

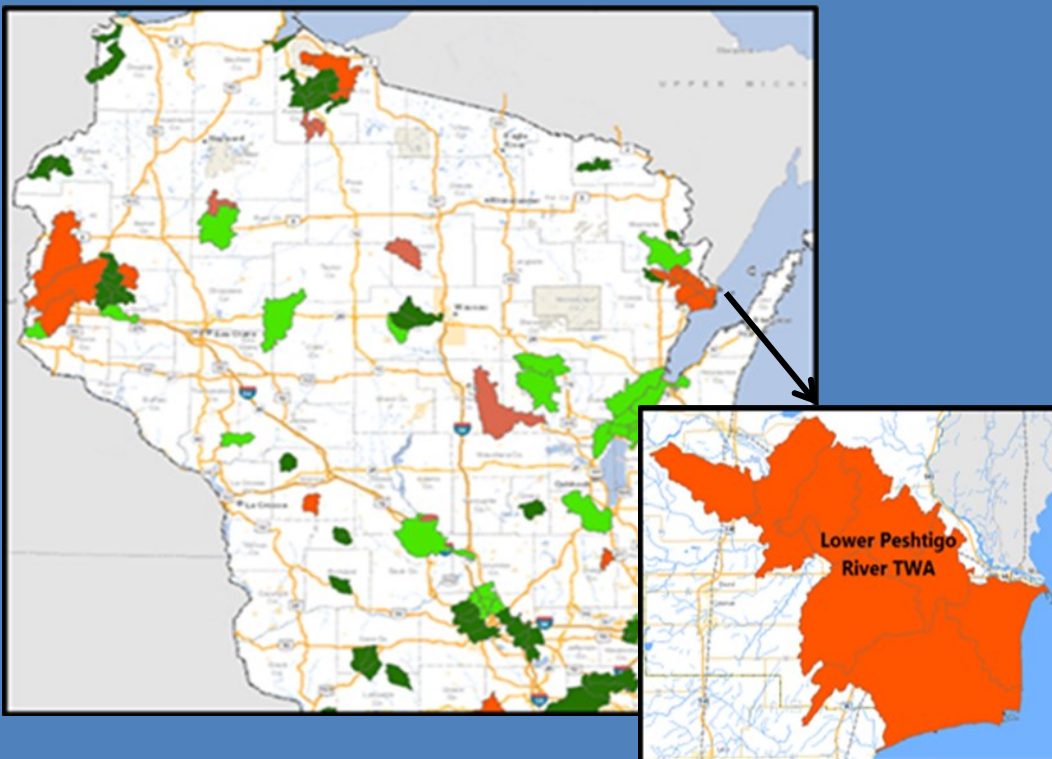


Birds of prey on the Peshtigo River at Potato Rapids Dam
 Photo by Andy Hudak, DNR

A Watershed Report created by the Bureau of Water Quality in support of the Clean Water Act.

LOWER PESHTIGO RIVER TWA WQM PLAN 2017

Lower Peshtigo River (GB07)
HUCs: 0403010506, Monitored 2014, 2015



EGAD # 3200-2017-12
 Water Quality Bureau,
 Wisconsin DNR

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Wisconsin Water Quality Monitoring and Planning

This Water Quality Management Plan was created under the state's Water Quality Management Planning and Water Resources Monitoring Programs. The plan reflects Water Quality Bureau and Water Resources Monitoring Strategy 2015-2020 goals and priorities and fulfills Areawide Water Quality Management Planning milestones under the Clean Water Act, Section 208. Condition information and resource management recommendations support and guide program priorities for the plan area.

This plan is hereby approved by the Wisconsin DNR Water Quality Program and is a formal update to the Lower Wisconsin Areawide Water Quality Management Plan and Wisconsin's Statewide Areawide Water Quality Management Plan. This plan will be forwarded to USEPA for certification as a formal plan update.

Greg Searle, Water Quality Bureau Field Operations Director

Date

Timothy Asplund, Water Quality Bureau Monitoring Section Chief

Date

Basin/Watershed Partners

- Marinette County Land and Water Conservation
- Marinette County Chapter of Trout Unlimited

Report Acknowledgements

- Andrew Hudak, Primary Author and Investigator, Eastern District, Wisconsin DNR
- Victoria Ziegler, Plan Support, Water Quality Bureau, Wisconsin DNR
- Lisa Helmuth, Program Coordinator, Water Quality Bureau, Wisconsin DNR

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List of Abbreviations

AEL: Aquatic Entomology Laboratory at UW – Stevens Point: the primary laboratory for analysis of macroinvertebrate taxonomy in the State of Wisconsin.

BMP: Best Management Practice. A practice that is determined effective and practicable (including technological, economic, and institutional considerations) in preventing or reducing pollution generated from nonpoint sources to a level compatible with water quality goals.

DNR: Department of Natural Resources. Wisconsin Department of Natural Resources is an agency of the State of Wisconsin created to preserve, protect, manage, and maintain natural resources.

FHMD: Fisheries and Habitat Management Database – or Fish Database – the state’s repository for fish taxonomy and auto-calculated metrics involving fish assemblage condition and related.

FIBI: Fish Index of biological integrity (Fish IBI). An Index of Biological Integrity (IBI) is a scientific tool used to identify and classify water pollution problems. An IBI associates anthropogenic influences on a water body with biological activity in the water and is formulated using data developed from biosurveys. In Wisconsin, Fish IBIs are created for each type of natural community in the state’s stream system.

HUC: Hydrologic Unit Code. A code or sequence of numbers that identify one of a number of nested and interlocked hydrologic catchments delineated by agencies including USGS, USFS, and DNR.

MIBI: Macroinvertebrate Index of biological integrity. In Wisconsin, the mIBI, or macroinvertebrate Index of biological integrity, was developed specifically to assess Wisconsin’s macroinvertebrate community (see also Fish IBI).

mg/L: milligrams per liter . A volumetric measure typically used in chemistry analysis characterizations.

Natural Community. A system of categorizing waterbodies based on their inherent physical, hydrologic, and biological assemblages. Both Streams and Lakes are categorized using an array of “natural community” types.

SWIMS ID. Surface Water Integrated Monitoring System (SWIMS) Identification Code is the unique monitoring station identification number for the location where monitoring data was gathered.

TWA: Targeted Watershed Assessment. A statewide study design a rotating watershed approach to gathering of baseline monitoring data with specialized targeted assessments for unique and site specific concerns, such as effectiveness monitoring of management actions.

WBIC: Water Body Identification Code. WDNR’s unique identification codes assigned to water features in the state. The lines and information allow the user to execute spatial and tabular queries about the data, make maps, and perform flow analysis and network traces.

WISSLOH: Wisconsin State Laboratory of Hygiene (aka WSLOH) – the state’s certified laboratory that provides a wide range of analytical services including toxicology, chemistry, and data sharing.

Watershed Discussion & Management Recommendations

Watershed Goals

The overall goal of this plan is to improve and protect water quality in the basin. This Targeted Watershed Assessment monitoring project provided substantial data to analyze current conditions and to make recommendations for future management actions in the area. This plan is designed to present monitoring study results, identify issues or concerns in the area found during the project and to make recommendations to improve or protect water quality consistent with Clean Water Act guidelines and state water quality standards.

Watershed Overview

The Lower Peshtigo River Watershed is situated in southeastern Marinette County. The Peshtigo River (WBIC: 515500) is the major surface waterbody in the watershed. The community of Peshtigo and part of the city of Marinette are located in this watershed. Soils in the watershed are primarily poorly drained, sandy and mucky soils in glacial lake basins. Wetlands are abundant around Gravelly and Mud brooks in the north and along the Green Bay shoreline in the southwestern portion of the watershed. Much of the watershed is forested, with limited areas of agriculture.

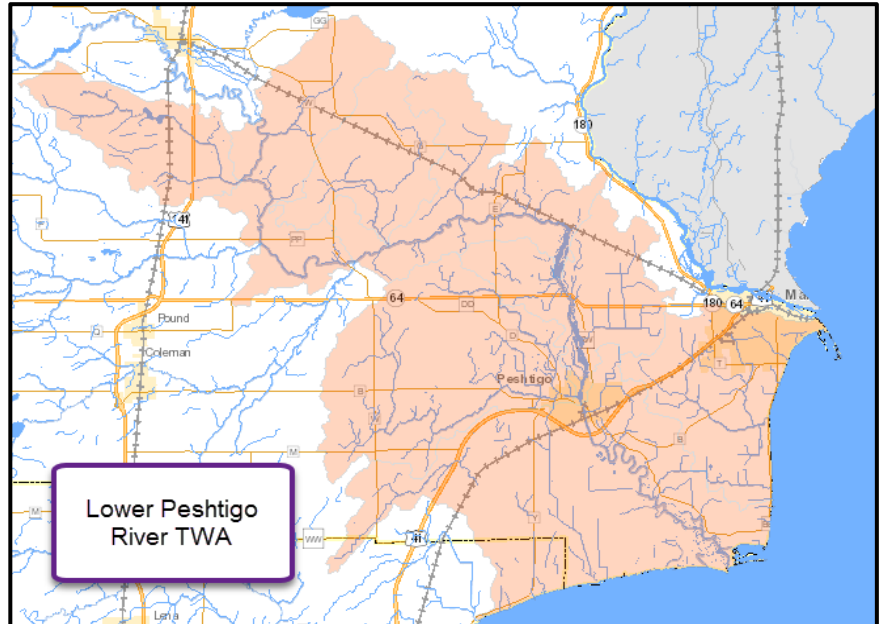


Figure 1: Map of Lower Peshtigo TWA Area

Land Use

Lower Peshtigo River watershed is 194.98 mi². Land use in the watershed is primarily wetland (36%), agricultural (30%) and a mix of forest (23%) and other uses (12%) (Figure 2). This watershed has 281.45 stream miles, 7,822.68 lake acres and 39,769.86 wetland acres.

Ecological Landscapes

The Lower Peshtigo River Watershed is located primarily within the Northern Lake Michigan Coastal Ecological Landscape which is located in northeastern Wisconsin, and includes Green Bay and the northern part of the Door Peninsula. Its landforms consist of the Niagara escarpment, a prominent dolomite outcropping

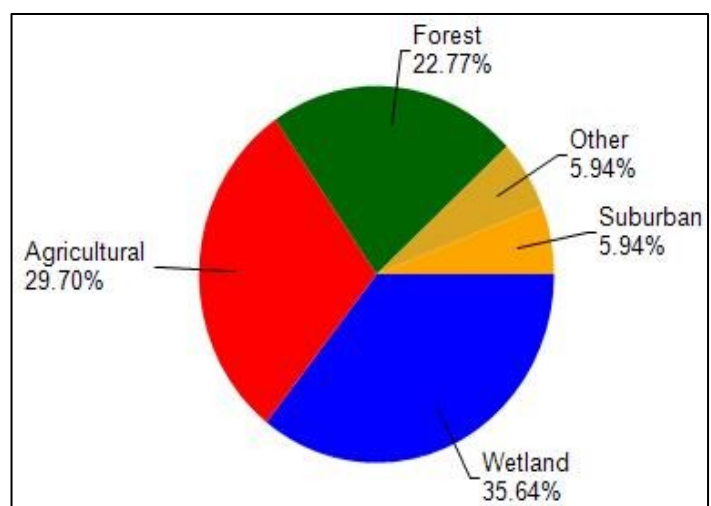


Figure 2: Land Use in Lower Peshtigo Watershed (GB07)

along the east side of Green Bay, a lacustrine plain along the west side of Green Bay, and ground moraine elsewhere.

Low sand dunes and beach ridges that support Great Lakes endemics and many other rare species are found along the Great Lakes shoreline. The influence of Lake Michigan moderates extreme temperatures. Soils are very diverse; in some areas, lacustrine sands are found overlying clays or bedrock within only a few feet of the surface. In the Door Peninsula, soils are typically stony loamy sands to loams. Poorly drained sands are common in the lake plain or in depressions between dunes and beach ridges.

On the western side of Green Bay, the ground moraine is composed mostly of moderately well drained, rocky sandy loams, interspersed with lacustrine sands and clays, and peat and muck also common. Historic vegetation included maple-basswood-beech forest, hemlock-hardwood forest, northern white cedar swamp, hardwood-conifer swamp, wet meadows, and coastal marshes. Conifer dominated upland forests that resemble the boreal forest were present along Lake Michigan; they contain a significant component of white spruce and balsam fir.

Cliffs, sinkholes, and dolomite ledges are associated with the Niagara Escarpment. Current vegetation consists of more than 60% non-forested land, most of which is in agricultural crops, with smaller amounts of grassland, wetland, shrubland, and urbanized areas. Forested lands are dominated by maple-basswood, with smaller amounts of lowland hardwoods, aspen-birch, and lowland conifers. High quality areas of exposed alkaline bedrock beach occur on the northern Door Peninsula, providing habitat for many rare plants. Several islands lie off the Door Peninsula and these also provide critical habitat for rare species and colonially nesting birds.

Study Summary

Streams in the Lower Peshtigo River Watershed can typically be characterized as cool-warm to cool-cold headwater streams. Although 46 different species of fish were observed during survey work, over 50% of the streams surveyed contain five or fewer species. Eight of the species surveyed were considered intolerant and were most often observed in Left Foot Creek, Gravelly Brook, and the Peshtigo River. Intolerant species were largely absent with the exception of Mottled Sculpin and Rock Bass which were observed at low frequencies in scattered tributary streams along with a few other rare occurrences of Brook Trout, Spottail Shiner, and Lamprey Ammocoetes.

Management Priorities

Focus efforts to reduce non-point source impacts in the Trout and Bundy Creek Subwatershed and the small tributaries to Lake Michigan and the Peshtigo River below Hwy 64. Efforts should focus on landowners willingness to improve stream buffers, manage manure and inorganic nutrient application, improve tillage practices to prevent upland soils losses, and improve overall soil health in the watershed.

Management Recommendations

- The lower segment of Trout Creek should be considered for listing on the State's 303(d) list of impaired waters for a degraded macroinvertebrate community.

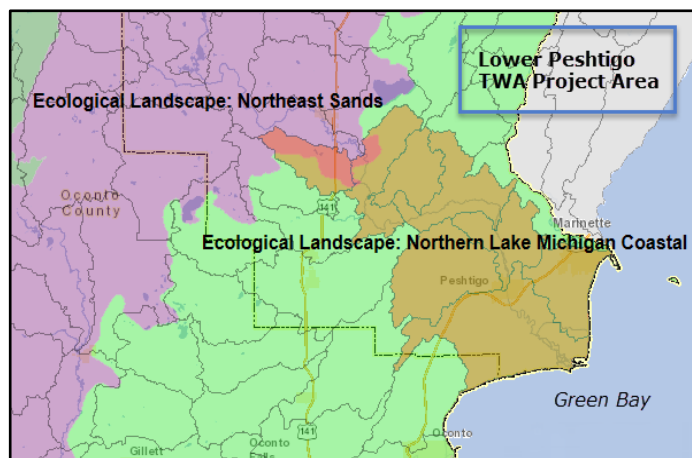


Figure 3: Ecological Landscapes in TWA Project Area

- Conduct additional TP monitoring, Fish and Macroinvertebrate monitoring on Trout Creek upstream of Jandt Road.
- Five Unnamed Tributaries should be considered for listing on the State’s 303(d) list of impaired waterbodies for degraded biological communities. The UNT to Lake Michigan at Spitzmacher (498000) and CTH BB (3000624) along with the UNT to Peshtigo River at River Dr. (5008538), the Snowmobile Crossing (5008359) and CTH BB (515600).
- Investigate the installation of an unauthorized rock dam upstream of Loop Lake Road that may act as a fish passage barrier.
- Conduct follow-up monitoring on Mud Brook to re-evaluate for impairments by pollutant other than Total Phosphorous.
- Conduct additional surveys in the Left Foot Creek HUC 12 watershed to determine suitability to continue to manage Left Foot Creek as Trout water. Additional temperature monitoring, fish surveys, and habitat surveys should be completed above and below Left Foot Lake.
- Conduct temperature monitoring and fish surveys in mid to upper reaches of Peterman Brook to verify natural community and trout stream classification
- Conduct temperature monitoring and fish surveys on the Unnamed Tributary to Little River within the designated Class III segment to verify natural community and trout stream classification.
- Conduct culvert passage assessment within the watershed to evaluate crossings for fish passage.
- Support the development, implementation, and post implementation monitoring for a 9-Key Element Plan in coordination with Marinette County in the Lower Peshtigo River Watershed.

Ecological, Aquatic Resources

Trout Waters

DNR uses three categories to classify the different types of trout streams throughout Wisconsin. These are evident in Wisconsin Trout Stream Maps, which provides a comprehensive list of trout streams and a set of trout stream maps covering the majority of the state. Efforts have been made to list all trout streams in the State of Wisconsin, but it is recognized that this listing is not exhaustive. Trout waters in this watershed are listed in Table 1.

High quality trout waters (Class I) that have sufficient natural reproduction to sustain populations of wild trout, at or near carry capacity. Consequently, streams in this category require no stocking of hatchery trout. These streams or stream sections are often small and may contain small or slow-growing trout, especially in the headwaters. Class II streams may have some natural reproduction, but not enough to utilize available food and space. Therefore, stocking is required to maintain a desirable sport fishery. These streams have good survival and carryover of adult trout, often producing some fish larger than average size. Class III are marginal trout habitat with no natural reproduction occurring. They require annual stocking of trout to provide trout fishing. Generally, there is no carryover of trout from one year to the next.

Table 1: Trout waters located in the Lower Peshtigo River watershed (GB07)

Local Waterbody Name	WBIC	Start Mile	End Mile	Trout Class
Left Foot Creek	524500	5.09	7.98	CLASS II
Peterman Brook	525400	1.88	3	CLASS II
Creek 30-10	583300	0	4.74	CLASS III

Impaired Waters

Every two years, Section 303(d) of the Clean Water Act requires states to publish a list of all waters that do not meet water quality standards. The list, also known as the Impaired Waters List, is updated to reflect waters that are newly added or removed based on new information. Impaired waters in this watershed are impaired for historical discharges, mine tailings, and runoff issues.

Impaired waters in the Lower Peshtigo River watershed (GB07) include the Green Bay and the Peshtigo River and the impairments are contaminated fish tissue and contaminated sediment with the pollutants mercury, and PCBs (Table 2).

Table 2: Impaired waters in the Lower Peshtigo River watershed (GB07)

Local Name	WBIC	Start Mile	End Mile	Pollutant	Impairment	Sources	303 Status
Green Bay (Gl Shoreline)	70	0	8.94	PCBs	Contaminated Fish Tissue	Sediment Resuspension (Contaminated Sediment)	303d Listed
Peshtigo Flowage	515800	0	393.15	Mercury	Contaminated Fish Tissue	Atmospheric Deposition - Toxics	303d Listed
Peshtigo River	515500	0	11.5	Mercury	Contaminated Fish Tissue, Sediment	Contaminated Sediments, Atmospheric Deposition - Toxics	303d Listed

Monitoring Project Discussion

Purpose of Project

The purpose of this project was to monitor the contemporary status of streams within the Lower Peshtigo Watershed. The Department and Marinette County desired current fish, habitat, macroinvertebrate, and water chemistry data for streams in this watershed. The data are used to determine whether these streams are achieving their designated use, assess the overall health of the watershed, and provide guidance to Marinette County for developing a 9-Key elements plan to address non-point source issues in the watershed.

Site Selection and Study Design

The initial monitoring work was completed in 2014 at 30 sites and follow-up monitoring was conducted at 20 sites in 2015. Sites were selected so data was not biased toward stream order, location, or natural community; however sites were targeted based on access and the desire to focus a sample station on a particular stream reach. Sample stations were established to limit outside influences and set-up using DNR field procedures manuals of 35 times the mean stream width (Modified from Simonson, et al. 1994). Stations were no less than the minimum of 100 meters and no more than the maximum of 400 meters. The main branch of the Peshtigo River is largely considered non-wadeable. Two non-wadeable sites were sampled in 2014 in the lower sections and two were sampled using wadeable protocols in 2015 in the upper sections.

Table 3: List of monitoring stations for the Lower Peshtigo River TWA

WBIC	Waterbody Name	Station	Station Name
516100	Bundy Creek	10020596	Bundy Creek- CTH B
516100	Bundy Creek	10042548	Bundy Creek- Town Hall Rd (East)
516100	Bundy Creek	10042806	Bundy Creek- Town Hall Rd (West)
516100	Bundy Creek	10016804	Bundy Creek -Townline Rd

WBIC	Waterbody Name	Station	Station Name
517100	Gravelly Brook	383183	Gravelly Br - Gravelly Brook Rd
517100	Gravelly Brook	10041620	Gravelly Brook @ Peshtigo River
524500	Left Foot Creek	383254	Left Foot Creek - 5th Rd
524500	Left Foot Creek	10042722	Left Foot Creek - Loop Lake Rd
524500	Left Foot Creek	10042721	Left Foot Creek - US 141
583200	Little River	10039303	Little River - Hwy BB
583200	Little River	10021853	Little River -Krause Road
516900	Mud Brook	10042723	Mud Brook - CTH G
516900	Mud Brook	383175	Mud Brook – Mud Brook Rd
515500	Peshtigo River	383081	Peshtigo River – below Peshtigo Dam
515500	Peshtigo River	10042950	Peshtigo River- CTH W
515500	Peshtigo River	10043930	Peshtigo River- Left Foot Creek
525400	Peterman Brook	10043983	Peterman Brook -Riverview Rd
516000	Sucker Brook	10042807	Sucker Brook - Aubin St
516000	Sucker Brook	10042944	Sucker Brook- CTH E
515900	Trout Creek	10041618	Trout Creek - Hwy D
515900	Trout Creek	10043555	Trout Creek - Jandt Rd
515900	Trout Creek	10016931	Trout Creek - Townline Rd
3000624	Unnamed	10042724	UNT to Lake Michigan - CTH BB
498000	Unnamed	10041617	UNT to Lake Michigan- Spitzmacher Rd
497900	Unnamed	10038400	UNT To Lake Michigan- CTH Y
524600	Unnamed	10042939	UNT to Left Foot Creek - 22nd St
524800	Unnamed	10042938	UNT to Left Foot Creek - Devils Lake Rd
5008966	Unnamed	10042825	UNT to Peshtigo River - CTH B
516300	Unnamed	10041619	UNT to Peshtigo River - Right of Way Rd
5008538	Unnamed	10042720	UNT to Peshtigo River - River Dr
5008721	Unnamed	10042310	UNT to Peshtigo River - STH 64
515600	Unnamed	10042808	UNT to Peshtigo River- CTH BB
5008359	Unnamed	10042940	UNT to Peshtigo River- Snowmobile Trail Crossing
5008962	Unnamed	10042936	UNT to Trout Creek - Aubin St

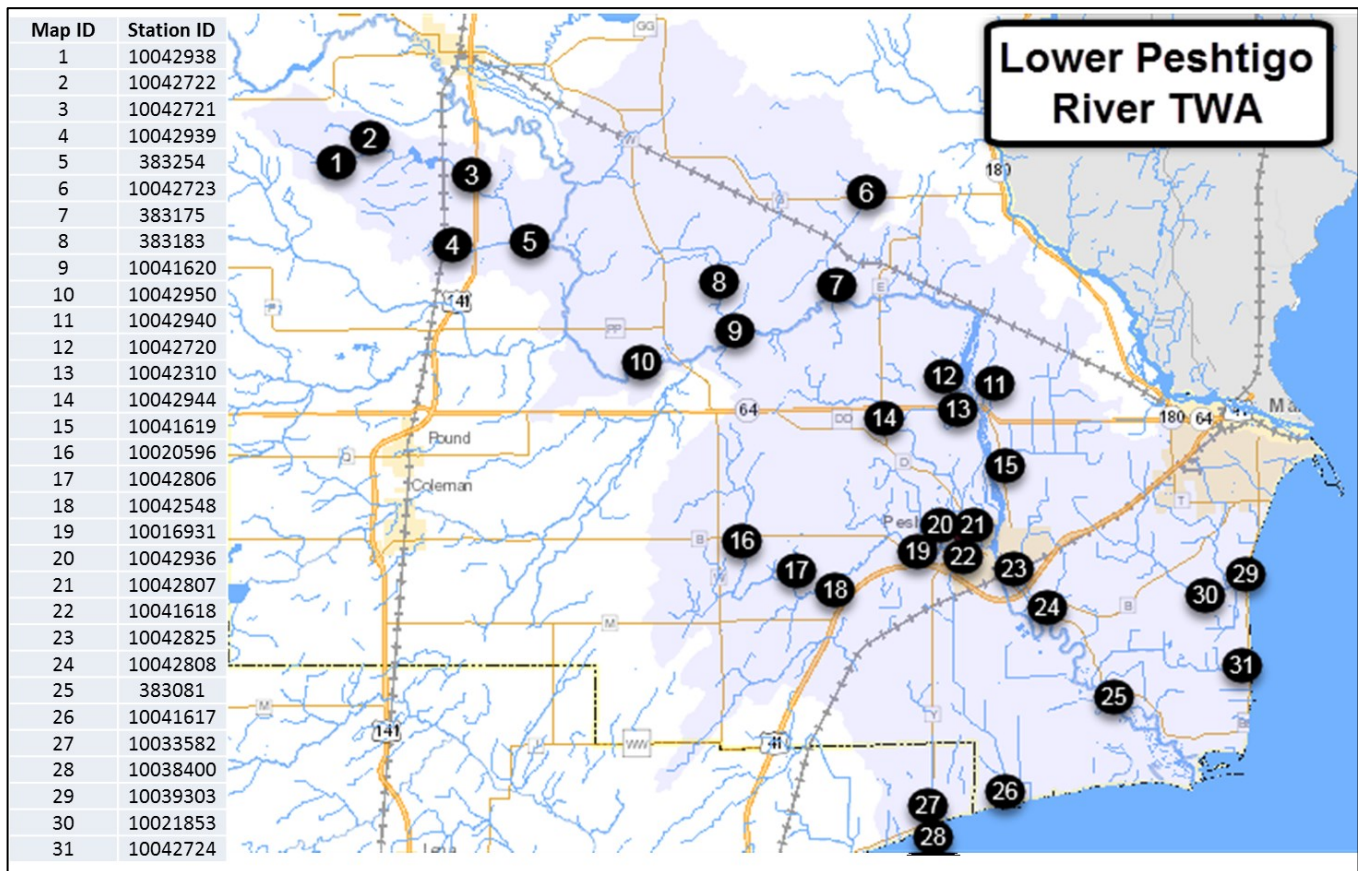


Figure 4: Map of monitoring stations for the Lower Peshtigo River TWA

Methods, Equipment and Quality Assurance

Collection of total phosphorus (TP), continuous water temperatures, quantitative habitat, fish, and aquatic macroinvertebrates used standard DNR data collection methods and samples were sent to certified laboratories in the state for specific analysis. No specific in-field duplicates, replicates or blanks were collected for the study; however quality assurance sampling procedures were used in the collection and preservation of samples for all parameters.

Total Phosphorus (TP)

TP Samples were collected by a Water Action Volunteer, Greg Cleereman with Marinette County, at the specific pour point locations of the major tributaries to the Lower Peshtigo River. Standard DNR grab sampling methods were used to collect a total of 48 samples (Table 4). All samples were shipped to Wisconsin State Laboratory of Hygiene (WISLOH) for analysis. The WISLOH entered all sample analysis data into the Surface Water Integrated Monitoring System (SWIMS) database.

Continuous Temperature

Onset continuous temperature loggers were placed in 26 sites in 2014 and collected water temperature readings at 15 minute intervals to ascertain daily maximum average temperatures throughout the summer, approximately May through October.

Fish Assemblage

The fisheries assemblage was determined by a quantitative survey involving electroshocking a section of stream with a minimum station length of 35 times the mean stream width (Lyons, 1992). All fish were collected, identified, and counted. All gamefish were measured for length. All other DNR sampling protocols were used to assess the fish community for purposes of calculating the index of biotic integrity. DNR staff entered the fish data into the DNR Fisheries Database.

Habitat Surveys

Habitat was evaluated throughout each fish survey station. Quantitative habitat survey station lengths were 35 times the mean stream width of the survey station. Following the determination of station length, the station was divided into 12 transects. At each transect, substrate, sedimentation, erosion, water depth, and riparian land use data were collected. DNR staff entered the quantitative habitat data into the DNR Fisheries and Habitat Management Database (FHMD).

Macroinvertebrates

All sites were sampled using the DNR Guidelines for Collecting Macroinvertebrate Samples from Wadable Streams (2000). A D-shaped kicknet with 600 micron mesh was used at all sites by standing upstream from the net and placing it firmly on the stream bed while digging into the substrate with the heel or toe to free the macroinvertebrates from the substrate. Riffles were targeted at each of the sites, but if none were present then overhanging vegetation, woody debris, or other vegetation would be sampled. For a representative sample of the aquatic macroinvertebrate community, a minimum of 100 aquatic macroinvertebrates collected in each sample was targeted. The aquatic macroinvertebrates were preserved in a 70-80% ethanol solution inside quart "Mason" jars. If necessary, multiple "Mason" jars were used per sample depending upon how much sediment and organic material was collected with the aquatic macroinvertebrates. Within the next 24 hours, the samples were re-preserved with another 70-80% ethanol solution. Samples were taken to the University of Wisconsin-Stevens Point Aquatic Entomology Laboratory (UWSP AEL) for lowest possible taxonomic identification. Staff at the UWSP AEL entered the data into the SWIMS database upon final taxonomic identification.

Project Results

Total Phosphorus

All inorganic chemistry samples were sent to the WISLOH in Madison for analysis. Three of the 15 stream samples in this project had an average TP concentration (mg/L) exceeding the NR 102 water quality criteria (WQC) for creeks and rivers of 0.075 mg/L (Table 4). Wisconsin Consolidated Assessment and Listing Methodology (WisCALM 2018) requires a parametric statistical approach to assess creek TP data against the applicable water quality criterion found in NR 102. This approach involves the calculation of a 90% confidence limit around the median of a TP sample dataset. If the lower 90% confidence limit (LCL) exceeds the criterion for TP, then that creek segment (assessment unit) is considered to be exceeding the criterion. The LCLs were calculated for each creek's TP samples (Table 4). None of the streams sampled calculated LCLs met the water quality criterion for TP (Figure 5 and Figure 6).

Table 4: Total Phosphorus Concentrations and Average in 15 streams in the Lower Peshtigo River Watershed in 2014 and 2015

2014											
SWIMS Station ID	Waterbody Name	May	June	July	August	September	October	Mean	Median	Lower 90% Median	Upper 90% Median
10033582	UNT TO LM in Oconto Park	0.068	0.081	0.029	0.066	0.066	0.040	0.059	0.066	0.044	0.069
10071617	UNT to LM Spitzmacher Rd	0.059	0.067	0.038	0.036	0.063	0.057	0.053	0.058	0.044	0.061
10039303	Little River	0.046	0.053	0.049	0.044	0.044	0.033	0.045	0.045	0.039	0.049
10043555	Trout Creek	0.062	0.108	0.049	0.134	0.071	0.136	0.093	0.089	0.067	0.112
10041619	UNT to Peshtigo River	0.046	0.082	0.070	0.061	0.043	0.058	0.060	0.059	0.050	0.067
383175	Mud Brook	0.017	0.051	0.045	0.044	0.030	0.037	0.037	0.040	0.027	0.045
10041620	Gravelly Brook	0.016	0.041	0.022	0.024	0.026	0.026	0.026	0.025	0.026	0.030
383254	Left Foot Creek	0.016	0.029	0.017	0.021	0.016	0.023	0.020	0.019	0.017	0.023
2015											
SWIMS Station ID	Waterbody Name	May	June	July	August	September	October	Mean	Median	Lower 90% Median	Upper 90% Median
10042808	UNT to Peshtigo	0.019	0.042	0.033	0.040	0.023	0.017	0.029	0.028	0.021	0.034
10042825	UNT to Peshtigo River	0.031	0.035	0.031	0.025	0.036	0.018	0.029	0.031	0.025	0.033
10042936	UNT to Trout Creek	0.056	0.080	0.212	0.238	0.072	0.036	0.116	0.076	0.058	0.145
10042807	Sucker Brook	0.039	0.061	0.034	0.093	0.021	0.029	0.046	0.037	0.029	0.056
10016931	Trout Creek	0.061	0.119	0.052	0.127	0.041	0.030	0.072	0.057	0.044	0.069
10042720	UNT to Peshtigo River	0.016	0.058	0.037	0.073	0.023	0.024	0.039	0.031	0.024	0.048
10043555	Trout Creek	0.079	0.129	0.046	0.448	0.030	0.023	0.126	0.063	0.047	0.122
10042548	Bundy	0.063	0.130	0.033	0.061	0.056	0.035	0.063	0.059	0.041	0.076

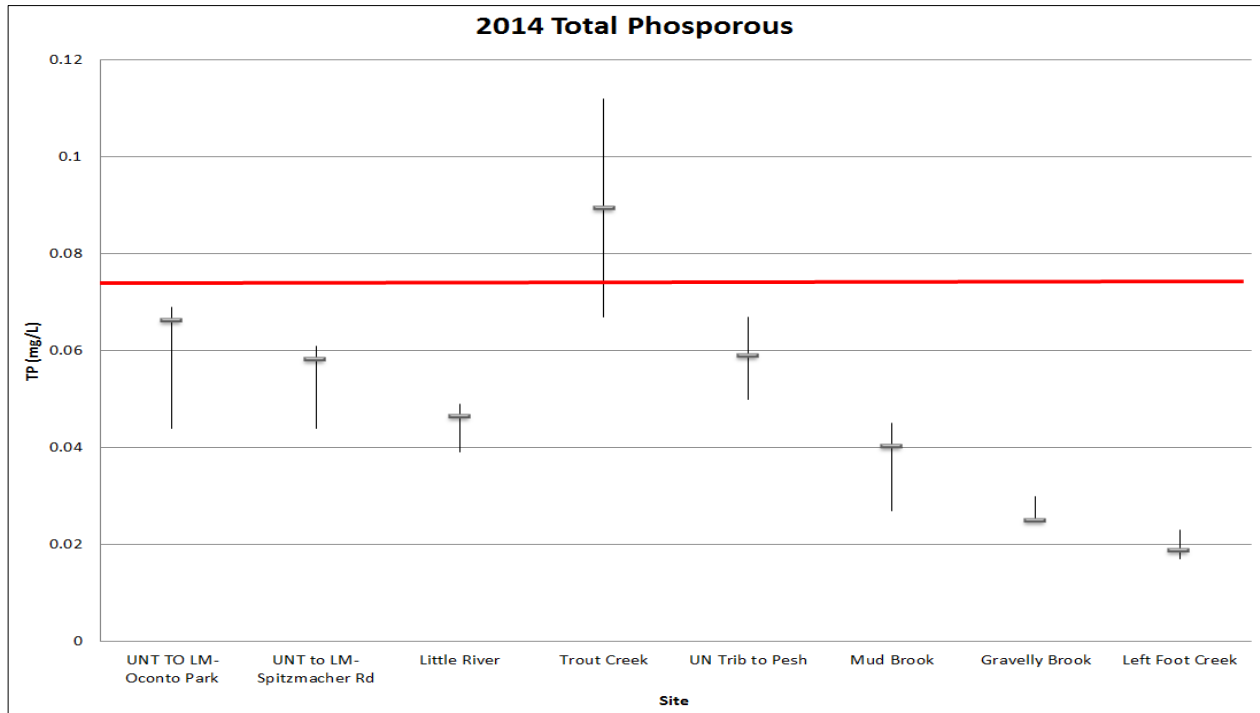


Figure 5: Lower 90% confidence limit of total phosphorus concentrations in 2014 at various stations.

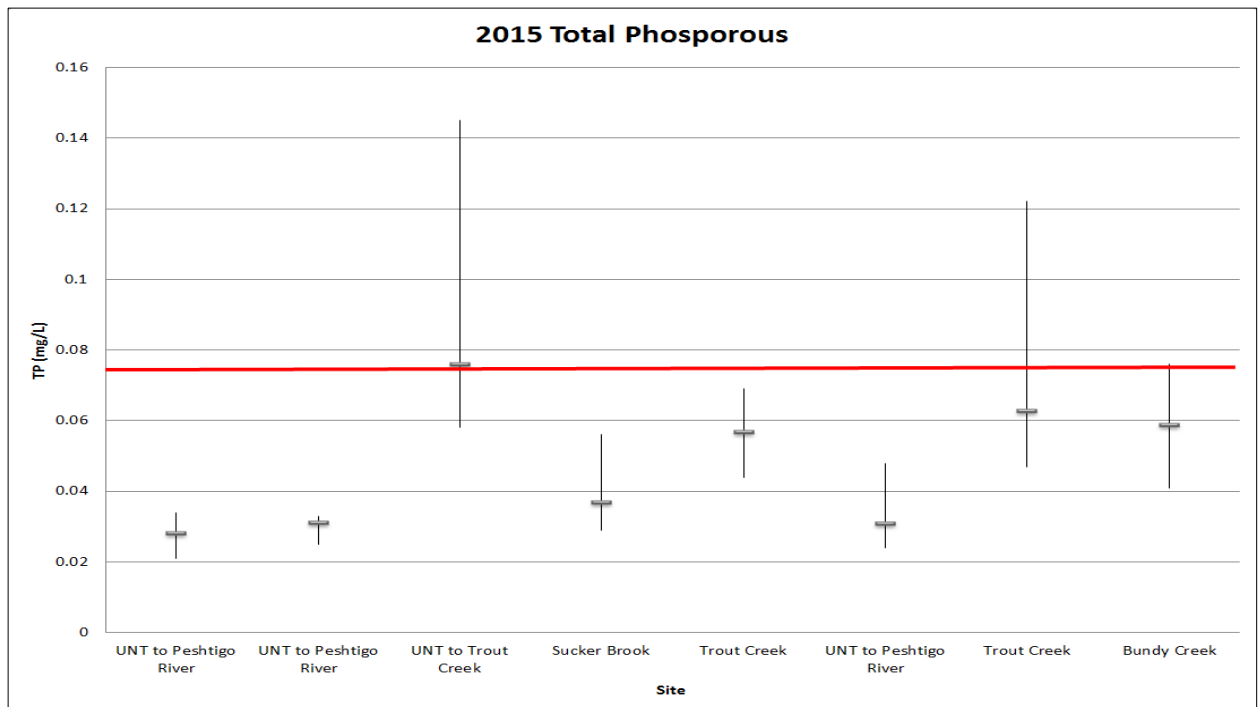


Figure 6: Lower 90% confidence limit of total phosphorus concentrations in 2015 at various stations.

Continuous Water Temperature

Continuous water temperature loggers were placed at 26 sites in the Lower Peshtigo River Watershed in 2014 (Table 5 and Appendix C). Continuous water temperatures were recorded on 15 minute intervals to assess water temperatures compared to their modeled natural community thermal regime. Three loggers were damaged, lost or removed by fisherman so 23 sites have data available.

Table 5. Continuous Water Temperature monitoring sites in the Lower Peshtigo River Watershed (GB07)

WBIC	Water body Name	Station	Station Name
497900	Unnamed	10038400	UNT To Lake Michigan- CTH Y
498000	Unnamed	10041617	UNT to Lake Michigan- Spitzmacher Rd
515600	Unnamed	10042808	UNT to Peshtigo River- CTH BB
515900	Trout Creek	10041618	Trout Creek - Hwy D
516000	Sucker Brook	10042807	Sucker Brook - Aubin St
516000	Sucker Brook	10042944	Sucker Brook- CTH E
516100	Bundy Creek	10042548	Bundy Creek- Town Hall Rd (East)
516100	Bundy Creek	10042806	Bundy Creek- Town Hall Rd (West)
516100	Bundy Creek	10016804	Bundy Creek -CTH B (DS)
516300	Unnamed	10041619	UNT to Peshtigo River - Right of Way Rd
516300	Unnamed	383175	Mud Brook – Mud Brook Rd
516900	Mud Brook	10042723	Mud Brook - CTH G
524500	Left Foot Creek	383254	Left Foot Creek - 5th Rd
524500	Left Foot Creek	10042721	Left Foot Creek - US 141
524600	Unnamed	10042939	UNT to Left Foot Creek - 22nd St
524600	Unnamed	10042938	UNT to Left Foot Creek - Devils Lake Rd
583200	Little River	10039303	Little River - Hwy BB
3000624	Unnamed	10042724	UNT to Lake Michigan - CTH BB
3000624	Unnamed	10042940	UNT to Peshtigo River- Snowmobile Trail Crossing
5008359	Unnamed	10042720	UNT to Peshtigo River - River Dr
5008538	Unnamed	10042310	UNT to Peshtigo River - STH 64
5008721	Unnamed	10042936	UNT to Trout Creek - Aubin St
5008962	Unnamed	10042825	UNT to Peshtigo River - CTH B

Fish Assessments

Fish surveys were completed on 30 stream sites between May and September in 2014 and on 20 follow-up stream sites between May and September in 2015. Some fish species are tolerant of environmental degradation, some species are moderately tolerant, and some others are intolerant. Based upon the representative fish collected during the survey and their associated tolerance to environmental degradation, a Fish Index of Biotic Integrity (FIBI) was calculated to indicate the water quality of the streams in the Lower Peshtigo River Watershed. The FIBI scores ranged from 0 to 100. Sites with lower scores that were suspected to have environmental degradation were sampled a second time in 2015. Of

the 50 fish surveys completed, 24 had a condition of poor, 12 had a condition of Fair, 9 had a condition of Good, and 5 had a condition of excellent (Table 6, Figure 7 and 8).

Table 6. Fish Index of Biotic Integrity (FBI) scores and ratings, Lower Peshtigo Watershed (GB07) 2014, 2015.

WBIC	Name	Station	Station Name	Value	Condition (Year)
497900	Unnamed	10038400	UNT To Lake Michigan- CTH Y	50	Fair ('14)
498000	Unnamed	10041617	UNT to Lake Michigan- Spitzmacher Rd	0	Very Poor ('14)
498000	Unnamed	10041617	UNT to Lake Michigan- Spitzmacher Rd	0	Vary Poor ('15)
515500	Peshtigo River	10042950	Peshtigo River- CTH W	65	Good (NW)
515500	Peshtigo River	10042950	Peshtigo River- CTH W	90	Excellent ('15)
5582027	Unnamed	383081	Peshtigo River – Below Peshtigo Dam	85	Excellent (NW)
515500	Peshtigo River	10043930	Peshtigo River- Left Foot Creek	100	Excellent ('15)
515600	Unnamed	10042808	UNT to Peshtigo River- CTH BB	20	Poor ('14)
515600	Unnamed	10042808	UNT to Peshtigo River - CTH BB	20	Poor ('15)
515900	Trout Creek	10016931	Trout Creek - Townline Rd	60	Fair ('15)
515900	Trout Creek	10043555	Trout Creek - Jandt Rd	20	Poor ('15)
515900	Trout Creek	10041618	Trout Creek - Hwy D	50	Fair ('14)
516000	Sucker Brook	10042807	Sucker Brook - Aubin St	20	Poor ('14)
516000	Sucker Brook	10042807	Sucker Brook - Aubin St	10	Poor ('15)
516000	Sucker Brook	10042944	Sucker Brook- CTH E	30	Poor ('14)
516000	Sucker Brook	10042944	Sucker Brook- CTH E	0	Poor ('15)
516100	Bundy Creek	10020596	Bundy Creek- CTH B	10	Poor ('14)
516100	Bundy Creek	10020596	Bundy Creek CTH B	10	Poor ('15)
516100	Bundy Creek	10042548	Bundy Creek- Town Hall Rd	60	Fair ('14)
516100	Bundy Creek	10042548	Bundy Creek- Town Hall Rd	50	Fair ('15)
516100	Bundy Creek	10042806	Bundy Creek- Town Hall Rd	40	Fair ('14)
516100	Bundy Creek	10042806	Bundy Creek- Town Hall Rd	50	Fair ('15)
516100	Bundy Creek	10016804	Bundy Creek -Townline Rd	40	Fair ('14)
516100	Bundy Creek	10016804	Bundy Creek -Townline Rd	40	Fair ('15)
516300	Unnamed	10041619	UNT to Peshtigo River - Right of Way Rd	50	Fair ('14)
516900	Mud Brook	383175	Mud Brook – Mud Brook Rd	50	Good ('14)
516900	Mud Brook	10042723	Mud Brook - CTH G	20	Poor ('14)
517100	Gravelly Brook	383183	Gravelly Br - Gravelly Brook Rd	80	Excellent ('14)
517100	Gravelly Brook	10041620	Gravelly Brook @ Peshtigo River	80	Excellent ('14)
524500	Left Foot Creek	383254	Left Foot Creek - 5th Rd	100	Excellent ('14)
524500	Left Foot Creek	10042721	Left Foot Creek - US 141	90	Good ('14)
524500	Left Foot Creek	10042722	Left Foot Creek - Loop Lake Rd	80	Good ('14)
524600	Unnamed	10042939	UNT to Left Foot Creek - 22nd St	20	Poor ('14)

WBIC	Name	Station	Station Name	Value	Condition (Year)
524800	Unnamed	10042938	UNT to Left Foot Creek - Devils Lake Rd	0	Very Poor ('14)
583200	Little River	10021853	Little River -Krause Road	70	Good ('14)
583200	Little River	10021853	Little River -Krause Road	60	Good ('15)
583200	Little River	10039303	Little River - Hwy BB	60	Good ('14)
3000624	Unnamed	10042724	UNT to Lake Michigan - CTH BB	20	Poor ('14)
3000624	Unnamed	10042724	UNT to Lake Michigan - CTH BB	10	Poor ('15)
5008359	Unnamed	10042940	UNT to Peshtigo River- Snowmobile Trail	10	Poor ('14)
5008359	Unnamed	10042940	UNT to Peshtigo River- Snowmobile Trail	20	Poor ('15)
5008538	Unnamed	10042720	UNT to Peshtigo River - River Dr	30	Poor ('14)
5008538	Unnamed	10042720	UNT to Peshtigo River - River Dr	30	Poor ('15)
5008721	Unnamed	10042310	UNT to Peshtigo River - STH 64	20	Poor ('14)
5008721	Unnamed	10042310	UNT to Peshtigo River - STH 64	40	Fair ('15)
5008962	Unnamed	10042936	UNT to Trout Creek - Aubin St	20	Poor ('14)
5008962	Unnamed	10042936	UNT to Trout Creek - Aubin St	70	Good ('15)
5008966	Unnamed	10042825	UNT to Peshtigo River - CTH B	30	Poor ('14)
5008966	Unnamed	10042825	UNT to Peshtigo River - CTH B	0	Poor ('15)
525400	Peterman Brook	10043983	Peterman Brook -Riverview Rd	90	Good ('15)



Unnamed tributary of Left Foot Creek

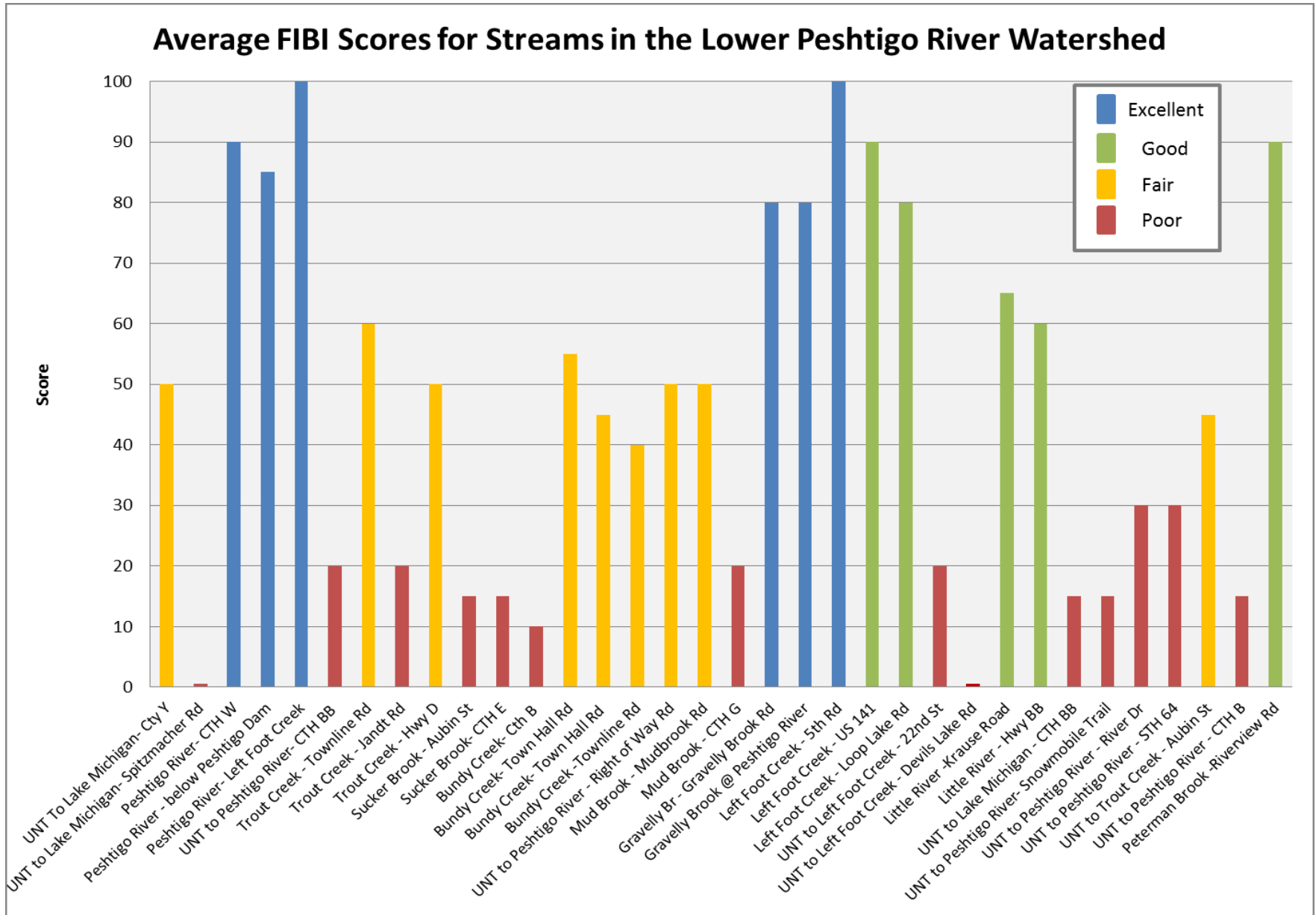


Figure 7: FIBI Scores and Ratings in the Lower Peshtigo River Watershed averages from 2014 and 2015

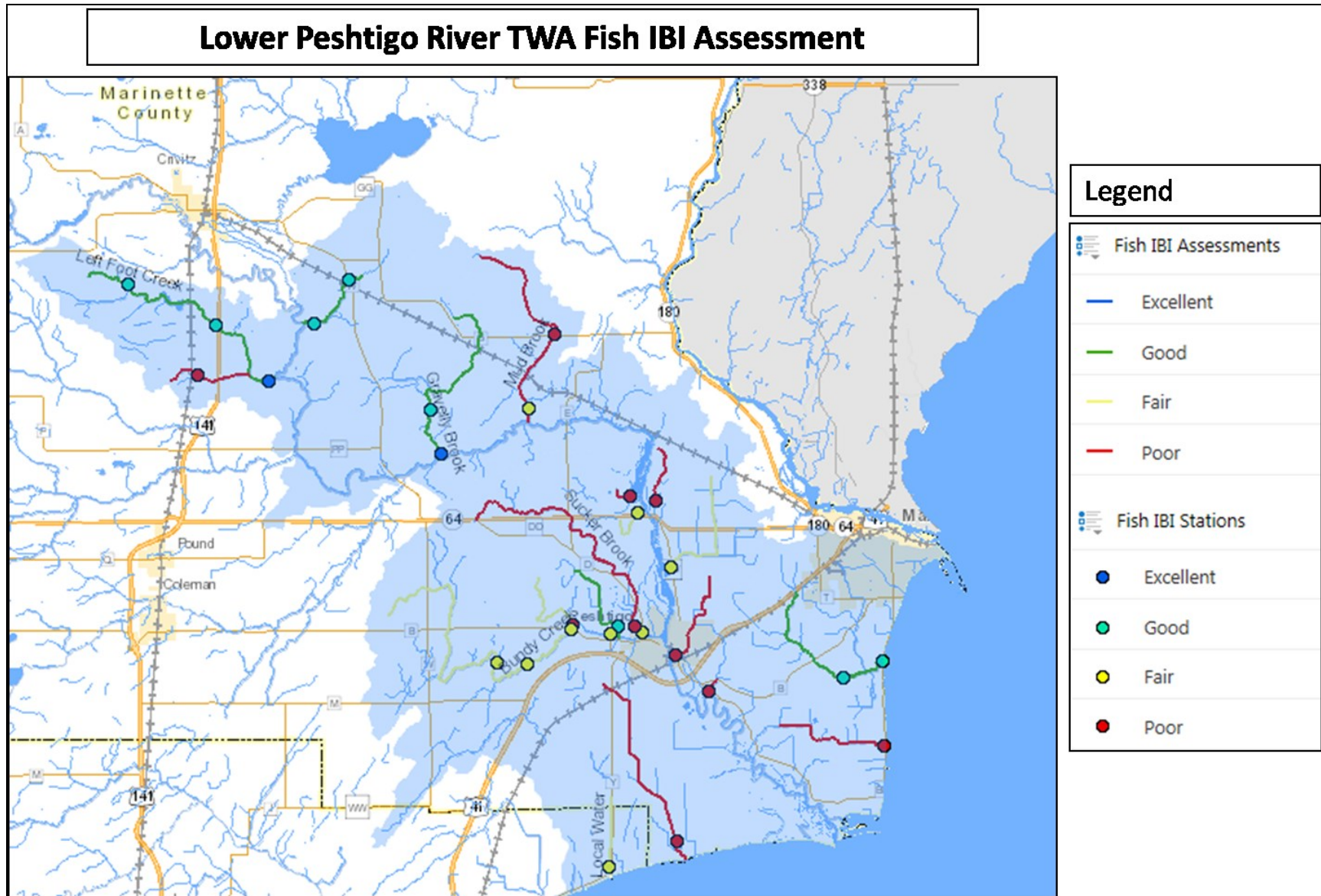


Figure 8: Map of FIBI Scores and Ratings in the Lower Peshtigo River TWA

Macroinvertebrates

In the fall of 2014, macroinvertebrate samples were collected from streams for the purpose of calculating macroinvertebrate Index of Biotic integrity (MIBI). Some aquatic macroinvertebrate species are tolerant of environmental degradation, some species are moderately tolerant, and some others are intolerant. Based upon the representative macroinvertebrate samples collected and their associated tolerance to environmental degradation, the m-IBI was calculated to indicate the water quality condition of the stream (Table 7, Figure 8). The MIBI scores ranged from 0.63 to 11.10. A few sites with suspected environmental degradation were sampled a second time in 2015. Of the 40 samples analyzed from 32 sites, 18 samples rated poor to fairly poor and scored less than 4.00 which demonstrated these sites are likely impacted from environmental degradation.

Table 7: Macroinvertebrate Index of Biotic Integrity (MIBI) scores and ratings in the Lower Peshtigo River Watershed (GB07) 2014 and 2015.

WBIC	Name	Station	Station Name	Value	Condition (Year)
497900	Unnamed	10038400	UNT To Lake Michigan- CTH Y	2.32	Poor
498000	Unnamed	10041617	UNT to Lake Michigan- Spitzmacher Rd	5.41	Good ('14)
498000	Unnamed	10041617	UNT to Lake Michigan- Spitzmacher Rd	4.50	Fair ('15)
515500	Peshtigo River	10042950	Peshtigo River- CTH W	6.92	Good
5582027	Unnamed	383081	Peshtigo River - Channel Mile 3.92	85 (NW)	Excellent
515600	Unnamed	10042808	UNT to Peshtigo River- CTH BB	3.05	Fair ('14)
515600	Unnamed	10042808	UNT to Peshtigo River - CTH BB	1.75	Poor ('15)
515900	Trout Creek	10016931	Trout Creek - Townline Rd	0.54	Poor ('14)
515900	Trout Creek	10016931	Trout Creek - Townline Rd	0.63	Poor ('15)
515900	Trout Creek	10043555	Trout Creek - Jandt Rd	2.73	Fair ('15)
515900	Trout Creek	10041618	Trout Creek - Hwy D	3.47	Fair
516000	Sucker Brook	10042807	Sucker Brook - Aubin St	4.75	Fair
516000	Sucker Brook	10042807	Sucker Brook - Aubin St	1.83	Poor ('15)
516000	Sucker Brook	10042944	Sucker Brook- CTH E	3.12	Fair
516100	Bundy Creek	10020596	Bundy Creek- CTH B	3.35	Fair ('14)
516100	Bundy Creek	10020596	Bundy Creek CTH B	5.22	Good ('15)
516100	Bundy Creek	10042548	Bundy Creek- Town Hall Rd	5.24	Good ('14)
516100	Bundy Creek	10042548	Bundy Creek- Town Hall Rd	3.28	Fair ('15)
516100	Bundy Creek	10042806	Bundy Creek -Townline Rd	4.32	Fair
516300	Unnamed	10041619	UNT to Peshtigo River - Right of Way Rd	4.00	Fair
516900	Mud Brook	383175	Mud Brook – Mud Brook Rd	3.97	Fair
516900	Mud Brook	10042723	Mud Brook - CTH G	3.58	Fair
517100	Gravelly Brook	383183	Gravelly Br - Gravelly Brook Rd	7.21	Good
517100	Gravelly Brook	10041620	Gravelly Brook @ Peshtigo River	10.00	Excellent

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WBIC	Name	Station	Station Name	Value	Condition (Year)
524500	Left Foot Creek	383254	Left Foot Creek - 5th Rd	6.10	Good
524500	Left Foot Creek	10042721	Left Foot Creek - US 141	8.80	Excellent
524500	Left Foot Creek	10042722	Left Foot Creek - Loop Lake Rd	11.10	Excellent
524600	Unnamed	10042939	UNT to Left Foot Creek - 22nd St	3.42	Fair
524800	Unnamed	10042938	UNT to Left Foot Creek - Devils Lake Rd	5.36	Good
583200	Little River	10021853	Little River -Krause Road	6.64	Good
583200	Little River	10039303	Little River - Hwy BB	0.93	Poor
3000624	Unnamed	10042724	UNT to Lake Michigan - CTH BB	5.93	Good ('14)
3000624	Unnamed	10042724	UNT to Lake Michigan - CTH BB	0.78	Poor ('15)
5008359	Unnamed	10042940	UNT to Peshtigo River- Snowmobile Trail	4.42	Fair
5008538	Unnamed	10042720	UNT to Peshtigo River - River Dr	4.59	Fair
5008721	Unnamed	10042310	UNT to Peshtigo River - STH 64	4.63	Fair
5008962	Unnamed	10042936	UNT to Trout Creek - Aubin St	3.70	Fair
5008966	Unnamed	10042825	UNT to Peshtigo River - CTH B	4.34	Fair ('14)
5008966	Unnamed	10042825	UNT to Peshtigo River - CTH B	5.22	Good ('15)
525400	Peterman Brook	10043983	Peterman Brook -Riverview Rd	6.02	Good ('15)



Little River Hwy BB Photo by Andy Hudak

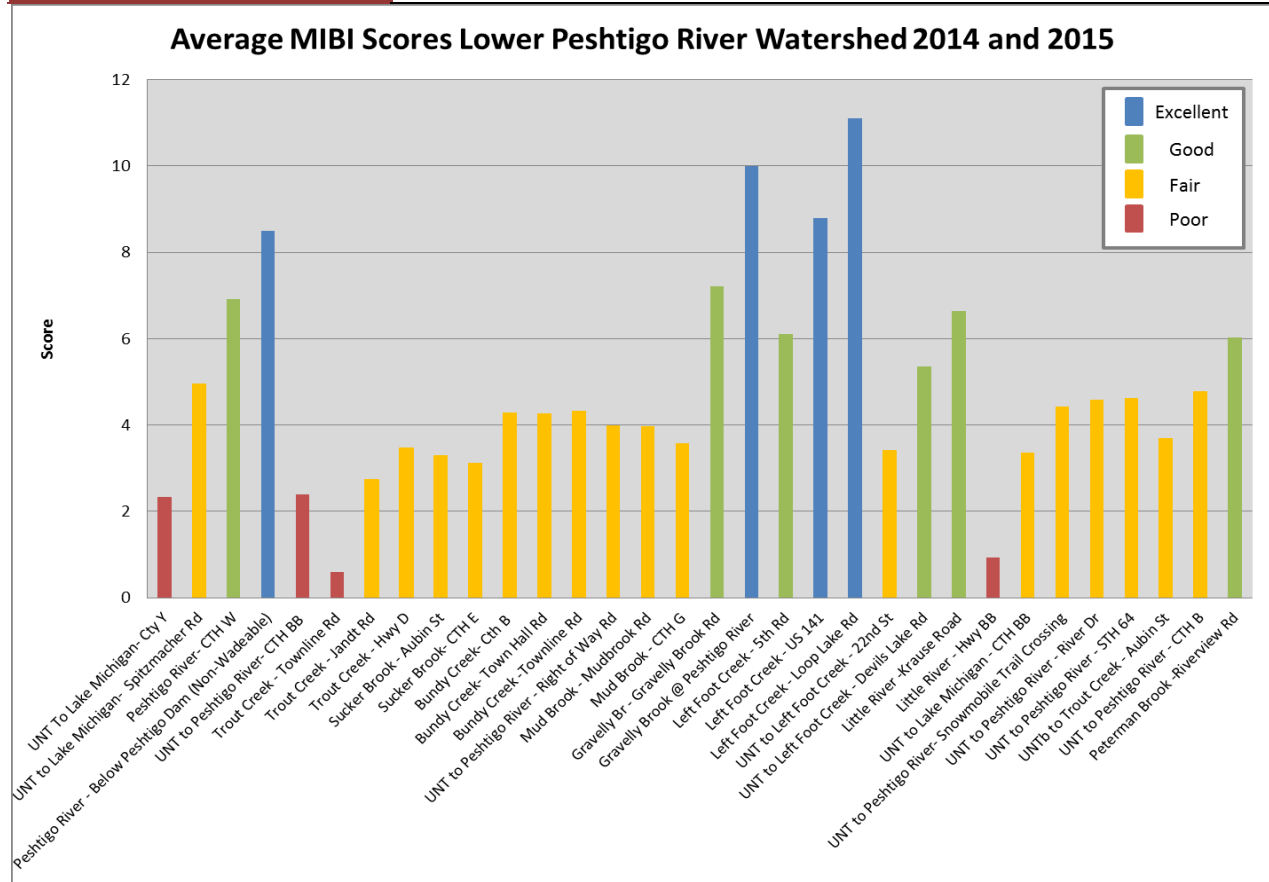


Figure 8: Average MIBI Scores and Ratings in the Lower Peshtigo River Watershed

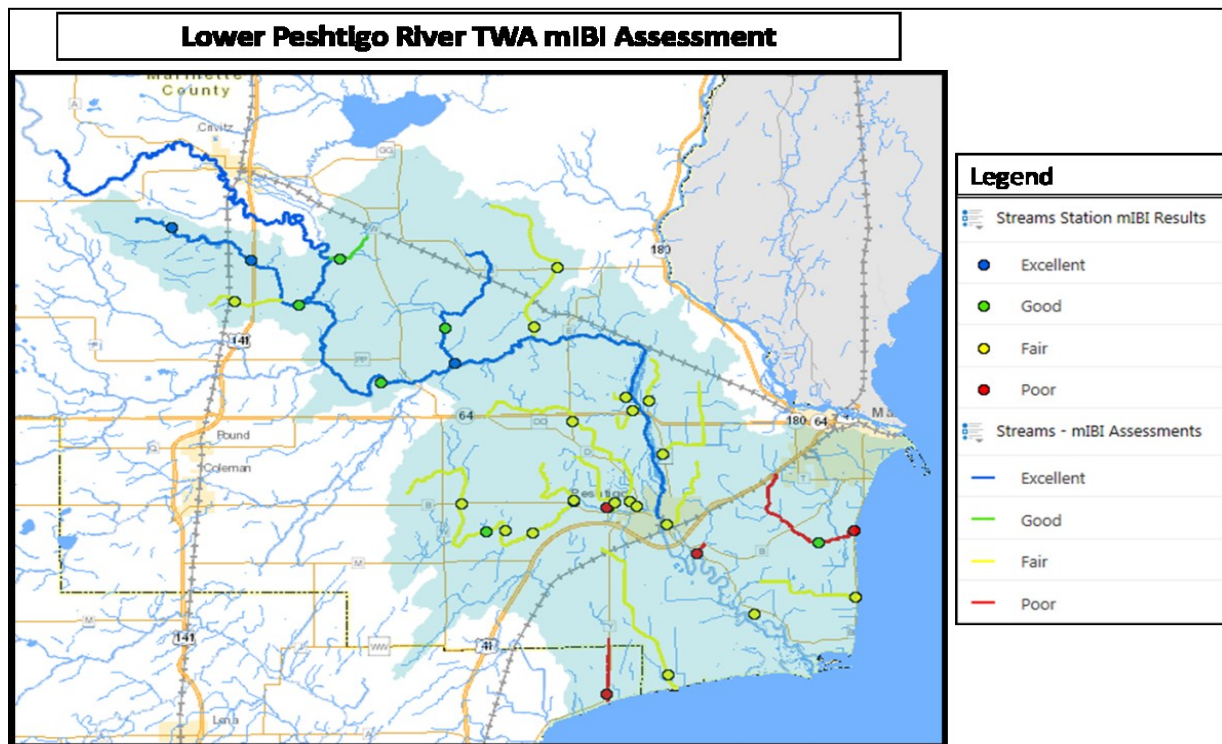


Figure 9: Map of MIBI Scores and Ratings in the Lower Peshtigo River Watershed

Habitat Assessments

Quantitative habitat assessments evaluate a representative stream reach (35 X Mean Stream Width) for the quantity and quality of habitat for fish and compare the habitat to reference streams in Wisconsin. Based upon the assessment data collected during the 2014 surveys, a habitat rating was calculated for the 30 small streams less than 10m wide and two large streams greater than 10 m wide. (Table 9, Figure 10). The habitat rating scores were relatively similar for all streams and half scored in the Fair range and half scored in the Good range. The greatest factor influencing the score and rating of Fair to Good is the amount of fish cover present and the mean buffer width.



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Table 9. Habitat scores, rating, and metrics scores in the Lower Peshtigo River Watershed (GB07) 2015.

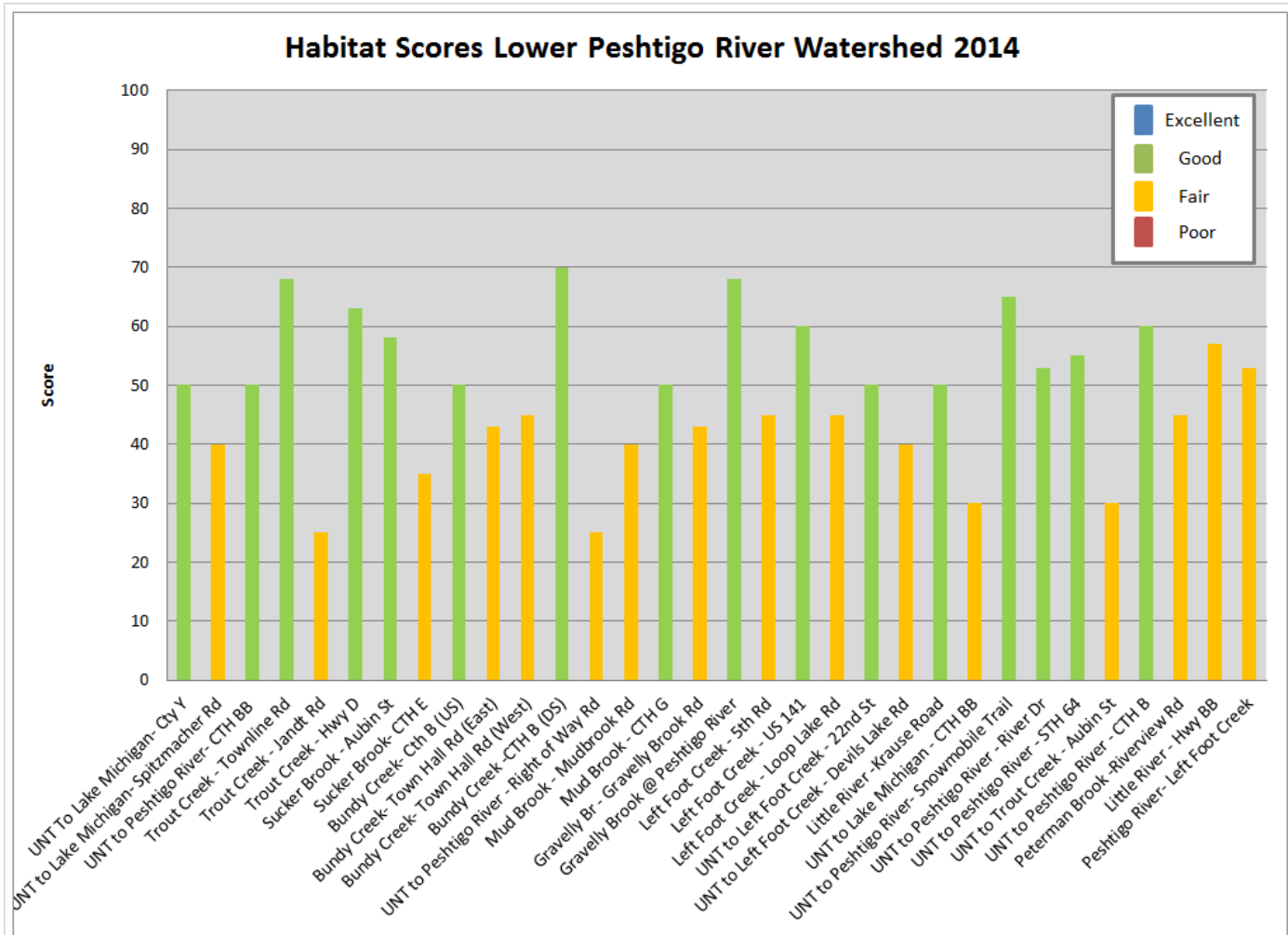
Water body Name	WBIC	SWIMS ID	Station Name	MSW (m)	Flow (CMS)	Buffer Score	Erosion Score	Pool Score	W:D Score	Riff:Riff Score	Bend: Bend Score	Fine Sed Score	Fish Cover Score	Score Small	Rating Small
Unnamed	497900	10038400	UNT To Lake Michigan- CTH Y	3	0.039	10	10	0	10	15	0	5	0	50	Good
Unnamed	498000	10041617	UNT to Lake Michigan- Spitzmacher Rd	3	0.088	10	5	0	10	0	15	0	0	40	Fair
Unnamed	515600	10042808	UNT to Peshtigo River- CTH BB	2	0.045	15	10	0	10	0	15	0	0	50	Good
Trout Creek	515900	10016931	Trout Creek - Townline Rd	6	0.0452	10	15	3	5	15	5	5	15	68	Good
Trout Creek	515900	10043555	Trout Creek - Jandt Rd	3	0.0198	10	5	0	10	0	0	0	0	25	Fair
Trout Creek	515900	10041618	Trout Creek - Hwy D	8	1	10	10	3	10	0	15	0	15	63	Good
Sucker Brook	516000	10042807	Sucker Brook - Aubin St	4	0.169	15	10	3	10	0	15	0	5	58	Good
Sucker Brook	516000	10042944	Sucker Brook - CTH E	1.5	0.11	5	15	0	10	0	0	0	5	35	Fair
Bundy Creek	516100	10020596	Bundy Creek- CTH B (US)	3	0.002	15	5	0	10	15	15	5	0	50	Good
Bundy Creek	516100	10042548	Bundy Creek- Town Hall Rd (East)	5	0.402	0	15	3	10	0	15	0	0	43	Fair
Bundy Creek	516100	10042806	Bundy Creek- Town Hall Rd (West)	6	0.359	10	5	0	10	15	5	5	0	45	Fair
Bundy Creek	516100	10016804	Bundy Creek -CTH B (DS)	7	0.022	15	15	0	10	0	15	0	15	70	Good
Unnamed	516300	10041619	UNT to Peshtigo River - Right of Way Rd	4	0	10	10	0	5	0	0	0	0	25	Fair
Mud Brook	516900	383175	Mud Brook – Mud Brook Rd	3	0	10	10	0	10	0	5	0	5	40	Fair
Mud Brook	516900	10042723	Mud Brook - CTH G	3	0.02	15	10	0	10	0	15	0	0	50	Good
Gravelly Brook	517100	383183	Gravelly Br - Gravelly Brook Rd	4	0.031	10	0	3	10	0	15	0	5	43	Fair
Gravelly Brook	517100	10041620	Gravelly Brook @ Peshtigo River	6	0.405	15	15	3	10	0	15	0	10	68	Good
Left Foot Creek	524500	383254	Left Foot Creek - 5th Rd	7	0.4	10	10	0	5	15	15	5	0	45	Fair
Left Foot Creek	524500	10042721	Left Foot Creek - US 141	8	0.266	10	15	0	5	0	15	0	15	60	Good
Left Foot Creek	524500	10042722	Left Foot Creek - Loop Lake Rd	5	0.105	15	15	0	0	0	15	0	0	45	Fair
Unnamed	524600	10042939	UNT to Left Foot Creek – 22nd	1.2	0.011	10	10	0	10	0	5	0	15	50	Good

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Water body Name	WBIC	SWIMS ID	Station Name	MSW (m)	Flow (CMS)	Buffer Score	Erosion Score	Pool Score	W:D Score	Riff:Riff Score	Bend: Bend Score	Fine Sed Score	Fish Cover Score	Score Small	Rating Small
Unnamed	524800	10042938	UNT to Left Foot Creek - Devils Lake Rd	1.5	0.01	10	5	0	10	0	15	0	0	40	Fair
Little River	583200	10021853	Little River -Krause Road	4	0.314	15	5	0	10	0	15	0	5	50	Good
Unnamed	3000624	10042724	UNT to Lake Michigan - CTH BB	2.5	0.024	10	10	0	10	0	0	0	0	30	Fair
Unnamed	5008359	10042940	UNT to Peshtigo River- Snowmobile Trail	3	0.21	15	15	0	10	0	15	0	10	65	Good
Unnamed	5008538	10042720	UNT to Peshtigo River - River Dr	3	0.025	10	10	3	10	15	0	5	0	53	Good
Unnamed	5008721	10042310	UNT to Peshtigo River - STH 64	3	0.078	15	15	0	10	0	0	5	10	55	Good
Unnamed	5008962	10042936	UNT to Trout Creek - Aubin St	3	0.136	10	10	0	10	0	0	0	0	30	Fair
Unnamed	5008966	10042825	UNT to Peshtigo River - CTH B	2.5	0.088	10	5	0	10	15	0	5	15	60	Good
Peterman Brook	525400	10043983	Peterman Brook -Riverview Rd	5	0.001	15	10	0	5	15	15	0	0	45	Fair
Little River	583200	10039303	Little River - Hwy BB	10	0.25	12	0	12	25	0	8			57	Fair
Peshtigo River	515500	10043930	Peshtigo River- Left Foot Creek	60	NA	12	0	0	25	8	8			53	Fair

Figure 10: Quantitative habitat survey scores and rating conditions for streams in the Lower Peshtigo River Watershed (GB07).



Discussion

Overall River and Stream Health

Most of the streams in the Lower Peshtigo River watershed are modeled to be cool-warm transitional headwater streams (Lyons, 2008). The department has developed a methodology to determine whether or not the modeled natural community is accurate based on the fishery assemblage and climate conditions (Lyons, 2013). In most cases, the modeled natural community was accurate but only about 70% of the time. When the methodology was applied, additional cool-warm transitional streams were identified and two additional streams had sufficient flow and size to be considered main-stem streams rather than headwater stream. It is interesting to note that almost a two-thirds of the streams are considered cool-warm transitional headwater streams yet when looking at the continuous temperature readings from the summer of 2014, most streams in the system were in the range of cool-cold to Coldwater thermal regimes. During the summer season of 2014 and 2015, over which the temperature

loggers were deployed, air temperatures were slightly cooler and precipitation was slightly drier in both years than normal but these were not considered extreme weather occurrences. It is unlikely the weather during these periods affected the fish community assemblages observed in 2014 or 2015. Environmental degradation can sometimes explain the discrepancy between the modelled and actual community where there is a lack of intolerant species and a dominance of tolerant ones. For the streams surveyed only three contained tolerant fish communities that prevented a new natural community classification from being proposed and two of these had low numbers of fish species collected. For all the newly proposed natural community changes, only four changes required an alternative IBI to be calculated. With the application of the new IBI all four sites improved in both score and rating. For all other changes in natural community between cool-cold, cool-warm, and warm headwater streams, the proposed change did not alter the IBI that was applied and thus scores and ratings stayed with the original under the small stream IBI.

There was great diversity throughout the watershed including 41 different fish species, which was not to be unexpected with the close proximity of some sites to Lake Michigan and the mainstem of the Peshtigo River. The most dominant fish species as far as percent of total catch (35%) and number of surveys (n=46%) was the Central Mudminnow. Other species that comprised a high percentage of the total catch include White Sucker (14%), Common Shiner (8%), Hornyhead Chub (6%), Creek Chub (5%), Burbot (5%), Brook Stickleback (4%), Northern Pike (3%), Johnny Darter (2%), and Yellow Perch (2%). Species that were captured in a large number of surveys include White Sucker (29), Northern Pike (26), Johnny Darter (19), Brook Stickleback (18), Mottled Sculpin (15), Burbot (14), Creek Chub (13), Common Shiner (12), Rock Bass (10), and Yellow Perch (8).

The percent of tolerant versus intolerant species is weighted heavily toward a tolerant community based in part from the Central Mudminnow and White Sucker comprising almost 50% of the total catch alone. It was promising to see that two intolerant species the Mottled Sculpin and Rock Bass were located in 18 surveys but at a much lower percentage of the overall percent catch.

Overall, habitat scores in the Lower Peshtigo River Watershed were fair to good. Generally habitat scores throughout the watershed were depressed from lack of pools, poor riffle sequences, extensive fines, and lack of cover for fish. Extensive deposits of sand exist in many of the streams which have filled in pools and buried rock and gravel. The extensive deposits of sand may be legacy sand during the late 1800's logging era when white pine forests were clear-cut and extensive sedimentation into streams and rivers occurred. Given current land use, hydrologic modifications, and Biologists' observations in the Trout and Bundy Creek sub-watershed, small tributary streams to Lake Michigan and the Peshtigo River, there are suggestions of environmental degradation. Streams such as Gravelly Brook, Mud Creek, Peterman Brook, Little River and Left Foot Creek are generally in good conditions with limited environmental degradation.

Nutrient management is a growing concern in the watershed. Grazing pressure appears light with a few exceptions of cattle that were allowed free access to Bundy Creek. Banks within this area were in good conditions and showed little to no erosion and appear to be managed appropriately to at least prevent bank trampling and instability. A general trend in the watershed appears to be fewer dairy farms but existing farms are favoring larger herd sizes housed in barns with reduced pressure to pasturing of dairy herds. This provides unique challenges in manure management, storage and application. Cash cropping

practices are the most significant portion of agricultural land use in the watershed, promoting limited crop residue after harvest.

The macroinvertebrate data showed a consistent theme with streams such as Gravelly Brook, Mud Creek, Peterman Brook, Little River and Left Foot Creek having good to excellent MIBI scores. Streams identified as being subject to environmental degradation such as streams in the Trout and Bundy Creek sub-watershed and tributaries to Lake Michigan and the Peshtigo River scored in the poor to fair range with a few exceptions. The MIBI has shown the combination of watershed land cover and local riparian and instream conditions strongly influence one another (Weigel, 2003). This relationship was reaffirmed through biologists' observations and comparison of the FIBI, MIBI, and the habitat scores on streams within the watershed.

Growing season total phosphorous concentrations were fairly consistent between the streams and sites in 2014 and 2015 with the exception of Trout Creek and an UNT to Trout Creek. The department's listing methodology for impaired waters (WDNR, 2013) recommends listing sites where the median phosphorus concentration exceeds 0.075 mg/l on wadeable streams and 0.1 mg/l on rivers. The impairment listing protocol uses a 95% confidence interval about the median for listing streams and rivers as impaired for total phosphorous. This guidance may have been exceeded in Trout Creek in 2014 and the UNT to Trout Creek in 2015. It is likely the yearly total phosphorous concentrations in these two streams are influenced by non-point sources in the watershed and may vary depending on agricultural practices.

Growing season total phosphorous samples were not collected on the Peshtigo River for this project however the DNR collects quarterly samples on the Peshtigo River downstream of US 41. These samples indicate that the Peshtigo River clearly meets the water quality criteria for Total Phosphorous and is not impaired by Total Phosphorous concentrations.

Management Actions

Management Priorities

Focus efforts to reduce non-point source impacts in the Trout and Bundy Creek Subwatershed and the small tributaries to Lake Michigan and the Peshtigo River below Hwy 64. Efforts should focus on landowners willingness to improve stream buffers, manage manure and inorganic nutrient application, improve tillage practices to prevent upland soils losses, and improve overall soil health in the watershed.

Monitoring and Assessment Recommendations

- The lower segment of Trout Creek should be considered for listing on the State's 303(d) list of impaired waters for a degraded macroinvertebrate community.
- Five Unnamed Tributaries should be considered for listing on the State's 303(d) list of impaired waterbodies for degraded biological communities. The UNT to Lake Michigan at Spitzmacher (498000) and CTH BB (3000624) along with the UNT to Peshtigo River at River Dr. (5008538), the Snowmobile Crossing (5008359) and CTH BB (515600).
- Conduct follow-up monitoring on Mud Brook to re-evaluate for impairments by pollutant other than Total Phosphorous.

- Conduct additional surveys in the Left Foot Creek HUC 12 watershed to determine suitability to continue to manage Left Foot Creek as Trout water. Additional temperature monitoring, fish surveys, and habitat surveys should be completed above and below Left Foot Lake.
- Conduct temperature monitoring and fish surveys in mid to upper reaches of Peterman Brook to verify natural community and trout stream classification
- Conduct temperature monitoring and fish surveys on the Unnamed Tributary to Little River within the designated Class III segment to verify natural community and trout stream classification.
- Conduct additional TP monitoring, Fish and Macroinvertebrate monitoring on Trout Creek upstream of Jandt Road.

Management Recommendations for DNR

- Investigate the installation of an unauthorized rock dam upstream of Loop Lake Road that may act as a fish passage barrier.
- Conduct a culvert passage assessment within the watershed to evaluate crossings for fish passage.

Management Recommendations for External Partners

- Support the development, implementation, and post implementation monitoring for a 9-Key Element Plan in coordination with Marinette County in the Lower Peshtigo River Watershed.



Appendix A: References

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Appendix B: Stream Narratives

Peshtigo River, WBIC: 515500

The Peshtigo River flows approximately 136 miles from its headwaters in Forest County southeast through Marinette County before its confluence with Green Bay. The portion within the Lower Peshtigo River Watershed is approximately 17 miles from the outlet of Lake Noquebay to Potato Rapids flowage and another 11.5 miles from the dam at the Peshtigo Flowage to the Bay of Green Bay. Two hydroelectric dams are located on the River, the Potato Rapids Dam and the Peshtigo Dam. Potato Rapids dam has a hydraulic head of 14 ft. and impounds 281 acres of the Peshtigo River to create the Potato Rapids Flowage. The Potato Rapids Flowage is relatively shallow with almost entirely natural shorelines with little development.

The Peshtigo Dam has a hydraulic head of 12 ft. and impounds 232 acres of the Peshtigo River to create the Peshtigo Flowage which extends to the tail waters of the Potato Rapids Dam. The Peshtigo Flowage is relatively shallow with most of the shoreline in residential development. The Peshtigo River from Green Bay up to the first dam provides seasonal runs of fish including Trout, Salmon, Walleye, Muskellunge, Northern Pike, Lake Sturgeon, and Suckers. The Lower Peshtigo River watershed has generally good to excellent water quality. Various chemical parameters are sampled quarterly from a Long Term Water Chemistry site on the Peshtigo River in Peshtigo.

Total Phosphorous concentrations meet state water quality standards and other parameters such as Orthophosphate, Total Suspended Solids, Chlorophyll A, and Ammonia- Nitrogen have been showing downward trends since the mid 1970's. Other parameters such as Nitrate-Nitrite Nitrogen, Total Kjeldahl Nitrogen, and Chlorides have been slowly increasing during this same time period but still are below concentrations that may lead to impairments. Biological sampling near the Long Term Trend water chemistry location was conducted by assessing the Non-wadeable Macroinvertebrate IBI and Non-wadeable fish IBI scores which both rated as excellent. Wadeable Fish IBI scores also rated as excellent upstream of CTH W and upstream of the confluence of Left Foot Creek while the macroinvertebrate score rated as Good. The main goal for continued protection of the Lower segment of the Peshtigo River should prioritize the protection of ecosystem diversity and critical habitats. This can largely be accomplished by identifying critical sites for stream bank protection, in-stream habitat improvement, proper road crossing installations, shoreline corridor protection through support of the local shoreline ordinance, and the continued protection of adjacent wetlands.

Gravelly Brook, WBIC: 517100

Gravelly Brook, in the Lower Peshtigo River Watershed, is a 7.71 mile cool-warm mainstem Tributary to the Peshtigo River. There is very little agriculture in this sub-watershed with limited rural development. There is one small seasonal campground on a man-made private lake. Extensive wooded wetlands consisting of cedar swamp and upland mixed northern hardwood forest provide protection to this stream from the headwaters down to the confluence of the Peshtigo River. The stream has good gradient and flow that supports a moderately diverse but excellent fish community up to 13 species. The most notable observations were the number of young of the year Burbot. While other tributaries to the Peshtigo River provide spawning and nursery habitat for Burbot, Gravelly Brook provides far and above the most suitable habitat for this top predatory species. It is also important to note that three species of intolerant species find suitable conditions in Gravelly Brook, Rock Bass, Mottled Sculpin, and Lamprey *Ammocoetes*, most Likely Northern Brook Lamprey. The stream appears to be limited by

legacy fine sediment in the form of sand from historic logging impacts dating back to the late 1800's. These fine sediments continue to limit habitat availability in the mid to upper reaches of the stream and habitat rated as fair to good.

Left Foot Creek, WBIC: 524500

Left Foot Creek, in the Lower Peshtigo River Watershed, is a 7.98 mile stream that originates within an Unnamed Spring and flows through Devils Lake and Left Foot Lake on its way towards the confluence of the Peshtigo River. The upper 2.5 miles from the Unnamed Spring to the confluence of Left Foot Lake is managed as a Class II trout stream. This segment was modeled as a cool-cold headwater stream but the fish community assemblage was representative of a cool-warm headwater stream. No Coldwater species were encountered but this segment achieved a good rating. As the stream exits Left Foot Lake, the natural community was verified as a cool-warm mainstem. There were 18 different species of fish which rated this segment of stream in the excellent category.

Lamprey Ammocoetes, Mottled Sculpin, Northern Hog Sucker, and Rock Bass all comprised the intolerant species observed within this segment of stream. Generally habitat scores ranged from fair to good with lack of fish habitat and extensive fines as limiting factors. Stream buffers are well established however the upper portion of this sub-watershed is dominated by agriculture land use. This area of the sub-watershed lies within the Northeast Sands ecological landscape and center pivot irrigation utilizing high capacity wells are on the rise. Surprisingly enough, this segment of the Left Foot Creek scored the highest rating of excellent for the macroinvertebrate IBI within the entire Lower Peshtigo River Watershed. The remainder of Left Foot Creek rated in the good to excellent range. Overall Left Foot Creek displays excellent water quality but may be subject to environmental degradation due to land use, development, and agricultural practices in the watershed.

Mud Brook, WBIC: 516900

Mud Brook, in the Lower Peshtigo River Watershed, is a 7.38 mile cool-warm headwater tributary stream to the Peshtigo River that transitions from a headwater stream to a main-stem stream for approximately the last mile as it approaches the Peshtigo River. Near this transition, a small dam and impoundment once existed on Mud Creek that pre-dates the Department's records and likely served some purpose during the logging era or the Chicago, Milwaukee, St. Paul and Pacific Railroad. Mud Creek below this transition had a moderately diverse fish community of transitional species and scored in the good range while above this transition the fish community was poor with decreased diversity and dominance by Central Mudminnows and young-of-the-year Burbot. Land use in the sub-watershed is generally forested with more agricultural dominated lands within the mid-segments of the stream. Two small gravel pits are located within the sub-watershed in close proximity to Mud Brook and their impact on overall stream conditions is unknown. Lack of pools, riffles, extensive fines, and limited fish habitat were factors impacting the overall habitat scores. Nutrients in the form of Total Phosphorous meet state standards and do not appear to be impacting the macroinvertebrate community which rated as fair. Although the lower portions of Mud Brook appear to be in stable condition, the upper reaches may be limited by unknown impairments.

Peterman Brook, WBIC: 525400

Peterman Brook, in the Lower Peshtigo River Watershed, is a 6.38 mile diverse cool-cold headwater tributary to the Peshtigo River. There is a 1.1 mile long segment currently listed as a class II trout

stream and Brook Trout were most recently surveyed in this segment in 2010. Peterman Brook rated good on both the fish and macroinvertebrate index but display some limitations in habitat by lack of cover for fish, absence of pools and extensive fines. Land use practices such as online ponds, wetland fill, ditching, and conventional agricultural practices in the mid to upper segments of the watershed continue to threaten the overall stream conditions.

Little River, WBIC: 583200

Little River, in the Lower Peshtigo River Watershed, is a 7.24 mile Tributary to bay of Green Bay and Lake Michigan. The lower 1.4 miles of the Little River is affected by seiche effect from the Bay and water levels fluctuate greatly based on wind patterns. This segment is consistent with a cool-warm main-stem based on the fish community assemblage and is rated good. The macroinvertebrate community rated as poor but appears to be affected by factors other than Total Phosphorous concentrations as these values were within the range that meets state water quality standards. The upper 5.84 miles of the Little River has a cool-cold headwater natural community where Mottled Sculpin dominated the fish community. One other species to note that has become naturalized within the community is the Round Goby. Numbers of Round Goby do not appear to be limiting the potential of this stream however it appears that Round Goby consisted of anywhere between 3-20% of the overall fish community which could have adverse effects in the upper cool-cold headwater segment of the river where they may out compete native fishes for space and resources.

Sucker Brook, WBIC: 516000

Sucker Brook, in the Lower Peshtigo River Watershed, is a 9.10 mile Tributary to Trout Creek. Agriculture is the dominant land use within the watershed of this stream with scattered rural development and wetlands. This stream has seen significant hydrologic modifications in the form of ditching, straightening, and realigning to facilitate agricultural production. Old open gravel pit quarries have been abandoned and are now ponds located in the lower half of the sub-watershed.

Sucker Brook is cool-warm transitional headwater that has a poor fish community. It is mainly comprised of Central Mudminnows and Northern Pike and had one of the lowest diversities of any stream within the entire Lower Peshtigo River watershed especially when considering its size. Macroinvertebrate scores were in the low fair range but total phosphorous concentrations sampled in 2015 indicate the site is clearly meeting water quality criteria. It is likely the most limiting factor affecting the quality of Sucker Brook is habitat and overall stream conditions. Land use practices such as online ponds, field tiling, wetland filling, ditching, and conventional agricultural in the mid to upper reaches continue to threaten the overall stream conditions.

Trout Creek, WBIC: 515900

Trout Creek, in the Lower Peshtigo River Watershed, is a 6.62 mile Tributary to the Peshtigo River. This stream originates as a spring in a small wetland complex and flows through agriculturally dominated lands prior to the confluence of Bundy Creek. This headwater section is considered a cool-warm headwater with a poor fish community with only Central Mudminnow and White Suckers observed. The macroinvertebrate IBI scored in the fair category but based on total phosphorous data collected may exceed state water quality criteria. Land use is likely causing environmental degradation in the upper reaches of this stream. The lower reaches of this stream is highly influenced by the contribution of Bundy Creek and the proximity to the Peshtigo River. This site may meet state water quality criteria for

Total Phosphorous but has a degraded biological community when assessing the macroinvertebrate index of biotic integrity. Although the lower reaches gain considerably in size and flow, the natural community is still considered a cool-warm headwater. The fish community is considered fair and dominated by Central Mudminnow during most surveys. The lower reaches contain suitable habitat for northern Pike spawning and nursery habitat and likely help support the Northern Pike population within the Peshtigo Flowage and Peshtigo River. One surprising find during a survey was the abundance of Mottled Sculpin, an intolerant, coldwater species. Although no species of trout have ever been encountered during various years of surveys on Trout Creek, some local residents report the stream was named to reflect trout that once existed in the system. It is difficult to ascertain if Trout Creek ever harbored a population of Brook Trout or if during years of advantageous conditions, Brook Trout migrated down from coldwater streams in the Mid-Peshtigo River watershed to Trout Creek. Current land use, habitat conditions, and marginal water quality conditions are likely not conducive for Brook Trout to become established.

Bundy Creek, WBIC: 516100

Bundy Creek, in the Lower Peshtigo River Watershed, is a 12.98 mile Tributary to Trout Creek. This stream originates by the convergence of surface water flows in the upper segment before additional contributions of surface water and ground water near Town Hall Road. Fish habitat above Town Hall Road is limited by flow and during dry periods flow is often intermittent. Very few fish were collected in the upper reaches during surveys in 2014 and 2015. Surveys from the mid to lower reaches of the stream were supported by adequate flow and habitat to support a low diversity, Cool-Warm headwater community that scored fair for the Fish IBI. Bundy Creek provides excellent spawning and nursery habitat for Northern Pike as this surpassed by far all other streams in the Lower Peshtigo River for young of the year Northern Pike. Mottled Sculpin, a coldwater intolerant species, was observed at two sites in the mid reaches of the stream. The dominant land use within the Bundy Creek sub-watershed is agriculture but limited agricultural practices such as dredging, straightening, or re-alignment have not occurred to the extent and degree as they have in other parts of the Lower Peshtigo River watershed. The lack of hydrologic modifications have left the habitat scores variable from the upper to lower reaches with scores ranging from lower fair to higher good. Fine sediment and lack of fish habitat are a general theme limiting habitat scores on Bundy Creek. With the intensive agriculture that is present in the sub-watershed, it was anticipated that Total Phosphorus concentrations may exceed standards but concentrations were within the “may meet” criteria. The macroinvertebrate IBI scores ranged from Fair to Good. With the extensive agriculture in the watershed, buffers, nutrient management, and soil health should all be high priorities to prevent water quality declines in Bundy Creek.

Unnamed Tributary to Lake Michigan, WBIC: 3000624

The Unnamed Tributary to Lake Michigan is a 3.54 mile tributary that drains into Green Bay. This small cool-warm headwater stream has been highly altered for agricultural purposes including dredging, straightening, and realigning dating back prior to 1938. These hydrologic modifications lead to a poor fish community, fair macroinvertebrate community, and a low fair habitat score. It is not surprising that the stream does not have any resemblance of riffle, run, and pool morphology, is void of fish habitat, and is dominated by excessive fines. Current land use within the drainage for this stream has changed over the years toward more undisturbed forested land uses since small tract farms are less prevalent in this streams watershed. What little agricultural land remains appears to be in cash crop operations. This stream would benefit from channel restoration but this may not pose to be a feasible alternative since forested wetlands have recaptured most of the stream corridor. It is likely the stream may remain

in its current state for many years to come as the straightened ditches continue to provide limited habitat for aquatic life.

Unnamed Tributary to Lake Michigan, WBIC: 498000

The Unnamed Tributary to Lake Michigan is a 6.01 mile tributary that drains into Green Bay. This small stream was modeled as Coldwater and has been highly altered for agricultural purposes including dredging, straightening, and realigning dating back prior to 1938. These hydrologic modifications to improve drainage of wet soils lead to a poor fish community, fair to Good macroinvertebrate community, and a fair habitat score. The current land use is intensive cash crop grain agriculture in all but the uppermost reaches of the stream. Small tracts of agricultural acreage in this streams' watershed has reverted back to forested and shrub-carr wetland. For all practical purposes intensive agriculture continues and relies on this stream for proper drainage to make farming more productive in the wet soils.

Nutrients in the form of Total Phosphorous does not appear to be a contributing factor to the condition of the stream based on monitoring results meeting water quality criteria. Stream conditions are directly correlated to historic hydrologic modifications and land use that minimize stream buffers, limit stream morphology, reduce fish habitat, and allow for depositions of fine sediments. The modeled natural community of this stream may be more representative of a cool-cold or cool-warm headwater stream but based on the percent of tolerant individuals and lack of intolerant individuals a new natural community classification will not be proposed. This stream and the adjacent land border the project area for Green Bay West Shores- Peshtigo Unit. It is currently not within the project boundary but the inclusion of this stream and adjacent land should be considered within the acquisition boundary. This stream provides unique connectivity to Green Bay for fish species and ample opportunities exist for restoration projects that could improve wetlands and provide numerous opportunities for Northern Pike spawning habitat.

Unnamed Tributary to Lake Michigan, WBIC: 497900

The Unnamed Tributary to Lake Michigan is a 3.24 mile tributary that drains into Green Bay. This small cool-warm headwater stream has been historically altered and currently flows along CTH Y as a roadside ditch. The origin of this hydrologic modification does not appear to be for agricultural purposes but appears to have originated from the construction of the County highway after 1938. Even with this hydrologic modification and flowing along CTH Y within a roadside ditch, the habitat rated as good however the fish community IBI rated as fair and the macroinvertebrate IBI as poor. It would appear that impacts and degradation to the stream would from a pollutant other than Total Phosphorous as sample results indicate the stream is meeting the state water quality criteria. The lower reaches of this stream currently provide good spawning and/or nursery habitat for two species of interest in Green Bay, the North Pike and Yellow Perch.

Unnamed Tributary to Left Foot Creek, WBIC: 524600

The Unnamed Tributary is a 4.13 mile tributary Left Foot Creek. This small cool-warm headwater tributary stream had a poor rating for the fish IBI, a fair rating for the macroinvertebrate IBI with an overall good habitat rating. The mid to lower segment of this stream flows through relatively undisturbed cedar swamp wetlands with an only a small portion adjacent to high intensity agriculture. The upper segment of this stream originates as convergence of upland drainage within agricultural land

use. The potential of this stream may be limited by factors attributable to adjacent land use, intermittent flows, or a combination of both.

Unnamed Tributary to Left Foot Creek, WBIC: 524800

The Unnamed Tributary is a 3.03 mile tributary Left Foot Creek. This small coldwater tributary stream had a poor rating for the fish IBI, good rating for the macroinvertebrate IBI and with an overall habitat rating of fair. The upper segment of this stream originates as convergence of upland drainage within agricultural land use and through a mix of wetland types as it approaches Left Foot Creek. The headwaters of this stream are likely affected from center pivot irrigation in that pivot well heads are located along the stream thread at the headwaters. Online ponds in the mid reaches may have been constructed within or in close proximity to springs which may be further limiting the potential of this small stream to support coldwater species. Only two species of tolerant transitional species were observed during the surveys which may indicate the modeled natural community may be inaccurate or the potential of the stream is limited based on watershed land use impacts.

Unnamed Tributary to Peshtigo River, WBIC: 5008966

The Unnamed Tributary is a 3.07 mile tributary to the Peshtigo River. This small cool-cold headwater stream had a poor rating for the fish IBI, a fair rating for the macroinvertebrate IBI and with an overall habitat rating of good. This stream has been straightened and realigned and flows almost entirely through the developed City of Peshtigo. This stream met the water quality criteria for Total Phosphorous but is likely limited by hydrologic alterations and other non-point source impacts within the developed areas of the City. It is unlikely removing hydrologic modifications will be made to this stream based on the location of infrastructure of the City. Improvements to storm water quality and quantity, stream buffers, and other urban non-point sources will begin removing barriers limiting the potential of this stream.

Unnamed Tributary to Peshtigo River, WBIC: 516300

The Unnamed Tributary is a 5.05 mile tributary to the Peshtigo River. This small cool-warm headwater stream had a fair rating for both the Fish IBI and the macroinvertebrate IBI and had an overall rating of fair bordering on poor for habitat. The lower 0.65 miles of stream are a well buffered meaning stream however the remainder of the stream was straightened, realigned and ditched prior to 1938. Comparing land use in 1938 to current conditions, agricultural acreage in the watershed has been drastically reduced and much of this acreage has been reverted back to undisturbed forested, field, or wetland condition. Total Phosphorous concentrations are meeting the water quality criteria and are not limiting the potential of this stream. There may be some other unknown pollutant that that is limiting the potential of this stream but it is likely the most significant impact to this stream is from the historic hydrologic alteration, degraded habitat, and lack of cover for fish. Habitat improvements within this stream may provide additional spawning and nursery habitat for Northern Pike and Burbot that were surveyed within this stream and lead to improvements to the fish and macroinvertebrate IBI scores.

Unnamed Tributary to Peshtigo River, WBIC: 5008538

The Unnamed Tributary is a 1.95 mile tributary to the Peshtigo River. This small cool-warm headwater stream had a poor fish IBI rating, a fair macroinvertebrate rating, and overall habitat was rated as good. The headwaters of this stream originate by the convergence of upland drainage within agricultural land use. The stream then flows through forested woods and wetlands before entering the Porterfield Music Festival grounds and campground. Historic straightening, dredging and realigning of the stream for

agricultural purposes in the mid to upper reaches are likely limiting the potential of this stream. One interesting thing to note was this tributary was the only stream in the Lower Peshtigo River watershed where a single Brook Trout was surveyed. Antidotal reports of Brook Trout were reported by local residents so there may be some conditions Brook Trout find conducive in this tributary to the Peshtigo River. Habitat was rated as good however historic conditions from hydrologic modifications likely limit the potential of this stream. Based on continuous temperature reading of this stream, the temperature was more than adequate to support coldwater species.

Unnamed Tributary to Peshtigo River, WBIC: 5008721

The Unnamed Tributary is a 2.61 mile tributary to the Peshtigo River. This small cool-warm headwater stream had a poor fish IBI rating, a fair macroinvertebrate rating, and overall habitat was rated as good. The headwaters of this stream originate by the convergence of upland drainage within agricultural land use. The stream continues on flowing through upland and wetland forest before its convergence with the Peshtigo River. This stream likely provide suitable spawning and nursery habitat for Burbot and Northern Pike.

Unnamed Tributary to Peshtigo River, WBIC: 515600

The Unnamed Tributary is a 2.43 mile tributary to the Peshtigo River. This small cool-cold headwater stream had a poor fish IBI rating, a poor macroinvertebrate rating, and overall habitat was rated as good. The headwaters of this stream originate by the convergence of upland drainage within industrial land use in the City of Peshtigo. The stream then travels under US Hwy 41 and multiple borrow pits now converted to ponds. The remainder of the stream flows through forested and light residential land use prior to its confluence with the Peshtigo River. Hydrologic modifications are limited to the headwaters of this stream and may not significantly limit its potential. Flow appears to be the greatest limiting factor within this stream as total phosphorous concentrations met water quality criteria and continuous temperature readings were below the cold water criteria. The number of species was low which would be expected in a cold water stream however no cold water or intolerant species were surveyed. One interesting thing to note was in 2014 three Steelhead were surveyed that likely found conducive conditions in the stream likely following stocking in the Peshtigo River.

Unnamed Tributary to Peshtigo River, WBIC: 5008359

The Unnamed Tributary is a 2.19 mile tributary to the Peshtigo River. This small cool-cold headwater stream had a poor fish IBI rating, a fair macroinvertebrate rating, and overall habitat was rated as good. The headwaters of this stream originate in afforested wetland complex and land use throughout the majority of its watershed is undeveloped. It is likely during wet years this stream provides spawning and nursery habitat for Northern Pike. The only other species observed are tolerant pioneer species. Continuous temperature readings indicate this stream meets cold water criteria however no cold water species were surveyed. With the undeveloped state of this small stream's watershed it is unclear why no coldwater, intolerant species were observed when temperature conditions are conducive and the habitat availability is present. Some unknown factors may be limiting this streams potential.

Unnamed Tributary to Trout Creek, WBIC: 5008962

The Unnamed Tributary is a 3.75 mile tributary to the Trout Creek. This small cool-warm headwater stream had a fair fish IBI rating, a fair macroinvertebrate rating, and overall habitat was rated as fair. The headwaters of this stream originate in afforested wetland complex and it flows through a mix of

forested and agricultural land use. The majority of the stream was ditched, straightened, and realigned prior to 1938 for agricultural purposes. For all practical purposes very little land use change has occurred in this watershed since these hydrologic modifications were completed. This stream was sampled and has elevated levels of Total Phosphorus that may exceed water quality criteria. Total Phosphorus and degraded habitat from hydrologic modification are likely limiting the potential of this stream.

Appendix C: Stream Temperature Graphs

Designated Use: Default FAL

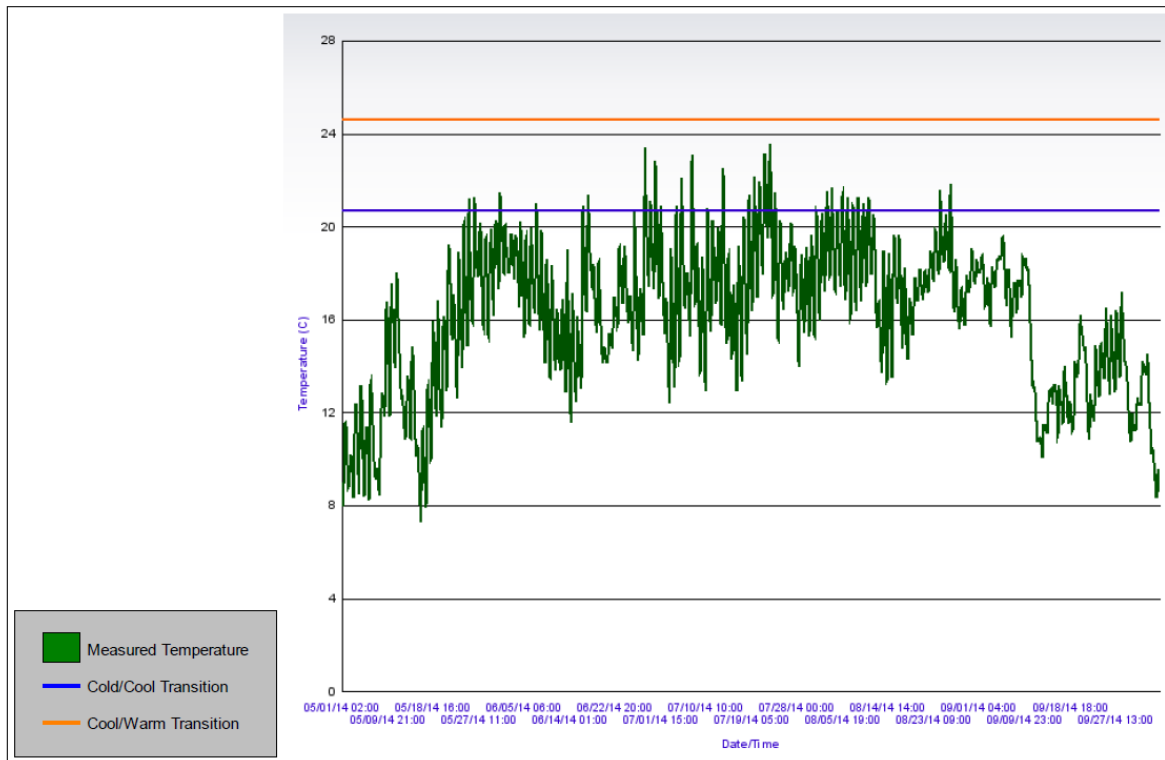
Natural Community: Cool-Cold Headwater

Station ID: 10038400

Fieldwork Event Start: 05/05/2014 00:00

Station Name: Unnamed Trib.(497900)-West of Cty Y

Fieldwork Event End: 10/05/2014 23:59



SWIMS: Temperature for a Selected Fieldwork Event

Designated Use: Default FAL

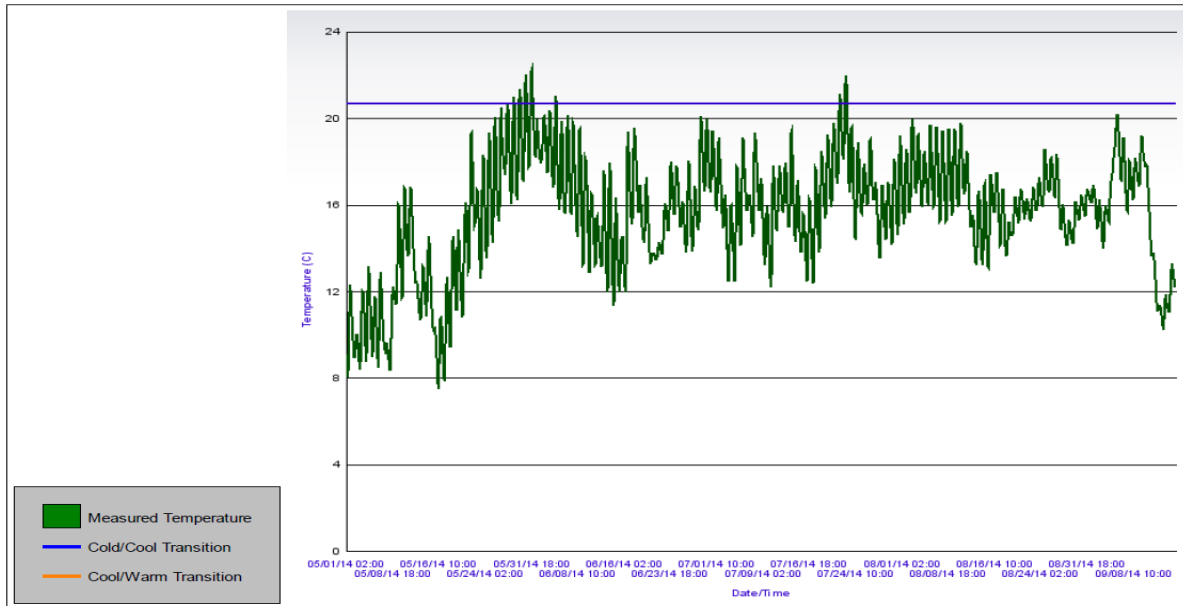
Natural Community: Coldwater

Station ID: 10041617

Fieldwork Event Start: 05/01/2014 00:00

Station Name: UN Trib to Lake Michigan ds Spitzmacher Rd

Fieldwork Event End: 09/15/2014 23:59



SWIMS: Temperature for a Selected Fieldwork Event

Designated Use: Default FAL

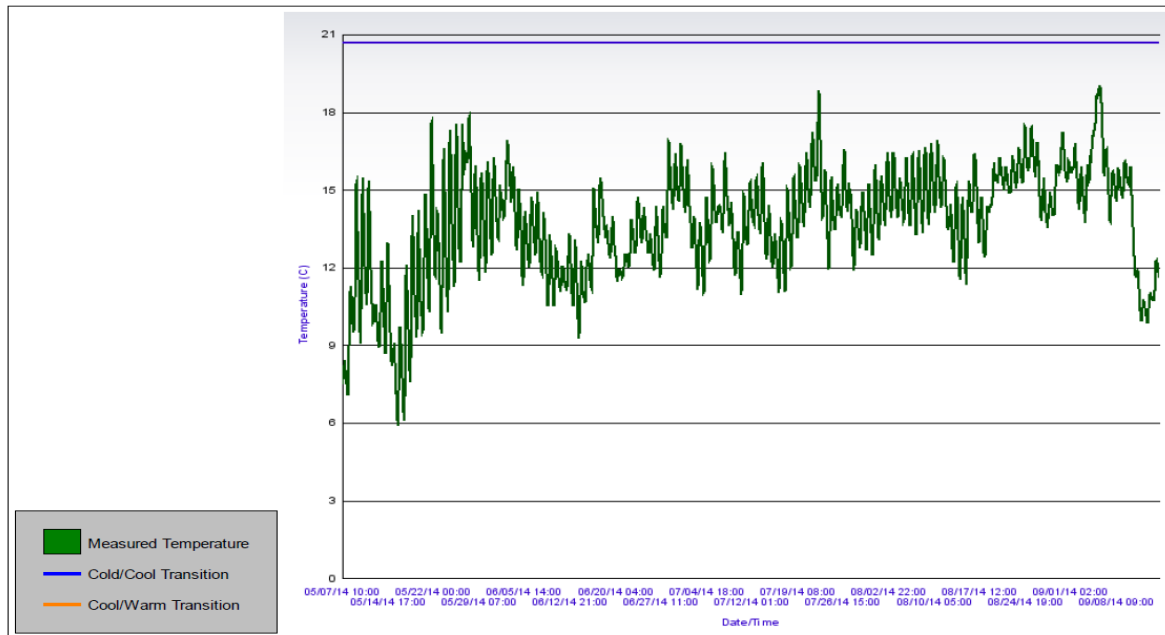
Natural Community: Cool-Cold Headwater

Station ID: 10042808

Fieldwork Event Start: 05/07/2014 00:00

Station Name: Unnamed Trib to Peshtigo R 30m US CTH BB

Fieldwork Event End: 09/15/2014 11:59



SWIMS: Temperature for a Selected Fieldwork Event

Designated Use: Default FAL

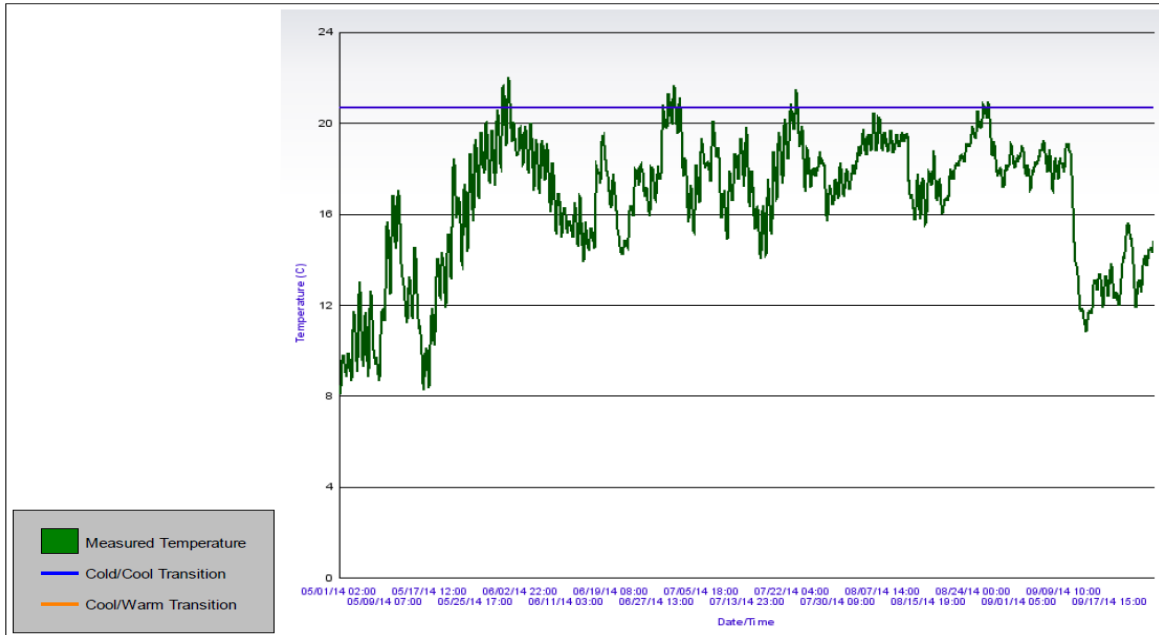
Natural Community: Cool-Warm Headwater, Warm Headwater

Station ID: 10041618

Fieldwork Event Start: 05/01/2014 00:00

Station Name: Trout Creek US @ Hwy D

Fieldwork Event End: 09/25/2014 23:59



SWIMS: Temperature for a Selected Fieldwork Event

Designated Use: Default FAL

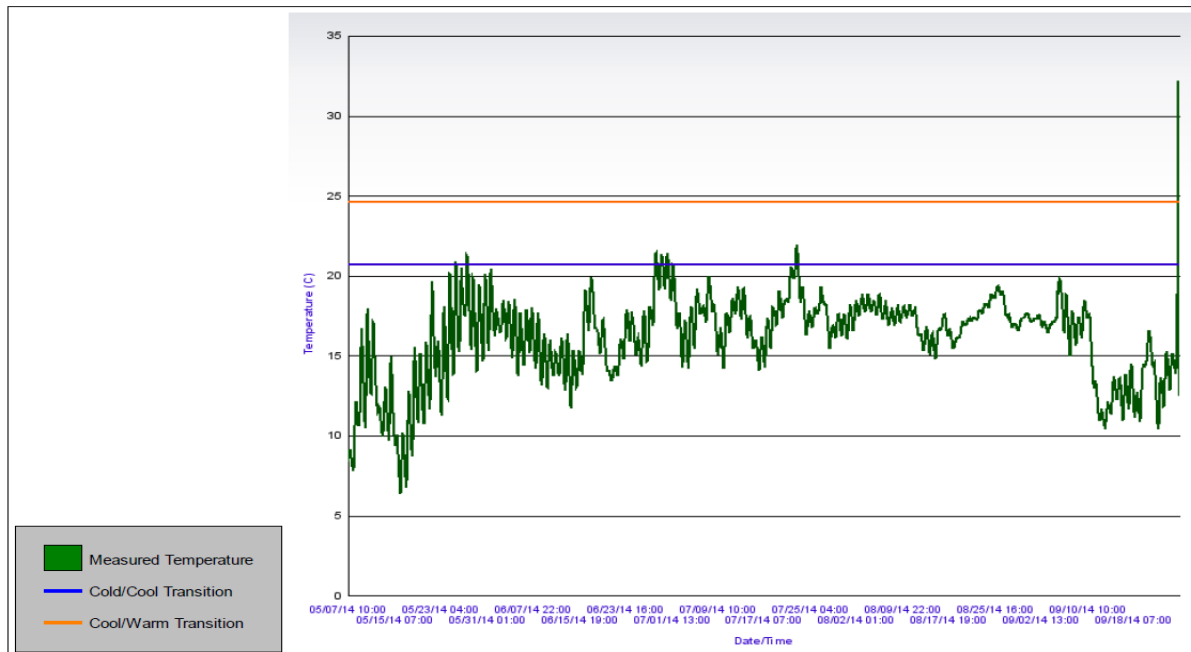
Natural Community: Cool-Warm Headwater, Macroinvertebrate

Station ID: 10042807

Fieldwork Event Start: 05/07/2014 00:00

Station Name: Sucker Brook 180m ds Aubin St

Fieldwork Event End: 09/25/2014 23:59



SWIMS: Temperature for a Selected Fieldwork Event

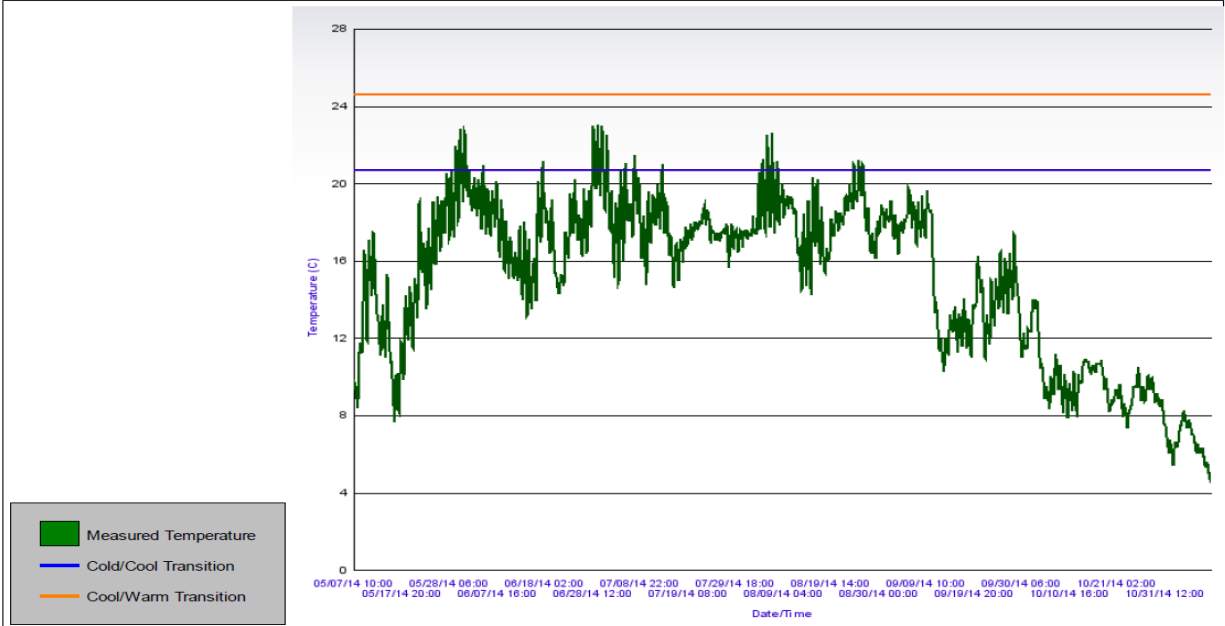
Designated Use: Default FAL
Station ID: 10042548

Natural Community: Cool-Warm Headwater, Warm Headwater

Fieldwork Event Start: 05/07/2014 00:00

Station Name: Bundy Creek US Town Hall Road E of Hartwig Road

Fieldwork Event End: 11/10/2014 23:59



SWIMS: Temperature for a Selected Fieldwork Event

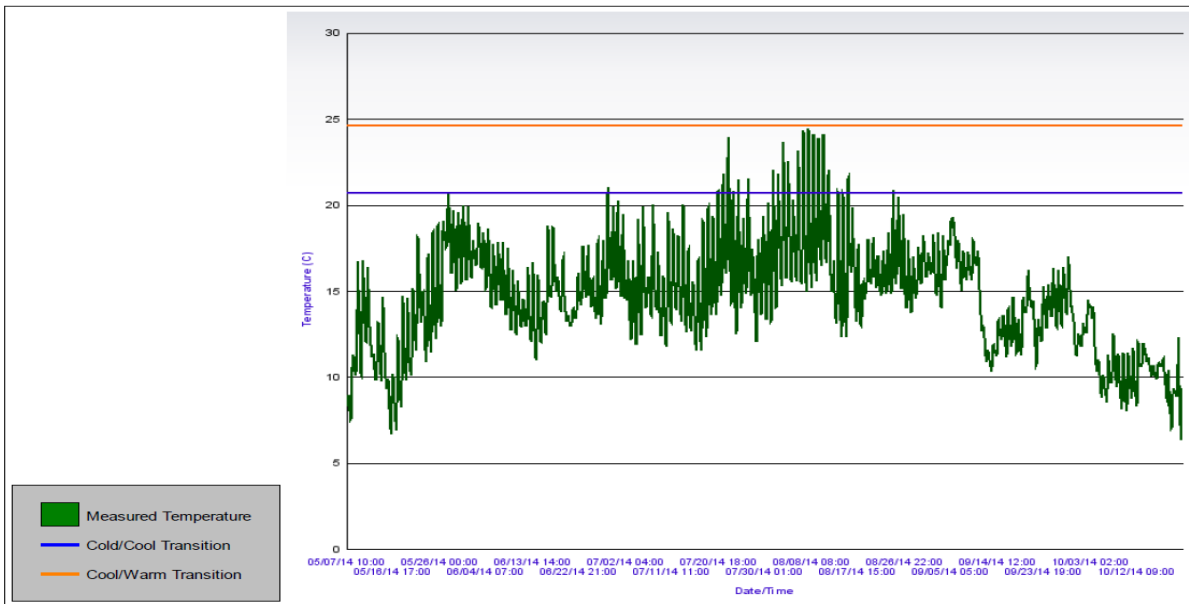
Designated Use: Default FAL
Station ID: 10042806

Natural Community: Cool-Warm Headwater, Warm Headwater

Fieldwork Event Start: 05/07/2014 00:00

Station Name: Bundy Creek 15m US Townline Rd

Fieldwork Event End: 10/21/2014 23:59



SWIMS: Temperature for a Selected Fieldwork Event

Designated Use: Default FAL

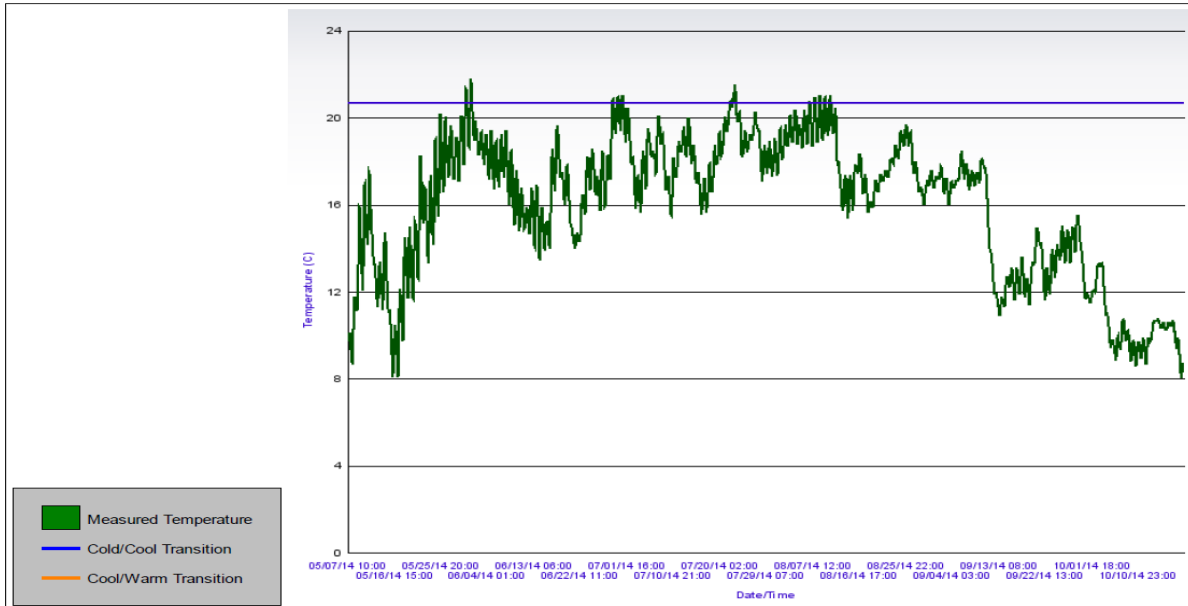
Natural Community: Cool-Warm Headwater, Warm Headwater

Station ID: 10016804

Fieldwork Event Start: 05/07/2014 00:00

Station Name: Bundy Creek - Town Line Road - East

Fieldwork Event End: 10/19/2014 23:59



SWIMS: Temperature for a Selected Fieldwork Event

Designated Use: Default FAL

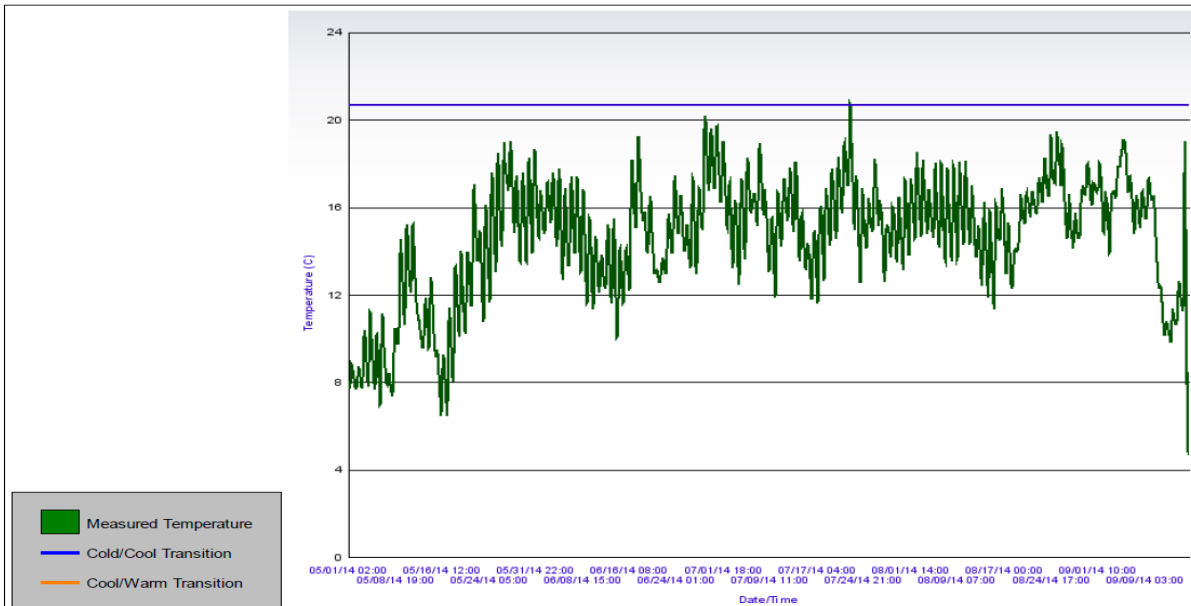
Natural Community: Cool-Cold Headwater, Cool-Warm Headwater

Station ID: 10041619

Fieldwork Event Start: 05/01/2014 00:00

Station Name: UN Trib to Peshtigo River US Right of Way Rd

Fieldwork Event End: 09/16/2014 23:59



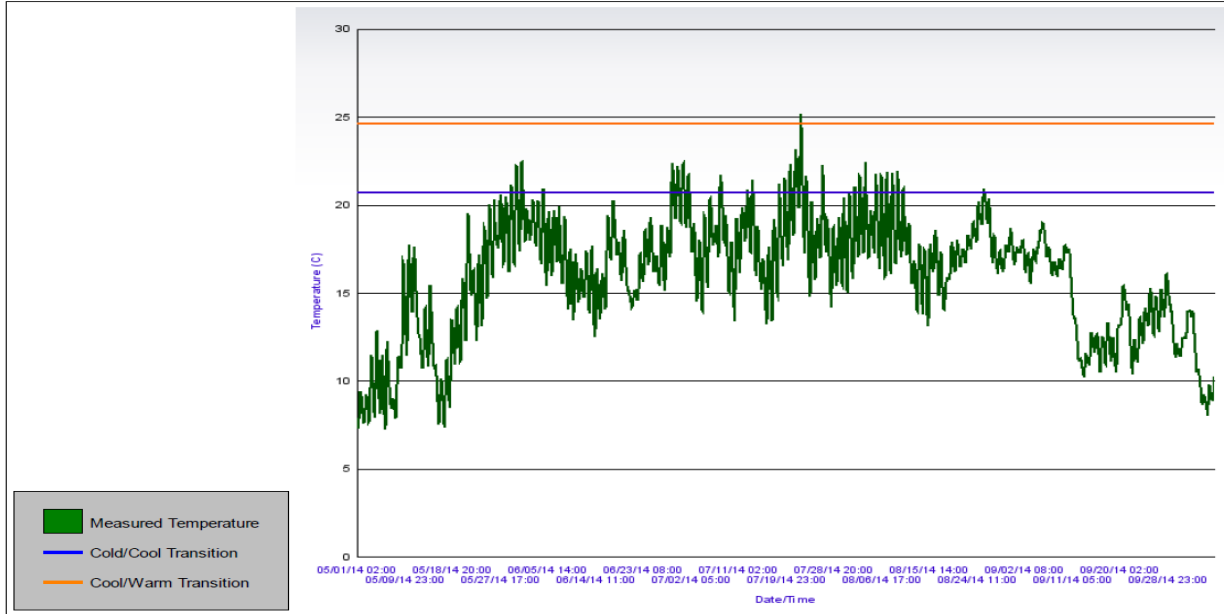
SWIMS: Temperature for a Selected Fieldwork Event

Designated Use: Default FAL
Station ID: 383175

Natural Community: Cool-Warm Headwater, Macroinvertebrate

Fieldwork Event Start: 05/07/2014 00:00
Fieldwork Event End: 10/07/2014 23:59

Station Name: Mud Brook - Mudbrook Road



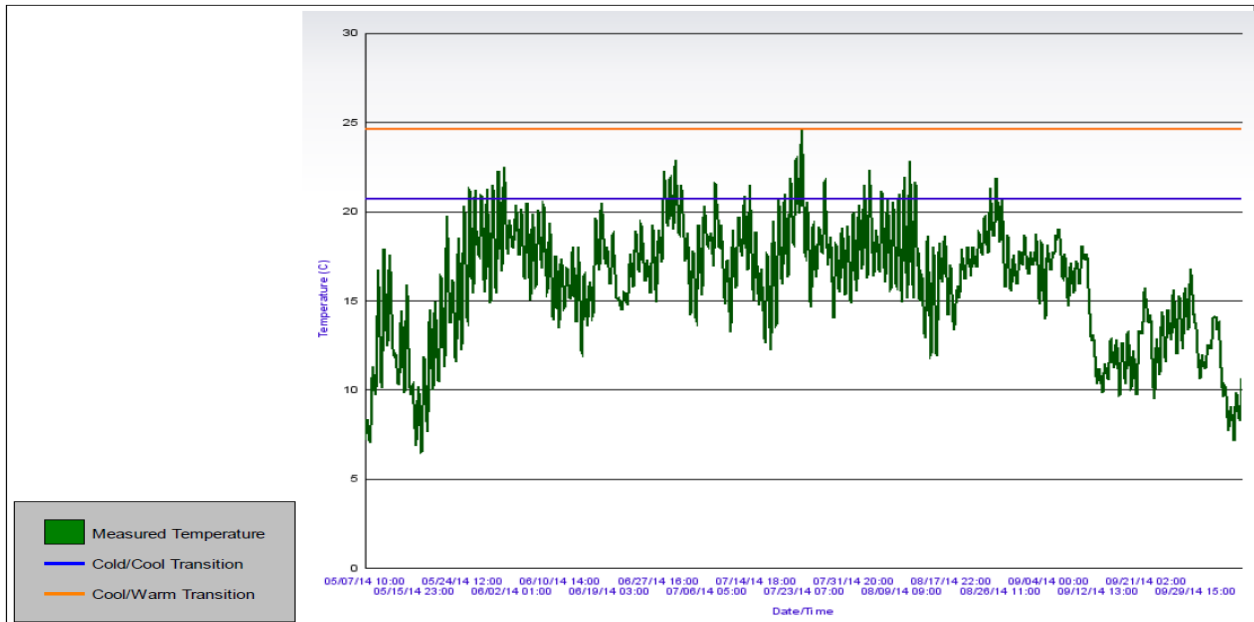
SWIMS: Temperature for a Selected Fieldwork Event

Designated Use: Default FAL
Station ID: 10042723

Natural Community: Cool-Warm Headwater, Macroinvertebrate

Fieldwork Event Start: 05/07/2014 00:00
Fieldwork Event End: 10/07/2014 23:59

Station Name: Mud Brook 30m us CTH G



SWIMS: Temperature for a Selected Fieldwork Event

Designated Use: Default FAL

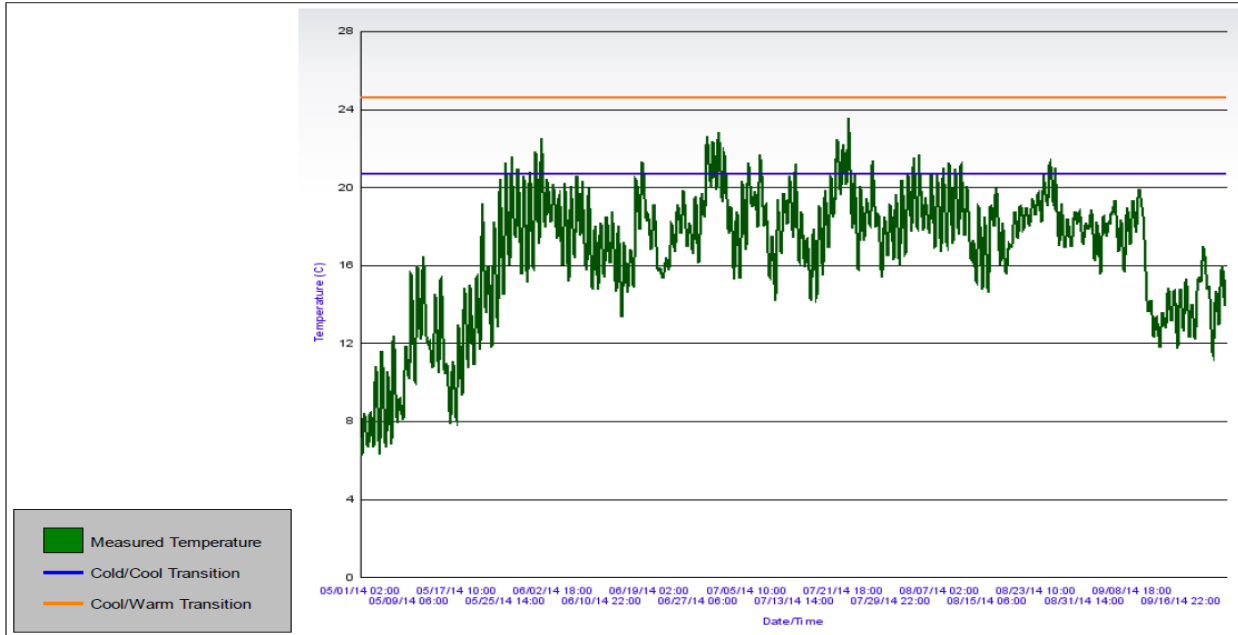
Natural Community: Cool-Warm Mainstem, Two-Story

Station ID: 383254

Fieldwork Event Start: 05/01/2014 00:00

Station Name: Left Foot Creek - 200 Yds Above 5th Rd

Fieldwork Event End: 09/24/2014 23:59



SWIMS: Temperature for a Selected Fieldwork Event

Designated Use: Default FAL

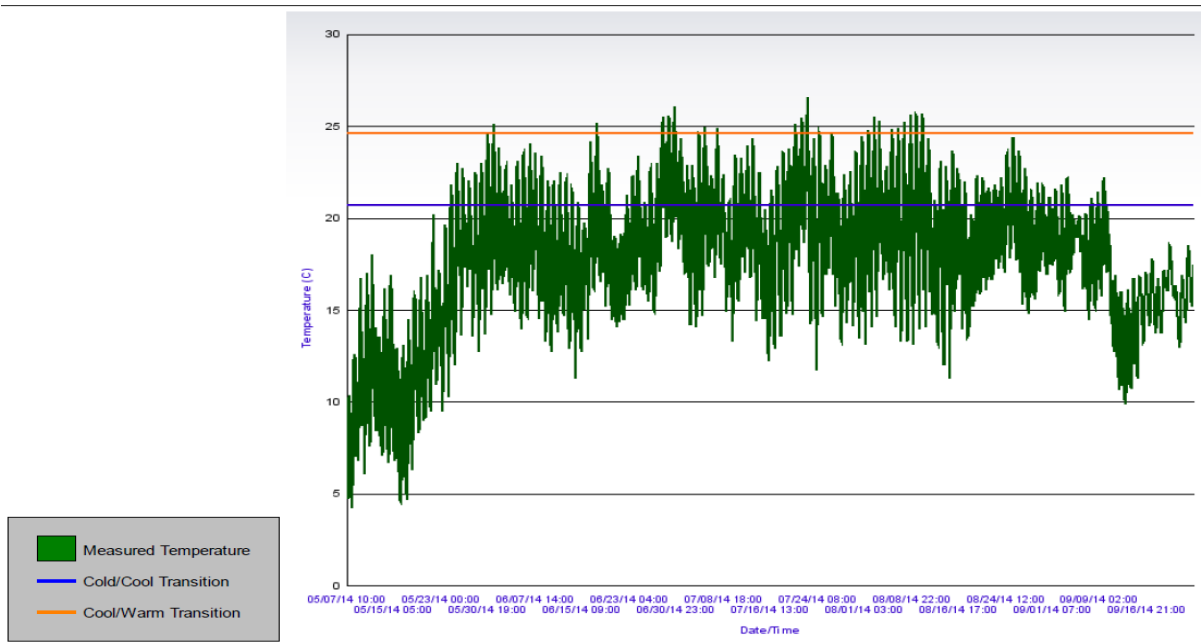
Natural Community: Cool-Warm Mainstem, Two-Story

Station ID: 10042721

Fieldwork Event Start: 05/07/2014 00:00

Station Name: Left Foot Creek 30m US US 141

Fieldwork Event End: 09/24/2014 23:59



SWIMS: Temperature for a Selected Fieldwork Event

Designated Use: Default FAL

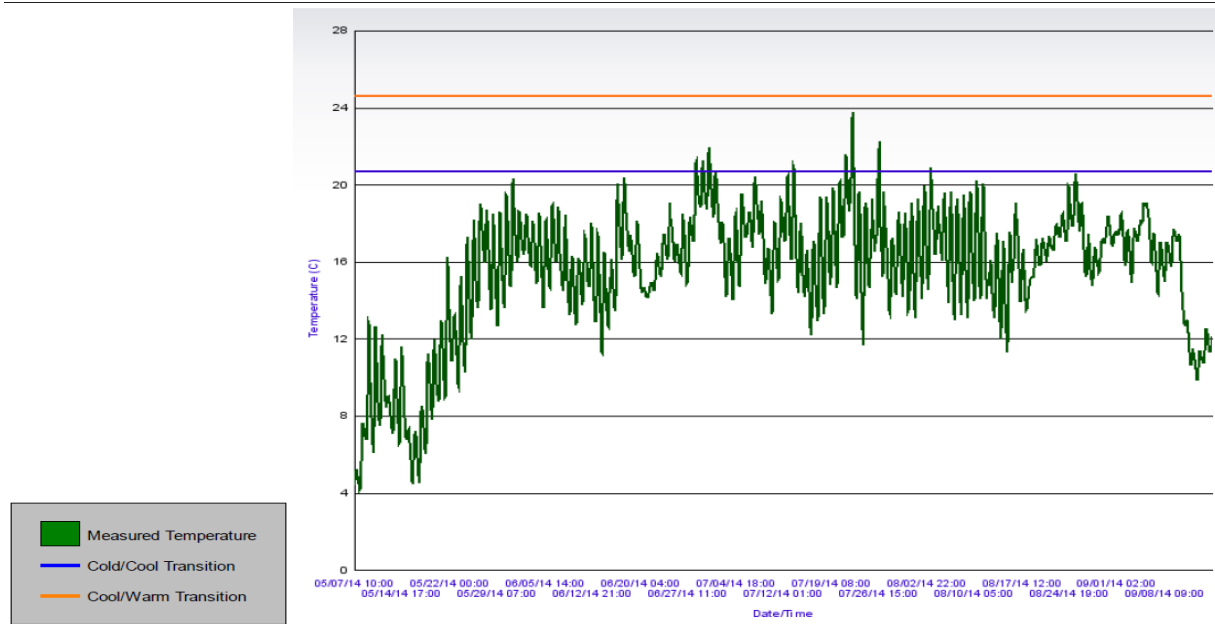
Natural Community: Cool-Warm Headwater, Macroinvertebrate

Station ID: 10042939

Fieldwork Event Start: 05/07/2014 00:00

Station Name: Unnamed Trib to Left Foot Creek 10m us E 22nd St

Fieldwork Event End: 09/15/2014 13:00



SWIMS: Temperature for a Selected Fieldwork Event

Designated Use:

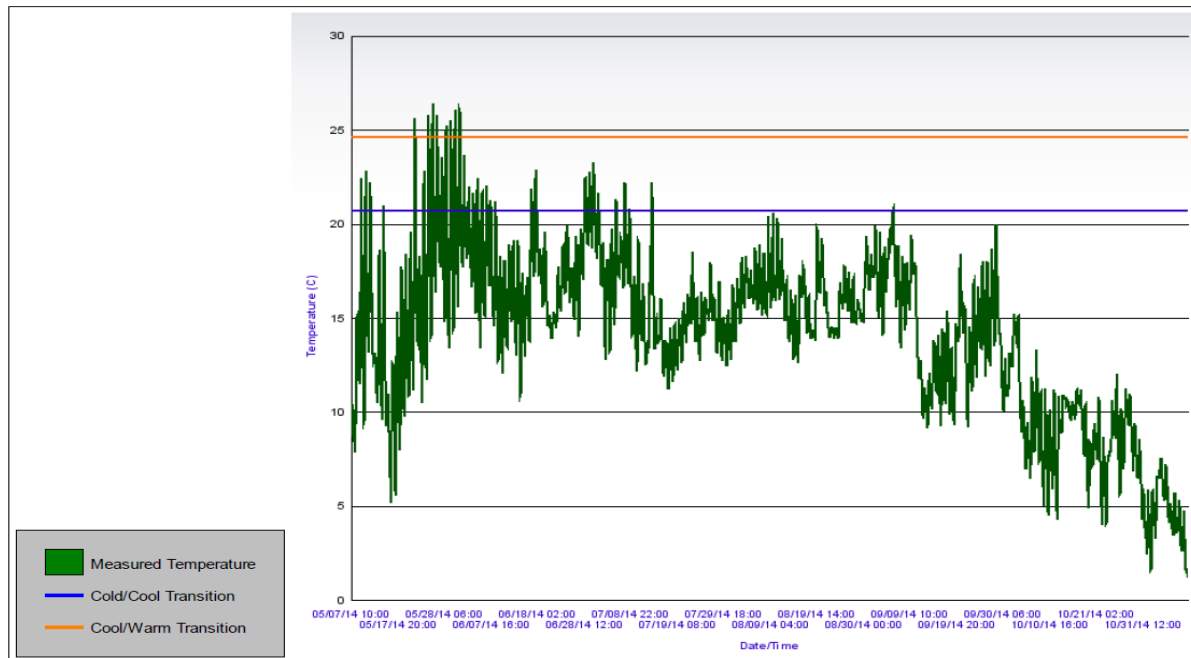
Natural Community:

Station ID: 10042938

Fieldwork Event Start: 05/07/2014 00:00

Station Name: Unnamed Trib to Left Foot Creek 130m ds Devils Lake Rd

Fieldwork Event End: 11/10/2014 23:59



SWIMS: Temperature for a Selected Fieldwork Event

Designated Use: Default FAL

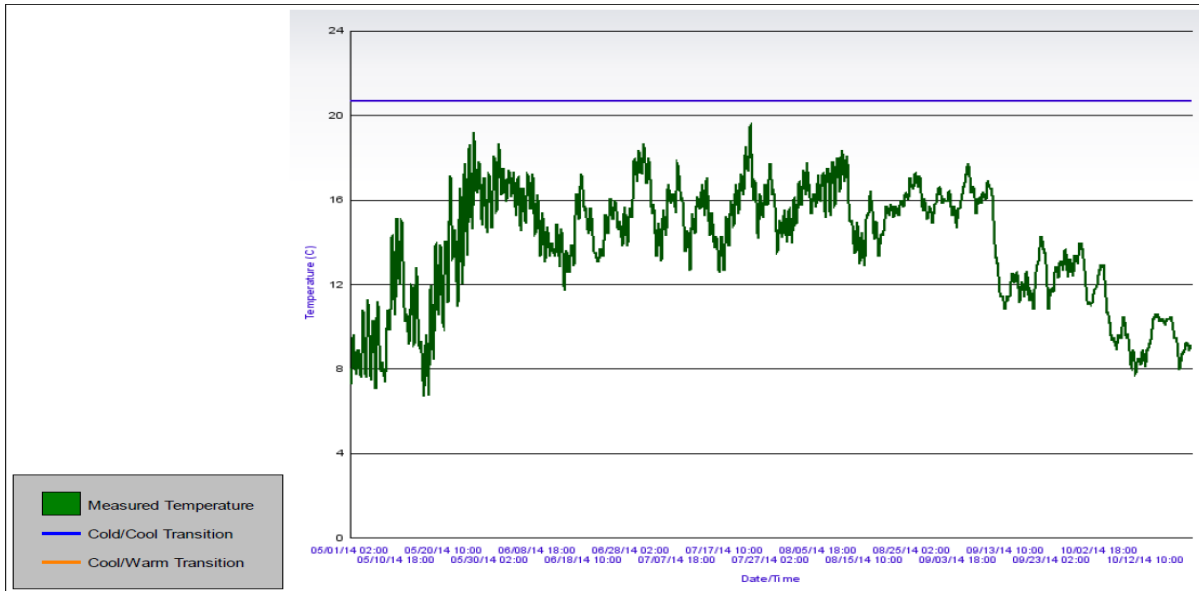
Station ID: 10039303

Station Name: Little River at Hwy BB

Natural Community: Cool-Warm Headwater, Cool-Warm Mainstem

Fieldwork Event Start: 05/07/2014 00:00

Fieldwork Event End: 10/21/2014 23:59



SWIMS: Temperature for a Selected Fieldwork Event

Designated Use: Default FAL

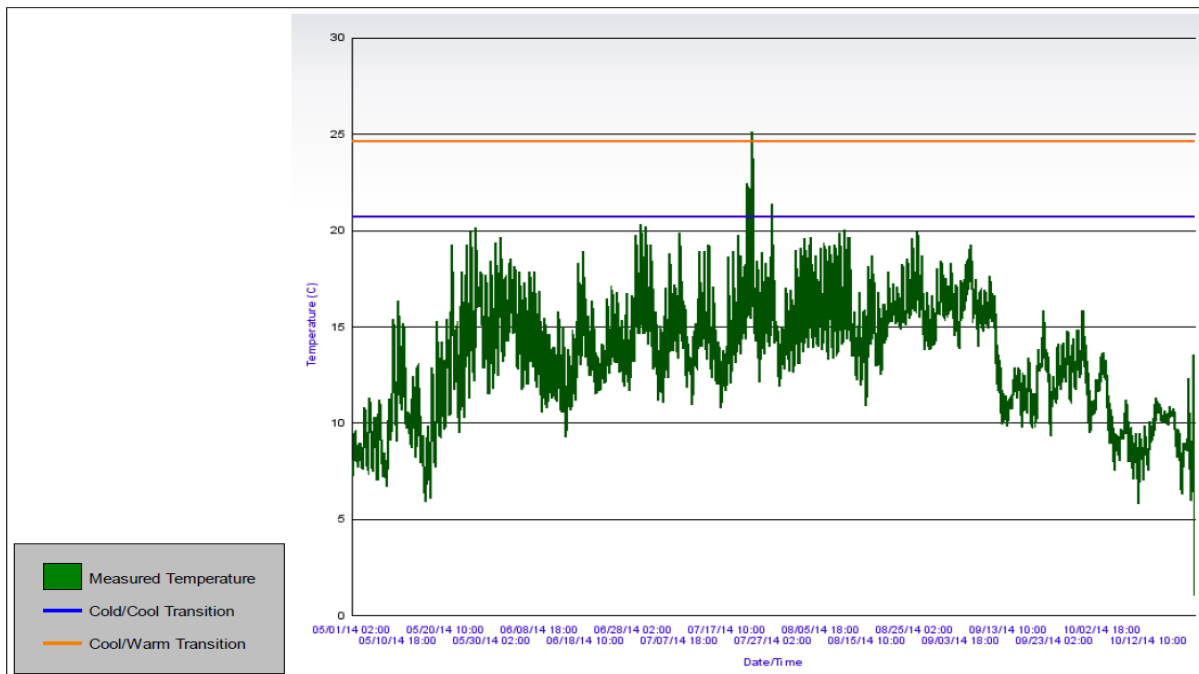
Station ID: 10042724

Station Name: UNT to Lake Michigan 10m us CTH BB

Natural Community: Cool-Warm Headwater

Fieldwork Event Start: 05/07/2014 00:00

Fieldwork Event End: 10/21/2014 23:59



SWIMS: Temperature for a Selected Fieldwork Event

Designated Use: Default FAL

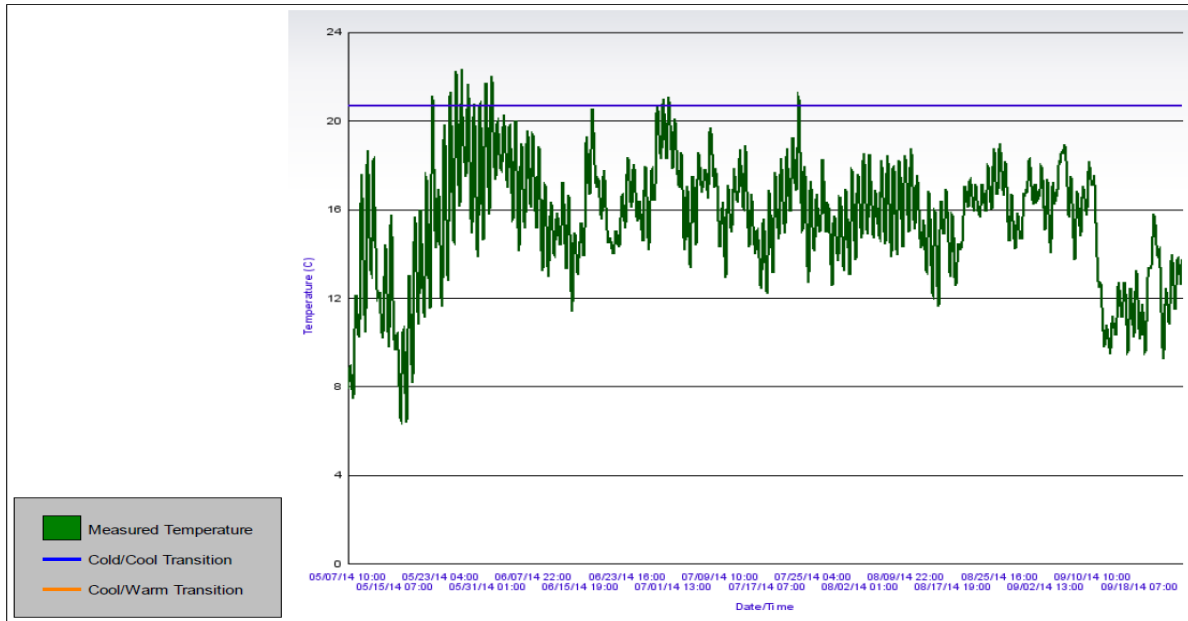
Natural Community: Cool-Cold Headwater

Station ID: 10042940

Fieldwork Event Start: 05/07/2014 00:00

Station Name: Unnamed Trib to Peshtigo River 165m DS Snowmobile Trail Crossing

Fieldwork Event End: 09/25/2014 23:59



SWIMS: Temperature for a Selected Fieldwork Event

Designated Use: Default FAL

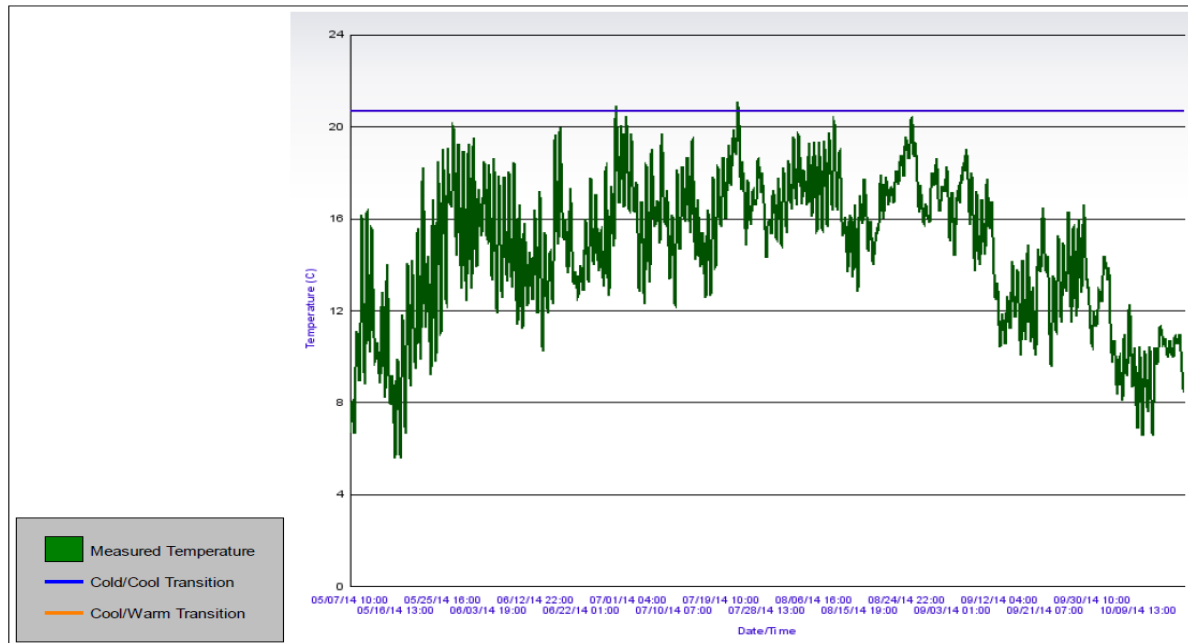
Natural Community: Cool-Warm Headwater

Station ID: 10042720

Fieldwork Event Start: 05/07/2014 00:00

Station Name: UNT to Peshtigo River 30 us River Dr.

Fieldwork Event End: 10/18/2014 23:59



SWIMS: Temperature for a Selected Fieldwork Event

Designated Use: Default FAL

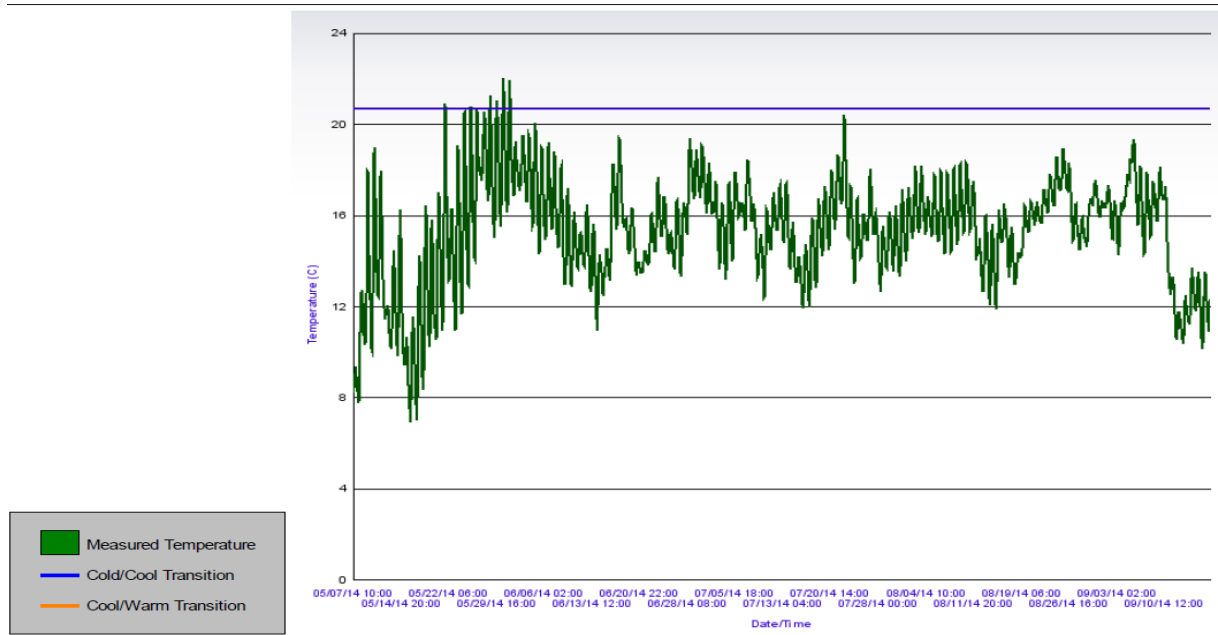
Natural Community: Cool-Warm Headwater

Station ID: 10042310

Fieldwork Event Start: 05/07/2014 00:00

Station Name: Unnamed Trib to Peshtigo River 130m DS STH 64

Fieldwork Event End: 09/17/2014 23:59



SWIMS: Temperature for a Selected Fieldwork Event

Designated Use: Default FAL

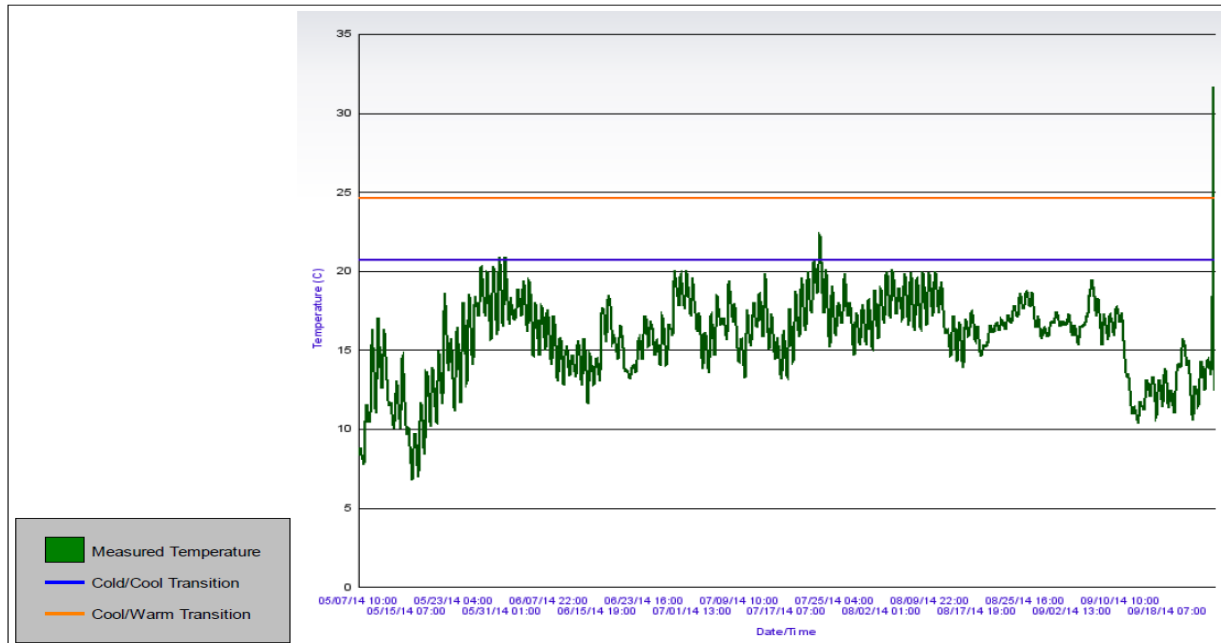
Natural Community: Cool-Warm Headwater

Station ID: 10042936

Fieldwork Event Start: 05/01/2014 00:00

Station Name: Unnamed Trib to Trout Creek 130m ds Aubin St

Fieldwork Event End: 09/25/2014 00:00



SWIMS: Temperature for a Selected Fieldwork Event

Designated Use: Default FAL

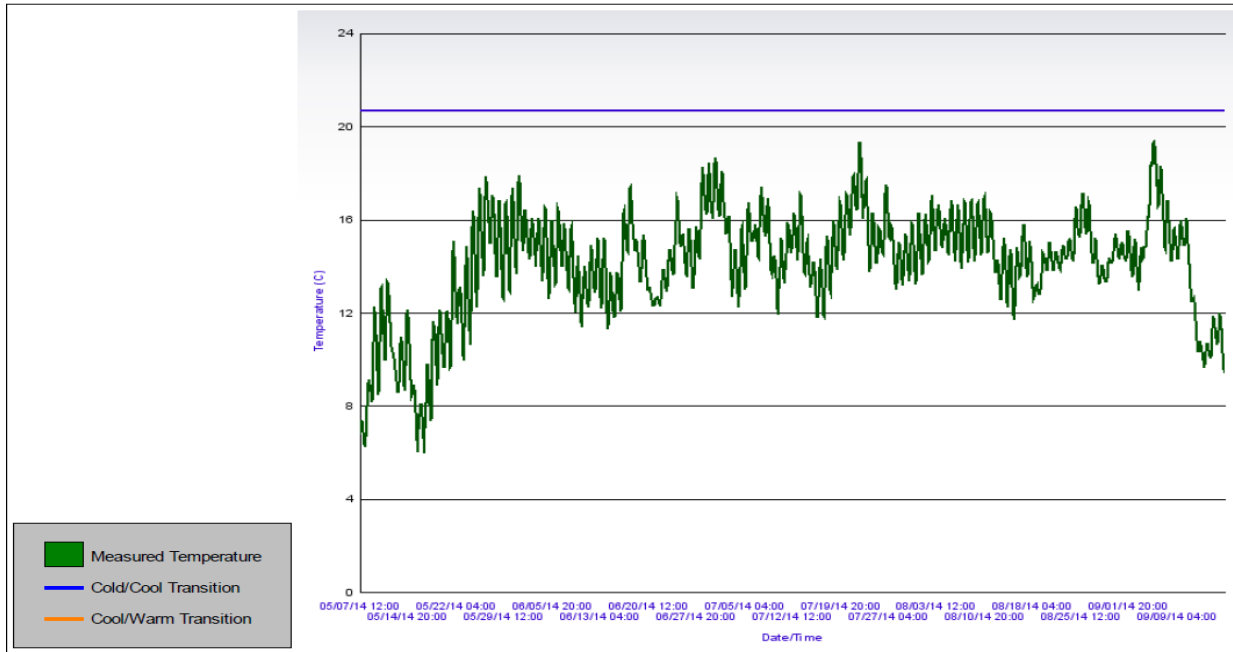
Natural Community: Cool-Cold Headwater

Station ID: 10042825

Fieldwork Event Start: 05/07/2014 00:00

Station Name: UN Trib to Peshtigo River 30m US CTH B

Fieldwork Event End: 09/16/2014 23:59



SWIMS: Temperature for a Selected Fieldwork Event

Appendix E: Fisheries Tables 2015

Stream - Site	UNT to Peshtigo River CTH B	Bundy Creek CTH B- Upstream Site	Bundy Creek CTH B- DS Site	UNT to Peshtigo River River Drive	Little River Krause Road	UNT to Trout Creek Aubin Street	Sucker Brook CTH E	UNT to Peshtigo River HWY 64	UNT to Lake Michigan Spitzmacher Road	Trout Creek Poplar Ridge Road	UNT to Lake Michigan HWY BB	Trout Creek Jandt Road	Sucker Brook Aubin Street	Bundy Creek Townhall Road-US	Peshtigo River Left Foot Creek Access	Peterman Brook Riverview Road	Peshtigo River CTH W	Bundy Creek Townhall Road	UNT to Peshtigo River Snowmobile trail	UNT to Peshtigo River HWY BB
Stream Order	1	2	3	2	2	2	2	1	2	3	2	2	3	3	6	2	6	3	2	1
Mean Stream Width	2	3.0	7	3	4	3.5	3	3.50	3	5.00	3	3	3	5.0	60	5	50	5	3	2.50
Station Length	105	105	245	105	140	105	105	140	105	175	105	105	105	175	400	175	400	175	105	105
Nat. Comm. Classification	CCHW	WHW	WHW	CWHW	CWHW	CWHW	CWHW	CWHW	CW	WHW	CWHW	CWHW	CWHW	WHW	LR	CWHW	LR	WHW	CCHW	CCHW
Ver. Nat. Comm. Classification	CWHW	WHW	CWHW	CWHW	CCHW	CWHW	CWHW	CWHW	CW	WHW	CWHW	CWHW	CWHW	CWHW	LR	CCHW	LR	CWHW	CCHW	CCHW
Fish Species																				Total
Banded Darter															16		7			23
Black Crappie															2					2
Blackside Darter				1											44		18			63
Bluegill								1							2					3
Bluntnose Minnow					1															2
Bowfin					1															1
Brook Stickleback	1		1			8		1				27		74		8	1	15	33	18
Brook Trout				1																1
Burbot				8				6		2					32	10	10			68
Central Mudminnow	14	2	132	30	10	51	3	20	54	43	14		4	83	4	26	1	119	135	15
Common Shiner															96	4	39			139
Creek Chub								22							2	65				89
Fantail Darter															6					6
Fathead Minnow											1									1
Golden Redhorse																				1
Green Sunfish								1												2
Hornyhead Chub															30	41	29			100
Johnny Darter			1		1	1	2			4					16	13	2			40
Lamprey Ammocoetes															16	7	6			29
Largemouth Bass															6		3			9
Mimic Shiner															18		2			20
Mottled Sculpin					16	1				11				5		19		2		54
Northern Hog Sucker															13		2			15
Northern Pike		2	12			2		2		3			5				1	7		34
Pumpkinseed									1											1
Rock Bass			1							8					36		24			69
Rosyface/Carmine Shiner															3					3
Round Goby					7															7
Shorthead Redhorse															9		13			22
Silver Redhorse															9					9
Smallmouth Bass															11					11
Spotfin Shiner					1															1
Walleye															4		1			5
White Sucker			96		2	1		1		2	10	2		126	20	22	4	345		631
Yellow Perch									12						6		1			19
Totals	15	4	243	40	39	64	5	54	67	73	25	29	9	288	401	215	167	488	168	33
# species	2	2	6	4	8	6	2	8	3	7	3	2	2	4	23	10	21	5	2	2
35 species																				
IBI Score																				
Coldwater	-	-	-	-	-	-	-	-	P 0	-	-	-	-	-	-	-	-	-	-	-
Coolwater (CC)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Coolwater (CW)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Warmwater	-	-	-	-	-	-	-	-	-	-	-	-	-	-	E 100	-	E 90	-	-	-
Non-Wadeable IBI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Small Stream	P 0	P 10	F 40	F 30	G 60	G 70	P 0	F 40	-	F 60	P 10	P 20	P 10	F 50	-	G 90	-	F 50	P 20	P 20

Appendix F: Watershed Reporti

WBIC	Waterbody Name	Start Mile	End Mile	Current Use	Attainable Use	Supporting Attainable Use	Designated Use	Impairments	Sources	Assessment	Impaired Water Status
70	Green Bay (Wi - Menominee Aoc)	0	6.43	WWSF	WWSF	Not Supporting	Default FAL	Contaminated Sediment	NA	Monitored	Pollutant Removed, 303d Listed
70	Green Bay (GI Shoreline)	0	8.94	WWSF	WWSF	Supporting	Default FAL	NA	NA	Monitored	303d Listed
498000	Unnamed Trib to Lake Michigan	0	6.04	FAL	FAL	Fully Supporting	Default FAL	NA	NA	Monitored	NA
515500	Peshtigo River	0	11.5	Cold	Cold	Fully Supporting	Default FAL	NA	NA	Monitored	303d Listed
515500	Peshtigo River	11.83	54.43	FAL	FAL	Fully Supporting	Default FAL	NA	NA	Monitored	NA
515600	Unnamed Trib to Peshtigo River	0	0.53	FAL	FAL	Not Assessed	Default FAL	NA	NA	Not Assessed	NA
515800	Peshtigo Flowage	0	393.15	Shallow Lowland	FAL	Not Assessed	Default FAL	NA	NA	Monitored	303d Listed
515900	Trout Creek	0	3.65	FAL	WWFF	Fully Supporting	Default FAL	NA	NA	Monitored	NA
515900	Trout Creek	3.65	6.62	FAL	WWFF	Fully Supporting	Default FAL	NA	NA	Monitored	NA
516000	Sucker Brook	0	9	FAL	WWSF	Fully Supporting	Default FAL	NA	NA	Monitored	NA
516100	Bundy Creek	0	12.36	FAL	WWFF	Fully Supporting	Default FAL	NA	NA	Monitored	NA
516300	Unnamed Trib to Peshtigo River	0	3.85	FAL	FAL	Fully Supporting	Default FAL	NA	NA	Monitored	NA
516800	Bagley Flowage	0	244.88	Shallow Lowland	FAL	Supporting	Default FAL	NA	NA	Monitored	NA

WBIC	Waterbody Name	Start Mile	End Mile	Current Use	Attainable Use	Supporting Attainable Use	Designated Use	Impairments	Sources	Assessment	Impaired Water Status
516900	Mud Brook	0	7	FAL	WWSF	Fully Supporting	Default FAL	NA	NA	Monitored	NA
517100	Gravelly Brook	0	7	FAL	WWFF	Fully Supporting	Default FAL	NA	NA	Monitored	NA
517400	Little Peshtigo River	0	71.93	FAL	WWSF	Fully Supporting	Default FAL	NA	NA	Monitored	NA
520100	Beaver Creek	0	4	Class III Trout	FAL	Fully Supporting	Default FAL	NA	NA	No Assessment on File	NA
524500	Left Foot Creek	0	5.09	FAL	FAL	Not Assessed	Default FAL	NA	NA	Not Assessed	NA
524500	Left Foot Creek	5.09	7.98	Cold (Class II Trout)	Cold (Class II Trout)	Not Assessed	Cold	NA	NA	No Assessment on File	NA
524600	Unnamed Trib to Left Foot Creek	0	2.57	FAL	FAL	Not Assessed	Default FAL	NA	NA	Not Assessed	NA
524700	Left Foot Lake	0	79	Deep Lowland	FAL	Supporting	Default FAL	NA	NA	Monitored	NA
525200	Devils Lake	0	5.55	Small	FAL	Supporting	Default FAL	NA	NA	Monitored	NA
583200	Little River	0	6	FAL	WWSF	Fully Supporting	Default FAL	NA	NA	Monitored	NA
3000624	Unnamed Ditch to Lk Michigan	0	3.53	FAL	FAL	Fully Supporting	Default FAL	NA	NA	Monitored	NA
5008359	Unnamed Trib to Peshtigo River	0.45	2.21	FAL	FAL	Not Assessed	Default FAL	NA	NA	Not Assessed	NA
5008538	Unnamed Trib to Peshtigo River	0	0.63	FAL	FAL	Not Assessed	Default FAL	NA	NA	Not Assessed	NA

WBIC	Waterbody Name	Start Mile	End Mile	Current Use	Attainable Use	Supporting Attainable Use	Designated Use	Impairments	Sources	Assessment	Impaired Water Status
5008721	Unnamed Trib to Peshtigo River	0	1.4	FAL	FAL	Not Assessed	Default FAL	NA	NA	Not Assessed	NA
5008962	Unnamed Trib to Trout Cr	0	2.84	FAL	FAL	Fully Supporting	Default FAL	NA	NA	Monitored	NA
5008966	Unnamed Trib to Peshtigo River	0	3.08	FAL	FAL	Not Assessed	Default FAL	NA	NA	Not Assessed	NA
5582027	Peshtigo River	0	19.08	FAL	FAL	Not Assessed	Default FAL	NA	NA	Not Assessed	NA
5582047	Peshtigo River	0	85.82	FAL	FAL	Not Assessed	Default FAL	NA	NA	Not Assessed	NA

ⁱ The watershed assessment table reflects the condition of waters in the study area watershed. This table data is stored in the Water Assessment Tracking and Electronic Reporting System (WATERS) and is updated on an ongoing basis via monitoring data and assessment calculations. The following definitions apply:

- Current Use – current condition of water based on monitoring data.
- Attainable Use – “ecological potential” of water based on water type, natural community, lack of human-induced disturbances.
- Supporting Attainable Use – decision on whether the water’s current condition is supporting its designated use under “water quality standards”.
- Designated Use – the water’s classified use under NR102, Wisconsin Water Quality Standards, for Fish and Aquatic Life.
- Impairments – documented impacts on water condition due to pollution sources or changes in hydro-geomorphological changes.
- Assessment – field indicates what type of data or information supports the decisions in the table (current, attainable, and supporting attainable).
- Impaired Water Status – This column indicates the status of the impaired water for TMDL development.