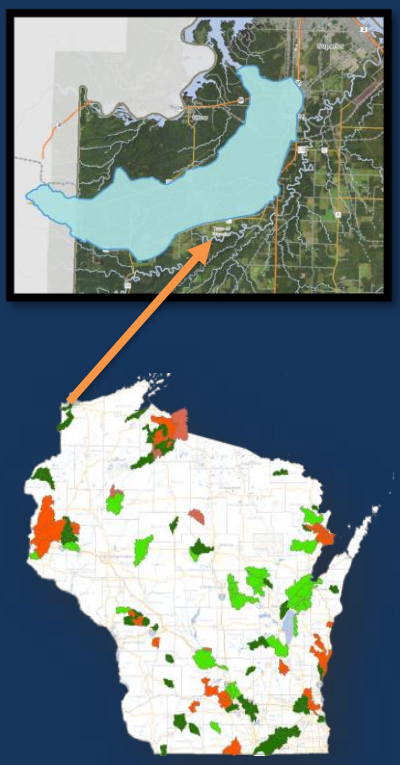
PUBLIC REVIEW DRAFT – FOR PUBLIC COMMENT

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

Pokegama River Targeted Watershed Assessment: A Water Quality Report to Protect Wisconsin Watersheds, 2020

St. Louis & Lower Nemadji Watershed (LS01)
HUC12 040102011602



Pokegama River Upstream of Cemetery Road
Photo by Craig Roesler, North District Water Quality Biologist
Department of Natural Resources

*To learn more about this area, see this plan on **Wisconsin's TWA Projects Online**!*

Or search for Pokegama River at Explore Wisconsin's Waters Online for more detail.

WISCONSIN DEPT. OF NATURAL RESOURCES

EGAD # 3200-2019-11
Water Quality Bureau
Wisconsin DNR

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Targeted Watershed Assessment Study Summary

The Pokegama River Watershed, located in northwestern Douglas County Wisconsin, was monitored in 2017 through a Targeted Watershed Assessment (TWA) project to analyze current conditions and to identify management goals, objectives, and recommendations. Previous monitoring data collected from several sites between 2012 and 2015 were also compiled and reviewed. The study involved gathering fish, habitat, macroinvertebrate, and chemistry water quality data. Monitoring for in-stream total phosphorus concentrations was also conducted. The extent of monitoring varied between sites. These datasets provide a baseline understanding of watershed conditions and inform managers of water quality conditions on specific waters.

Figure 1. Pokegama River Watershed Location

About the Watershed

The upper end of the Pokegama River Watershed is in Minnesota (Figure 1). Wetlands are the most common land use in the Pokegama River watershed, comprising 53% of the area. Undeveloped land uses (woodland and wetland combined) comprise 80.3% of the watershed. Grassland (pasture and hayfields) is the most common developed land use at 7.7%, followed by urban or developed land at 4.2%. Agricultural cropland is absent. The Pokegama River watershed is located in the Lake Superior Clay Plain ecoregion. Clay rich soils in the Clay Plain have high runoff potential.

The Pokegama River flows into Pokegama Bay. The bay is part of the Saint Louis River estuary, which is a Great Lakes Area of Concern (AOC). One of the AOC goals is to reduce phosphorus loading to the estuary and maintain estuary total phosphorus concentrations at 30 ug/l or less. Phosphorus loading reductions in the Pokegama River watershed could contribute toward achieving AOC phosphorus goals.

Biological Communities and Water Quality

Fish populations at all sites sampled are considered warm transition (cool water) natural communities. Seven of the sites are headwater communities, while the two most downstream sites are mainstem communities. Fish communities at all sites were dominated by forage fish species, with some game fish and panfish present at the most downstream site. The majority of fish captured at all sites (56% to 89%) are considered “tolerant” to environmental degradation, which is common for Clay Plain streams due to the flashy (runoff-dominated) flows, periods of no flow or very low flow, and chronic turbidity.

Six sampled sites had good qualitative fish habitat ratings, while the Pokegama River site at Barnes Road had a fair rating. Macroinvertebrate samples had index of biotic integrity (mIBI) ratings ranging from “fair” to “excellent”. Five of the seven sites had “good” ratings. These ratings are fairly typical for Clay Plain streams where macroinvertebrate species are well adapted to the flashy flows and chronic turbidity.

Streams in the Pokegama River Watershed are notable for having high total suspended solids concentrations, high turbidities and low transparencies. Clay rich soils in the Clay Plain have high runoff potential, and streambank erosion is the major source of suspended sediment, turbidity, and low transparency in streams located there.

The Pokegama River is an impaired water due to high total phosphorus concentrations (TP’s), which exceed the WDNR stream standard of 75 ug/l. TP’s greater than 75ug/l are commonly found throughout the watershed. Six of the seven sites where TP’s were measured during 2017 fish surveys had TP’s greater than 75 ug/l (one site TP was 71 ug/l). A 2012 study of Pokegama River TP’s showed substantial increases in TP’s below the Village of Superior wastewater lagoons compared to TP’s sampled above the lagoons. An updated permit for the Village of Superior wastewater treatment system is currently being prepared.

Recommendations

- The DNR should work with the Douglas County Land and Water Conservation Department to identify options for reducing phosphorus input to watershed streams. Any barnyards or locations with concentrated livestock in the watershed should be identified and assessed for potential application of runoff controls.
- The DNR should work with the Douglas County Land and Water Conservation Department to identify options for reducing peak flows in the watershed (“Slow the Flow” efforts).
- The DNR should work with the Village of Superior to identify options for reducing phosphorus discharge from the wastewater lagoons.

Wisconsin Water Quality Monitoring and Planning

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

This WQM Plan is approved by the Wisconsin DNR and is a formal update to Lake Superior Basin Areawide Water Quality Management Plan and Wisconsin's statewide Areawide Water Quality Management Plan (AWQM Plan). This plan will be forwarded to USEPA for certification as a formal update to Wisconsin's AWQM Plan.

_____ _____
Craig Roesler, North District Water Quality Biologist Date

_____ _____
Tom Aartila, North District Water Quality Field Supervisor Date

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Greg Searle, Water Quality Field Operations Director Date

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Timothy Asplund, Water Quality Monitoring Section Chief Date

Basin/Watershed Partners

- Douglas County Land and Water Conservation Department

Report Acknowledgements

- Craig Roesler, Primary Author and Investigator, North District, Wisconsin DNR
- Lisa Helmuth, Program Coordinator, Water Quality Bureau, Wisconsin DNR

EGAD # 3200-2019-11

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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 land management practice used to prevent or reduce nonpoint source pollution such as runoff, total suspended solids, or excess nutrients.

DATCP: Wisconsin Department of Agriculture, Trade and Consumer Protection – the state agency in partnership with DNR responsible for a variety of land and water related programs.

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

END: Endangered Species - Wisconsin species designated as rare or unique due to proximity to the farthest extent of their natural range or due to anthropogenic deleterious impacts on the landscape or both.

ERW: Exceptional Resource Water- Wisconsin's designation under state water quality standards to waters with exceptional quality and which may be provided a higher level of protection through various programs and processes.

FMDB: Fisheries 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 gauge water condition based on biological data. Results indicate condition and provide insight into potential degradation sources. In Wisconsin, specific fish IBI tools are developed for specific natural communities. Therefore, biologists must review and confirm the natural community to use the correct fish IBI tool.

HUC: **Hydrologic Unit Code.** A sequence of numbers that represent one of a series of nested hydrologic catchments delineated by a consortium of agencies including USGS, USFS, and Wisconsin DNR.

MIBI: **Macroinvertebrate Index of biological integrity.** The mIBI is the primary tool used to assess stream macroinvertebrate community condition.

NC: Natural Community. A system of categorizing water based on inherent physical, hydrologic, and biological components. Streams and Lakes have uniquely derived systems that result in specific natural community designations for each lake and river segment in the state. These designations dictate the appropriate assessment tools which improves the condition result, reflecting detailed nuances reflecting the modeling and analysis work foundational to the assessment systems.

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 except for fisheries taxonomy and habitat data.

MDM: Maximum Daily Averages – maximum daily average is a calculated metric that may be used for temperature, dissolved oxygen and related chemistry parameters to characterize water condition.

NC: Natural Community. A system of categorizing water based on inherent physical, hydrologic, and biological components. Streams and Lakes have uniquely derived systems that result in specific natural community designations for each lake and river segment in the state. These designations dictate the appropriate assessment tools which improves the condition result, reflecting detailed nuances reflecting the modeling and analysis work foundational to the assessment systems.

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

NOAA: National Oceanic and Atmospheric Administration – a federal agency responsible for water / aquatic related activities involve the open waters, seas and Great Lakes.

ND: No detection – a term used typically in analytical settings to identify when a parameter or chemical constituent was not present at levels higher than the limit of detection.

NRCS: USDA Natural Resources Conservation Service - the federal agency providing local support and land management outreach work with landowners and partners such as state agencies.

ORW: Outstanding Resource Water- Wisconsin's designation under state water quality standards to waters with outstanding quality and which may be provided a higher level of protection through various programs and processes.

SC: Species of Special Concern- species designated as special concern due to proximity to the farthest extent of their natural range or due to anthropogenic deleterious impacts on the landscape, or both.

SWIMS ID. Surface Water Integrated Monitoring System (SWIMS) identification number is the unique monitoring station identification number for the location of monitoring data.

TDP: Total Dissolved Phosphorus – an analyzed chemistry parameter collected in aquatic systems positively correlated with excess productivity and eutrophication in Wisconsin waters.

TMDL: Total Maximum Daily Load – a technical report required for impaired waters Clean Water Act. TMDLs identify sources, sinks and impairments associated with the pollutant causing documented impairments.

TP: Total Phosphorus - an analyzed chemical parameter collected in aquatic systems frequently positively correlated with excess productivity and eutrophication in many of Wisconsin's waters.

TWA: **Targeted Watershed Assessment.** A monitoring study design centered on catchments or watersheds that uses a blend of geometric study design and targeted site selection to gather baseline data and additional collection work for unique and site-specific concerns for complex environmental questions including effectiveness monitoring of management actions, evaluation surveys for site specific criteria or permits, protection projects, and generalized watershed planning studies.

TSS: Total suspended solids – an analyzed physical parameter collected in aquatic systems that is frequently positively correlated with excess productivity, reduced water clarity, reduced dissolved oxygen and degraded biological communities.

WATERS ID. The Waterbody Assessment, Tracking, and Electronic Reporting System Identification Code. The WATERS ID is a unique numerical sequence number assigned by the WATERS system, also known as "Assessment Unit ID code." This code is used to identify unique stream segments or lakes assessed and stored in the WATERS system.

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.

WSLH: Wisconsin State Laboratory of Hygiene– the state's certified laboratory that provides a wide range of analytical services including toxicology, chemistry, and data sharing.

WQC: Water quality criteria – a component of Wisconsin's water quality standards that provide numerical endpoints for specific chemical, physical, and biological constituents.

Pokegama river with moderate flow at Cemetery Rd. October 2017.

Water Quality Plan Goals

The overall goal of this plan is to identify water quality conditions and work to improve and protect water quality in the Pokegama River Watershed of the Lake Superior Basin. This Targeted Watershed Assessment project funded the collection of data to monitor chemistry, biological and habitat data for analyzing 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.

Resources Overview

Location, Size, Land Use & Population

The Pokegama River Watershed has an area of 75.3 km2 or 29 mi2 and is in Douglas County, Wisconsin (Figure 2). The watershed spans the border of Wisconsin and Minnesota. The Pokegama River is nearly 26 miles long and originates in Minnesota south of Jay Cooke State Park. The river is a tributary of the Saint Louis River, joining it in the western part of the City of Superior, Wisconsin. The Pokegama River Watershed is a subwatershed of the St. Louis River Lower Nemadji River Watershed (Figure 2).

Wetlands are the most common land use in the Pokegama River Watershed, comprising 53% of the area (Table 1). Undeveloped land uses (woodland and wetland combined) comprise 80.3% of the Pokegama River Watershed (Table 1, Figures 3 & 4). Grassland (pasture and hayfields) is the most common developed land use at 7.7%, followed by urban or developed land at 4.2% (Table 1, Figures 3 &4). Agricultural cropland is absent.

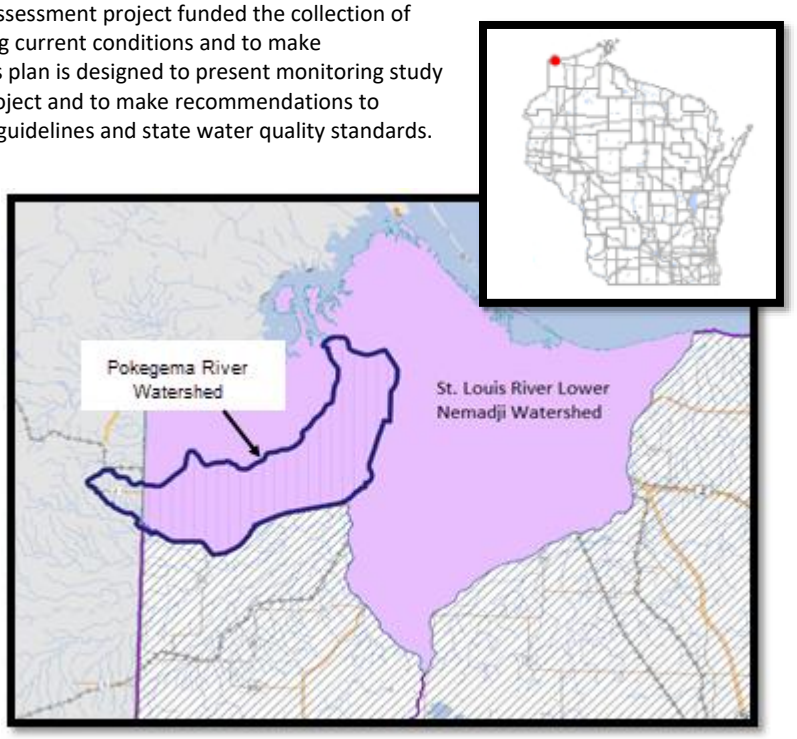


Figure 2. Pokegama River Watershed and St. Louis River Lower Nemadji River Watershed

The northeastern corner of the watershed contains an urban area (Figure 4) that includes most of the Village of Superior and a very small section of the City of Superior. This urban area has a roughly estimated population of 1,000. The remainder of the watershed is rural and sparsely populated, with a roughly estimated population of 100. The remainder of the City of Superior with a total population of 27,244 (2010) is located just to the northeast of the watershed.

Table 1. Pokegama River Watershed NLCD Land Type

Land Use	Percent
Undeveloped: Wetland (53%), Woodland (27.3%)	80.3
Grassland: Pasture, hayfields	7.7
Developed: urban	4.2

Figure 3. Pokegama River Watershed Land Use Percentage

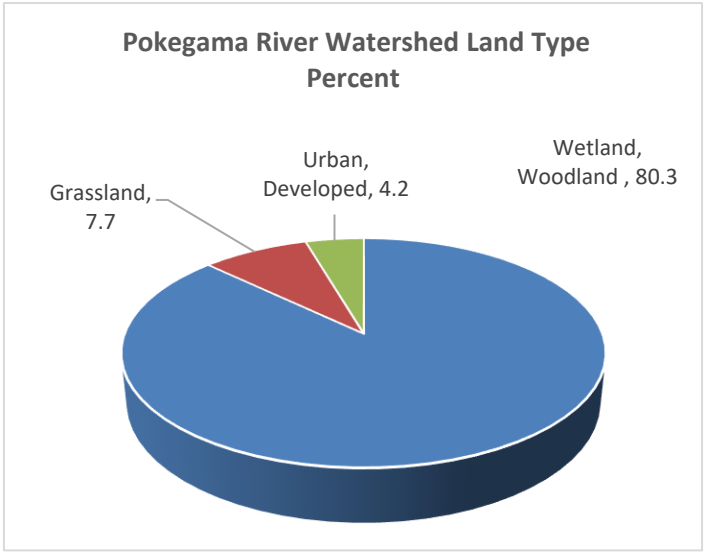
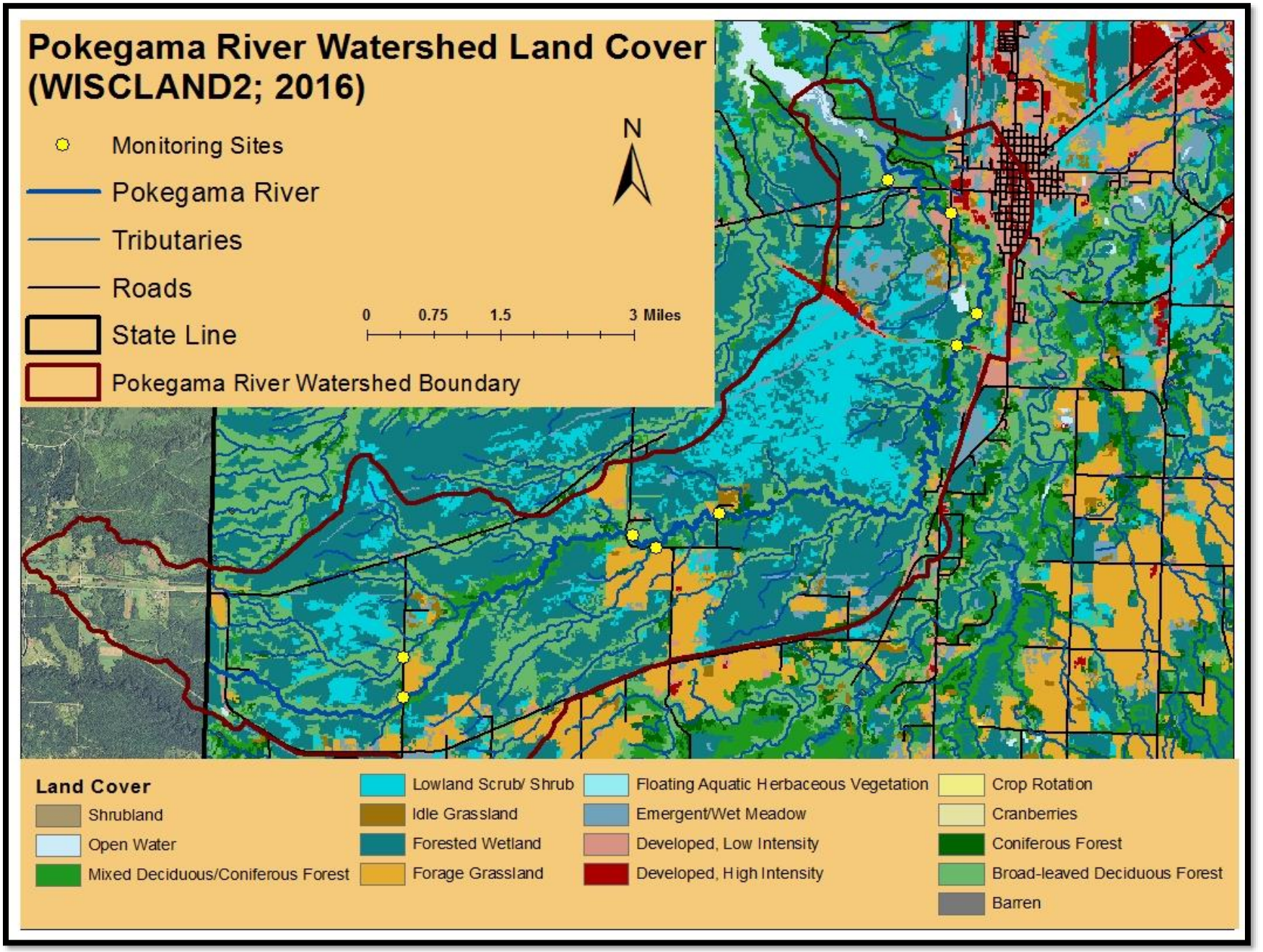
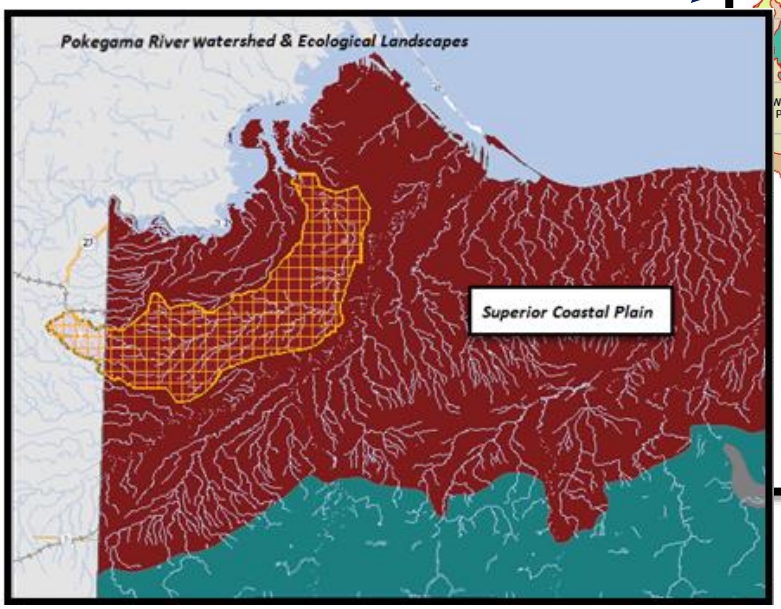


Figure 4. Pokegama Watershed NLCD 2011 Land Cover Map



Ecological Landscapes

The Pokegama River Watershed is located within the ***Superior Coastal Plain*** (a.k.a. Lake Superior Clay Plain). The Superior Coastal Plain is Wisconsin's northernmost Ecological Landscape. The climate is strongly influenced by Lake Superior, resulting in cooler summers, warmer winters, and greater precipitation compared to more inland locations. The soils in this area heavily influence streambank stability and water clarity.



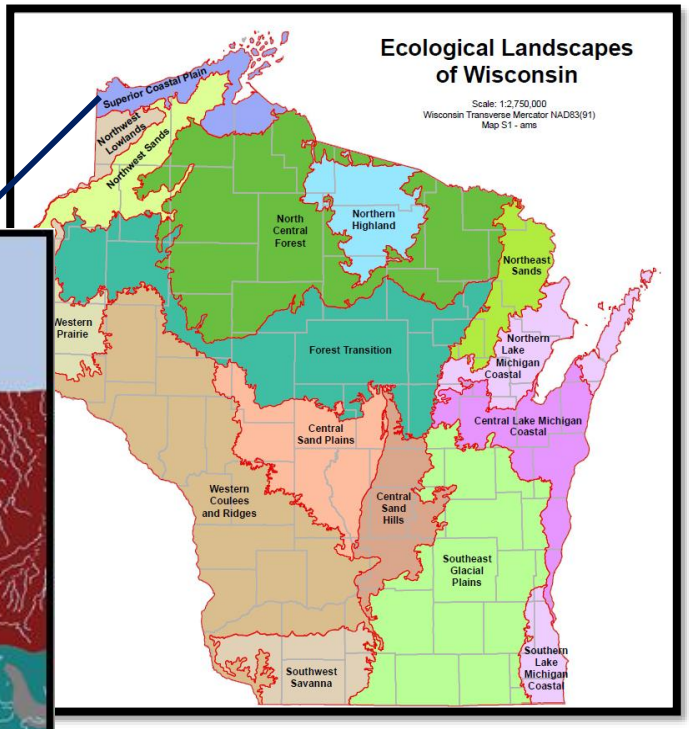


Figure 5. Pokegama River Watershed and Wisconsin's Ecological Landscapes

Read more at Wisconsin DNR

Hydrology

The Pokegama River flows into Pokegama Bay, which is a turbid bay of the St. Louis River estuary. The Saint Louis River estuary is a Great Lakes Area of Concern (AOC). Seiche-induced backflows from Lake Superior cause periodic flow reversals in the lower Pokegama River to a point slightly upstream of Cemetery Road (Figure 6). An outfall from the Village of Superior wastewater treatment lagoons is a point source discharge to the Pokegama River. The clay-rich watershed soils result in flashy stream flows with very high flows during runoff events and very low baseflows.

Soils

Soils in the watershed contain high amounts of clay and scattered subsurface bands of sand. There is little infiltration of precipitation or snowmelt which results in high runoff rates. Land development that reduces vegetative cover further increases runoff rates. Stream flows rise rapidly during runoff events. The soils also have poor stability as stream banks. Even fully vegetated stream banks are subject to slumping and severe erosion (see cover photo).

Trout Waters

DNR classifies trout streams into three classes. Class I are naturally reproducing populations; class II are supplemented by stocking, and class III are exclusively supported by stocking. New waters are monitored and identified or evaluated every year. There are no trout waters in the Pokegama River watershed. Appendix C displays trout waters in the larger St. Louis and Lower Nemadji Watershed.

Other Notable Fisheries

The Pokegama River is an important spawning area for walleye, northern pike, burbot, longnose suckers, white suckers, and other forage fish species (Pratt 1996).

Outstanding and Exceptional Resource Waters

Wisconsin designates the highest quality waters as Outstanding Resource Waters (ORWs) or Exceptional Resource Waters (ERWs). These are surface waters that provide outstanding recreational opportunities, support valuable fisheries and wildlife habitat, have good water quality, and are not significantly impacted by human activities. ORW and ERW status identifies waters that the State of Wisconsin has determined warrant additional protection from the effects of pollution. There are no ORW or ERW waters in the Pokegama River watershed, but there are two ERW waters in in the larger St. Louis and Lower Nemadji River Watershed – Red River (WBIC 2845800) and Unnamed tributary to Copper Creek (WBIC 2836700). Additional information on these two streams is contained in Appendix C.

Pokegama River with moderate flow upstream of Cemetery Road 6/17.

Impaired Waters

Section 303(d) of the Clean Water Act requires states to publish a list of waters that do not meet water quality standards. The Pokegama River is listed as an impaired water due to total phosphorus concentrations exceeding the State stream standard of 75 ug/l. Impaired waters in the larger watershed are listed in Appendix C (see footnotes).

Monitoring Project Study Summary

The Pokegama River Targeted Watershed Assessment was conducted to provide information for general planning purposes. The project was designed to assess the overall chemical, physical and biological condition of the Pokegama River and its tributaries.

Site Selection and Study Design

This study involved the collection of fish community, macroinvertebrate, water chemistry, and qualitative habitat data at several sites in the watershed. For 2017, four monitoring sites were distributed at accessible locations along the length of the Pokegama River, with three sites located on Pokegama River tributaries (Table 2, Figure 6). Fish community, macroinvertebrate, and water quality monitoring data collected from three sites during 2012 and 2015 were also compiled and reviewed. Monitoring for total phosphorus during 2017 was done at several sites in the vicinity of the Village of Superior wastewater lagoons outfall to check for other potential phosphorus sources and to assess impacts of the outfall on the Pokegama River. The design for that monitoring is described in the Village of Superior wastewater outfall section in the Water Quality discussion below.

Pokegama River eroding banks upstream Cemetery Rd 6/17.

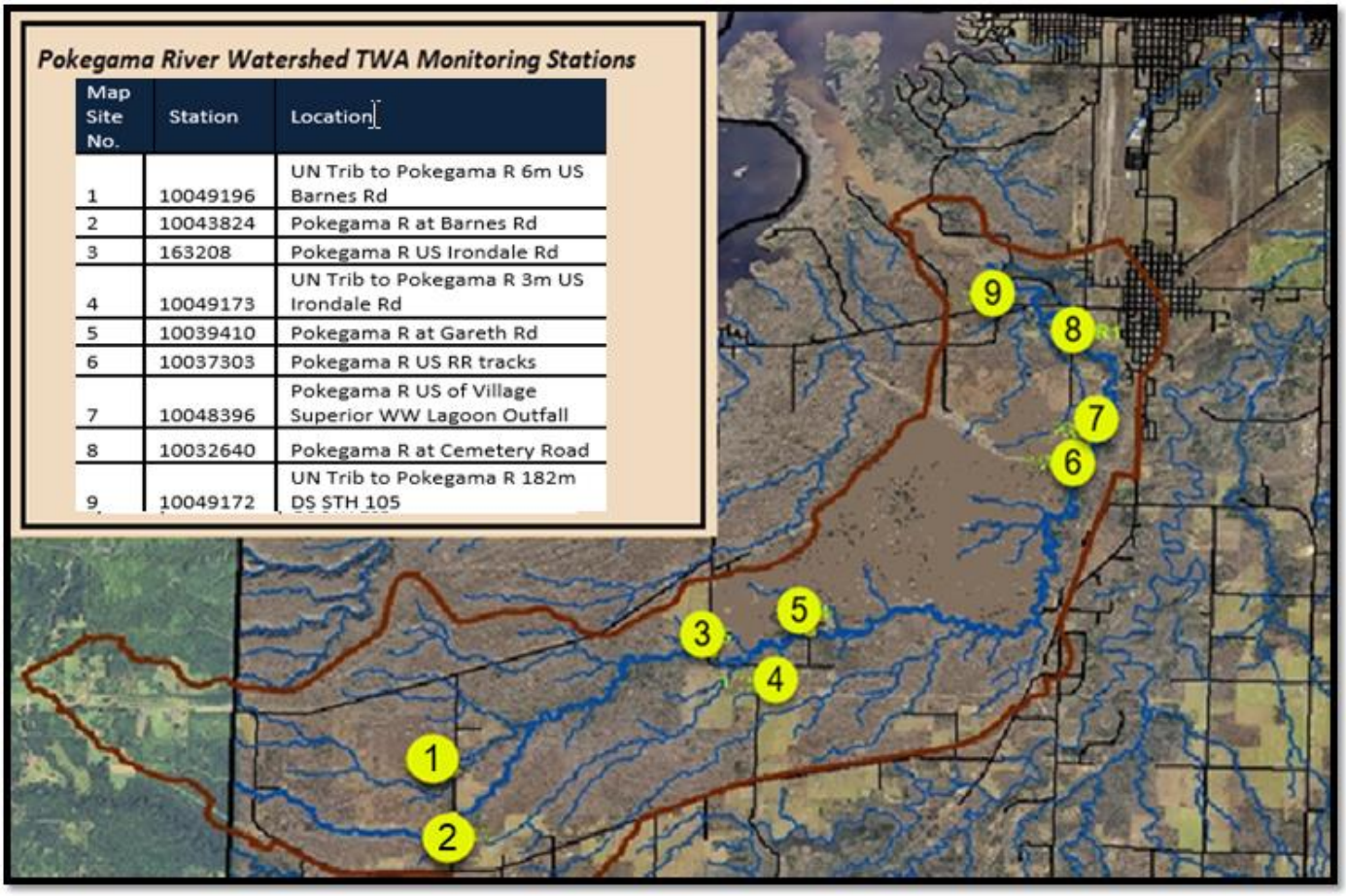
The 2017 monitoring included:

- Fish community surveys at seven sites. Water chemistry samples and a flow measurement were made at the time of each fish survey. Parameters measured were total phosphorus, total Kjeldahl nitrogen, ammonia nitrogen, nitrate plus nitrite nitrogen, total suspended solids, dissolved oxygen, pH, temperature, conductivity, turbidity, and transparency.
- Qualitative habitat assessments at seven sites.
- Macroinvertebrate samples at seven sites.
- Eight tributaries or surface runoff sites in the vicinity of the Village of Superior wastewater lagoons outfall were sampled for total phosphorus on one or two dates.
- Sites upstream and downstream of the Village of Superior wastewater lagoons outfall were sampled for total phosphorus on five dates.
- Flow monitoring of the Pokegama River at Cemetery Road was conducted by USGS during May-October (2017).

Table 2. Pokegama River TWA Stations and Data Collection

Map Site No.	Station	Location	WBIC	Lat	Long	Fish	Invertebrate	Qualitative Habitat	Water Quality
1	10049196	UN Trib to Pokegama R 6m US Barnes Rd	2844600	46.5855	-92.2453	2017	2017	2017	
2	10043824	Pokegama R at Barnes Rd	2844000	46.5785	-92.2451	2015, 2017	2015, 2017	2017	
3	163208	Pokegama R US Irondale Rd	2844000	46.6074	-92.1937	2017	2017	2017	
4	10049173	UN Trib to Pokegama R 3m US Irondale Rd	2844400	46.6049	-92.1864	2017	2017	2017	
5	10039410	Pokegama R at Gareth Rd	2844000	46.6104	-92.1719	2017	2017	2017	
6	10037303	Pokegama R US RR tracks	2844000	46.6399	-92.1166	2012	2012		2012
7	10048396	Pokegama R US of Village Superior WW Lagoon Outfall	2844000	46.6455	-92.1122	2017	2017	2017	2017
8	10032640	Pokegama R at Cemetery Road	2844000	46.6619	-92.1189	2012	2012		2012, 2017
9	10049172	UN Trib to Pokegama R 182m DS STH 105	5000717	46.6669	-92.1337	2017	2017	2017	

Figure 6. Pokegama River Watershed Monitoring Sites



Methods, Equipment, and Quality Assurance

Fish Assemblage and Natural Community

Fish surveys were conducted by electroshocking a section of stream with a station length of 35 times the mean stream width (100 m minimum and 400 m maximum station length) (Lyons, 1992). Two backpack shockers were used at the Pokegama River sites at Gareth Road, and upstream of the Village of Superior wastewater lagoons outfall. A single backpack shocker was used at the other five sites. All fish were collected, identified, and counted. Surveys were conducted using the following methods:

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

Fish Habitat Evaluation

At each site, qualitative fish habitat ratings were determined using the following methods:

- Qualitative Habitat Rating less that 10m Form (3600-532A) (R 6/07)
- Guidelines for Qualitative Physical Habitat Evaluation of Wadeable Streams

Macroinvertebrate Evaluation

Macroinvertebrate samples were obtained by kick sampling using a D-frame net in gravel or cobble riffles. All seven sites monitored during 2017 were sampled. Samples were preserved and sent to the University of Wisconsin-Stevens Point for analyses. Standard metrics were calculated for the macroinvertebrate communities found. Methods used were:

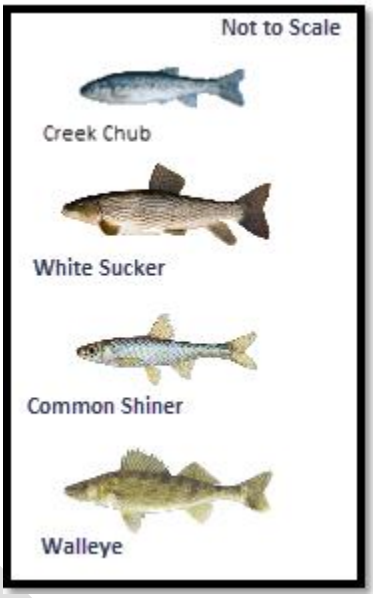
- Guidelines for Collecting Macroinvertebrate Samples in Wadeable Streams
- Wadeable Macroinvertebrate Field Data Report Form 3200-081 (R 08/14)

Water Sampling

Grab samples were shipped on ice to the State Laboratory of Hygiene where they were analyzed for total phosphorus, total Kjeldahl nitrogen, ammonia nitrogen, nitrate plus nitrite nitrogen, and total suspended solids. Field parameters measured were dissolved oxygen, pH, temperature, conductivity, turbidity, transparency, and flow. Methods used were:

- Guidelines and Procedures for Surface Water Grab Sampling (Dec. 2005 Version 3)
- 2301 open channel flow measurement
- Guidance for Dissolved Oxygen Meter Sampling

Project Results and Discussion



Fish Communities

Fish survey data is summarized in Table 3. Fish species identified at each site, are enumerated. The verified natural communities based on the existing fish populations are also listed.

The verified Natural Communities for most sites are warm transition headwaters. The two Pokegama River sites closest to the mouth (Cemetery Road and Upstream of Village of Superior WW Lagoons Outfall) are warm transition mainstems. The modeled Natural Communities for most sites were colder than what was verified. The model is probably over-estimating groundwater discharge to streams in this area.

Fish Condition

Fish Index of Biotic Integrity (IBI) ratings, based on the verified natural community ranged from fair to excellent, with half of the ten surveys rated 'good' (Tables 3 & 4, Figure 7). The three surveys rated fair were only one point short of a good rating. Surveys for the two Pokegama River sites closest to the mouth had *excellent* ratings.

Pioneer fish species (creek chub, central mudminnow, fathead minnow, johnny darter, and brook stickleback) comprise 52 – 86% of the fish populations at the headwater sites. Pioneer fish are adept at re-colonizing stream segments with fluctuating habitat availability. Habitat availability fluctuations in small headwater stream segments probably result from summer base flows periodically becoming zero and stream water freezing to the bottom during winter base flow. Flash flooding during runoff events might also contribute to habitat instability.

Tolerant species (Table 3) comprise 58% to 89% of the fish populations at the headwater sites. All pioneer species except johnny darters are tolerant. White sucker was another tolerant species frequently found in the watershed. Habitat instability along with chronically turbid water accounts for the dominance of tolerant fish species.

Creek chubs were the most abundant fish species at all survey sites. Sport fish were generally absent at all survey sites upstream of the site on the Pokegama River at the railroad tracks (Map site no. 6). Several species of sport fish (walleye, northern pike, yellow perch, black crappie, bluegill) were present at the railroad tracks site and sites downstream. Since surveys are done in mid-summer, fish species that make spring spawning runs are generally not well represented.

Pokegama River during high flow at Cemetery Road 10-3-17. Photo by Craig Roesler, WDNR.

Table 3. Pokegama River Watershed 2012-2017 Fish Survey Data

	1	2		3	4	5	6	7	8	9	
	UN Trib Pokegama R US Barnes Rd	Pokegama R US Barnes Rd		Pokegama R US Irondale	UN Trib Pokegama US Irondale	Pokegama R at Gareth Rd	Pokegama R US RR Tracks	Pokegama US Superior WWLagoon	Pokegama R Cemetery Rd	UN Trib Pokegama R 182 m DS STH 105	Fish Tolerance Rating
	10049196	10043824		163208	10049173	10039410	10037303	10048396	10032640	10049172	
Fish Species	2017	2015	2017	2017	2017	2017	2012	2017	2012	2017	
creek chub	243	41	174	211	57	117	95	277	14	79	tolerant
common shiner	23	11	32	90	7	77	48	192	9	17	intermediate
white sucker	16	41	46	31	12	21	11	50	12	11	tolerant
central mudminnow	7	8	23	9	2	3	20	3	3	7	tolerant
fathead minnow	58	6	12	1	3	1	19	12		14	tolerant
johnny darter	3	1	2	1	3	1	4	7	4	7	intermediate
brook stickleback	4	2	13		36	2	1	2			tolerant
troutperch				27		5	10	55	3	1	intermediate
brassy minnow	4			2	7	4		6			intermediate
pumpkinseed						1			1	4	intermediate
logperch								11	5		intermediate
lake chub								1			intermediate
northern pike									2	1	intermediate
ruffe									3	2	intermediate
fine scale dace	8										intermediate
yellow perch									9		intermediate
freshwater drum									1		intermediate
walleye							3		4		intermediate
black bullhead									14		tolerant
yellow bullhead									2		tolerant
black crappie							17		5		intermediate
spot tail shiner									9		intolerant
golden shiner							9		6		tolerant
bluegill							30				intermediate
Natural Community(1)											
Modeled	CCHW	Coldwater		Coldwater	CCHW	CCHW	CCHW	CCHW	CCHW	Macro-invertebrate	
Verified	CWHW	CWHW		CWHW	CWHW	CWHW	CWHW	CWMS	CWMS	CWHW	
IBI Used	small stream	small stream		small stream	small stream	small stream	small stream	cool warm	cool warm	small stream	
IBI Score	80	60	70	70	80	80	60	80	80	60	
IBI Rating	Good	Fair	Good	Good	Good	Good	Fair	Excellent	Excellent	Fair	
% tolerant(1)	58	89	89	68	87	62	58	56	50	79	
total species	9	7	7	8	8	10	8	11	18	10	
total fish	366	110	302	372	127	232	267	616	106	143	

(1) CCHW - Cold Transition Headwater, CWHW –Warm Transition Headwater,
(2) CCMS –Cold Transition Mainstem, CWMS –Warm Transition Mainstem

Table 4. Pokegama River Watershed 2012-2017 Fish Survey Condition Summary

Map Site No.	SWIMS Station	Site	Survey Date	No. of Species	No. of Fish	Best-fit Natural Community	IBI Applied	IBI Score	IBI Rating	Percent Tol. (1)
1	10049196	UN Trib Pokegama R 6m US Barnes Rd	2017	9	366	Warm Transition HW	Small Stream IBI	80	Good	58
2	10043824	Pokegama R at Barnes Rd	2015	7	110	Warm Transition HW	Small Stream IBI	60	Fair	89
			2017	7	302	Warm Transition HW	Small Stream IBI	70	Good	89
3	163208	Pokegama R US Irondale Rd	2017	8	372	Warm Transition HW	Small Stream IBI	70	Good	68
4	10049173	UN Trib Pokegama R 3 m US Irondale Rd	2017	8	127	Warm Transition HW	Small Stream IBI	80	Good	87
5	10039410	Pokegama R at Gareth Rd	2017	10	232	Warm Transition HW	Small Stream IBI	80	Good	62
6	10037303	Pokegama R US RR tracks	2012	12	267	Warm Transition HW	Small Stream IBI	60	Fair	58
7	10048396	Pokegama R US V. Superior WW Lagoon	2017	11	616	Warm Transition MS	Cool Warm IBI	80	Excellent	56
8	10032640	Pokegama R at Cemetery Road	2012	18	106	Warm Transition MS	Cool Warm IBI	80	Excellent	50
9	10049172	UN Trib to Pokegama R 182 m DS STH 105	2017	10	143	Macroinvertebrate	Small Stream IBI	60	Fair	79

1. Percent Tolerant Species

Condition (Rating) Categories for Small Stream Fish Index of Biotic Integrity (fIBI)

fIBI	Condition
91-100	excellent
61-90	good
31-60	fair
0-30	poor

Condition (Rating) Categories for Cool-Warm Mainstem Fish Index of Biotic Integrity (fIBI)

fIBI	Condition
61-100	excellent
41-60	good
21-40	fair
0-20	poor

Table 5: Pokegama River Watershed Macroinvertebrate Sample Data

No.	SWIMS Station	Site	Survey Date	MIBI	MIBI Condition	Hilsenhoff Biotic Index	HBI Condition	No. of Species	% EPT* Individuals	% Chironimidae Individuals
1	10049196	UN Trib to Pokegama R 6 m US Barnes Rd	2017	7.42	Good	5.46	Good	30	59	26.4
2	10043824	Pokegama R at Barnes Rd	2017	8.29	Excellent	5.05	Good	35	59.5	28.6
			2015	6.04	Good	5.82	Fair	9	43	42.2
3	163208	Pokegama R US Irondale Rd	2017	5.05	Good	4.08	Very Good	21	35.9	7.1
			2012	7.16	Good	4.69	Good	9	34.7	4.7
4	10049173	UN Trib Pokegama R 3 m US Irondale Rd	2017	7.64	Excellent	4.09	Very Good	33	88.1	9.0
5	10039410	Pokegama R at Gareth Rd	2017	9.62	Excellent	5.12	Good	22	63.9	32.0
6	10037303	Pokegama R US RR tracks	2012	5.23	Good	5.11	Good	27	57.7	36.2
7	10048396	Pokegama R US of V. Superior WW Lagoon	2017	4.18	Fair	3.41	Excellent	23	72.3	3.4
8	10032640	Pokegama R at Cemetery Road	2012	6.24	Good	6.72	Fairly Poor	29	50.5	47.0
9	10049172	UN Trib to Pokegama R 182 m DS STH 105	2017	6.57	Good	4.47	Very Good	29	56.6	4.4

* EPT = ephemeroptera (mayflies), plecoptera (stoneflies), trichoptera (caddisflies)

Complete sample result information is available at *DNR's Surface Water Integrated Monitoring System (SWIMS) database*.

Condition (Rating) Categories for Macroinvertebrate Index of Biotic Integrity (MIBI)

Score	Condition
>75	excellent
50-75	good
25-49	fair
< 25	poor

Condition (Rating) Categories for HBI's

HBI	Condition
0.00-3.50	excellent
3.51-4.50	very good
4.51-5.50	good
5.51-6.50	fair
6.51-7.50	fairly poor
7.51-8.50	poor
8.51-10.00	very poor

Table 6. Pokegama River Watershed Qualitative Fish Habitat Ratings for Streams < 10 m Wide

Map Site No.	1	2	3	4	5	7	9
Station Name	UN Trib Pokegama R US Barnes Rd	Pokegama R US Barnes Rd	Pokegama R US Irondale Rd	UN Trib to Pokegama US Irondale Rd	Pokegama R at Gareth Rd	Pokegama R US V. Superior WW Lagoon Outfall	UN Trib Pokegama R DS STH 105
Qualitative Habitat Metric (Max. Score)	10049196	10043824	163208	10049173	10039410	10048396	10049172
Riparian Buffer Width (15)	15	10	15	15	15	15	15
Bank Erosion (15)	5	5	0	5	5	0	5
Pool Area (10)	3	3	10	10	7	7	10
Width: Depth Ratio (15)	15	15	10	15	10	10	15
Riffle: Riffle or Bend: Bend Ratio (15)	5	5	10	10	10	5	10
Fine Sediments (15)	0	0	5	0	5	10	10
Cover for Fish (15)	10	10	10	10	10	10	10
Total Score	53	48	60	65	62	57	75
Rating	Good	Fair	Good	Good	Good	Good	Good

Condition (Rating) Categories for Qualitative Habitat	
Score	**Condition**
>75	excellent
50-75	good
25-49	fair
< 25	poor

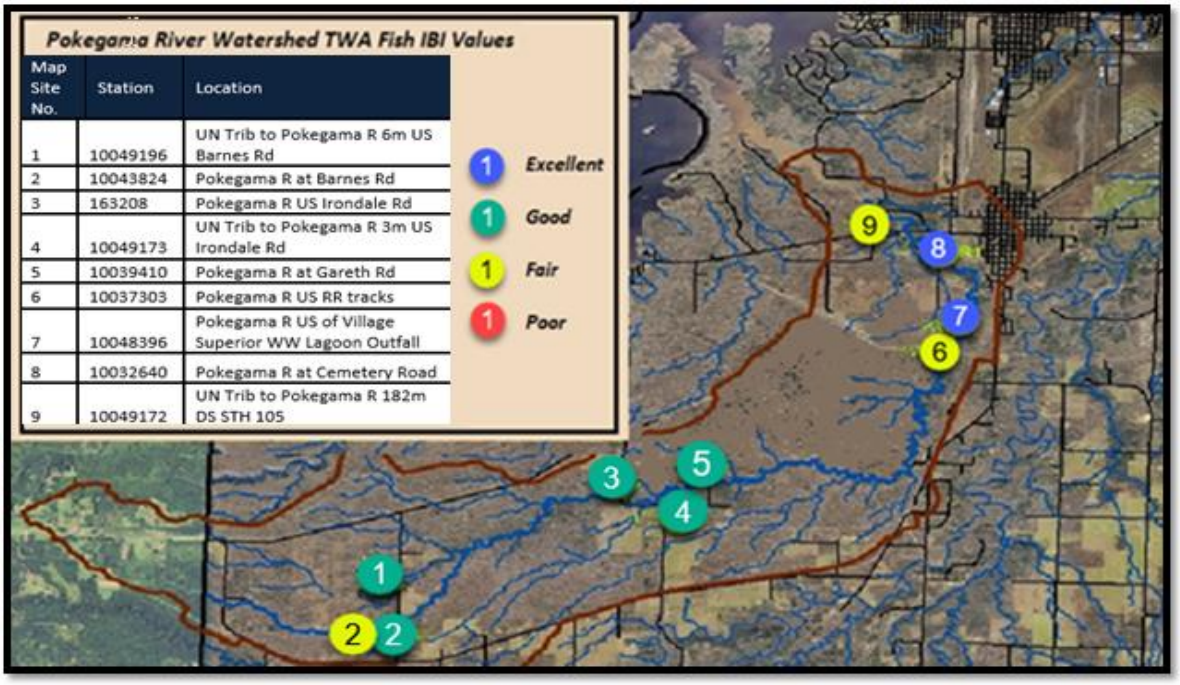
Pokegama River - Eroding Banks

Table 7. Pokegama River Watershed Water Quality, Macroinvertebrate, and Fish Survey Data

					Field Parameters							Lab Parameters					Macroinvertebrates					Fish
Map Site No.	Sites	SWIMS ID	Year or Date	WBIC	Temp. (°C)	D.O. (mg/l)	pH (s.u.)	Cond. (umhos /cm)	Transparency (cm)	Turbidity (ntu)	Flow (cfs)	TP++ (ug/l)	TSS (mg/l)	TKN (mg/l)	NH3-N (mg/l)	NO3+ NO2-N (mg/l)	MIBI	HBI	No. Species	% EPT Individuals	% Chironomidae Individuals	IBI Value
1	UN Trib to Pokegama US Barnes Rd	10049196	2017	2844600	17.0	4.6	7.6	140	21	80	0.13	137	12.7	1.87	0.04	0.019	7.42	5.46	30	59.0	26.39	80
2*	Pokegama R US Barnes Rd	10043824	2017	2844000	12.9	8.3	7.8	224	33	48	0.6	100	7.4	1.39	0.03	no data	8.29	5.05	35	59.5	28.65	70
3*	Pokegama R US Irondale Rd	163208	2017	2844000	13.0	9.3	7.8	188	17	89	2.4	117	13	1.56	0.03	0.004	5.05	4.08	21	35.9	7.05	70
4	UN Trib to Pokegama R US Irondale Rd	10049173	2017	2844000	11.2	9.9	7.8	141	29	51	0.5	79	4.29	1.68	0.03	0.025	7.64	4.09	33	88.1	9.03	80
5	Pokegama R at Gareth Rd	10039410	2017	2844000	15.1	7.9	7.7	184	16	83	3.5	106	17	1.64	0.03	0.051	9.62	5.12	22	63.9	31.97	80
6+	Pokegama R US RR tracks	10037303		2844000																		60
7	Pokegama R US V. Superior WW lagoon	10048396	2017	2844000	19.2	7.7	7.7	219	no data	56	no data	82.8	10.8	1.44	0.03	no data	4.18	3.41	23	72.3	3.38	70
8+	Pokegama R at Cemetery Rd	10032640		2844000																		80
9	UN Trib to Pokegama Bay DS STH 105	10049172	2017	5000717	10.5	11.1	7.9	190	15	56	1.1	70.8	25.6	1.66	0.05	0.056	6.57	4.47	29	56.6	4.41	60
Water Quality Samples from Prior Years																						
2	Pokegama R US Barnes Rd	10043824	7/15/2015	2844000	18	3.3	6.9	310	34	18	0.1	119	17									
3	Pokegama R US Irondale Rd	163208	5/30/2012	2844000	13.6	8.6	7.5	246	39	32		55	7	0.67	0.02	< LOD						
6	Pokegama R US RR tracks	10037303	6/11/2012	2844000	23.9	8.1	7.9	188	16	60		71	14									
6	Pokegama R US RR tracks	10037303	6/25/2012	2844000	16.9	8.7	7.4	122	10	93		85	33									
6	Pokegama R US RR tracks	10037303	7/23/2012	2844000	28.4	5.1	7	313	18	47		57	11									
6	Pokegama R US RR tracks	10037303	8/20/2012	2844000	16.2	6.1	7.3	247	9	131		97	63									
6	Pokegama R US RR tracks	10037303	9/26/2012	2844000	11.1	9.7	8.1	228	40	38		46	16									
6	Pokegama R US RR tracks	10037303	10/22/2012	2844000	9.2	11.5	8.1	219	32	31		48	13									
8	Pokegama R at Cemetery Rd	10032640	6/11/2012	2844000	21.8	7.2	7.8	200	22	39.3		100	12									
8	Pokegama R at Cemetery Rd	10032640	6/25/2012	2844000	17.7	8.6	6.9	133	10	90.6		108	30									
8	Pokegama R at Cemetery Rd	10032640	7/23/2012	2844000	25.2	5.3	7.1	315	34	25.3		149	7									
8	Pokegama R at Cemetery Rd	10032640	8/20/2012	2844000	19.4	8.4	8.2	297	23	26.5		148	10									
8	Pokegama R at Cemetery Rd	10032640	9/26/2012	2844000	12.4	7.7	8	317	38	22.3		159	10									
8	Pokegama R at Cemetery Rd	10032640	10/22/2012	2844000	8.2	10.5	8	302	8.2	16.6		1220	12									

(*) Sites with an asterisk are listed for work in the 2017 period and are also listed in the lower section as they were sampled in a previous year.
(+) Sites with a (+) were only sampled in a year prior to 2017.
++ TP sample values with blue backgrounds exceed the state's water quality criteria for streams (75 ug/l; NR102, Wisc. Adm. Code.)

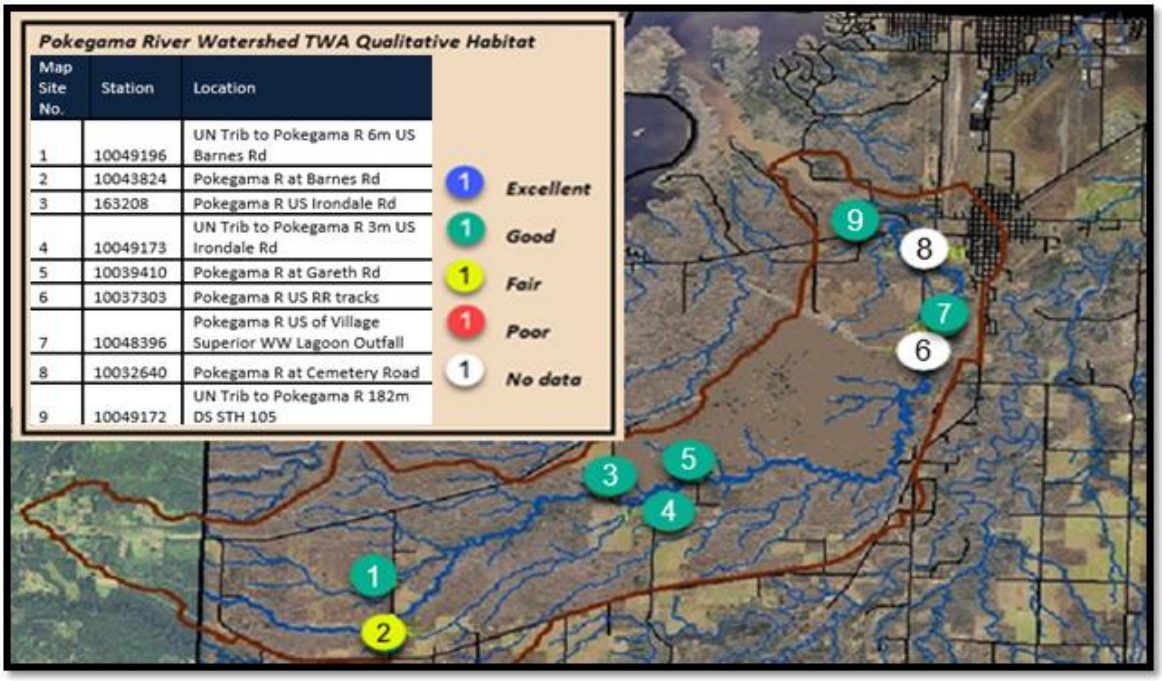
Figure 7. Pokegama River Watershed Fish IBI Values



Qualitative Fish Habitat

Qualitative fish habitat ratings for the Pokegama River Watershed sites are shown in Table 6 and Figure 8. Six of the seven sites have ratings of good. Rating points were lost mostly due to extensive bank erosion and the common presence of sand and silt substrates. While sand and silt substrates are common, substantial areas of gravel and cobble substrate are also present at most sites. The Pokegama River site upstream of Barnes Road is the only site with a fair habitat rating. A portion of the stream station is located alongside Barnes Road. This results in 5 points lost for the Riparian Buffer Width score.

Figure 8. Pokegama River Watershed Qualitative Habitat Values

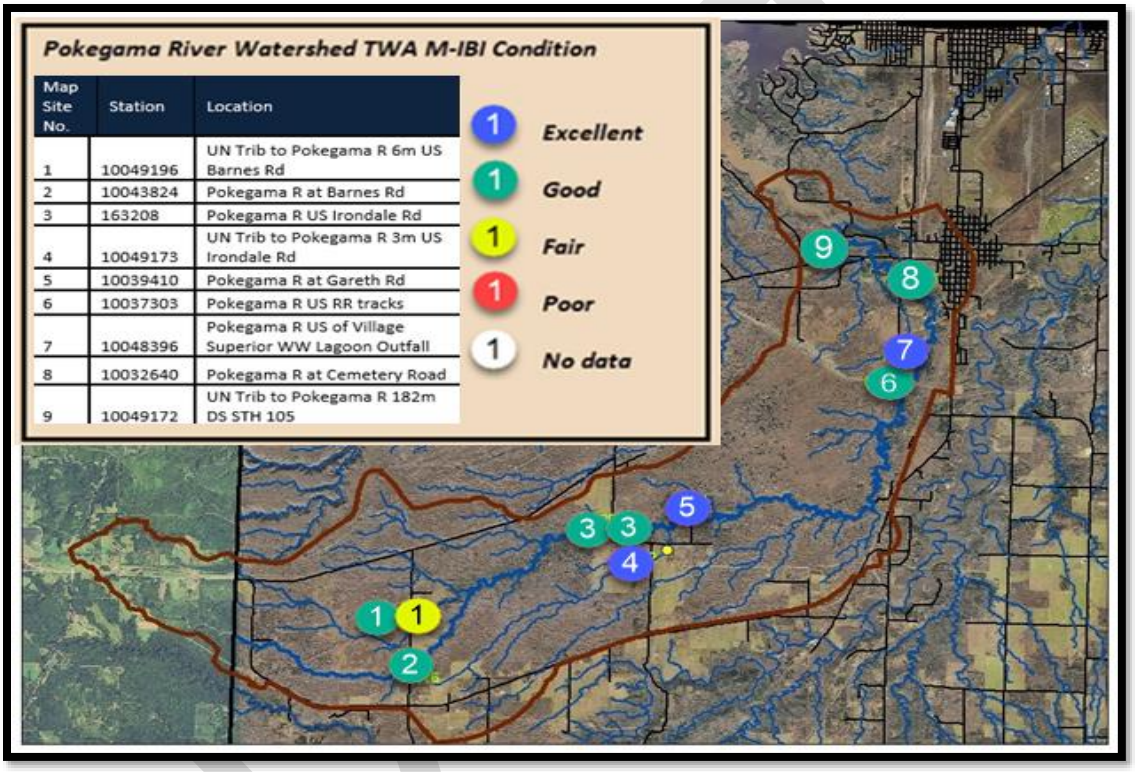


Macroinvertebrate Data

Macroinvertebrate sampling results are summarized in Table 5 and Figure 9. Results indicate good water quality and habitat conditions for macroinvertebrates. Three of the eleven macroinvertebrate IBI ratings (Weigel, 2003) are excellent and seven are good. Only one site (Pokegama River upstream of Village of Superior WW lagoon outfall) had a fair rating. The reason for a lower rating at this site is unknown.

Hilsenhoff biotic index (HBI) (Hilsenhoff 1987) ratings range from fairly poor to excellent (Table 5). Nine of the eleven sites have HBI ratings that range from good to excellent. HBI ratings are primarily influenced by dissolved oxygen (D.O.) availability and these ratings indicate D.O. availability is not a problem at most sites. The Pokegama River site at Cemetery Road had a fairly poor HBI. The channel at this location is deep and wide and flow is often sluggish. The protocol for HBI sample collection specifies that flow should be at least 1 ft/sec. Since this minimum flow is frequently not present at the site, the calculated HBI rating is of questionable validity. The Pokegama River site upstream of Barnes Road had a fair HBI. This site had a relatively low daytime D.O. of 3.3 mg/l at the time of the 2015 fish survey (Table 7). There may be issues with low D.O. conditions at this site. Species richness (number of species) values were low to moderately high and ranged from 9 to 35 species per sample.

Figure 9. Pokegama River Watershed Macroinvertebrate IBI Conditions



Water Quality

Water quality data for Pokegama River Watershed sites collected during fish surveys or other miscellaneous monitoring are shown in Table 7. Extensive monitoring of the Pokegama River at Cemetery Road, which is near the river's mouth, was also conducted in 2017 as part of a separate project (Roesler, 2018). That data is summarized in Table 8 and Table 9. The site was monitored four times per month during May through October. Monitoring dates were weighted toward periods of higher flow to allow better estimation of loading. The USGS monitored flows at the site during this period.

The Pokegama River is an impaired water due to high total phosphorus concentrations (TP's), which exceed the WI DNR stream standard of 75 ug/l. The impairment determination was based on six monthly May-October 2015 samples collected at the Cemetery Road site. TP's > 75ug/l are commonly found throughout the watershed. Six of the seven TP's measured during 2017 fish surveys were > 75 ug/l (one site TP was 71 ug/l) (Table 7). TP's measured during the four times/month sampling at the Cemetery Road site were all > 75 ug/l and ranged from 103 - 514 ug/l (Table 8). A few of the samples collected during 2012 had TP's < 75 ug/l (Table 7; Pokegama R US RR tracks). Monthly mean flows for July-October 2012 at the nearby Nemadji River USGS monitoring site were far below long term mean flow values. Low stream flows in the Pokegama River during this period probably contributed to the lower TP's found, since lower stream flows commonly have lower TP's.

Wisconsin's stream dissolved oxygen concentration (D.O.) standard is 5.0 mg/l for cool water streams. Most D.O.'s measured in the Pokegama River watershed exceeded this standard. D.O.'s measured during six of the seven 2017 fish surveys were > 7 mg/l (The unnamed tributary to the Pokegama River at Barnes Road had a D.O. of 4.6 mg/l) (Table 7). Only a single D.O. measured at the Cemetery Road site during 2017 was slightly below the standard (4.9 mg/l). The lowest D.O. measured, 3.3 mg/l, was at the Pokegama River upstream of Barnes Road in 2015.

pH values ranged from 6.9 to 8.2 s.u.'s and fell within the 6 to 9 s.u. range that is the Wisconsin stream standard.

Stream standards do not exist for the other water quality parameters measured. Streams in the Pokegama River watershed are notable for having high total suspended solids concentrations, high turbidities and low transparencies. The watershed is located in the Lake Superior Clay Plain ecoregion. Clay rich soils in the Clay Plain have high runoff potential, and streambank erosion is the major source of suspended sediment, turbidity, and low transparency in streams located there.

Concentrations of total Kjeldahl nitrogen, ammonia nitrogen, and nitrate plus nitrite nitrogen are not notable and are within the range of other northwest Wisconsin streams.

Table 8. 2017 Pokegama River at Cemetery Road Lab Parameter Result Summary from May-October Sampling (4x/month)

Statistic	Total Phosphorus (µg/l)	Ortho Phosphate (µg/l)	Total Suspended Solids (mg/l)	Ammonia - Nitrogen (mg/l)	Nitrate plus Nitrite - Nitrogen (mg/l)	Total Kjeldahl Nitrogen (mg/l)	Iron (mg/l)	Biochemical Oxygen Demand (mg/l)
Mean:	182	31	75	0.042	0.049	1.52	3.9	1.8
Median:	161	20	32	0.041	0.042	1.51	2.8	1.5
Max.:	514	154	464	0.086	0.152	2.19	8.3	3.4
Min.:	103	10	11	0.016	0.010	0.83	2.5	1

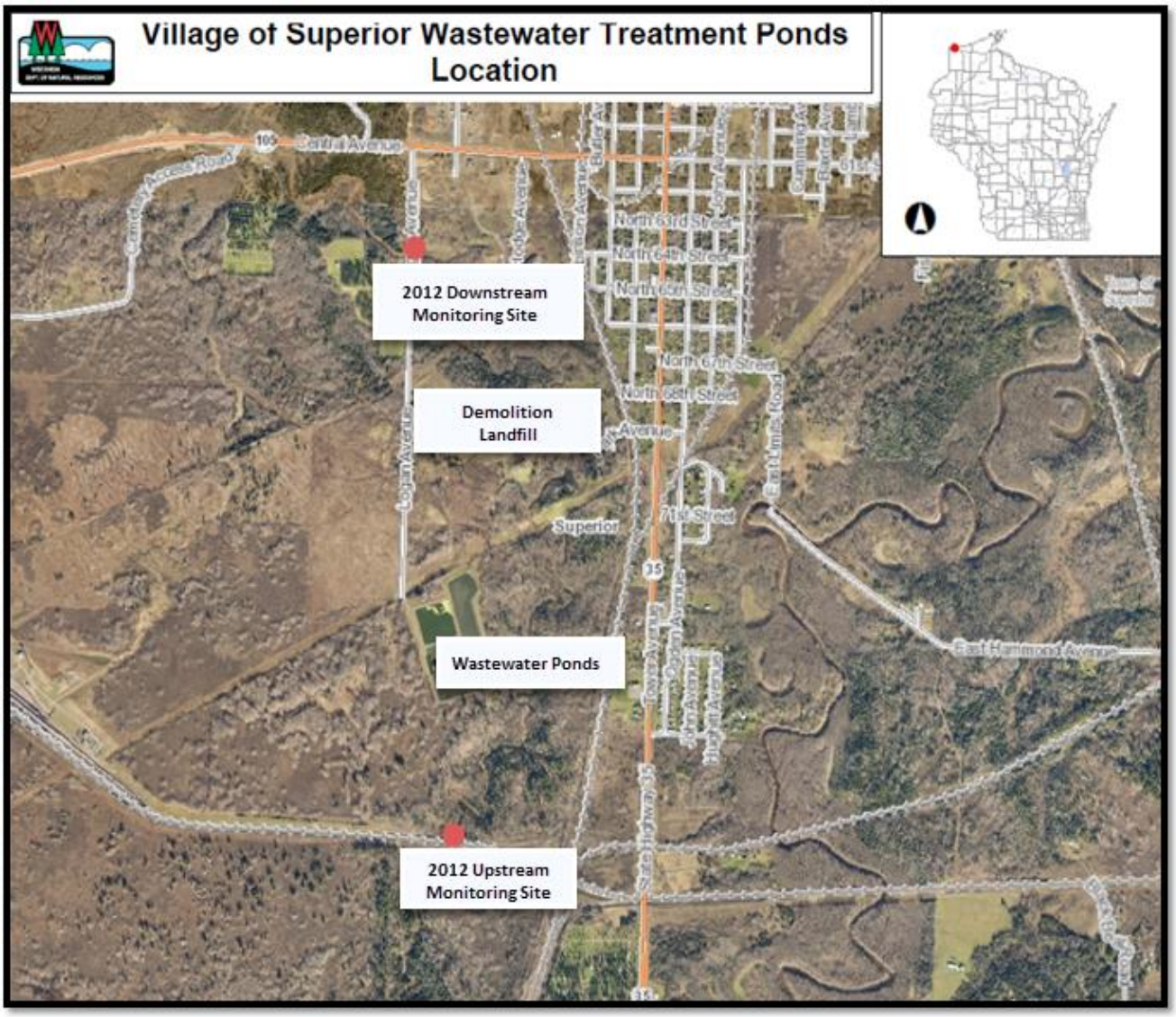
Table 9. 2017 Pokegama River at Cemetery Road Field Parameter Result Summary from May-October Sampling (4x/month)

Statistic	Temp. (°C)	Dissolved Oxygen (mg/l)	pH (s.u.)	Conductivity (umhos/cm)	Turbidity (ntu)	Transparency (cm)
Mean:	14.2	9.2	7.7	168	138	11
Median:	14.9	9.1	7.7	173	106	10
Max.:	21.6	12.1	8	258	475	24
Min.:	7.1	4.9	7.3	86	49	2

Village of Superior Wastewater Treatment Ponds

Effluent discharge from the Village of Superior wastewater treatment ponds is the only point source discharge to the Pokegama River. The multi-celled treatment ponds are located 1.2 miles south of State Highway 105 on the west side of the river (Figure 10). The facility treats the sewage from a population of 664 people. Sewage is pumped beneath the river, under pressure, from a pumping station on the east side of the river. The treatment ponds also receive leachate generated from a demolition materials landfill, located to the north of the ponds. Permit conditions specify that pond effluent should be discharged in spring and fall to minimize discharge during periods of low stream flow.

Figure 10. Location of Village of Superior WWTP ponds and 2012 monitoring sites.



Pokegama River monitoring during June-October 2012 showed consistent, substantial increases in total phosphorus concentrations (TP's) from above to below the treatment ponds (Table 10).

Table 10. Total Phosphorus Sites & Village Superior WWTP Ponds June-October 2012

Total Phosphorus (ug/l)						
	6/11/12	6/25/12	7/23/12	8/20/12	9/26/12	10/22/12
Upstream of ponds (station 10037303)	71	85	57	97	46	48
Downstream of ponds (station 10032640)	100	108	149	148	159	1220

Since the wastewater treatment ponds were not permitted to discharge in July and August, additional monitoring was conducted during 2017 in the vicinity of the ponds to determine if other significant sources of total phosphorus were present.

Sampling sites included all significant sources of drainage in the area and are shown in Figure 11. Some sites were selected to assess the possibility of leakage from the pressurized sewer line (SURF-5, SURF-6, TRIB-7). A rupture in the sewer line reportedly occurred in 2010 following a pressure test of the Enbridge Energy oil pipeline that runs closely parallel to the sewer line. The sewer line was replaced at that time. Remnants of old steel and concrete sewer lines are sitting in the Pokegama River (Figure 12 and Figure 13, respectively).

TP's found in samples collected in the vicinity of the wastewater treatment ponds are shown in Table 11. TP's ranged from 23 – 95 ug/l. None of the sites had the potential to significantly increase TP's in the Pokegama River.

Additional monitoring in 2017 was done at sites upstream (Figure 11; PO-US) and downstream (Figure 11; PO-DS) of the wastewater treatment ponds. Samples were collected on five dates (Table 12). On the three dates when wastewater pond effluent was being discharged (May 11th, Sept. 14th, Oct. 11th), TP's in the Pokegama River downstream increased 36 – 109%, to concentrations similar to those estimated by mixing calculations. On the two dates without effluent discharge (June 6th and 14th), downstream TP's were similar to upstream TP's.

No other significant total phosphorus sources are present in the area, and downstream TP's in 2017 only increased when effluent discharge was occurring. It seems likely that downstream total phosphorus increases throughout 2012 (Table 10) were due to effluent discharge.

Pokegama River monitoring during May-October of 2017 assessed the contribution of wastewater pond effluent to the total phosphorus load of the river (Roesler 2018). During May-October effluent was estimated to provide 5.8% of the river's total phosphorus load. Other sources of phosphorus to the Pokegama River are streambank and channel erosion, septic systems, and pasture, hayfield, and urban runoff. There are no row crops in the watershed. The clay-rich watershed soils minimize infiltration and maximize runoff, so delivery of phosphorus via runoff from any kind of land development is enhanced.

The Pokegama River flows into Pokegama Bay. The bay is part of the Saint Louis River estuary, which is a Great Lakes Area of Concern (AOC). One of the AOC goals is to reduce phosphorus loading to the estuary and maintain estuary TP concentrations at 30 ug/l or less. Phosphorus loading reductions in the Pokegama River Watershed would contribute toward achieving AOC phosphorus goals.

An updated permit for the Village of Superior wastewater treatment system is currently being prepared. Options for reducing TP in the discharge will be identified and assessed for feasibility.

Figure 11. Additional Village of Superior WWTP Monitoring Sites

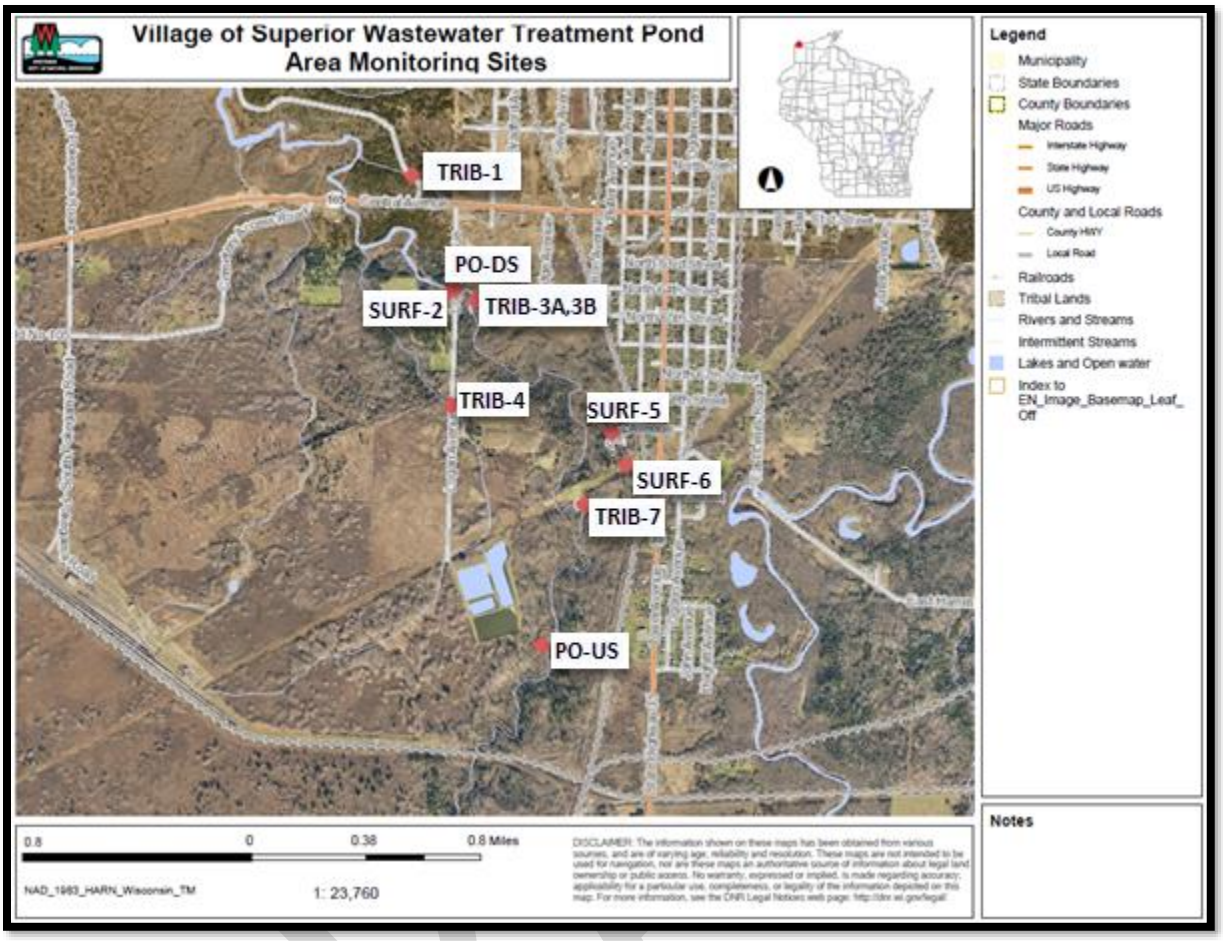


Table 11. Additional Monitoring Sites - Total Phosphorus

Site Description	SWIMS No.	Figure ID	Date	TP* (ug/l)
Unnamed stream at Billings Drive near STH 105	10048368	TRIB-1	5/4/2017	50
			5/17/2017	76
Surface drainage at cemetery near Pokegama R at Cemetery Rd	10048369	SURF-2	5/4/2017	23
			5/17/2017	46
Unnamed trib to Pokegama R upstream of Cemetery Rd	10048630	TRIB-3A	6/20/2017	95
		TRIB-3B	6/20/2017	78
Unnamed stream at Cemetery Rd	10048367	TRIB-4	5/4/2017	52
			5/17/2017	63
Ravine drainage near Village of Superior WW pump station	10048569	SURF-5	6/1/2017	39
Drainage across pipeline access road	10048570	SURF-6	6/1/2017	66
Unnamed tributary to Pokegama R upstream of pipeline	10048571	TRIB-7	6/1/2017	25
			6/20/2017	54
*TP = total phosphorus				

Figure 12. Remnants of old steel sewer lines are sitting in the Pokegama River

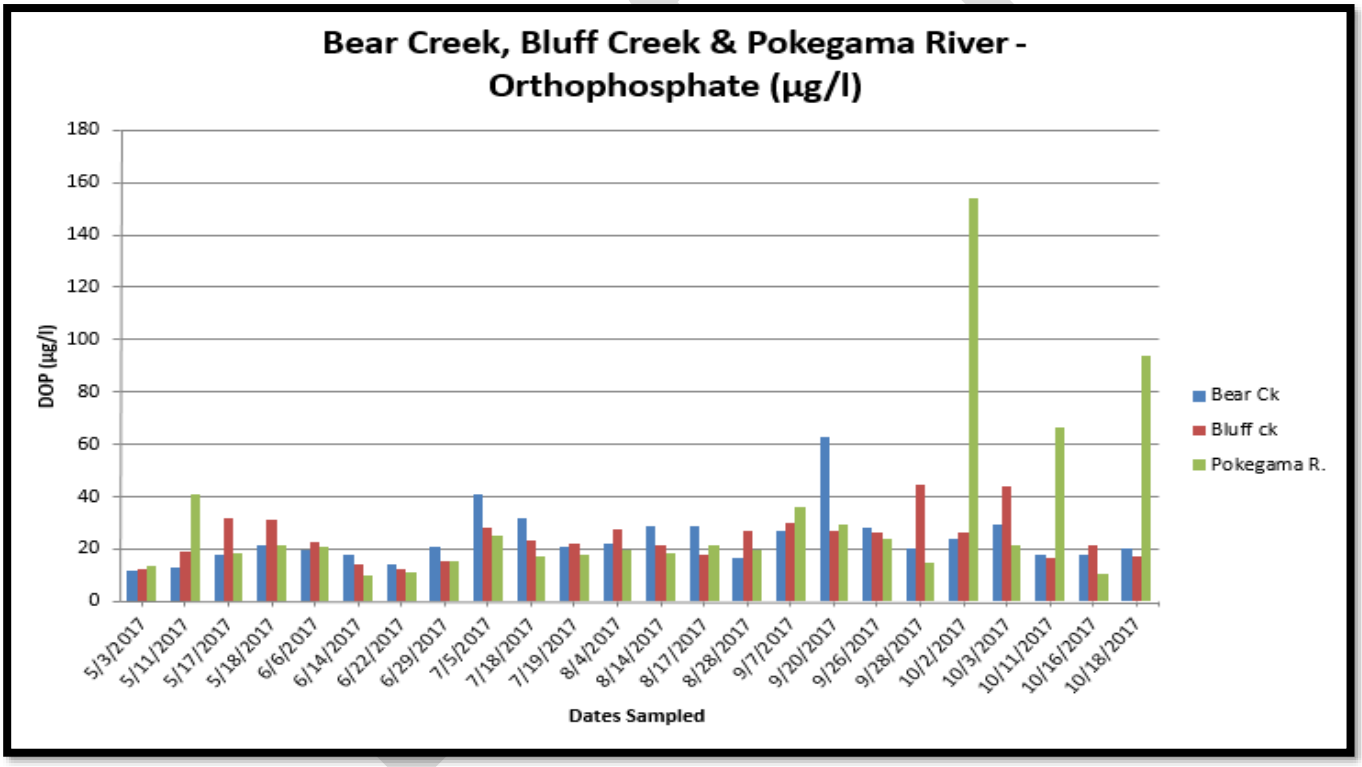
Figure 13. Remnants of old concrete sewer lines are sitting in the Pokegama River

Table 12. Total phosphorus and flow upstream and downstream of outfall.

DATE	Pokegama R TP (ug/l) upstream of WW ponds (PO-US; 10048396)	Pokegama R TP (ug/l) at Cemetery Rd downstream of WW ponds (PO-DS; 10032640)	Lagoon effluent TP (ug/l)	Pokegama R flow at Cemetery Rd (cfs)	Lagoon effluent flow (cfs)	Mixing calculation of downstream TP (ug/l)
5/11/2017	82.2	157	1,300	6.4	0.45	168
6/6/2017	106	114	none	15.6	0	106
6/14/2017	139	121	none	16.1	0	139
9/14/2017	82.8	113	1,600	3.0	0.08	123
10/11/2017	78.3	164	2,100	7.3	0.52	222

Village of Superior wastewater lagoon discharge was also observed to produce orthophosphate spikes in the Pokegama River in 2017. Figure 14 compares dissolved orthophosphate concentrations in the Pokegama River (at Cemetery Road) to those in Bear and Bluff Creeks, two nearby Lake Superior Clay Plain streams. Dissolved orthophosphate spikes in the Pokegama River during May and October of 2017 when lagoon effluent was being discharged were notable.

Figure 14. Comparison of Dissolved Orthophosphate (ug/l) in the Bear, Bluff and Pokegama Rivers.



Management Recommendations

Management Options

Since the Pokegama River is impaired due to high phosphorus concentrations, efforts should be made to reduce sources of phosphorus.

Suspended sediment concentrations and turbidity are also high in Pokegama River watershed streams. Streambank erosion is typically the largest source of suspended sediment and turbidity in Clay Plain streams. Reducing peak flows can reduce streambank erosion which would contribute to reduced suspended sediment and turbidity in the Pokegama River, Pokegama Bay, and the St. Louis River Estuary.

Management Recommendations for DNR and External Partners

- The DNR should work with the Douglas County Land and Water Conservation Department to identify options for reducing phosphorus input to watershed streams. Any barnyards or locations with concentrated livestock in the watershed should be identified and assessed for potential application of runoff controls.

- The DNR should work with the Douglas County Land and Water Conservation Department to identify options for reducing peak flows in the watershed ("Slow the Flow" efforts).

- The DNR should encourage Douglas County to continue to apply for grants to fund best management practices with landowners to implement practices and continue ongoing work with specific farmers for reduction of manure and nutrient runoff.

- The DNR should encourage Douglas County and local communities to apply for grants to continue best management practices designed to reduce runoff of total phosphorus and sediment.

- The DNR should work with the Village of Superior to identify options for reducing phosphorus discharge from the wastewater lagoons. An updated permit for the Village wastewater treatment system is currently being prepared.

Management Recommendations for External Partners

- Douglas County will be taking actions required by July 2000 revisions to the Wisconsin Plumbing Code. Actions required include:

    - An inventory of all private onsite wastewater systems.
    - Inspections of systems installed before July 2000.
    - Implementation of a maintenance tracking program.

Actions will be taken over a 3-year period, starting in the southern third of the County and working northward. Systems in the Pokegama River watershed will be addressed in 2021.

Monitoring and Assessment Recommendations

- After land management practices and restoration work are conducted, DNR should monitor and assess watershed streams to determine if conditions are improving.

- After land management practices and restoration work are conducted, engage water quality monitoring volunteers to support monitoring watershed streams.

Appendix A: References

Becker, George C. 1983. Fishes of Wisconsin. The University of Wisconsin Press. 1051 pp.

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Appendix B: Stream Narratives

Waters in the Pokegama River Watershed

Pokegama River (2844000)

The 26-mile long Pokegama River originates in Minnesota south of Jay Cook State Park and enters the St. Louis River near Dwight's Point, which is part of the Superior Municipal Forest (see graphic below). The Pokegama River empties into Pokegama Bay and the St. Louis River Estuary.

The river provides important spawning areas for walleye, northern pike, longnose and white suckers, burbot and more other members of a diverse fishery. Water quality is very important for successful reproduction for these species (Pratt, 1996).

A significant portion of the 4,000-acre City of Superior Municipal Forest was designated as a State Natural Area in 1996, which also borders the St. Louis River Estuary. This unique natural area site is highlighted by a sizable stand of relatively unfragmented boreal forest, which gives it regional conservation significance (City of Superior website, 2019).

As the river enters the St. Louis River Estuary, extensive areas of emergent marsh border each side of Pokegama Bay. This sheltered bay and others in the estuary include some the highest-quality remaining wetlands, and areas of emergent vegetation are interspersed with areas of submergent vegetation and open water between 3 and 5 feet deep. The health of these bays varies from one location to another: some have been impacted by input from excessive sediment and some exhibit lower than expected species diversity and/or invasion by exotic species. Purple loosestrife and other undesirable exotic plant species have become established in a number of sheltered bays (St. Louis River Habitat Plan). The City of Superior began a purple loosestrife control program in 2002 using Galerucella beetles. Although beetles have been fairly effective in controlling purple loosestrife, purple loosestrife has not been eradicated.

In tributaries and downstream areas of its drainage, the Pokegama River is similar to other flashy, red-clay influenced streams of this watershed, displaying steeply cut clay banks and a scoured, sometimes deeply cut channel. Red clay erosion here contributes to large amounts of sediment and turbidity in the river. The suspended clay limits the abundance of submerged vegetation and consequently can also limit fish abundance.

Dwight's Point and Pokegama Wetlands is a state natural area (No. 300). Located at the confluence of the Pokegama and St. Louis Rivers near Lake Superior, Dwight's Point and Pokegama Wetlands features boreal forest, emergent marsh, and wet clay flats supporting shrub swamp and wet meadow. The SNA borders the St. Louis River estuary. Extensive deep and shallow marshes border the Pokegama River.

DNR SNA, photo by Thomas A. Meyer
Learn more about this SNA
City of Superior Dept. of Parks & Rec

Pokegama River with Moderate Flow Upstream of Wastewater Lagoons 10-11-17

Pokegama-Carnegie Wetlands

This high-quality wetland is an extensive area of poorly drained, red clay flats comprised of shrub swamp, sedge meadow, emergent marsh, small ponds, and is punctuated with tiny upland "islets" consisting of white spruce, white and red pine, balsam poplar, and trembling aspen (Lake Superior Basin Water Quality Management Plan, WDNR, 1999) (see graphic on previous page). These wetlands support populations of rare plants, a wide variety of emergent and submergent vegetation, and abundant and diverse wildlife.

Waters in the St. Louis and Lower Nemadji River Watershed

Little Pokegama River (2845200)

The Little Pokegama River is eight-miles long and flows just north and west of the Pokegama River and is like the Pokegama River, is tributary to the St. Louis River, with its confluence located at the upstream end of Spirit Lake. The headwater areas of the Pokegama and Little Pokegama River are associated with the Pokegama-Carnegie wetlands, which have been identified by the Wisconsin Department of Natural Resources (WDNR) Bureau of Endangered Resources as a Lake Superior Basin Priority Site.

Bear Creek (2834600)

This stream is a small and at least partly intermittent drainage feeder to Allouez Bay of the St. Louis River and has variable and seasonal flows. The mouth of Bear Creek is an important spawning area for northern pike and many other warm water species (Pratt 1996).

Bluff Creek (2833200)

Bluff Creek is an approximately 18.2 mile red-clay tributary of Lake Superior, which flows into Allouez Bay on the southeast side of the City of Superior. It is flashy in nature during high-water storm events or runoff periods, with seasonal low flow conditions.

Erosion on Bluff Creek – unstable side slopes can not withstand erosive flashy runoff events

Pratt (1996) noted that the mouth of Bluff Creek is an important spawning area for northern pike and other warm-water species. Epstein (1997) documented significant sources of pollutants include barnyards, livestock, cropland, and erodible stream banks, with point source and septic contributions present. Impacts to Bluff Creek noted from surveys conducted in 1997 and also 303d assessment in 2009 include significant turbidity, silt or sedimentation, and low flow conditions. It has also been previously noted that runoff from Burlington Northern rail-yards and engine house reaches the stream (Lake Superior Basin Water Quality Management Plan, WDNR, 1999). Epstein (1997) found moderate richness of macroinvertebrate taxa and one rare macroinvertebrate at his study site.

Copper Creek (2836100)

Copper Creek flows 11.2-miles north of the Superior escarpment into the Nemadji River. Most of the stream is assumed to support a balanced fishery. The reach beginning from the town road crossing in section 25-26, T47N R14W and extending downstream about two miles to a warm water tributary is considered Class II trout waters reported to support brook trout. The unnamed tributary flowing north to Copper Creek in section 22, T27N, R14W is classified as supporting a Class I reproducing brook trout population and is listed as an exceptional resource water. The tributary has an extremely high gradient of 145 feet per mile but has a relatively small base flow. The bottom is mostly unstable sand with small amounts of gravel. Precipitated iron deposits cover most of the stream substrate at the headwaters. About an eighth of a mile of the stream flows within Pattison State Park. Both creeks are considered flashy based on in-stream debris and eroded banks.

Crawford Creek (2835500)

Crawford Creek is a warmwater tributary to the Nemadji River, located just south of Superior, Wisconsin. It is primarily a runoff stream, with a turbid water supply due to mucky clay substrates and highly eroded clay banks. It is flashy in nature, characterized with low flows (it can be intermittent or dry in its upper portions) and having very high flows during storm or runoff events. Evidence of high flow or flooding events is common throughout, with banks five to six feet high and eroding into the creek, and log or brush jams common.

Faxon (Central Park) Creek (2843700)

Faxon Creek, which is also known locally as Central Park Creek, is 'officially' an unnamed tributary to Superior Bay (Lake Superior). The

entire stream is within the City of Superior, Douglas County. From its mouth at Superior Bay and heading upstream, it flows for about its last 0.4 miles underground, passing under approximately six roads, highways, or RR crossings. Another 0.1 – 0.2 miles is channelized in this section leading upstream into Central Park.

Dutchman Creek (2847100)

Dutchman Creek is a nine-mile-long tributary to Lake Superior located on the eastern border of the City of Superior. On its way to Lake Superior, the creek flows near the city's municipal landfill and can be affected by trash. The creek is very turbid and although its riparian area is relatively undeveloped, it does receive some stormwater input from private landowner residences. Its principle water source is spring runoff and rain events. During seasonal low flow events, the river mouth can disconnect from Lake Superior and it cuts through sand beaches before reaching the lake. This is an important area for coastal wetlands.

Nemadji River (2835300)

The Nemadji River drains approximately 433 square miles of land in Minnesota and Wisconsin before entering the Duluth-Superior Harbor in Superior Bay near the Burlington Northern Ore Docks in the City of Superior. High turbidity in the water column, mainly from high sediment loads, impair in-stream physical habitat in the river and its tributaries.

Rocky Run (2836300)

Rocky Run is a small, intermittent drainage feeder to Copper Creek, with unpredictable seasonal flows. A baseline survey conducted upstream of East Twin Creek Road in 2006 lends support to a current use designation of WWFF, with six fish species found during sampling at that site. However, Epstein (1997) noted significant problems (streambank erosion, barnyards, livestock, croplands, impoundment and tile, and minor contributions from septic systems, leading to significant turbidity and to a lesser extent, silt) which were identified during survey work conducted as part of the coastal wetlands evaluation. During this evaluation, only moderate invertebrate taxa richness was found, and no rare species.

Stony Brook (2836400)

Stony Brook is a four-mile long intermittent, drainage stream that originates just outside of Pattison State Park and is a tributary to Copper Creek. Although it was sampled as part of the coastal wetland evaluation (Epstein, 1997), it's existing and potential biological uses are listed as "unknown". Agricultural runoff from barnyards, livestock and cropland, streambank erosion, and to a lesser degree septic systems, all potentially contribute to significant turbidity and flashy or low flows.

Appendix C: St. Louis Nemadji River Watershed Fish and Aquatic Life Use Attainment

WATER ID	Waterbody Name	WBIC	Local Waterbody Name	Start Mile	End Mile	Current Use	Attain-able Use	Supporting Attainable Use / Impaired Waters	Designated Use	Supporting Designated Use	Assessment	Data Quality	DNR Category	MAP
17455	Bear Creek	2834600	Bear Creek	0	11	WWFF	WWFF	Not Supporting - Impaired	Default FAL	NR102 Classification	Monitored	B1, B4, P3	Category 5P	Map
4700332	Birch Creek	2833500	Birch Creek	0	6.87	FAL	FAL	Supporting	Default FAL	NR102 Classification	Monitored	B4	Category 2	Map
17454	Bluff Creek	2833200	Bluff Creek	0	18.2	WWSF	WWSF	Not Supporting - Impaired	Default FAL	NR102 Classification	Monitored	B4, B1, P3	Category 5P	Map
17459	Copper Creek	2836100	Copper Creek	0	7.18	Cold (Class II Trout)	Cold (Class II Trout)	Not Assessed	Cold	1980 Trout Book Classification	Evaluated: Watershed Tables	B1	Category 3	Map
17460	Copper Creek	2836100	Copper Creek	7.18	9.58	Cold (Class II Trout)	Cold (Class II Trout)	Not Assessed	Cold	1980 Trout Book Classification	Evaluated: Watershed Tables	B1	Category 3	Map
1464553	Copper Creek	2836100	Copper Creek	9.6	11.2	Cold (Class II Trout)	Cold (Class II Trout)	Not Assessed	Cold	1980 Trout Book Classification	Evaluated: Watershed Tables	B1	Category 3	Map
17458	Crawford Creek	2835500	Crawford Creek	0	9.12	WWFF	FAL	Not Supporting - Impaired	Default FAL	NR102 Classification	Evaluated: Older Data	B1, B2	Category 5A	Map
17472	Dutchman Creek	2847100	Dutchman Creek	0	9.68	WWFF	WWFF	Supporting	Default FAL	NR102 Classification	Monitored	B1, B2	Category 2	Map
3898045	Lake Superior	2751220	Wisconsin Point Beach 5, Lake Superior	0	0.22	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Monitored	NA	Category 2	Map
3897996	Lake Superior	2751220	Wisconsin Point Beach 3, Lake Superior	0	0.11	FAL	FAL	Not Supporting - Impaired	Default FAL	NR102 Classification	Monitored	NA	Category 5A	Map
6878341	Lake Superior	2751220	Lake Superior - Wisconsin Point Lot 12 Beach	0	9.83	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Monitored	NA	Category 2	Map
1490997	Lake Superior	2751220	Wisconsin Point Beach #2, Lake Superior	0	0.48	FAL	FAL	Not Supporting - Impaired	Default FAL	NR102 Classification	Monitored	NA	Category 5A	Map
3897920	Lake Superior	2751220	Allouez Bay Beach 3, Lake Superior	0	0.04	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Monitored	NA	Category 2	Map
3898023	Lake Superior	2751220	Wisconsin Point Beach 4, Lake Superior	0	0.13	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Monitored	NA	Category 2	Map
1855793	Lake Superior	2751220	Lake Superior (mouth of Amnicon River)	0	59.1	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map

WATER ID	Waterbody Name	WBIC	Local Waterbody Name	Start Mile	End Mile	Current Use	Attain-able Use	Supporting Attainable Use / Impaired Waters	Designated Use	Supporting Designated Use	Assessment	Data Quality	DNR Category	MAP
1452402	Lake Superior	2751220	Barker Island Inner Beach	0	0.4	FAL	FAL	Recreational Use Impaired	Default FAL	NR102 Classification	Monitored	NA	Category 5A	Map
892439	Lake Superior	2751220	Lake Superior	0	186	Cold	Cold	Recreational Use Impaired	Default FAL	NR102 Classification	Monitored	B1	Category 5A	Map
17469	Little Pokegama R.	2845200	Little Pokegema River	0	8.55	FAL	FAL	Fully Supporting	Default FAL	NR102 Classification	Monitored	B1, P3	Category 2	Map
17473	Morrison Creek	2847900	Morrison Creek	0	8.6	WWFF	WWFF	Not Assessed	Default FAL	NR102 Classification	Evaluated	B1	Category 3	Map
4706393	Mud Lake	3000116	Mud Lake	0	135	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Evaluated	NA	Category 3	Map
17456	Nemadji River	2835300	Lower Nemadji River	0	38.2	WWSF	WWSF	Not Supporting - Impaired	FAL Warmwater	NR102 Classification	Monitored	B1, B4	Category 5A	Map
305141	Newton Creek	2843650	Newton Creek	0	1.76	LAL	WWFF	Not Supporting - Impaired	LFF	Classification Survey Pending	Monitored	B1, B4, P3	Category 5A	Map
17467	Pokegama River	2844000	Pokegema River	0	25.7	FAL	FAL	Not Supporting - Impaired	LFF	NR104 Classification Survey	Monitored	B1, B4, T2, P3	Category 5P	Map
17470	Red River	2845800	Red River	0	6.3	Class III Trout	Cold (Class I Trout)	Supporting	Default FAL	NR102 Classification	Monitored	B1, B2	Category 2	Map
1464653	Red River	2845800	Red River	6.3	7.35	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	No Assessment	NA	Category 3	Map
17461	Rocky Run	2836300	Rocky Run Creek	1.8	3.62	WWFF	WWFF	Supporting	Default FAL	NR102 Classification	Evaluated	B1, B2	Category 3	Map
1527203	Saint Louis River	2843800	St. Louis River AOC, Howards Bay	0	141	WWSF	WWSF	Not Supporting - Impaired	Default FAL	NR102 Classification	Monitored	NA	Category 5A	Map
17465	Saint Louis River	2843800	St. Louis River AOC, St. Louis River	0	5902	WWSF	WWSF	Not Supporting - Impaired	Default FAL	NR102 Classification	Monitored	B4, B1	Category 5A	Map
4705858	Spirit Lake	4000004	Spirit Lake	0	997	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Evaluated: Modeled Data	NA	Category 3	Map
17462	Stony Brook	2836400	Stony Brook Creek	2.56	4.12	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Evaluated	B1	Category 3	Map
891512	Superior Bay	2751300	Hog Island Inlet	0	18.5	FAL	Cold	Not Supporting - Impaired	Default FAL	NR102 Classification	Evaluated	B1	Category 5A	Map
20032	Unnamed	2829560	Un Lake	0	5.52	Small	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
20034	Unnamed	2829570	Un Lake	0	1.81	Small	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map

WATER ID	Waterbody Name	WBIC	Local Waterbody Name	Start Mile	End Mile	Current Use	Attain-able Use	Supporting Attainable Use / Impaired Waters	Designated Use	Supporting Designated Use	Assessment	Data Quality	DNR Category	MAP
20040	Unnamed	2829600	Un Lake	0	4.21	Small	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
20035	Unnamed	2829800	Un Lake	0	5.43	Small	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
20039	Unnamed	2829900	Un Lake	0	1.9	Small	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
20042	Unnamed	2830000	Un Lake	0	3.18	Small	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
20070	Unnamed	2830100	Un Lake	0	3.79	Small	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
4700326	Unnamed	2833300	Unnamed	0	2.02	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
4700338	Unnamed	2833400	Unnamed	0	5.85	FAL	FAL	Fully Supporting	Default FAL	NR102 Classification	Monitored	B4	Category 2	Map
6906749	Unnamed	2833600	Unnamed Stream	0	0.95	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6906758	Unnamed	2833700	Unnamed Stream	0	1.47	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6906767	Unnamed	2833800	Unnamed Stream	0	2.1	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6906777	Unnamed	2833900	Unnamed Stream	0	3.68	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6906790	Unnamed	2834000	Unnamed Stream	0	0.84	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6906799	Unnamed	2834100	Unnamed Stream	0	0.57	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6906808	Unnamed	2834200	Unnamed Stream	0	3.11	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6906819	Unnamed	2834300	Unnamed Stream	0	1.66	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6906830	Unnamed	2834400	Unnamed Stream	0	1.29	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6906839	Unnamed	2834500	Unnamed Stream	0	2.05	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
4700314	Unnamed	2834700	Unnamed	0	5.43	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
3995171	Unnamed	2834800	Local Water	0	2.96	FAL	FAL	Supporting	Default FAL	NR102 Classification	Monitored	B3	Category 2	Map

WATER ID	Waterbody Name	WBIC	Local Waterbody Name	Start Mile	End Mile	Current Use	Attain-able Use	Supporting Attainable Use / Impaired Waters	Designated Use	Supporting Designated Use	Assessment	Data Quality	DNR Category	MAP
6906849	Unnamed	2834900	Unnamed Stream	0	0.96	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6906858	Unnamed	2835000	Unnamed Stream	0	0.34	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
4700320	Unnamed	2835100	Unnamed	0	4.88	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6906867	Unnamed	2835200	Unnamed Stream	0	1.16	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6906877	Unnamed	2835400	Unnamed Stream	0	1.39	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
3994641	Unnamed	2835800	Crawford Creek	0	5.89	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6906890	Unnamed	2835900	Unnamed Stream	0	1.48	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
20062	Unnamed	2836000	Un Lake	0	2.7	Small	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6906906	Unnamed	2836200	Unnamed Stream	0	3.86	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6906919	Unnamed	2836500	Unnamed Stream	0	2.13	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
5726507	Unnamed	2836600	Local Water	0	3.17	FAL	FAL	Supporting	Default FAL	NR102 Classification	Monitored	B2	Category 2	Map
17463	Unnamed	2836700	Unnamed Trib To Copper Creek	0	1.37	Cold (Class I Trout)	Cold (Class I Trout)	Not Assessed	Cold	1980 Trout Book Classification	Not Assessed	B1	Category 3	Map
17464	Unnamed	2836800	Unnamed Trib To Unnamed Copper Ck. Trib	0	0.5	FAL	WWFF	Not Assessed	WWFF	NR102 Classification	Evaluated	B1	Category 3	Map
1525909	Unnamed	2843700	Faxon (Central Park) Creek	0	3.21	LFF	WWFF	Not Supporting - Impaired	Default FAL	NR102 Classification	Monitored	B4	Category 5A	Map
4700350	Unnamed	2843900	Unnamed	0	2.91	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6906931	Unnamed	2844100	Unnamed Stream	0	1.07	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
17468	Unnamed	2844200	Unnamed Trib. To Pokegama River T48n R14w S10/15	0	2.56	LFF	LFF	Not Assessed	LFF	Classification Survey Pending	Evaluated	B1	Category 3	Map
888997	Unnamed	2844300	Unnamed Creek	0	6.76	WWSF	WWSF	Supporting	Default FAL	NR102 Classification	Evaluated	B1	Category 3	Map
6906941	Unnamed	2844400	Unnamed Stream	0	4.09	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map

WATER ID	Waterbody Name	WBIC	Local Waterbody Name	Start Mile	End Mile	Current Use	Attain-able Use	Supporting Attainable Use / Impaired Waters	Designated Use	Supporting Designated Use	Assessment	Data Quality	DNR Category	MAP
6906959	Unnamed	2844500	Unnamed Stream	0	2.82	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6906974	Unnamed	2844700	Unnamed Stream	0	2.02	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6906987	Unnamed	2845400	Unnamed Stream	0	0.56	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6906996	Unnamed	2845500	Unnamed Stream	0	2.38	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
888991	Unnamed	2845600	Local Water	0	0.84	WWSF	WWSF	Supporting	Default FAL	NR102 Classification	Watershed Tables	B1	Category 3	Map
889093	Unnamed	2845700	Unnamed	0	2.48	WWSF	WWSF	Not Assessed	Default FAL	NR102 Classification	Watershed Tables	B1	Category 3	Map
889067	Unnamed	2845900	Unnamed	0	2.75	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Watershed Tables	B1	Category 3	Map
6907008	Unnamed	2846000	Unnamed Stream	0	1.25	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907019	Unnamed	2846100	Unnamed Stream	0	3.9	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907031	Unnamed	2846300	Unnamed Stream	0	3.97	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
4700302	Unnamed	2846800	Unnamed	0	3.06	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907041	Unnamed	2846900	Unnamed Stream	0	1.07	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
4700344	Unnamed	2847000	Unnamed	0	2.1	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907049	Unnamed	2847200	Unnamed Stream	0	3.53	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907073	Unnamed	2847400	Unnamed Stream	0	1.21	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907083	Unnamed	2847500	Unnamed Stream	0	0.97	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907092	Unnamed	2847600	Unnamed Stream	0	0.75	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907101	Unnamed	2847700	Unnamed Stream	0	1.13	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907110	Unnamed	2847800	Unnamed Stream	0	0.97	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
4700308	Unnamed	2848000	Unnamed	0	2.21	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map

WATER ID	Waterbody Name	WBIC	Local Waterbody Name	Start Mile	End Mile	Current Use	Attain-able Use	Supporting Attainable Use / Impaired Waters	Designated Use	Supporting Designated Use	Assessment	Data Quality	DNR Category	MAP
6907119	Unnamed	2848100	Unnamed Stream	0	1.73	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907129	Unnamed	2848200	Unnamed Stream	0	1.27	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907139	Unnamed	2848300	Unnamed Stream	0	0.41	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907148	Unnamed	2848400	Unnamed Stream	0	3.59	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907161	Unnamed	2848500	Unnamed Stream	0	1.95	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907178	Unnamed	2848600	Unnamed Stream	0	1.32	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907189	Unnamed	2848700	Unnamed Stream	0	0.86	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907200	Unnamed	2848800	Unnamed Stream	0	0.97	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
304749	Unnamed	3000141	Unnamed Creek	0	0.74	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
5726549	Unnamed	3000142	Local Water	0	1.1	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
5738172	Unnamed	3000143	Local Water	0	0.51	FAL	FAL	Supporting	Default FAL	NR102 Classification	Monitored	B3	Category 2	Map
6907211	Unnamed	3000291	Unnamed Stream	0	0.94	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
1525929	Unnamed	5000527	Local Water	0	0.67	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
1525949	Unnamed	5000547	Unnamed Creek	0	0.69	FAL	FAL	Not Supporting - Impaired	Default FAL	NR102 Classification	Monitored	B4	Category 5A	Map
6907227	Unnamed	5000550	Unnamed Stream	0	1.16	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
1525969	Unnamed	5000563	Local Water	0	0.56	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907243	Unnamed	5000615	Unnamed Stream	0	0.61	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907253	Unnamed	5000652	Unnamed Stream	0	0.39	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907264	Unnamed	5000661	Unnamed Stream	0	0.33	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907271	Unnamed	5000663	Unnamed Stream	0	0.43	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map

WATER ID	Waterbody Name	WBIC	Local Waterbody Name	Start Mile	End Mile	Current Use	Attain-able Use	Supporting Attainable Use / Impaired Waters	Designated Use	Supporting Designated Use	Assessment	Data Quality	DNR Category	MAP
6907281	Unnamed	5000670	Unnamed Stream	0	0.76	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907292	Unnamed	5000682	Unnamed Stream	0	0.52	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907304	Unnamed	5000688	Unnamed Stream	0	0.49	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907313	Unnamed	5000690	Unnamed Stream	0	0.5	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907323	Unnamed	5000701	Unnamed Stream	0	0.23	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907332	Unnamed	5000702	Unnamed Stream	0	0.42	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907341	Unnamed	5000706	Unnamed Stream	0	0.42	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907351	Unnamed	5000710	Unnamed Stream	0	0.66	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907361	Unnamed	5000717	Unnamed Stream	0	1.66	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907372	Unnamed	5000731	Unnamed Stream	0	0.4	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907381	Unnamed	5000732	Unnamed Stream	0	0.33	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907390	Unnamed	5000742	Unnamed Stream	0	0.69	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907398	Unnamed	5000783	Unnamed Stream	0	0.32	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907408	Unnamed	5000806	Unnamed Stream	0	0.71	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907417	Unnamed	5000807	Unnamed Stream	0	0.65	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907425	Unnamed	5000824	Unnamed Stream	0	2.3	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907436	Unnamed	5000836	Unnamed Stream	0	0.63	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907445	Unnamed	5000839	Unnamed Stream	0	0.73	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907455	Unnamed	5000855	Unnamed Stream	0	0.05	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907464	Unnamed	5000891	Unnamed Stream	0	0.93	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907474	Unnamed	5000898	Unnamed Stream	0	0.79	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map

WATER ID	Waterbody Name	WBIC	Local Waterbody Name	Start Mile	End Mile	Current Use	Attain-able Use	Supporting Attainable Use / Impaired Waters	Designated Use	Supporting Designated Use	Assessment	Data Quality	DNR Category	MAP
6907484	Unnamed	5000940	Unnamed Stream	0	0.9	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907494	Unnamed	5000943	Unnamed Stream	0	0.59	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907516	Unnamed	5000947	Unnamed Stream	0	0.44	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907531	Unnamed	5000949	Unnamed Stream	0	1.03	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907545	Unnamed	5000952	Unnamed Stream	0	0.65	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907555	Unnamed	5000977	Unnamed Stream	0	0.26	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
5726579	Unnamed	5000984	Unnamed Stream	0	3.65	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907565	Unnamed	5000998	Unnamed Stream	0	0.27	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907662	Unnamed	5001027	Unnamed Stream	0	0.61	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907672	Unnamed	5001096	Unnamed Stream	0	0.1	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907681	Unnamed	5001145	Unnamed Stream	0	0.16	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907691	Unnamed	5001153	Unnamed Stream	0	0.33	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907700	Unnamed	5001178	Unnamed Stream	0	1.52	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907713	Unnamed	5001184	Unnamed Stream	0	0.52	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907722	Unnamed	5001230	Unnamed Stream	0	1.27	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907733	Unnamed	5001397	Unnamed Stream	0	1.15	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907744	Unnamed	5001403	Unnamed Stream	0	2.19	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6907756	Unnamed	5001500	Unnamed Stream	0	0.42	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
6860188	Unnamed	5500274	Unnamed St. Louis R AOC	0	6.62	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
30012	Unnamed	5500276	Unnamed Lake	0	3.27	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
30013	Unnamed	5500280	Unnamed Lake	0	3.42	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map

WATER ID	Waterbody Name	WBIC	Local Waterbody Name	Start Mile	End Mile	Current Use	Attain-able Use	Supporting Attainable Use / Impaired Waters	Designated Use	Supporting Designated Use	Assessment	Data Quality	DNR Category	MAP
3997518	Unnamed	5500336	Unnamed Lake	0	0.48	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
30015	Unnamed	5500367	Unnamed Lake	0	6.72	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
33932	Unnamed	5500368	Unnamed Lake	0	5.26	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Evaluated: Modeled Data	NA	Category 3	Map
30016	Unnamed	5500390	Unnamed Lake	0	9.18	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
33933	Unnamed	5500398	Unnamed Lake	0	2.33	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
34722	Unnamed	5500408	Unnamed Lake	0	3.04	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
30017	Unnamed	5500416	Unnamed Lake	0	2.09	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
35505	Unnamed	5500436	Unnamed Lake	0	6.33	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
33934	Unnamed	5500442	Unnamed Lake	0	6.15	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
30019	Unnamed	5500573	Unnamed Lake	0	4.16	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
30040	Unnamed	5501150	Unnamed Lake	0	7.43	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
36264	Unnamed	5582591	Unnamed Lake	0	5.14	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
17471	Unnamed	2846500	Unnamed Seeps to Red River T48n R14w S30 NESW	0.01	1.54	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	B2	Category 3	Map
305565	Unnamed	2836800	Unnamed Trib To Unnamed Copper Ck Trib	0.5	1	LFF	LFF	Not Assessed	LFF	Classification Survey Pending	Evaluated: Watershed Tables	B1	Category 3	Map
1517167	Unnamed	3000143	Unnamed Tributary to Copper Creek	0.51	0.96	FAL	FAL	Supporting	LAL	NR104 Classification Survey	Monitored	B2	Category 2	Map
1486914	Unnamed	2845300	Local Water	9	11.3	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map
891570	UN Trib To Crawford Creek	Not on hydro layer)	Unnamed (Trib To Crawford Creek)	0	UNK	FAL	FAL	Not Supporting - Impaired	Default FAL	NR102 Classification	Evaluated: Watershed Tables	B1	Category 5A	Map

WATER ID	Waterbody Name	WBIC	Local Waterbody Name	Start Mile	End Mile	Current Use	Attain-able Use	Supporting Attainable Use / Impaired Waters	Designated Use	Supporting Designated Use	Assessment	Data Quality	DNR Category	MAP
6907218	Unnamed Creek	3000534	Unnamed Stream	0	0.55	FAL	FAL	Not Assessed	Default FAL	NR102 Classification	Not Assessed	NA	Category 3	Map

This 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 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.
Assessment – field indicates what type of data or information supports the decisions in the table (current, attainable, and supporting attainable).
Data Quality – Specific data areas used for the decision (see below)

P –Physical
B – Biological
C – Chemistry
H – Habitat
PA – Pathogen

Range 1-4 (1 – lowest level, 4 most sophisticated data collection)

DNR Category Is water meeting or not meeting standards

Category 2: Water meets at least 1 WQ standard,
Category 3: Insufficient data,
Category 4A: Water is impaired, TMDL in progress,
Category 5A: Water is impaired, TMDL required.
Category 5P: Water that has total phosphorus levels that exceed the State water quality standard but which currently do not exhibit biological impairments.