excellent	

**Central Upper Peninsula Watersheds  
Macroinvertebrate and Stream Habitat Surveys: July-September 2020**

Table 14. Qualitative macroinvertebrate sampling results for central Upper Peninsula watersheds

TAXA	Ford River Cedardale 28th Road (E2) 9/26/2020 STATION 17	Escanaba River two track off Little West Road/County Road SW 7/30/2020 STATION 18	Middle Branch Escanaba River US41 7/27/2020 STATION 19
<b>ANNELIDA (segmented worms)</b>			
Hirudinea (leeches)			1
Oligochaeta (worms)		7	14
<b>ARTHROPODA</b>			
<b>Crustacea</b>			
Amphipoda (scuds)	2		15
Decapoda (crayfish)	1	1	12
Isopoda (sowbugs)		11	47
<b>Arachnoidea</b>			
Hydracarina	4	1	
<b>Insecta</b>			
<b>Ephemeroptera (mayflies)</b>			
Baetiscidae	3		1
Baetidae	18	51	38
Ephemerellidae	33		
Ephemeridae	3	1	13
Heptageniidae	56	5	61
Isonychiidae	1		
Leptophlebiidae	64		1
Potamanthidae	1		
Tricorythidae (Leptohyphidae)	3	15	1
<b>Odonata</b>			
<b>Anisoptera (dragonflies)</b>			
Aeshnidae	2	3	3
Corduliidae			1
Gomphidae	3		
Macromiidae	1	1	
<b>Zygoptera (damselflies)</b>			
Calopterygidae	4	1	12
Coenagrionidae	1		
<b>Plecoptera (stoneflies)</b>			
Perlidae	23	17	1
Perlodidae	1		
Pteronarcyidae		1	
<b>Hemiptera (true bugs)</b>			
Belostomatidae	1		
Corixidae	1		8
Veliidae		6	1
<b>Megaloptera</b>			
Corydalidae (dobson flies)		1	2
Sialidae (alder flies)			1

**Central Upper Peninsula Watersheds  
Macroinvertebrate and Stream Habitat Surveys: July-September 2020**

<b>Trichoptera (caddisflies)</b>			
Brachycentridae	3	11	
Dipseudopsidae			1
Goeridae		2	
Helicopsychidae	1	2	
Hydropsychidae	27	23	
Hydroptilidae			2
Lepidostomatidae		2	
Leptoceridae		3	
Limnephilidae		3	3
Philopotamidae	9	4	
Phryganeidae			3
Polycentropodidae		3	1
Rhyacophilidae		1	
<b>Lepidoptera (moths)</b>			1
<b>Coleoptera (beetles)</b>			
Dytiscidae (total)	2		2
Gyrinidae (adults)			1
Elmidae	13	24	3
Psephenidae (larvae)	1		
<b>Diptera (flies)</b>			
Athericidae	3	29	
Ceratopogonidae	1	1	1
Chironomidae	5	33	16
Dixidae			1
Simuliidae	1	7	15
Tabanidae			1
Tipulidae	1	3	
<b>MOLLUSCA</b>			
<b>Gastropoda (snails)</b>			
Ancylidae (limpets)	1		
Hydrobiidae			5
Physidae	1	1	1
<b>Pelecypoda (bivalves)</b>			
Pisidiidae		3	2
Unionidae (mussels)	1		

TOTAL INDIVIDUALS

296

277

291

**Central Upper Peninsula Watersheds  
Macroinvertebrate and Stream Habitat Surveys: July-September 2020**

Table 14 continued. Macroinvertebrate metric evaluation of central Upper Peninsula watersheds

METRIC	Ford River Cedardale/ 28th Road (E2) 9/26/2020		Escanaba River two track off Little West Road/County Road SW 7/30/2020		Middle Branch Escanaba River  US41 7/27/2020	
	STATION 17		STATION 18		STATION 19	
	Value	Score	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	36	1	33	1	36	1
NUMBER OF MAYFLY TAXA	9	1	4	0	6	1
NUMBER OF CADDISFLY TAXA	4	0	10	1	5	0
NUMBER OF STONEFLY TAXA	2	1	2	1	1	0
PERCENT MAYFLY COMPOSITION	61.49	1	25.99	1	39.52	1
PERCENT CADDISFLY COMPOSITION	13.51	0	19.49	0	3.44	0
PERCENT DOMINANT TAXON	21.62	0	18.41	0	20.96	0
PERCENT ISOPOD, SNAIL, LEECH	0.68	1	4.33	0	18.56	-1
PERCENT SURFACE AIR BREATHERS	1.35	1	2.17	1	3.44	1
TOTAL SCORE	6		5		3	
MACROINVERTEBRATE COMMUNITY RATING	Excellent		Excellent		Acceptable	

**Central Upper Peninsula Watersheds  
Macroinvertebrate and Stream Habitat Surveys: July-September 2020**

Table 15. Qualitative macroinvertebrate sampling results for central Upper Peninsula watersheds

TAXA	Middle Branch Escanaba River Snowmobile trail upstream mill 9/20/2022	Middle Branch Escanaba River County Rd FX 9/21/2022	Middle Branch Escanaba River Snowmobile trail 9/20/2022
PORIFERA (sponges)	1		
ANNELIDA (segmented worms)			
Hirudinea (leeches)			1
Oligochaeta (worms)	2	6	
ARTHROPODA			
Crustacea			
Amphipoda (scuds)	20	4	7
Decapoda (crayfish)		1	1
Isopoda (sowbugs)		19	1
Insecta			
Ephemeroptera (mayflies)			
Baetiscidae			1
Baetidae	9	7	4
Caenidae	16		
Ephemeridae	12	5	2
Heptageniidae	32	42	14
Leptophlebiidae	71	20	28
Metretopodidae		10	1
Tricorythidae (Leptohiphidae)	3	3	
Odonata			
Anisoptera (dragonflies)			
Aeshnidae			3
Corduliidae	1	1	
Libellulidae	1		
Zygoptera (damselflies)			
Calopterygidae	50	23	10
Coenagrionidae	8		
Plecoptera (stoneflies)			
Perlidae			1
Perlodidae			1
Hemiptera (true bugs)			
Belostomatidae	1	1	1
Corixidae	5	25	13
Nepidae	1	1	1
Pleidae			2
Megaloptera			
Corydalidae (dobson flies)			1
Sialidae (alder flies)	2		
Trichoptera (caddisflies)			

**Central Upper Peninsula Watersheds  
Macroinvertebrate and Stream Habitat Surveys: July-September 2020**

Dipseudopsidae	1		
Hydropsychidae	1		5
Hydroptilidae		1	
Leptoceridae		1	
Limnephilidae	2	2	
Molannidae	1	3	
Phryganeidae	2	7	1
<b>Coleoptera (beetles)</b>			
Dytiscidae (total)		6	1
<b>Diptera (flies)</b>			
Ceratopogonidae	2	1	
Chironomidae	5	1	3
Simuliidae		121	153
<b>MOLLUSCA</b>			
<b>Gastropoda (snails)</b>			
Ancylidae (limpets)	4	1	1
Hydrobiidae		8	4
Physidae		1	
Planorbidae		1	
<b>Pelecypoda (bivalves)</b>			
Pisidiidae		4	

TOTAL INDIVIDUALS

253

326

261

**Central Upper Peninsula Watersheds  
Macroinvertebrate and Stream Habitat Surveys: July-September 2020**

Table 15 continued. Macroinvertebrate metric evaluation of central Upper Peninsula watersheds

METRIC	Middle Branch Escanaba Snowmobile trail upstream mill 9/20/2022		Middle Branch Escanaba River County Rd FX 9/21/2022		Middle Branch Escanaba River Snowmobile trail downstream mill 9/20/2022	
	Value	Score	Value	Score	Value	Score
	TOTAL NUMBER OF TAXA	24	0	29	1	26
NUMBER OF MAYFLY TAXA	6	1	6	1	6	1
NUMBER OF CADDISFLY TAXA	4	0	5	0	2	-1
NUMBER OF STONEFLY TAXA	0	-1	0	-1	2	1
PERCENT MAYFLY COMPOSITION	56.75	1	26.69	1	19.16	0
PERCENT CADDISFLY COMPOSITION	2.38	-1	4.29	0	2.30	-1
PERCENT DOMINANT TAXON	28.17	-1	37.12	-1	58.62	-1
PERCENT ISOPOD, SNAIL, LEECH	1.59	1	9.20	0	2.68	1
PERCENT SURFACE AIR BREATHERS	2.78	1	10.12	0	6.90	0
TOTAL SCORE	1		1		0	
MACROINVERTEBRATE COMMUNITY RATING	Acceptable		Acceptable		Acceptable	

**Central Upper Peninsula Watersheds  
Macroinvertebrate and Stream Habitat Surveys: July-September 2020**

Table 16 Qualitative fish sampling results for Middle Branch Escanaba River

TAXA	Middle Branch Escanaba River Snowmobile trail upstream mill 9/20/2022	Middle Branch Escanaba River County Rd FX 9/21/2022	Middle Branch Escanaba River Snowmobile trail downstream mill 9/20/2022
Umbridae (mudminnows)			
<i>Umbra limi</i> (Central mudminnow)	7	1	1
Cyprinidae (minnows and carps)			
<i>Semotilus atromaculatus</i> (Creek chub)		2	
<i>Notemigonus crysoleucas</i> (Golden shiner)	5	2	1
<i>Luxilus cornutus</i> (Common shiner)		1	
Cottidae (sculpins)			
<i>Cottus bairdii</i> (Mottled sculpin)			1
Catostomidae (suckers)			
<i>Catostomus commersoni</i> (White sucker)	2	2	1
Centrarchidae (sunfish)			
<i>Ambloplites rupestris</i> (Rock bass)	1	3	3
<i>Lepomis macrochirus</i> (Bluegill sf)	1		
<i>Micropterus salmoides</i> (Largemouth bass)		1	
<b>TOTAL INDIVIDUALS</b>	<b>16</b>	<b>12</b>	<b>7</b>

**Central Upper Peninsula Watersheds  
Macroinvertebrate and Stream Habitat Surveys: July-September 2020**

**Table 17. Habitat evaluation for central Upper Peninsula watersheds**

	STATION 1	STATION 2	STATION 3	STATION 4	STATION 5
	Ford River	Ford River	Bark River	Bark River	Bark River
	at I Road	at 18th Road	9th Rd	at East 5 Lane	D Road
	9/27/2020	9/27/2020	9/27/2020	9/18/2020	9/17/2020
	RIFFLE/RUN	RIFFLE/RUN	GLIDE/POOL	RIFFLE/RUN	GLIDE/POOL
<b>HABITAT METRIC</b>					
<b>Substrate and Instream Cover</b>					
Epifaunal Substrate/ Avail Cover (20)	16	18	10	19	15
Embeddedness (20)*	20	20		18	
Velocity/Depth Regime (20)*	15	19		20	
Pool Substrate Characterization (20)**			14		16
Pool Variability (20)**			15		10
<b>Channel Morphology</b>					
Sediment Deposition (20)	20	20	16	20	15
Flow Status - Maint. Flow Volume (10)	10	10	10	10	10
Flow Status - Flashiness (10)	10	10	9	8	10
Channel Alteration (20)	20	20	20	20	20
Frequency of Riffles/Bends (20)*	20	20		20	
Channel Sinuosity (20)**			20		18
<b>Riparian and Bank Structure</b>					
Bank Stability (L) (10)	10	9	9	10	10
Bank Stability (R) (10)	10	9	9	10	10
Vegetative Protection (L) (10)	10	8	7	9	10
Vegetative Protection (R) (10)	2	10	7	9	10
Riparian Vegetation Zone Width (L) (10)	10	10	10	7	8
Riparian Vegetation Zone Width (R) (10)	2	8	10	8	7
<b>TOTAL SCORE (200):</b>	175	191	166	188	169
<b>HABITAT RATING:</b>	<b>EXCELLENT</b>	<b>EXCELLENT</b>	<b>EXCELLENT</b>	<b>EXCELLENT</b>	<b>EXCELLENT</b>

**Central Upper Peninsula Watersheds  
Macroinvertebrate and Stream Habitat Surveys: July-September 2020**

<b>Date:</b>	9/27/2020	9/27/2020	9/27/2020	9/18/2020	9/17/2020
<b>Weather:</b>	cloudy	cloudy	Partly cloudy	sunny	Partly cloudy
<b>Air Temperature: °F</b>	63	67	63	37	53
<b>Water Temperature: °F</b>	65	65	62	52	59
<b>Ave. Stream Width: Feet</b>	84.83333333	100	13	23.66666667	15.33333333
<b>Ave. Stream Depth: Feet</b>					
<b>Surface Velocity: Feet/Second</b>	0	0	0.317460317	1.717171717	0.630252101
<b>Estimated Flow: Cubic Feet/Second</b>	0	0	8.474074074	24.92570146	5.799719888
<b>Stream Modifications:</b>	none	none	none	none	none
<b>Nuisance Plants (Y/N):</b>	N	N	N	N	N
<b>STORET No.:</b>	210330	210331	210194	210332	210190
<b>County Code:</b>			21		21
<b>TRS:</b>	39N23W19	39N24W11	38N24W20	38N24W33	39N24W30
<b>Latitude (dd):</b>	45.75522	45.79689	45.666389	45.65071	45.75477
<b>Longitude (dd):</b>	-87.20262	-87.22884	-87.28972	-87.27526	-87.30573
<b>Ecoregion:</b>	NLAF	NLAF	NLAF	NLAF	NLAF
<b>Stream Type:</b>			Coldwater		Warmwater
<b>USGS Basin Code:</b>	4030109	4030109	4030109	4030109	4030109
* Applies only to Riffle/Run stream Surveys	** Applies only to Glide/Pool stream Surveys				

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).

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**Table 18. Habitat evaluation for central Upper Peninsula watersheds**

	STATION 6	STATION 7	STATION 8	STATION 9	STATION 10
	Bryan Creek	Chander Brook	Dexter Creek	West Branch Whitefish River	Days River
	at Charlie Lakes Road	at County Road 438	at M-67 Bridge	at Lawson Road	at Saint Nicholas 31st Road/County Road 430
	7/28/2020	9/27/2020	9/26/2020	7/29/2020	7/30/2020
	GLIDE/POOL	GLIDE/POOL	RIFFLE/RUN	GLIDE/POOL	GLIDE/POOL
<b>HABITAT METRIC</b>					
<b>Substrate and Instream Cover</b>					
Epifaunal Substrate/ Avail Cover (20)	15	16	19	8	19
Embeddedness (20)*			20		
Velocity/Depth Regime (20)*			16		
Pool Substrate Characterization (20)**	10	16		8	16
Pool Variability (20)**	15	16		13	15
<b>Channel Morphology</b>					
Sediment Deposition (20)	14	16	19	13	16
Flow Status - Maint. Flow Volume (10)	10	10	10	10	10
Flow Status - Flashiness (10)	10	10	10	10	6
Channel Alteration (20)	20	20	20	20	20
Frequency of Riffles/Bends (20)*			19		
Channel Sinuosity (20)**	14	20		14	15
<b>Riparian and Bank Structure</b>					
Bank Stability (L) (10)	10	10	10	9	10
Bank Stability (R) (10)	10	10	10	9	10
Vegetative Protection (L) (10)	10	9	10	7	8
Vegetative Protection (R) (10)	9	9	10	8	8
Riparian Vegetation Zone Width (L) (10)	10	10	10	8	10
Riparian Vegetation Zone Width (R) (10)	10	10	10	10	10
<b>TOTAL SCORE (200):</b>	167	182	193	147	173
<b>HABITAT RATING:</b>	<b>EXCELLENT</b>	<b>EXCELLENT</b>	<b>EXCELLENT</b>	<b>GOOD</b>	<b>EXCELLENT</b>

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<b>Date:</b>	7/28/2020	9/27/2020	9/26/2020	7/29/2020	7/30/2020
<b>Weather:</b>	sunny	cloudy	rainy	sunny	sunny
<b>Air Temperature: °F</b>	76	65	65	70	76
<b>Water Temperature: °F</b>	64	60	64	66	65
<b>Ave. Stream Width: Feet</b>	14.5	17.66666667	20	5.333333333	15.23333333
<b>Ave. Stream Depth: Feet</b>					
<b>Surface Velocity: Feet/Second</b>	1.631944444	1.729411765	0.527773763	0.42484472	1.116666667
<b>Estimated Flow: Cubic Feet/Second</b>	41.30632716	74.24941176	9.464273685	3.251478261	26.40891852
<b>Stream Modifications:</b>	none	none	none	none	none
<b>Nuisance Plants (Y/N):</b>	N	N	N	N	N
<b>STORET No.:</b>	520571	520573	020005	520572	210333
<b>County Code:</b>					
<b>TRS:</b>	45N27W34	44N26W26	44N21W10	46N23W35	42N23W35
<b>Latitude (dd):</b>	46.25712	46.18735	46.219726	46.34662	45.98571
<b>Longitude (dd):</b>	-87.66889	-87.532028	-86.928059	-87.1377	-87.14095
<b>Ecoregion:</b>	NLAF	NLAF	NLAF	NLAF	NLAF
<b>Stream Type:</b>					
<b>USGS Basin Code:</b>	4030110	4030110	4030111	4030111	4030111
* Applies only to Riffle/Run stream Surveys	** Applies only to Glide/Pool stream Surveys				

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).

**Central Upper Peninsula Watersheds  
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**Table 19. Habitat evaluation for central Upper Peninsula**

	STATION 11	STATION 12	STATION 13	STATION 14	STATION 15
	Southwest Branch Fishdam River	Eighteen Mile Creek	Bear Creek	West Branch Chocoley River	East Branch Escanaba River
	at KK Road	downstream Forest Highway 13	County Road 565	County Road 545 (West Branch Road)	Iron Street
	7/31/2020	7/31/2020	7/27/2020	7/29/2020	7/28/2020
	GLIDE/POOL	GLIDE/POOL	GLIDE/POOL	RIFFLE/RUN	GLIDE/POOL
<b>HABITAT METRIC</b>					
<b>Substrate and Instream Cover</b>					
Epifaunal Substrate/ Avail Cover (20)	15	15	10	16	15
Embeddedness (20)*				15	
Velocity/Depth Regime (20)*				15	
Pool Substrate Characterization (20)**	15	15	11		14
Pool Variability (20)**	13	15	11		13
<b>Channel Morphology</b>					
Sediment Deposition (20)	13	14	10	11	15
Flow Status - Maint. Flow Volume (10)	10	10	10	10	10
Flow Status - Flashiness (10)	10	9	10	10	8
Channel Alteration (20)	20	20	20	20	19
Frequency of Riffles/Bends (20)*				13	
Channel Sinuosity (20)**	17	14	14		10
<b>Riparian and Bank Structure</b>					
Bank Stability (L) (10)	10	9	10	10	6
Bank Stability (R) (10)	10	10	10	10	10
Vegetative Protection (L) (10)	9	8	8	8	10
Vegetative Protection (R) (10)	9	8	9	9	9
Riparian Vegetation Zone Width (L) (10)	10	10	10	10	8
Riparian Vegetation Zone Width (R) (10)	10	10	10	10	8
<b>TOTAL SCORE (200):</b>	171	167	153	167	155
<b>HABITAT RATING:</b>	<b>EXCELLENT</b>	<b>EXCELLENT</b>	<b>GOOD</b>	<b>EXCELLENT</b>	<b>EXCELLENT</b>

**Central Upper Peninsula Watersheds  
Macroinvertebrate and Stream Habitat Surveys: July-September 2020**

<b>Date:</b>	7/31/2020	7/31/2020	7/27/2020	7/29/2020	7/28/2020
<b>Weather:</b>	Partly cloudy	sunny	sunny	Partly cloudy	Partly cloudy
<b>Air Temperature: °F</b>	70	70	79	75	73
<b>Water Temperature: °F</b>	68	62	67	58	
<b>Ave. Stream Width: Feet</b>	11.93333333	21.4	13.1	19.53333333	48
<b>Ave. Stream Depth: Feet</b>					
<b>Surface Velocity: Feet/Second</b>	1.069019608	0.710253968	1.223703704	1.787710438	1.748148148
<b>Estimated Flow: Cubic Feet/Second</b>	7.297840523	28.57493765	26.37652543	40.16151089	190.2451358
<b>Stream Modifications:</b>	none	none	none	none	
<b>Nuisance Plants (Y/N):</b>	N	N	N	N	N
<b>STORET No.:</b>	210334	210317	520500	520420	520502
<b>County Code:</b>		21	52	52	52
<b>TRS:</b>	41N19W1	42N19W22	45N26W10	46N24W22	45N25W21
<b>Latitude (dd):</b>	45.97269	46.01797	46.31189	46.37527	46.28336
<b>Longitude (dd):</b>	-86.62078	-86.67072	-87.55107	-87.28491	-87.4367
<b>Ecoregion:</b>	NLAF	NLAF	NLAF	NLAF	NLAF
<b>Stream Type:</b>		Coldwater	Coldwater	Coldwater	Coldwater
<b>USGS Basin Code:</b>	4030112	4030112	4030110	4020201	4030110
* Applies only to Riffle/Run stream Surveys	** Applies only to Glide/Pool stream Surveys				

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).

**Central Upper Peninsula Watersheds  
Macroinvertebrate and Stream Habitat Surveys: July-September 2020**

**Table 20. Habitat evaluations for central Upper Peninsula watersheds**

	STATION 16	STATION 18	STATION 19	STATION 17
	Forty-Seven Mile Creek	Ford River	Escanaba River	Middle Branch Escanaba River
	Mott 46 Lane/Mott Lane	Cedardale/ 28th Road (E2)	two track off Little West Road/County Road SW	US 41
	9/17/2020	9/26/2020	7/30/2020	7/27/2020
	GLIDE/POOL	RIFFLE/RUN	RIFFLE/RUN	GLIDE/POOL
<b>HABITAT METRIC</b>				
<b>Substrate and Instream Cover</b>				
Epifaunal Substrate/ Avail Cover (20)	15	20	16	14
Embeddedness (20)*		19	19	
Velocity/Depth Regime (20)*		19	14	
Pool Substrate Characterization (20)**	15			14
Pool Variability (20)**	17			11
<b>Channel Morphology</b>				
Sediment Deposition (20)	15	20	19	15
Flow Status - Maint. Flow Volume (10)	10	10	10	10
Flow Status - Flashiness (10)	10	9	10	10
Channel Alteration (20)	20	20	20	19
Frequency of Riffles/Bends (20)*		20	17	
Channel Sinuosity (20)**	20			11
<b>Riparian and Bank Structure</b>				
Bank Stability (L) (10)	10	10	10	10
Bank Stability (R) (10)	10	10	10	10
Vegetative Protection (L) (10)	10	10	10	10
Vegetative Protection (R) (10)	10	5	10	8
Riparian Vegetation Zone Width (L) (10)	10	10	10	10
Riparian Vegetation Zone Width (R) (10)	10	5	9	8
<b>TOTAL SCORE (200):</b>	182	187	184	160
<b>HABITAT RATING:</b>	<b>EXCELLENT</b>	<b>EXCELLENT</b>	<b>EXCELLENT</b>	<b>EXCELLENT</b>

**Central Upper Peninsula Watersheds  
Macroinvertebrate and Stream Habitat Surveys: July-September 2020**

<b>Date:</b>	9/17/2020	9/26/2020	7/30/2020	7/27/2020
<b>Weather:</b>	Partly cloudy	Partly cloudy	sunny	sunny
<b>Air Temperature: °F</b>	53	70	68	72
<b>Water Temperature: °F</b>	62	64	65	68
<b>Ave. Stream Width: Feet</b>	32	65	205.5333333	40.43333333
<b>Ave. Stream Depth: Feet</b>				
<b>Surface Velocity: Feet/Second</b>	0.987240829	1.300271739	0	0.881891813
<b>Estimated Flow: Cubic Feet/Second</b>	28.66508595	190.323375	0	83.82126913
<b>Stream Modifications:</b>	none	none	none	Canopy removal
<b>Nuisance Plants (Y/N):</b>	N	N	N	N
<b>STORET No.:</b>	550211	210316	520497	520503
<b>County Code:</b>	55	21	52	52
<b>TRS:</b>	39N25W15	41N24W19	43N25W03	47N28W06
<b>Latitude (dd):</b>	45.78321	45.93127	46.14574	46.49291
<b>Longitude (dd):</b>	-87.37344	-87.35679	-87.42352	-87.86711
<b>Ecoregion:</b>	NLAF	NLAF	NLAF	NLAF
<b>Stream Type:</b>	Warmwater	Warmwater	Warmwater	Warmwater
<b>USGS Basin Code:</b>	4030109	4030109	4030110	4030110
* Applies only to Riffle/Run stream Surveys	** Applies only to Glide/Pool stream Surveys			
<p>Note: Individual metrics may better describe conditions directly affecting the biological community while the Habitat Rating describes the general riverine environment at the site(s).</p>				

**Central Upper Peninsula Watersheds  
Macroinvertebrate and Stream Habitat Surveys: July-September 2020**

**Table 21. Habitat evaluation for central Upper Peninsula**

	<b>Middle Branch Escanaba</b>	<b>Middle Branch Escanaba River</b>	<b>Middle Branch Escanaba River</b>
	<b>Snowmobile trail upstream mill</b>	<b>County Rd FX</b>	<b>Snowmobile trail downstream mill</b>
	<b>9/20/2022</b>	<b>9/21/2022</b>	<b>9/20/2022</b>
	<b>GLIDE/POOL</b>	<b>GLIDE/POOL</b>	<b>GLIDE/POOL</b>
<b>HABITAT METRIC</b>			
<b>Substrate and Instream Cover</b>			
Epifaunal Substrate/ Avail Cover (20)	11	7	10
Embeddedness (20)*			
Velocity/Depth Regime (20)*			
Pool Substrate Characterization (20)**	14	13	15
Pool Variability (20)**	15	14	15
<b>Channel Morphology</b>			
Sediment Deposition (20)	17	11	16
Flow Status - Maint. Flow Volume (10)	10	9	10
Flow Status - Flashiness (10)	10	10	9
Channel Alteration (20)	20	19	18
Frequency of Riffles/Bends (20)*			
Channel Sinuosity (20)**	17	16	15
<b>Riparian and Bank Structure</b>			
Bank Stability (L) (10)	10	10	9
Bank Stability (R) (10)	10	10	9
Vegetative Protection (L) (10)	8	8	9
Vegetative Protection (R) (10)	8	8	9
Riparian Vegetation Zone Width (L) (10)	9	9	10
Riparian Vegetation Zone Width (R) (10)	9	8	8
<b>TOTAL SCORE (200):</b>	<b>159</b>	<b>144</b>	<b>154</b>
<b>HABITAT RATING:</b>			
	<b>Excellent</b>	<b>Good</b>	<b>Excellent</b>

**Central Upper Peninsula Watersheds  
Macroinvertebrate and Stream Habitat Surveys: July-September 2020**

<b>Date:</b>	9/20/2022	9/21/2022	9/20/2022
<b>Weather:</b>	sunny	sunny	sunny
<b>Air Temperature: °F</b>	77	62	70
<b>Water Temperature: °F</b>	67	63	62
<b>Ave. Stream Width: Feet</b>	26	28.33333333	42.33333333
<b>Ave. Stream Depth: Feet</b>			
<b>Surface Velocity: Feet/Second</b>	0.206010777	0.563141923	0.443476064
<b>Estimated Flow: Cubic Feet/Second</b>	8.199366252	27.12779788	44.64128612
<b>Stream Modifications:</b>	canopyremoval,relocated,habitatimprovement	snagging,impounded,canopyremoval	bankstabilization
<b>Nuisance Plants (Y/N):</b>	N	N	N
<b>STORET No.:</b>	520588	520005	520587
<b>County Code:</b>	52	52	52
<b>TRS:</b>	48N29W27	47N29R02	47N29W01
<b>Latitude (dd):</b>	46.52708	46.49935	46.49765
<b>Longitude (dd):</b>	-87.91222	-87.88699	-87.877347
<b>Ecoregion:</b>	NLAF	NLAF	NLAF
<b>Stream Type:</b>	Coldwater	Coldwater	Coldwater
<b>USGS Basin Code:</b>	403011001	403011001	4030110
* Applies only to Riffle/Run stream Surveys	** Applies only to Glide/Pool stream Surveys		

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).