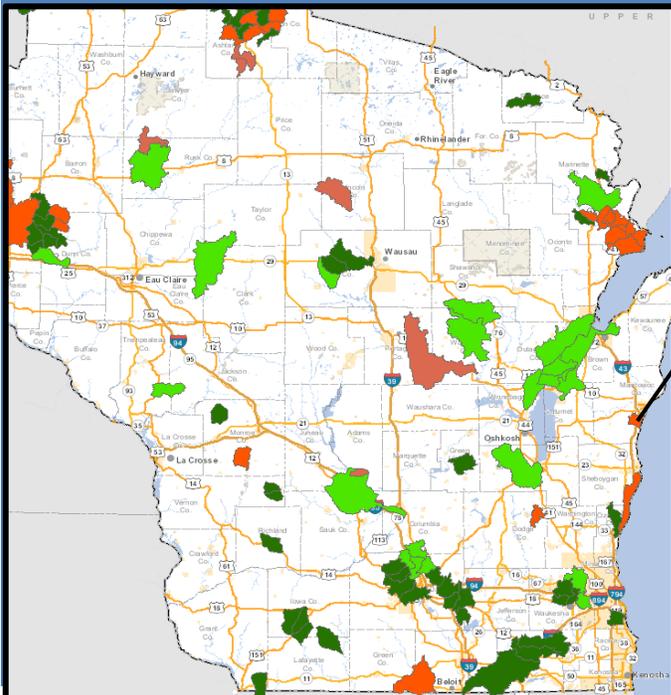




Calvin Creek at County LS  
Photo by Mary Gansberg 10/04/2016

# PINE & CALVIN CREEK FRONTAL LAKE MICHIGAN TWA WQM 2017

*Sevenmile and Silver Creeks (MA01)*  
*HUC: 040301010702, Monitored 2016*



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



EGAD # 3200-2017-10  
Water Quality Bureau,  
Wisconsin DNR

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Calvin Creek S. 26th street

## 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 Manitowoc 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 plan update.

\_\_\_\_\_  
Water Quality Field Supervisor

\_\_\_\_\_  
Date

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Greg Searle, Water Quality Bureau Field Operations Director

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Date

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Date

### Basin/Watershed Partners

- Manitowoc County Soil and Water Conservation Department
- UW Manitowoc
- Lakeshore Natural Resources Partnership
- Manitowoc County Lakes Association
- Carstens Lake Association
- Hartlaub Lake Association

### Report Acknowledgements

- Mary Gansberg, Water Resources Biologist & Investigator, Eastern District, Wisconsin DNR
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### ***Wisconsin Department of Natural Resources***

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## List of Abbreviations

**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.

**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 a consortium of agencies including USGS, USFS, and Wisconsin 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).

**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.

**Monitoring Seq. No.** Monitoring Sequence Number refers to a unique identification code generated by the Surface Water Integrated Monitoring System (SWIMS), which holds much of the state's water quality monitoring data.

**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.

**WATERS ID:** The Waterbody Assessment, Tracking and Electronic Reporting System Identification Code (WATERS ID) is a unique numerical sequence number assigned by the WATERS system, also known as "Assessment Unit ID code".

**WBIC: Water Body Identification Code.** WDNR 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.

## Watershed Discussion & Management Recommendations

### Watershed Goals

The overall goal of this plan is to improve and protect water quality in the Manitowoc Basin. This Targeted Watershed Assessment monitoring project provided data for the Pine and Calvin Creeks subwatersheds (Figure 1) and therefore the analysis of this report focuses on this area. However, this study area is part of the larger Sevenmile and Silver Creeks Watershed. Because this report serves as an update to the Manitowoc Basin Plan for the Sevenmile and Silver Creeks Watershed, specific information related to waters outside of the study area are included in general information, management recommendations, tables and appendices. While the primary focus is monitoring conducted in the area in Figure 1, the plan reflects information updates from both the study and from statewide CWA reporting assessment work conducted in 2017 in the Sevenmile and Silver Creek Watershed.

### Watershed Overview

The Sevenmile and Silver Creeks Watershed covers 112.90 mi<sup>2</sup> (292 square kilometers) extending a few miles inland from Lake Michigan between the cities of Manitowoc and Sheboygan (Figure 2). Approximately 75 percent of the watershed is in Manitowoc County. The watershed contains seven small streams draining directly to Lake Michigan and 13 small inland lakes. These small inland lakes are used by diving ducks, especially during fall migrations when Lake Michigan conditions are not conducive to resting and feeding. The watershed was named for two of the stream systems: Sevenmile Creek in Sheboygan County and Silver Creek in Manitowoc County.

The Pine Creek Watershed is primarily agricultural, flowing into Lake Michigan near the Town of Newton, just south of Manitowoc. Three sites in Pine Creek were monitored for a targeted watershed assessment for fish, physical habitat and macroinvertebrates. The Calvin Creek Watershed is also primarily agricultural. Two sites in Calvin Creek were assessed for a targeted watershed assessment for fish, physical habitat and macroinvertebrates. These sites are described in much greater detail in the study summary below.



Figure 1: Pine and Calvin Creek TWA Watershed



Figure 2: Sevenmile and Silver Creeks Watershed

### Population, Land Use, Site Characteristics

As described above, the Sevenmile and Silver Creeks watershed is 112.90 mi<sup>2</sup>, with land use primarily agricultural (73%), wetland (8%), forest (5%) and other uses (7%). This watershed has 184 stream miles, 10,578 lake acres and 4,732.70 wetland acres (Figure 3).

### Ecological Landscapes

Pine and Calvin Creeks are part of the Seven Mile and Silver Creeks Watershed located in the Central Lake Michigan Coastal Ecological Landscape which stretches from southern Door County west across Green Bay to the Wolf River drainage, then southward in a narrowing strip along the Lake Michigan shore to central Milwaukee County (Figure 4). Owing to the influence of Lake Michigan in the eastern part of this landscape, summers in this area are cooler, winters are warmer, and precipitation levels are greater than at locations farther inland. A series of dolomite cliffs (part of the Niagara Escarpment) provides critical habitat for rare terrestrial snails, bats, and specialized plants. The primary glacial landforms are ground moraine, outwash, and lake plain.

The topography in this area is generally rolling where the surface is underlain by ground moraine, variable over areas of outwash, and nearly level where lacustrine deposits are present. Important soils include clays, loams, sands, and gravels. Certain landforms, such as sand spits, clay bluffs, beach and dune complexes, and ridge and swale systems are associated only with the shorelines of Lake Michigan and Green Bay.

Historically, most of this landscape was vegetated with mesic hardwood forest composed primarily of sugar maple, basswood, and beech. Hemlock and white pine were locally important, but hemlock was generally restricted to cool moist sites near Lake Michigan. Areas of poorly drained glacial lake plain supported wet forests of tamarack, white cedar, black ash, red maple, and elm, while the Wolf and Embarrass Rivers flowed through extensive floodplain forests of silver maple, green ash, and swamp white oak. Emergent marshes and wet meadows were common in and adjacent to lower Green Bay, while Lake Michigan shoreline areas featured beaches, dunes, interdunal wetlands, marshes, and highly diverse ridge and swale vegetation. Small patches of prairie and oak savanna were present in the southwestern portion of this landscape.

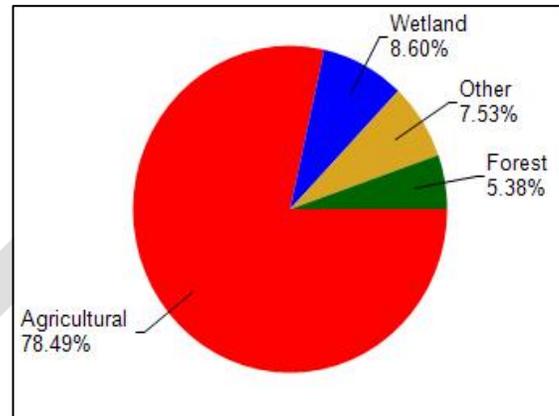


Figure 3: Landuse in the Sevenmile and Silver Creeks Watersheds



Figure 4: Ecological landscapes in the Sevenmile and Silver Creek Watershed

## Hydrology

Dolomites and shales underlie the glacial deposits that blanket virtually all of the Central Lake Michigan Coastal Ecological Landscape. The dolomite Niagara Escarpment is the major bedrock feature, running across the entire landscape from northeast to southwest. The Niagara Escarpment is a geologic formation that runs hundreds of miles through our state and beyond, forming a great circle all the way to Niagara Falls at the New York-Canada border. The “ledge” is a hard limestone layer called Niagara dolomite and it contains fossils of the simple life forms existing 400 million years ago.

Much of the ledge is wooded due to fallen rock at its base and too little soil on top for farming. There is often water at the base in the forms of springs, marshes, and lakes. Springs pop up at the base because dolomite, though hard, is fractured; the dolomite filters groundwater down until it stops at the underlying layer of shale, which is nearly impermeable and the water therefore rises again in the form of springs. Dolomite is notoriously fractured and susceptible to land surface pollution, resulting in – for example – bacteria or nutrients seeping through karstic seams and fractures to reach the shale layer of the aquifer. The surface features in this area are not amenable to livestock grazing or heavily agriculture uses due to the inherent conflict with potential contamination of drinking water supplies (2002, McLean).

## Study Summary

This study of the Pine Creek and Calvin Creek subwatersheds was initiated as a planning project to assess the overall chemical, physical and biological condition of waters that discharge directly to Lake Michigan. While the report focuses on the monitoring results for this smaller subwatershed, this document will cover assessment data for the larger Sevenmile and Silver Creek Watershed.

Three sites in *Pine Creek* were assessed for fish, physical habitat and macroinvertebrates (Pine at Carstens Road [393295], Pine at Gass Lake Road [10045063], and Pine at CTH U [10016013]). In addition, a diatom sample, six monthly water chemistry samples, and long-term temperature data were collected at the most downstream site at CTH LS [10016345]. Diatom results are not yet available and will be reported on the website when they are analyzed (Figure 5). Two sites in Calvin Creek were assessed for fish, physical habitat and macroinvertebrates, at Clover Road [10044972] and at South 26th Street [10045061]. A diatom sample, six monthly water chemistry samples, and long-term temperature data were collected downstream at CTH LS [363227].

## Management Recommendations

A priority issue for this watershed is to work with landowners to decrease the amount of agricultural runoff reaching surface and groundwater. Water quality goals for the Pine and Calvin Creek subwatershed should be to minimize agricultural runoff from rural area, restore key wetlands and forest

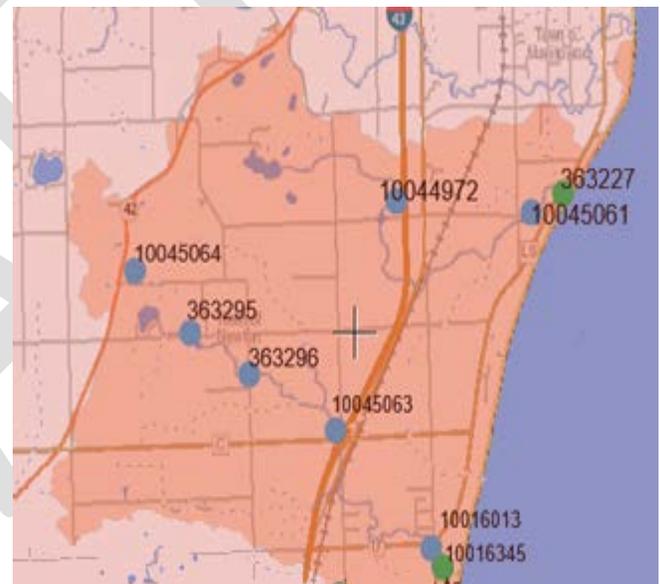


Figure 5: Stations in the Pine and Calvin Creek Project Study Area. The green stations are ones where diatoms, chemistry and long-term temperature probes were placed.

lands for water quality improvements and protection, establish riparian buffers to protect water quality, monitor and control non-native invasive species, minimize fish passage barriers, and increase citizens' watershed awareness, understanding and stewardship. In addition, Pine Creek and Calvin Creek water quality could be restored via listing for total phosphorus and implementing best management practices and watershed management activities.

## Ecological, Aquatic Resources

### Impaired Waters

Every two years Wisconsin publishes a list of waters that do not meet water quality standards. The Impaired Waters List reflects waters newly added or removed based on new information. Impaired waters in this watershed are impaired for historical discharges and runoff issues (Table 1).

Table 1: Impaired Waters in Sevenmile and Silver Creeks watershed (MA01).<sup>1</sup>

Local Name	WBIC	Start Mile	End Mile	Pollutant	Impairment	Sources	Impaired Status
Carstens Lake*	66800	0	21	Total Phosphorus	Eutrophication, Excess Algal Growth	Non-point source	303d Listed
Gass Lake*	67100	0	6	Total Phosphorus	Excess Algal Growth	Non-point source	Proposed for List
Hartlaub Lake*	67200	0	34	Total Phosphorus	Impairment Unknown	Non-point source	Proposed for List
Hika Park Bay Beach	20	0	0.2	E. coli	Recreational Restrictions - Pathogens	NA	303d Listed
Fischer Park Beaches	20	0	0.85	E. coli	Recreational Restrictions - Pathogens	Non-point source	Proposed for List
Lake Michigan	20	0	103.38	Mercury PCBs	Contaminated Fish Tissue	Contaminated Sediments	303d Listed
Pine Creek*	66300	2	6	Total Phosphorus	Impairment Unknown	Non-point source	303d Listed
Silver Creek	67300	0	17.98	Total Phosphorus	Impairment Unknown	Non-point source	303d Listed
Silver Lake	67400	0	72.61	Total Phosphorus	Fish Kills, Excess Algal Growth	Non-point source	TMDL Approved

<sup>1</sup> Waters with asterisks (\*) are located in the study area.

## Monitoring Project Discussion

### Purpose of Project

The Pine and Calvin Creeks Frontal Lake Michigan is a Targeted Watershed Assessment selected for general planning purposes. The project was designed to assess the overall chemical, physical and biological condition of both Pine Creek and Calvin Creek which discharge to Lake Michigan.

### Site Selection and Study Design

This 2016 study involved collection fish assemblage data, qualitative or quantitative habitat, and macroinvertebrate data at several sites in the targeted Hydrologic Unit (HUC12). Sites were selected based on upstream biological and habitat indicators and "pour point" analysis of surface water chemistry, temperature, and diatoms. Continuous temperature was collected at the first upstream road crossing from where the streams meet Lake Michigan (See Figure 5). Phosphorus data was collected 6

times during the growing season from the pour point of the subwatershed. These sites were selected to represent the overall stream health in the watershed.

Monitoring included:

- Six monthly water chemistry samples during the growing season for TP, N, and TSS.
- Continuous temperature meters at two locations during the growing season.
- Quantitative and qualitative habitat assessments.
- Fish surveys at five locations.
- Macroinvertebrate samples at six locations.
- Diatom samples at two locations.

### Methods, Equipment and Quality Assurance

#### **Fish Assemblage**

The fisheries assemblage was collected with the following methods:

- [Wadeable Stream Fish Community Evaluation Form 3600-230 \(R 7/00\)](#)
- [Guidelines for Assessing Fish Communities of Wadeable Streams in Wisconsin](#)

The method for fish collected was conducted by electroshocking a section of stream with a minimum station length of 35 times the mean stream width (Lyons, 1992). A stream tow barge with a generator and two probes was used at the lower most Pine Creek site. A backpack shocker with a single probe was used at the other four sites. All fish were collected, identified, and counted.

#### **Habitat Evaluation**

At each site, qualitative notes on average stream width and depth, riparian buffers and land use, evidence of sedimentation, fish cover and potential management options were also recorded. A qualitative habitat survey (Simonson, et. al., 1994) was performed at the upper stream reaches while a quantitative habitat survey was collected at the lower station both on Pine and Calvin Creeks.

- [Guidelines for Qualitative Physical Habitat Evaluation of Wadeable Streams](#)
- [Qualitative Habitat Rating less than 10m Form \(3600-532A\) \(R 6/07\)](#)
- [Guidelines for Evaluating Habitat of Wadeable Streams Revised June 2002 \(Quantitative Habitat\)](#)
- [Wadeable Stream Quantitative Habitat Evaluation Form 3600-228 \(R 6/07\)](#)

#### **Macroinvertebrate Evaluation**

Macroinvertebrate samples were obtained by kick sampling and collecting using a D-frame net at three sites in Pine Creek and three sites in Calvin Creek. Samples were preserved and sent to the University of Wisconsin-Stevens Point for analyses.

- [Guidelines for Collecting Macroinvertebrate Samples in Wadeable Streams](#)
- [Wadeable Macroinvertebrate Field Data Report Form 3200-081 \(R 08/14\)](#)

#### **Water Sampling**

Water samples were collected once per month throughout the growing season (May through October), one site in Pine Creek and one site in Calvin Creek. Samples were analyzed for total phosphorus, total nitrogen, and total suspended solids at the State Laboratory of Hygiene.

- [Guidelines and Procedures for Surface Water Grab Sampling \(Dec. 2005 Version 3\)](#)

### Continuous Temperature

Water temperature data loggers (HOBO brand) were placed in Pine Creek at CTH LS and Calvin Creek at S. 26<sup>th</sup> Street from May to October 2016. The loggers recorded hourly water temperature.

- [Guidelines and Standard Procedures for Continuous Temperature Monitoring Wisconsin DNR May 2004 \(Version 1\)](#)

### Diatom Sampling

Diatom samples were collected at one site in both Pine Creek and Calvin Creek following the Diatom sampling in wadeable streams protocol.

- [Diatom Collections for Calculation of the Diatom Nutrient Index \(DNI\), WQ Monitoring 2016 SOP v2.3 01](#)

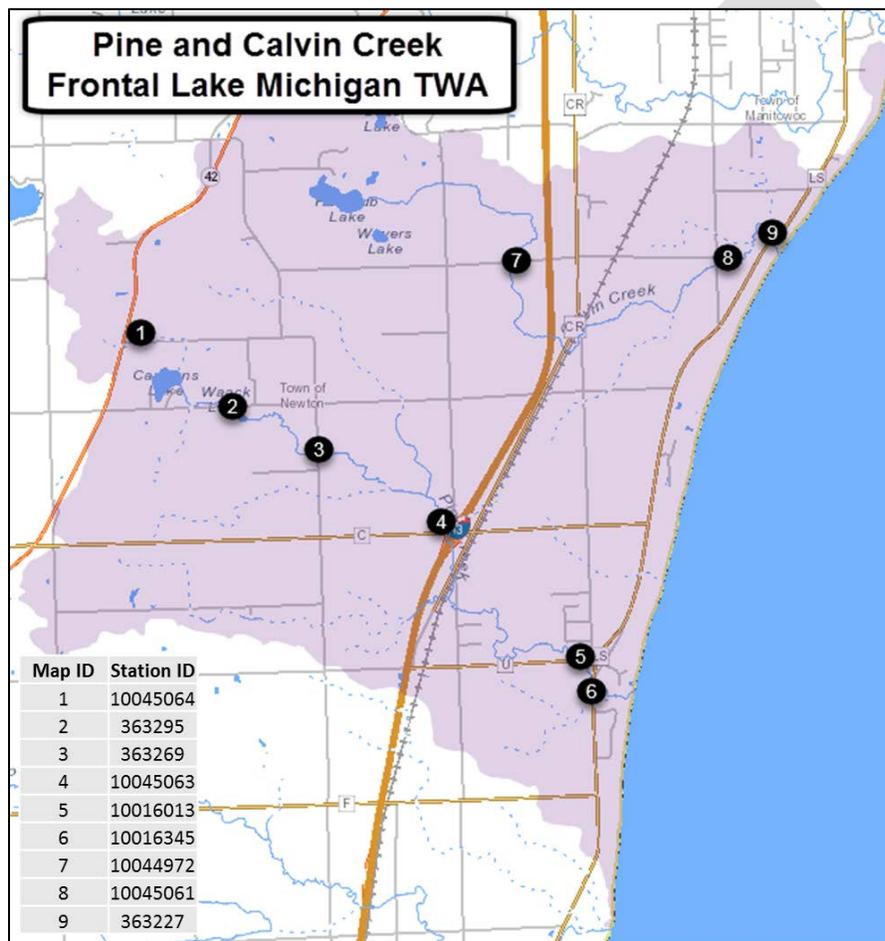


Figure 6: Map of monitoring stations in the Pine and Calvin Creek Frontal Lake Michigan TWA.

### Monitoring Stations and Data Tables

This study's primary stations include those below in Table 2. The Pine Creek stations at the top of the table (No's 2 & 3) have contemporaneous data. While these stations were not directly sampled for this study they present additional information.

Table 2: List of monitoring stations in the Pine and Calvin Creek Frontal Lake Michigan TWA.

Waterbody	No.	Station ID	Station Name
Pine Creek (66300)	1	10045064	Pine Creek 120 Meters DS Carstens Road
	2	363295	Pine Creek at Carstens Lake Rd
	3	363296	Pine Creek at Center Road
	4	10045063	Pine Creek 25 Meters US Gass Lake Road
	5	10016013	Pine Creek Above Cth U
	6	10016345	Pine Creek Above And Under Ls Bridge
Calvin Creek (66900)	7	10044972	Calvin Creek 15 meters US Clover Road
	8	10045061	Calvin Creek 200 meters DS South 26th Street
	9	363227	Calvin Creek at Cth Ls (Bi Sur)

Table 3: Monitoring Locations and data groups.

Water (WBIC)	Station ID	Location	Parameter Group					
			Water Chemistry	Diatoms	Water Temp	Invertebrate	Habitat	Fish
Pine Creek (66300)	10045064	Carsten Road				X	X	X
	10045063	Gass Lake Road				X	X	X
	10016013	CTH U					X	X
	10016345	CTH LS	X	X	X	X		
Calvin Creek (66900)	10044972	Clover Road				X	X	X
	363227	CTH LS	X			X		
	10045061	S. 26 <sup>th</sup> Street		X	X	X	X	X

Table 4: List of stations with macroinvertebrate index of biological integrity values and condition

Waterbody Name	WBIC	Station Id	Station Name	Result	Condition
Calvin Creek	66900	363227	Calvin Creek at Cth Ls (Bi Sur)	4.79	Fair
Calvin Creek	66900	10044972	Calvin Creek 15 meters US Clover Road	4.57	Fair
Calvin Creek	66900	10045061	Calvin Creek 200 meters DS South 26th Street	2.05	Poor
Pine Creek	66300	10016345	Pine Crk. - Above And Under Ls Bridge	4.47	Fair
Pine Creek	66300	10045063	Pine Creek 25 Meters US Gass Lake Road	4.66	Fair
Pine Creek	66300	10045064	Pine Creek 120 Meters DS Carstens Road	4.72	Fair

Table 5: List of stations with chemistry data and values

Waterbody Name	WBIC	Start Date	Station Id	Station Name	Total Phosphorus Result (mg/L)
Calvin Creek	66900	05/15/2016	363227	Calvin Creek at Cth Ls (Bi Sur)	0.0897
Calvin Creek	66900	06/13/2016	363227	Calvin Creek at Cth Ls (Bi Sur)	0.192
Calvin Creek	66900	07/20/2016	363227	Calvin Creek at Cth Ls (Bi Sur)	0.275
Calvin Creek	66900	08/23/2016	363227	Calvin Creek at Cth Ls (Bi Sur)	0.325
Calvin Creek	66900	09/20/2016	363227	Calvin Creek at Cth Ls (Bi Sur)	0.272
Calvin Creek	66900	10/19/2016	363227	Calvin Creek at Cth Ls (Bi Sur)	0.157

Pine Creek	66300	09/20/2016	10016345	Pine Crk. - Above And Under Ls Bridge	0.1
Pine Creek	66300	10/19/2016	10016345	Pine Crk. - Above And Under Ls Bridge	0.0922
Pine Creek	66300	05/15/2016	10016345	Pine Crk. - Above And Under Ls Bridge	0.0448
Pine Creek	66300	06/13/2016	10016345	Pine Crk. - Above And Under Ls Bridge	0.122
Pine Creek	66300	07/20/2016	10016345	Pine Crk. - Above And Under Ls Bridge	0.0687
Pine Creek	66300	08/23/2016	10016345	Pine Crk. - Above And Under Ls Bridge	0.0873

Table 6: List of Fish and Habitat Data

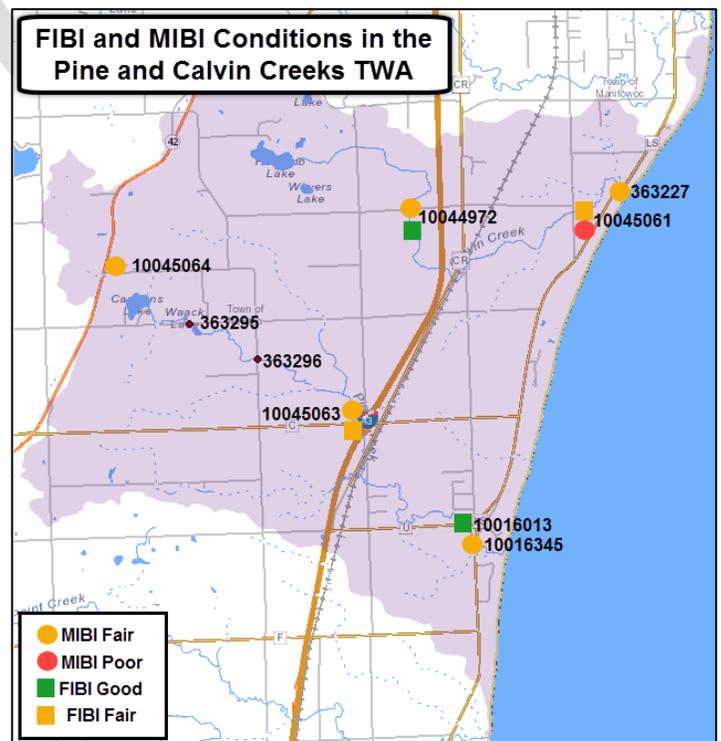
Station ID	Station Name	M-Natural Community	Natural Community	FIBI USED	fIBI Value Condition	Habitat Values	Notes
10045061	Calvin Creek 200 meters DS South 26th Street	WARM HEADWATER	Cool Warm Headwater	INTERMITTENT IBI	(40) Fair	Quantitative Good	fish assessment and quantitative habitat surveys Sampled Riffle
10044972	Calvin Creek 15 meters US Clover Road	WARM HEADWATER	Cool Warm Headwater	INTERMITTENT IBI	(60) Good	Qualitative Excellent	fish assessment and qualitative habitat surveys Sampled Riffle
10045063	Pine Creek 25 Meters US Gass Lake Road	WARM HEADWATER	Cool Warm Headwater	INTERMITTENT IBI	(40) Fair	Qualitative Good	fish assessment and qualitative habitat surveys Sampled Riffle
10016013	Pine Creek Above Cth U	WARM HEADWATER	Cool Cold Headwater	INTERMITTENT IBI	(70) Good	Quantitative Fair	fish assessment and quantitative habitat surveys Sampled Riffle.

Figure 7: Map of FIBI and MIBI conditions in the Pine and Calvin Creeks TWA. Note that fish and macroinvertebrate studies were not completed on stations 363295 and 363296.

## Discussion

### River/Stream Health

A watershed’s fishery is a long-term gauge of conditions and is a good bioassessment tool for the overall conditions. The DNR uses a system of identifying the natural community or temperature / flow conditions of a stream using a stream model. Staff verify the natural community through evaluating fish community assemblages found during sampling events.



**Natural Community Analysis**

The department has developed a method to determine whether or not the modeled natural community is accurate based on the fishery assemblage and climate conditions (Lyons, 2013).

Four fish surveys were conducted in the study with the modeled natural communities at stations sampled updated based on the Natural Community Validation 2017 spreadsheet created by Lyons and Minahan (2017). The analysis resulted in cooler natural communities; however, both the warm and cooler water communities use the intermittent IBI (Table 6, Figure 7). All four sites showed some signs of degradation, while habitat values were fair to excellent.

Pine and Calvin Creeks are modeled as a Warm Headwater under the state's Natural Community Determinations. Warm Headwaters are small, usually intermittent streams with warm summer temperatures. Coldwater fishes are absent, transitional fishes are common to uncommon, and warm water fishes are abundant to common. Headwater species are abundant to common, mainstem species are common to absent, and river species are absent. Analysis of data found at recent surveys indicates that the natural community may be Cool Warm Headwater. Both natural communities use the intermittent IBI for it application of the mIBI indicator parameter.

**Fish Index of Biological Integrity**

Fish surveys were completed on 5 sites between June and August 2016. 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 watershed. The FIBI scores ranged from 0 to 100. Of the five fish surveys completed two had a condition of good, two had a condition of fair and one site (Pine Creek at Carstens Road) had no fish.

**Habitat Findings**

Habitat scores ranged widely from excellent in Calvin Creek at Clover Road, good in Calvin Creek at S, 26<sup>th</sup> street and Pine Creek at Grass Lake Road, to fair in the Pine Creek at Carstens Road and on CTH U.

**Macroinvertebrate Data**

The macroinvertebrate IBI has shown the combination of watershed land cover and local riparian and instream conditions strongly influence one another (Weigel, 2003). The macroinvertebrate locations sampled for this project indicated watershed disturbance, with three stations sampled on each of Calvin and Pine Creek. Results indicated that mIBI values were fair for all sites sampled with the exception of Calvin Creek downstream of South 26<sup>th</sup> Street with a Poor value (Figure 8, Table 4).

**Condition category thresholds for wadeable stream macroinvertebrate index of biotic integrity.**

<i>Wadeable Stream M-IBI Thresholds</i>	<i>Condition Category</i>
> 7.5	Excellent
5.0-7.4	Good
2.5-4.9	Fair
< 2.5	Poor

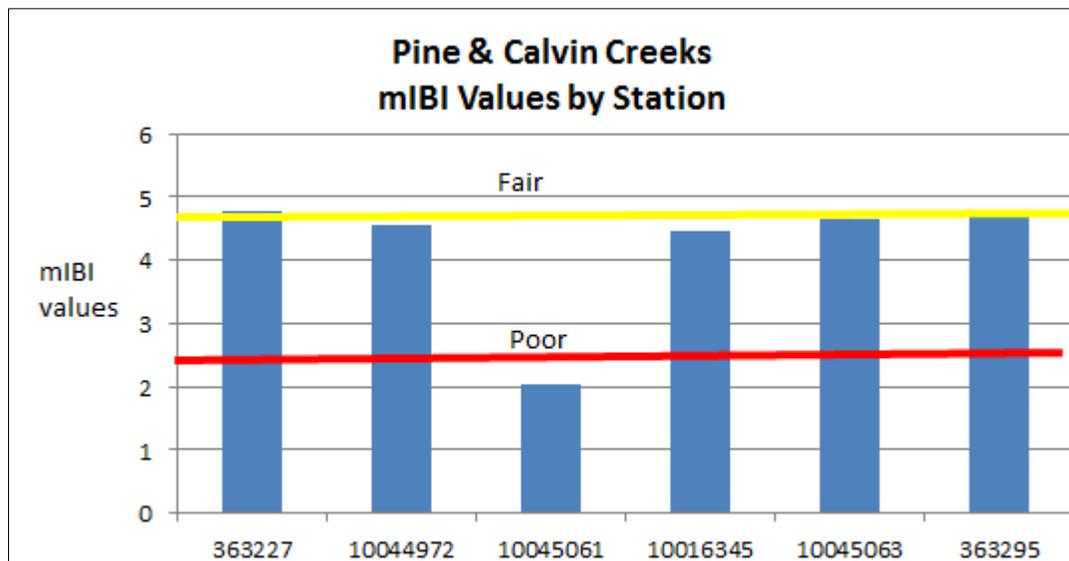


Figure 8: Chart of mIBI Values

**Chemistry Results**

For phosphorus, the department’s listing methodology for impaired waters (WDNR, 2017) lists waters where the median concentration exceeds 0.075 mg/l on wadable 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.

The samples from Calvin Creek exceeded the phosphorus standard showing a mean value of 232 mg/l, far exceeding the listing standard of 75 mg/L, while fewer results exceed the standard on Pine Creek which is already listed as impaired for phosphorus. Pine Creek is listed from mile 2 to 6 for phosphorus (Category 5P) with the pollutant “unknown”; biological data from the study for both creeks supports impairments for excess nutrients and the recent values for phosphorus support the listing (Figure 10).

Total Phosphorus Rivers/Streams Assessment Report WisCALM  
Streams 75 ug/L threshold, Rivers 100 ug/L threshold Includes data from 2007 to 2016 Date Report Ran: 06/26/2017

WBIC: 66900 Official Name: Calvin Creek Segment #: 1  
Local Name: Calvin Creek TP Threshold (ug/L): 75  
County: Manitowoc Watershed: Sevenmile and Silver Creeks

Station ID	Name	# Results	Median	Min	Max	Std Dev	90% CI Lower	90% CI Upper	Relation to Standard
363227	Calvin Creek at Cth Ls (Bi Sur)	6	232.0	89.7	325.0	87.7	150.8	267.7	Clearly Exceeds

For Total Nitrogen, no surface water quality standard exists in Wisconsin. However, concentrations at which biological effects are expressed, published in literature, were found to be higher than results in this project (median total nitrogen in USGS report 0.560 mg/L based on 23 streams (USGS, 1999)) and values for nitrogen are listed in Figure 9 below. Total suspended solids are similarly not promulgated in NR102 or listed in WisCALM 2018. However, TSS concentrations in August of 2016 at Pine Creek at 18 mg/L are higher than other sites in this study (Figure 12).

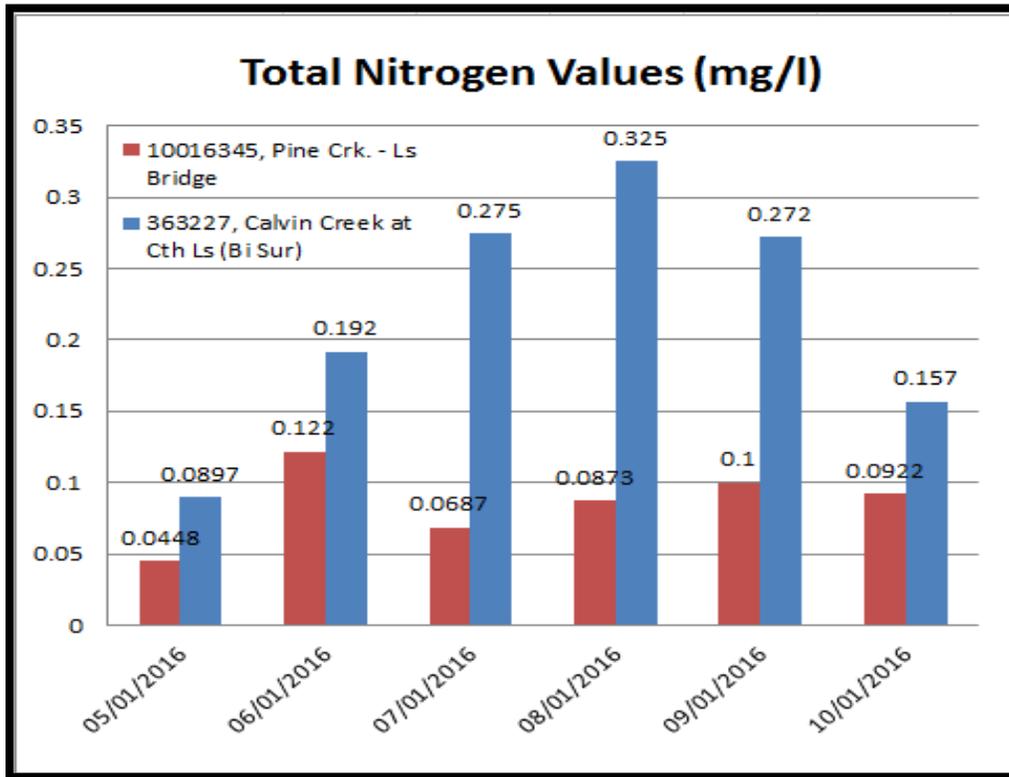
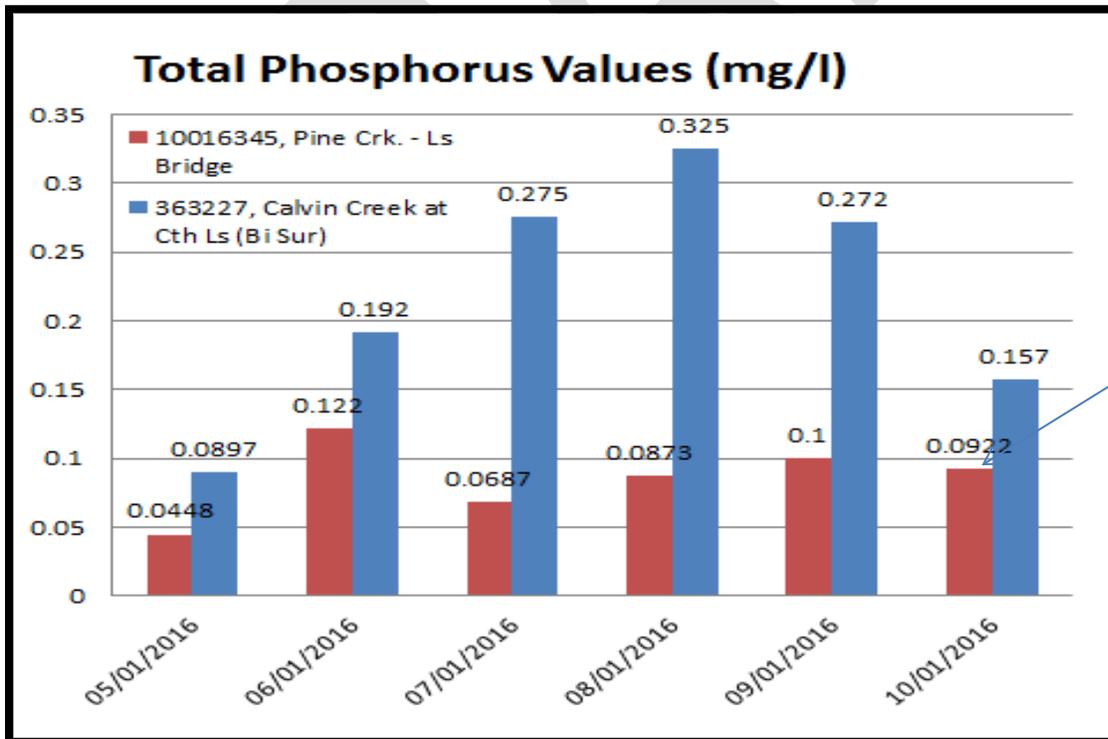


Figure 9: Total Nitrogen Values (mg/L)



WQ Standard = 0.075 mg/l

Figure 10: Total Phosphorus Values (mg/L)

### What are Total Suspended Solids?

Total suspended solids (TSS) are particles that are larger than 2 microns found in the water column. Anything smaller than 2 microns (average filter size) is considered a dissolved solid. Most suspended solids are made up of inorganic materials, though bacteria and algae can also contribute to the total solids concentration<sup>3</sup>.

Both organic and inorganic particles of all sizes can contribute to the suspended solids concentration.

These solids include anything drifting or floating in the water, from sediment, silt, and sand to plankton and algae<sup>1</sup>. Organic particles from decomposing materials can also contribute to the TSS concentration. As algae, plants and animals decay, the decomposition process allows small organic particles to break away and enter the water column as suspended solids<sup>17</sup>. Even chemical precipitates are considered a form of suspended solids<sup>20</sup>. Total suspended solids are a significant factor in observing water clarity<sup>3</sup>. The more solids present in the water, the less clear the water will be.



Figure 11: What are Total Suspended Solids from Fundamentals of Environmental Measures (<http://bit.ly/2s8DLdo>)

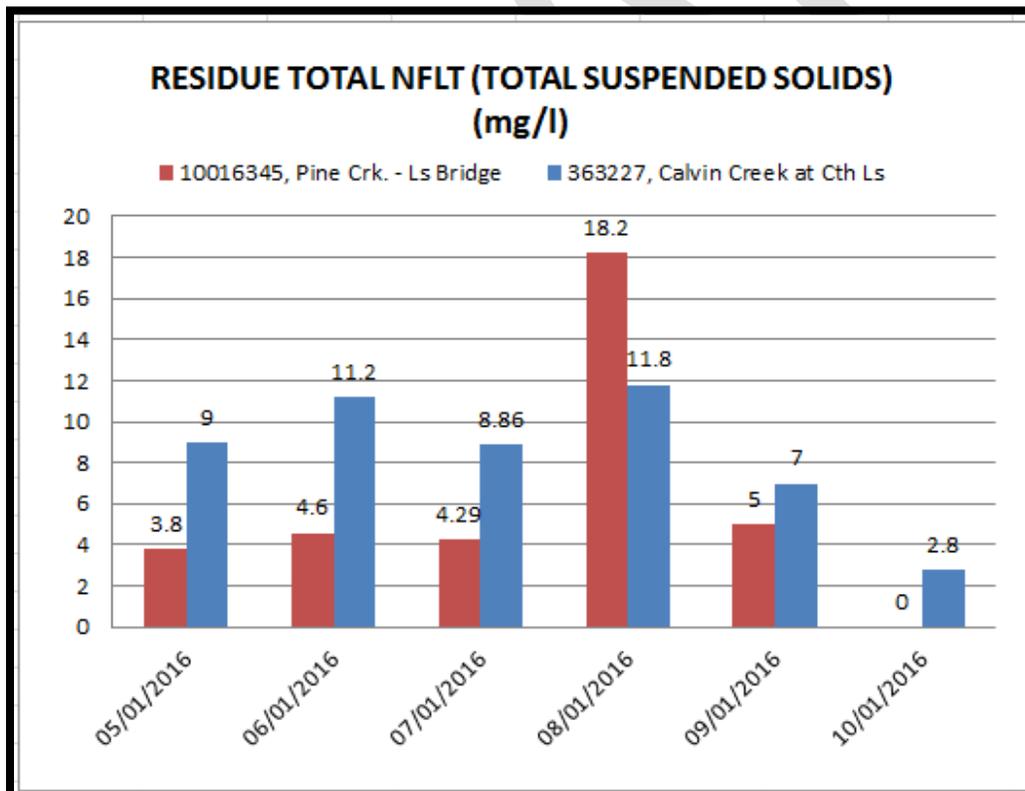


Figure 12: Residue Total NFLT (Total Suspended Solids, mg/L)

## Management Actions

### Management Priorities

- A priority issue for this watershed is to work with landowners to decrease the amount of agricultural runoff reaching surface and groundwater.

### Management Goals

Water quality goals for the Pine and Calvin Creek subwatershed are:

- Minimize agricultural runoff from rural areas.
- Restore key wetlands and forest lands for water quality improvements and protections.
- Establish riparian buffers to protect water quality.
- Monitor and control non-native invasive species.
- Minimize fish passage barriers.
- Increase citizens' watershed awareness, understanding, and stewardship.
- Restore the water quality of Pine Creek and Calvin Creek through listing for total phosphorus, best management practices, and watershed management activities.



### Monitoring and Assessment Recommendations

- Calvin Creek should be added to the state's 303d List of impaired waters due to the total phosphorus concentrations exceeding the WisCALM guidance.
- Assess the condition of all the lakes within the Pine and Calvin Creeks Subwatershed since this study only focused on streams.
- Natural Community validation or recommended changes or updates based on analysis of fish species found in recent surveys:
  - Station 10045061, Calvin Creek 200 meters DS South 26th Street was modeled as a WARM HEADWATER but is recommended as a Cool Warm Headwater based on the 2017 Natural Community temperature evaluation analysis tool.
  - Station 10044972, Calvin Creek 15 meters US Clover Road was modeled as WARM HEADWATER but is recommended as a Cool Warm Headwater based on the 2017 Natural Community temperature evaluation analysis tool.

- Station 10045063, Pine Creek 25 Meters US Gass Lake Road was modeled as a WARM HEADWATER but is recommended as a Cool Warm Headwater based on the 2017 Natural Community temperature evaluation analysis tool.
- Station 10016013, Pine Creek above Cth U was modeled as a WARM HEADWATER but is recommended as a Cool Cold Headwater based on the 2017 Natural Community temperature evaluation analysis tool.

#### Management Recommendations for DNR

- Pine Creek is currently listed for phosphorus. This study provides additional biological data showing impacts from the phosphorus listing.
- Calvin Creek should be listed as impaired for phosphorus as it is found to be clearly exceeding listing values for the 2018 WisCALM guidance.

#### Management Recommendations for External Partners

- DNR should work with partners to reduce phosphorus runoff and engage local units of government and watershed residents in stream restoration.
- DNR encourages local governments and nonprofit organizations to apply for runoff management grants to reduce phosphorus delivery in the larger watershed (MA01).



## Appendix A: References

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## Pine Creek at Gass Lake Rd

### Appendix B: Waterbody Narratives

#### [Waters in the study area](#)

##### Calvin Creek WBIC: 66900

Calvin Creek supports a forage fishery. Migration of salmonid species from Lake Michigan is limited because of low flow and impassable culverts. Stream habitat assessments indicate poor habitat in the lower reaches but excellent habitat further upstream. . Macroinvertebrate values were fair in the upstream reaches but poor downstream. This study confirms that Calvin Creek is impaired for total phosphorus

##### Carstens Lake WBIC: 66800

Carstens Lake near the headwaters of Pine Creek is a hard water seepage lake in a ground moraine, with a surface area of 20 acres, a maximum depth of 30 feet, and a mean depth of 12 feet. The total shoreline length is 0.77 miles, with 0.3 miles in public ownership. Six acres of wetlands adjoin the lake,

which drains a 1.0 square mile watershed. This lake was assessed in 2017 and found to be exceeding phosphorus standards and is recommending for listing on the 303d list of impaired water. The mean value in the assessment was found to be 67 ug/l, and the threshold for this type of lake is 20 ug/l.

**Gass Lake WBIC: 67100**

Gass Lake is small seepage lake (6 acres) and is a hard water landlocked lake in terminal moraine about 3 miles southwest of Manitowoc with a depth of 24 feet. The lake is fed by seepage and drainage and has clear water. The bottom is mostly mucky with some gravelly areas. It is managed for largemouth bass, panfish, and northern pike. Approximately 80% of the ten acres of adjacent wetland is wooded. Hunting is permitted. There is a boat landing on this lake with limited parking spaces available. Gass Lake was assessed during the 2016 listing cycle; total phosphorus and chlorophyll sample data exceed 2016 WisCALM listing thresholds for the Recreation use, but do not exceed Fish and Aquatic Life thresholds.

**Glomski Lake WBIC: 45400**

This is a small (8.46 acre), hard water landlocked lake in terminal moraine about 3 miles southwest of Manitowoc. The lake is seepage fed and has clear water. Littoral material consists of muck. Historically, the lake has been managed for largemouth bass and panfish. Hunting is permitted. There is no access and no public frontage. This lake is managed for fishing and swimming and is currently not considered impaired.

**Hartlaub Lake WBIC: 67200**

Hartlaub Lake, a seepage lake forming the headwaters of Calvin Creek, has an area of 38.4 acres, a maximum depth of approximately 60 feet, and a mean depth of 20 feet. The total shoreline length is 1.2 miles, of which 0.01 miles are publicly owned. There are six acres of adjoining woody wetlands. The drainage basin covers 1 square mile. Northern pike are present, while largemouth bass and panfish are common. Hartlaub Lake was assessed during the 2016 listing cycle; total phosphorus sample data exceed 2016 WisCALM listing thresholds for the Recreation use, however, chlorophyll data do not exceed REC thresholds. Total phosphorus and chlorophyll data did not exceed Fish and Aquatic Life thresholds at that time.

**Kasbaum Lake WBIC: 45800**

Kasbaum Lake, in the Sevenmile and Silver Creeks Watershed, is a 6.48 acre lake in Manitowoc County that is managed for fishing and swimming and is currently not considered impaired. This is a small, hard water landlocked lake in terminal moraine about 3 miles southwest of Manitowoc. The lake is fed by seepage and has clear alkaline water. Littoral material is muck. Historically it has been managed for largemouth bass and panfish. Kasbaum Lake was assessed during the 2016 listing cycle; chlorophyll sample data were clearly below 2016 WisCALM listing thresholds for Recreation use and Fish and Aquatic Life use. Total phosphorus sample data were clearly below FAL use listing thresholds and did not exceed REC listing thresholds. This water is meeting these designated uses and is not considered impaired.

**Pine Creek WBIC: 66300**

Pine Creek supports a forage fishery. The stream is modeled as a warm water stream but may be considered a cool-warm headwater; both of these communities use the intermittent IBI. Stream habitat was rated as fair to good. The macroinvertebrate values are generally fair. . Phosphorus results confirm impairment due to exceedance of water quality standards.

**Weyers Lake WBIC: 49400**

Weyers Lake is a small seepage lake covering 6 acres and having a maximum depth of 32 feet. A public boat ramp provides access.

**Grosshuesch Lake WBIC: 66600**

Grosshuesch Lake, in the Sevenmile and Silver Creeks Watershed, is a 3.47 acre in Manitowoc County. This lake is a small, hard water lake in terminal moraine about 5 miles southwest of Manitowoc that is managed for fishing and swimming and is currently not considered impaired. The lake is fed by seepage and by Pine Creek, which enters at the northwest end. Littoral material consists of muck. Pine Creek drains the lake through the outlet at the southeast end. Northern pike provide seasonal fishing. Algae blooms and summer kill detract from the use of this body of water. All 12 acres of adjacent wetland are woody. Ducks make limited use of the area and hunting is permitted. A town road without parking provides access. There is no public frontage.

**Waack Lake WBIC: 66700**

Waack Lake, a small, seepage lake in terminal moraine which has hard, light brown water, in the Sevenmile and Silver Creeks Watershed, is a 1.00 acre lake that falls in Manitowoc County. This lake is managed for fishing and swimming and is currently not considered impaired. This lake displays a rather remarkable characteristic in that it develops a thermocline at a depth of just one foot, possibly because the lake is so small and sheltered. Pine Creek enters the lake at the west end and drains it toward Grosshuesch Lake at the southeast end. The channel is, however, generally -stagnant. The shoreline is wild and there are no dwellings. A town road provides difficult access. Hunting is permitted and a limited number of ducks provide some fall shooting.

**Waters in the larger watershed****Centerville Creek WBIC: 65400**

Centerville Creek, in the Sevenmile and Silver Creeks Watershed, is a 5.54 mile river that falls in Manitowoc County. This river is managed for fishing and swimming and is currently not considered impaired.

**English Lake WBIC: 68100**

English Lake is a small, deep, seepage lake in the outwash plain west of Newtonburgh. The water is clear, hard and alkaline. The bottom is primarily muck. Silver Creek intermittently drains the lake at the southwest corner. The lake is managed for largemouth bass, panfish, and walleyes. There is a boat landing on this lake with adequate public parking. This lake was assessed in 2017 and found to be exceeding phosphorus standards and is recommended for listing on the 303d list of impaired waters. The mean value in the assessment was higher than the threshold of 20 ug/l. for this type of lake

**Unnamed Tributary to Fischer Creek WBIC: 5025420**

Unnamed Tributary to Fischer Creek, in the Sevenmile and Silver Creeks Watershed, is a 2.78 mile river that falls in Manitowoc County. This river is managed for fishing and swimming and is currently not considered impaired.

**Fischer Creek WBIC: 65800**

Fischer Creek, a six-mile creek, supports a warm water forage fishery with some seasonal migration of brook trout, rainbow trout and coho salmon from Lake Michigan. Fischer Creek is one of the Lake Michigan tributaries being managed by the WDNR as a Class II steelhead stream. The fishery is limited by low flow conditions during the summer and the fall. Siltation inhibits fish spawning. Nonpoint source pollution from an unnamed tributary (T17N R23E S15) is degrading the water quality of Fischer Creek and has caused several fish kills. In 1996, 123 acres known as the Fischer Creek property was added to the Manitowoc County park system. The state's Stewardship Fund purchased the property. The tract is a mixture of young forest, marsh and grassland crossed by the creek. The greatest value of the property is for non-consumptive recreation such as birding, walking and photography.

**Fischer Park Beaches, Lake Michigan WBIC: 20**

This beach is listed for bacterial pollution, which is caused by a combination of point and nonpoint sources.

**Fourmile Creek WBIC: 64700**

Fourmile Creek, in the Sevenmile and Silver Creeks Watershed, is a 6.06 mile creek that falls in Sheboygan County. This creek is managed for fishing and swimming and is currently not considered impaired.

**Hika Park Bay Beach, Lake Michigan WBIC: 20**

This beach is listed for bacterial pollution, which is caused by a combination of point and nonpoint sources.

**Meeme Creek WBIC: 65300**

Meeme Creek, in the Sevenmile and Silver Creeks Watershed, is a 5.10 mile river that falls in Sheboygan County. This river is managed for fishing and swimming and is currently not considered impaired.

**Sevenmile Creek WBIC: 65100**

The fishery in Sevenmile Creek consists of pollution-tolerant forage fish. The ability of the creek to support a viable fishery is limited due to the extreme low flow. Stream habitat assessments indicate fair habitat although dissolved oxygen readings, obtained in conjunction with habitat survey, were depressed. These low dissolved oxygen readings are indicative of organic pollution.

**Silver Lake WBIC: 67400**

Silver Lake is the subject of a TMDL. This 67 acre lake has a maximum depth of 40 feet and a mean depth of 16 feet. The Lake is nutrient (phosphorus (P)) impaired as a result of agriculture, internal loading and local land use, is listed on the 1998 303(d) list as a high priority water and external load sources are nonpoint source (NPS) dominated. The designated use for Silver Lake is a full recreation, warm water sport fishery. Total shoreline length is 2.20 miles, of which a portion, including a boat ramp, opens to the public. The drainage basin covers 1 square mile and includes English Lake, which intermittently drains into the lake via Silver Creek. About 10 acres of wetlands adjoin the lake. For more information see:

<http://dnr.wi.gov/water/projectDetail.aspx?key=144746962>

**Point Creek WBIC: 66000**

This twelve mile creek supports several species of fish considered relatively intolerant of pollution. The potential of the stream to support a significant sport fishery is somewhat limited by flow; but, native gamefish species are suspected to use this stream during high water years and high water periods. A seasonal spawning run of Lake Michigan salmonid species occurs and provides opportunities for fishing. Staff should conduct surveys to assess existing and potential uses during normal to slightly higher water summer periods.

**Silver Creek WBIC: 67300**

Silver Creek Park at the mouth of Lower Silver Creek provides public access to the stream and Lake Michigan. The majority of the recreational activity on Lower Silver Creek occurs at the park. Biotic index samples taken in 1985 at one site on Lower Silver Creek indicate poor to very poor water quality (Nonpoint Source Pollution Control Plan 1987). Silver Creek below Silver Lake has a diverse population of fish including northern pike, bluegill, bullhead, sucker, as well as brook trout, rainbow trout, and brown trout. Salmonid (trout and salmon) species are reported to migrate up the creek during spring and fall spawning runs, at which time the stream receives significant fishing pressure. Surveys conducted in the upper reaches of Silver Creek indicate that flow is intermittent and the stream is often without flow during the summer and fall. The creek supports a population of rough and forage species of fish, with very few game fish present. In addition to poor water quality, the fishery in the stream is further limited by very low flow during the summer and fall. Streambank erosion in the sandy soil area near the mouth of the stream appears to be severe and may have a significant impact on the localized stream habitat and fishery. Silver Creek is one of the Lake Michigan tributaries being managed by the WDNR as a Class II steelhead stream and as such receives annual smolt stockings of the ganaraska strain of steelhead. Silver Creek was placed on the impaired waters list for total phosphorus in 2014. The 2016 assessments showed continued impairment by phosphorus; total phosphorus sample data exceed 2016 WisCALM listing criteria for the Fish and Aquatic Life use, however, no biological data (i.e. no macroinvertebrate or fish Index of Biotic Integrity (IBI) scores) were available to assess biological impairment. Based on the most updated information, no change in existing impaired waters listing is needed.

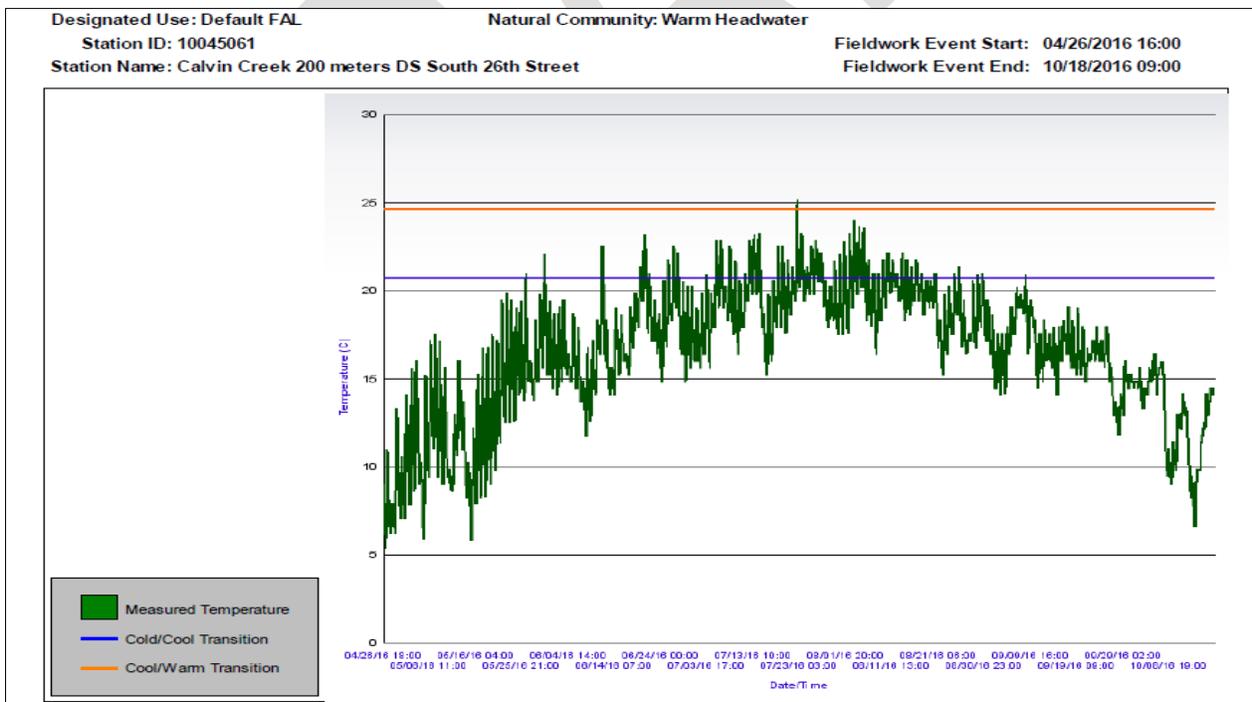
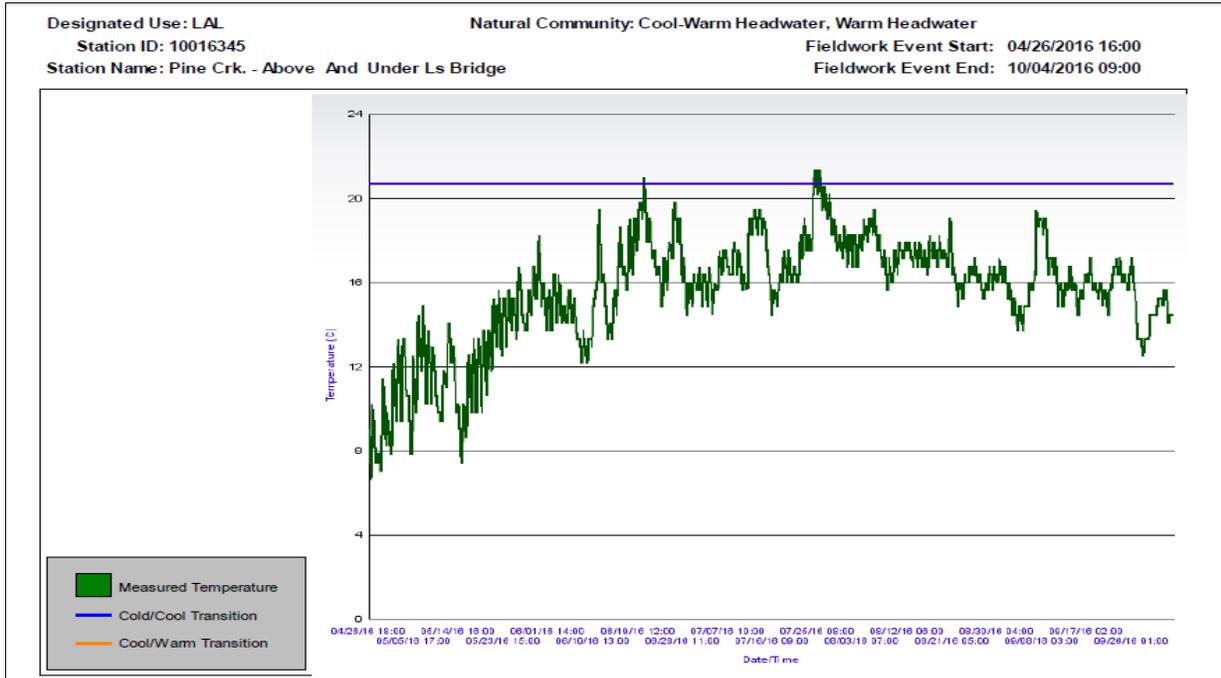
**Teek Lake WBIC: 67700**

Teek Lake, in the Sevenmile and Silver Creeks Watershed, is a 4.88 acre lake that falls in Manitowoc County. This lake is managed for fishing and swimming and is currently not considered impaired. This is a small, landlocked lake located in ground moraine. The hard, light brown water is supplied by drainage. Muck and sand are the major littoral materials. Northern pike, panfish and largemouth bass provide fishing. Winterkill is a use problem. There are no dwellings on the shoreline. There is no public access. About 20 acres of wetland adjoin the lake. Hunting is not permitted.

**Vetting Lake WBIC: 67900**

Vetting Lake, in the Sevenmile and Silver Creeks Watershed, is a 5.16 acre lake that falls in Manitowoc County. This lake is managed for fishing and swimming and is currently not considered impaired.

### Appendix C: Temperature Graphs



## Appendix D: Monitored Stations

WBIC	NAME	STATION	STATION_NAME	EARLIEST_DATE	LATEST DATE
67200	Hartlaub Lake	363229	Hartlaub Lake - Deep Hole	11/06/1980	04/04/2017
67100	Gass Lake	363035	Gass Lake - Deepest Point	02/11/1976	04/03/2017
66800	Carstens Lake	363036	Carstens Lake - Deep Hole - Middle	02/11/1976	04/02/2017
66900	Calvin Creek	363227	Calvin Creek at Cth Ls (Bi Sur)	04/24/1979	10/19/2016
66300	Pine Creek	10016345	Pine Crk. - Above And Under Ls Bridge	04/24/1979	10/19/2016
66900	Calvin Creek	10044972	Calvin Creek 15 meters US Clover Road	10/18/2016	10/18/2016
66900	Calvin Creek	10045061	Calvin Creek 200 meters DS South 26th Street	04/26/2016	10/18/2016
66300	Pine Creek	10045063	Pine Creek 25 Meters US Gass Lake Road	06/14/2016	10/04/2016
66300	Pine Creek	363295	Pine Creek at Carstens Lake Rd	09/29/2016	09/29/2016
20	Lake Michigan	10019608	Lake Michigan -- Hika Park Access	06/10/2007	09/16/2016
68100	English Lake	363037	English Lake - Deep Hole	02/11/1976	09/02/2016
49400	Weyers Lake	363067	Weyers Lake - Deep Hole	03/09/1977	09/01/2016
45800	Kasbaum Lake	363309	Kasbaum Lake - Deep Hole	06/09/2002	08/31/2016
20	Lake Michigan	10012703	Lake Michigan - Fischer Creek Park 36-001	05/29/2003	08/30/2016
68100	English Lake	10019217	English Lake -- Access at SW Side Of Lake (Nr Lake Rd)	07/15/2007	08/25/2016
67400	Silver Lake	363312	Silver Lake - East Basin Deep Spot	11/01/1995	08/24/2016
67200	Hartlaub Lake	10019451	Hartlaub Lake -- Access at NW Side Of Lake W	02/25/1997	08/20/2016
66800	Carstens Lake	363373	Carstens Lake -- Boat Landing	03/12/2002	08/13/2016
67100	Gass Lake	10019447	Gass Lake -- Access at NE Side Of Lake	07/03/2010	07/23/2016
67400	Silver Lake	10019640	Silver Lake -- Access at Just Off Hwy 151 Manitowoc	06/11/2008	06/25/2016
66300	Pine Creek	10016013	Pine Cr. - Above Cth U	04/17/1989	06/15/2016
66300	Pine Creek	10045064	Pine Creek 120 Meters DS Carstens Road	06/14/2016	06/14/2016
68100	English Lake	10003547	English Lake	04/24/1996	06/11/2016
67100	Gass Lake	10003544	Gass Lake	09/08/2000	05/18/2016
66800	Carstens Lake	10003543	Carstens Lake	06/01/1993	04/17/2016

WBIC	WATERBODY_NAME	STATION_ID	PRIMARY_STATION_NAME	EARLIEST_FIELDWORK_DATE	LATEST_FIELDWORK_DATE
64800	Unnamed	10043485	Unnamed Tributary to Four Mile Creek at Lakeshore Road	01/01/2015	10/24/2015
67300	Silver Creek	10016777	Silver Mw #99 - Across From 3224 Hwy Cr	09/27/1999	08/04/2015
67400	Silver Lake	10003522	Silver Lake	04/13/1994	08/01/2015
67200	Hartlaub Lake	10003545	Hartlaub Lake	04/17/1982	08/01/2015
65100	Sevenmile Creek	10044253	Sevenmile Creek at Luelloff Rd W of LS	07/14/2015	07/14/2015
5024032	Unnamed	10044222	Unnamed Trib (WBIC=5024032) at Hwy CL	07/14/2015	07/14/2015
49400	Weyers Lake	10019296	Weyers Lake -- Access at S Side Of Lake	06/11/2008	07/12/2015
66100	Unnamed	10043558	Unnamed Trib to Point Creek DS of pond discharge	04/30/2015	04/30/2015
66100	Unnamed	10043559	Unnamed Trib to Point Creek US of pond discharge	04/30/2015	04/30/2015
45400	Glomski Lake	100351	Glomski Lake	09/17/2003	09/23/2014
49400	Weyers Lake	10003534	Weyers Lake	09/08/2000	09/23/2014
5556212	Unnamed	101188	Unnamed - WBIC 5556212	08/28/2008	09/23/2014
48900	Unnamed	10003532	Unnamed Lake (T18 R22E S34)	09/08/2000	09/23/2014
66300	Pine Creek	10032600	Pine Creek at Hwy. C	04/08/2014	04/08/2014
66300	Pine Creek	363296	Pine Creek at Center Road	07/30/2013	07/30/2013
67200	Hartlaub Lake	10041549	Hartlaub Lake - N side E of public access	07/02/2013	07/02/2013
65300	Meeme Creek	10038051	Meeme Creek US Union Rd	08/14/2012	10/15/2012
67400	Silver Lake	363080	Silver Lake - Deep Hole-West Basin	05/03/1979	09/04/2012
67400	Silver Lake	10038251	Silver Lake (Manitowoc Co) nearshore site	08/29/2012	08/29/2012
45800	Kasbaum Lake	10003526	Kasbaum Lake	09/08/2000	09/07/2011
66000	Point Creek	363331	Point Creek at Cth F	09/27/1999	09/27/2010
65800	Fischer Creek	10031812	Fischer Creek at Dairyland Drive	09/27/2010	09/27/2010
65800	Fischer Creek	363224	Fischer Creek at Centerville Rd (Bi)	05/16/1979	09/27/2010
65800	Fischer Creek	10031811	Fischer Creek 400ft W of LS	09/27/2010	09/27/2010
66000	Point Creek	363333	Point Creek at Center Road	05/10/2004	09/27/2010

Appendix E: Watershed Report<sup>i</sup>

WBIC	Waterbody Name	Start Mile	End Mile or Acres	Current Use	Attainable Use	Supporting Attainable Use	Designated Use	Impairments	Sources	Assessment	Impaired Water Status
20	Lake Michigan	0	103.38	WWSF	WWSF	Supporting	Default FAL	NA	NA	Monitored	303d Listed
20	Fischer Park Beaches, Lake Michigan	0	0.85	FAL	FAL	Not Assessed	Default FAL	NA	NA	Monitored	Water Delisted, 303d Listed
20	Hika Park Bay Beach, Lake Michigan	0	0.2	FAL	FAL	Not Assessed	Default FAL	NA	NA	Monitored	303d Listed
45400	Glomski Lake	0	9	Small	FAL	Supporting	Default FAL	NA	NA	Monitored	NA
45800	Kasbaum Lake	0	9	Small	FAL	Fully Supporting	Default FAL	NA	NA	Monitored	NA
49400	Weyers Lake	0	6	Small	FAL	Supporting	Default FAL	NA	NA	Monitored	NA
64700	Fourmile Creek	0	6.06	FAL	FAL	Not Assessed	Default FAL	NA	NA	Not Assessed	NA
65100	Sevenmile Creek	0	5	WWFF	WWFF	Not Assessed	Default FAL	NA	NA	Evaluated: Watershed Tables	NA
65300	Meeme Creek	0	5.1	FAL	FAL	Supporting	Default FAL	NA	NA	Monitored	NA

October 1, 2017

**[PINE & CALVIN CREEK FRONTAL LAKE MICHIGAN TWA WQM  
2017]**

WBIC	Waterbody Name	Start Mile	End Mile or Acres	Current Use	Attainable Use	Supporting Attainable Use	Designated Use	Impairments	Sources	Assessment	Impaired Water Status
65400	Centerville Creek	0	5.54	FAL	FAL	Not Assessed	Default FAL	NA	NA	Not Assessed	NA
65600	Centerville Flowage	0	3.94	Small	FAL	Not Assessed	Default FAL	NA	NA	No Assessment	NA
65800	Fischer Creek	0	7	FAL	FAL	Fully Supporting	Default FAL	NA	NA	Monitored	NA
65800	Fischer Creek	7	8.78	FAL	FAL	Not Assessed	Default FAL	NA	NA	Not Assessed	NA
66000	Point Creek	0	13.74	FAL	WWFF	Supporting	Default FAL	NA	NA	Monitored	NA
66300	Pine Creek	0	2	FAL	FAL	Not Assessed	LAL	NA	NA	No Assessment	NA
66300	Pine Creek	2	6	FAL	LAL	Not Supporting	LAL	Impairment Unknown	Non-Point Source (Rural or Urban)	Monitored	303d Listed
66300	Pine Creek	6.59	7.66	FAL	FAL	Not Assessed	Default FAL	NA	NA	Not Assessed	NA
66600	Grosshuesch Lake	0	3.47	Small	FAL	Not Assessed	Default FAL	NA	NA	No Assessment	NA
66700	Waack Lake	0	1	Small	FAL	Not Assessed	Default FAL	NA	NA	No Assessment	NA

October 1, 2017

**[PINE & CALVIN CREEK FRONTAL LAKE MICHIGAN TWA WQM 2017]**

WBIC	Waterbody Name	Start Mile	End Mile or Acres	Current Use	Attainable Use	Supporting Attainable Use	Designated Use	Impairments	Sources	Assessment	Impaired Water Status
66800	Carstens Lake	0	21	Deep Seepage	FAL	Not Supporting	Default FAL	Eutrophication	Non-Point Source	Monitored	303d Listed
66900	Calvin Creek	0	6	FAL	WWFF	Supporting	Default FAL	NA	NA	No Assessment	NA
67100	Gass Lake	0	6	Small	FAL	Supporting	Default FAL	NA	NA	Monitored	303d Listed
67200	Hartlaub Lake	0	34	Deep Seepage	FAL	Fully Supporting	Default FAL	NA	NA	Monitored	303d Listed
67300	Silver Creek	0	17.98	FAL	WWFF	Not Supporting	Default FAL	Impairment Unknown	Non-Point Source	Monitored	303d Listed
67400	Silver Lake	0	72.61	Deep Seepage	WWSF	Fully Supporting	Default FAL	Fish Kills	Livestock, Non-Point Source Transfer of Water from an Outside Watershed	Monitored	TMDL Approved
67700	Teek Lake	0	5	Small	FAL	Fully Supporting	Default FAL	NA	NA	No Assessment	NA
67900	Vetting Lake	0	4	Small	FAL	Fully Supporting	Default FAL	NA	NA	No Assessment	NA
68100	English Lake	0	51	Deep Seepage	FAL	Fully Supporting	Default FAL	NA	NA	Monitored	NA

October 1, 2017

**[PINE & CALVIN CREEK FRONTAL LAKE MICHIGAN TWA WQM  
2017]**

WBIC	Waterbody Name	Start Mile	End Mile or Acres	Current Use	Attainable Use	Supporting Attainable Use	Designated Use	Impairments	Sources	Assessment	Impaired Water Status
5024580	Point Creek Unnamed Tributary	0	2.13	FAL	FAL	Not Assessed	Default FAL	NA	NA	Not Assessed	NA
5025420	Fischer Creek	0	2.78	FAL	FAL	Not Assessed	Default FAL	NA	NA	Not Assessed	NA

<sup>i</sup> 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.