

A. Project Description

The Wadeable Trend Reference Sites monitoring program samples 44 regionally based, least-disturbed (hereafter, reference) stream locations distributed throughout the State. Stream locations were selected from a combination of the 2008-2009 reference stream project and best professional judgment based on regional expectations of reference condition and stratified among natural communities. The major goal of this monitoring program is to track long term variation in biological indices over time at reference sites to understand natural variation and broad scale impacts of climatic extreme events on biologic communities. Secondly, a suite of physical and chemical parameters are monitored over time to understand natural variation.

B. Project Locations

Stream monitoring locations were selected from a dataset of previously monitored reference sites and by best professional judgment. Although sites are meant to represent least-disturbed conditions because of the non-uniform distribution of land uses within the State the amount of agriculture and urban land uses in a specific reference watershed may vary across the State. Site locations are shown in Figure 1 and SWIMS ID and staff responsible for field sampling is located in Table 1.

C. Day and Time of Monitoring

Monitoring for the Wadeable Trend Reference Sites requires multiple site visits to sample during the appropriate index periods. Temperature loggers should be deployed in spring as soon as the water levels are safe to work and removed in fall. Fish, chemical, physical habitat and flow monitoring should take place during the fish sampling summer index period avoiding recent rainfalls. The macroinvertebrate monitoring should occur during the fall sampling index period.

D. Field Activities

1. Spring sampling event

- a. Deploy continuous temperature loggers to record at a minimum hourly intervals from May to October

2. Summer sampling event

- a. Fish community survey
- b. Water Chemistry (single grab)
 - i. Total Phosphorus
 - ii. Total Nitrogen
 - iii. Ammonia
 - iv. Nitrate + Nitrite
 - v. Total Suspended Solids
 - vi. Chloride

- c. Water Quality (meter)
 - i. Conductivity
 - ii. pH
 - iii. Dissolved Oxygen
 - iv. Water temperature
- d. Algae
 - i. Diatom sample (DPI)
 - ii. Algal abundance (viewing bucket protocol)
- e. Quantitative Physical Habitat
- f. Flow

3. Fall sampling event

- a. Macroinvertebrate sample
- b. Retrieve continuous temperature logger

E. SOPs

Staff should make themselves familiar with the necessary SOPs for monitoring including:

a) Chemistry Grab Samples

- a. Nutrients
[Nutrient Sampling Guidance \(2015\)](#)
- b. Total Suspended Solids
[Guidelines and Procedures for Surface Water Grab Sampling \(December 2005 Version 3\)](#)

b) Field Measurements

- a. Dissolved Oxygen, Temperature, [pH](#) and Conductivity probes (not yet updated)
[Determination of pH](#)
[Guidelines for Deployment of Continuous Dissolved Oxygen Meters Data Evaluation and Data Storage \(2007\)](#)
- b. Temperature Loggers
[Guidelines & Standard Procedures for Continuous Temperature Monitoring \(2005, V. 3\)](#)
- c. Quantitative Physical Habitat
[Guidelines for Evaluating Habitat of Wadeable Streams \(2002\)](#)
- d. Flow
[Monitoring Procedures \[flow subteam documents on central drive\]](#)

c) Biologic Indices

- a. Fish Community Survey
[Guidelines for Assessing Fish Communities of Wadeable Streams in Wisconsin \(2001\)](#)
- b. Macroinvertebrate Sampling
[Guidelines for Collecting Macroinvertebrate Samples from Wadeable Streams \(2000\)](#)
- c. Algal Sampling
[Diatom Collections for Calculation of the Diatom Nutrient Index \(DNI\), WQ Monitoring 2016 SOP v2.3](#)
[Benthic Algal Abundance \(Viewing Bucket\) DRAFT](#)
[Benthic Algal Abundance Visual Guide DRAFT](#)

F. Safety

Safety precautions of a general nature should be recognized. When monitoring in spring use caution when entering the stream as flows may be higher and cause a dangerous wading situation. Collecting samples in extremely hot and humid weather carries the risk of dehydration and heat stroke. Staff must have appropriate electrofishing and CPR training according to the current Bureau wide safety policies.

G. Data Management

All data collected for the Wadeable Trend Reference Sites will be stored in SWIMS or the Fish and Habitat Database (FH). Quantitative habitat and fish community results need to be entered into the FH database maintained by the Bureau of Fisheries management. Contact the Fisheries database coordinators for instructions and access information. All other data will be stored in SWIMS. As of 2022 the Streams and Rivers Technical Team approved the creation of two SWIMS projects to house WTSN data. Only the continuous temperature monitoring data are to be housed in a separate SWIMS project named "Stream Temperature Monitoring Network". Staff should use the stream temperature QC tool to clean continuous data and then enter it into this project. All other data have lab slips printed and data housed in the traditional SWIMS project "Long-Term Trend Wadeable Reference Streams (LTT Streams)". All Field chemistry will be entered directly by the State Lab of Hygiene as long as the data are recorded on the lab slip. Macroinvertebrate data will be entered into SWIMS by the UW Stevens Point Aquatic Biomonitoring Laboratory after identification

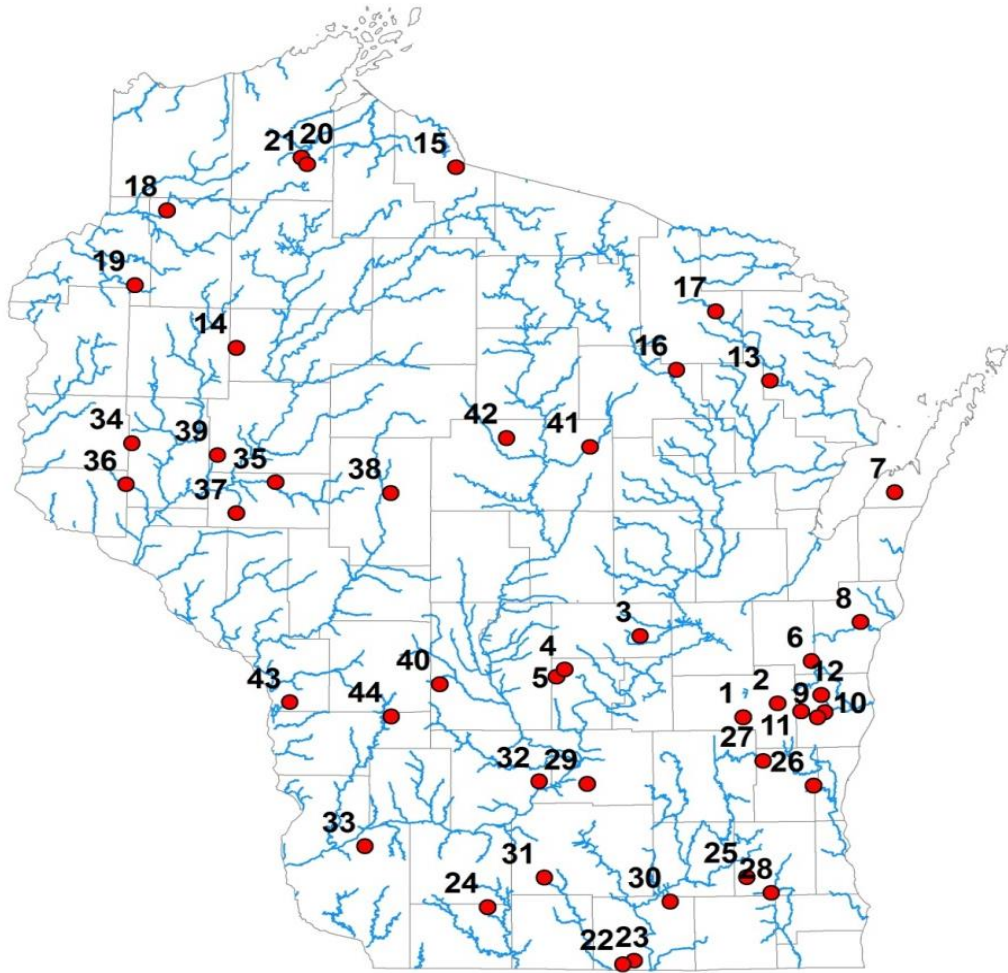


Figure 1. Spatial location of 44 Wadeable Trend Reference site streams. Labels indicate Map Code on Table 2.

**[WADEABLE TREND REFERENCE SITES (LTT_STREAMS) V 1.4 DNR
WATER QUALITY MONITORING PROGRAM]**

April 14, 2023

Table 1. Stream monitoring sites that are included in the Wadeable Trend Reference Stream monitoring network.

Stream Name	Location	County	Biologist	WBIC	Station ID	District	Map Code
Parsons Creek	Hickory Road	Fond du Lac	Bolha	136000	203102	E	1
Sheboygan River	CTH T	Fond du Lac	Bolha	50700	203096	E	2
Cedar Springs Creek	CTY Q	Waushara	Bolha	245000	10030585	E	3
Caves Creek	5th Ave	Marquette	Bolha	166100	10017030	E	4
Lawrence Creek	Eagle Ave	Marquette	Bolha	167100	393123	E	5
Pine Creek	CTH T	Calumet	Gansberg	79900	10020831	E	6
Ahnapee River	CTH H	Door	Gansberg	94800	153161	E	7
Branch River	Union Road	Manitowoc	Gansberg	71300	363299	E	8
Nichols Creek	CTHY N	Sheboygan	Helker	27100	10030491	E	9
Onion River	County Highway E	Sheboygan	Helker	51200	603340	E	10
Watercress Creek	Watercress Road	Sheboygan	Helker	39000	10008873	E	11
Mullet River	CTHY CJ	Sheboygan	Helker	53400	10008194	E	12
North Fork Thunder River	Thunder Mountain Rd	Marinette	Hudak	535600	10030422	E	13
Moose Ear Creek	CTH W	Rusk	Kleist	2089600	10029349	N	14
Laymans Creek	Camp 7 Road	Iron	Kleist	2948000	10030051	N	15
Lily River	County Highway A	Langlade	Klosiewski	370900	10029113	N	16
Haymeadow Creek	us Browns Rd (FR2132)	Forest	Klosiewski	569400	10030155	N	17
Totagatic River	Nancy Lake Road	Washburn	Roesler	2689800	10022312	N	18
North Fork Clam River	Sand Road	Burnett	Roesler	2656600	10031948	N	19
Eighteenmile Creek	Old 63 South	Bayfield	Roesler	2895900	43097	N	20
Pre-emption Creek	Camp Eight Rd	Bayfield	Roesler	2895200	10013195	N	21
W. Fork Raccoon Creek	STH 81	Rock	Amrhein	874000	10013075	S	22
E. Fork Raccoon Creek	Beloit-Newark Road	Rock	Amrhein	874100	10009956	S	23
Yellowstone River	Gant Road	Lafayette	Amrhein	902500	333235	S	24
Scuppernong Creek	Highway 67	Waukesha	Sabre	817600	10020631	S	25
N. Br. Cedar Creek	CTHY NN	Washington	Sabre	22500	10022038	S	26
Kohlsville River	Midland Drive	Washington	Sabre	865400	10022037	S	27
Mukwonago River	Highway 83	Waukesha	Sabre	765500	10010534	S	28
Rowan Creek	STH 51	Columbia	Sorge	1263700	10016029	S	29
Otter Creek	Klug Road	Rock	Sorge	812600	10012580	S	30
Mt. Vernon Creek	CTH U	Dane	Sorge	886600	10013350	S	31
Manley Creek	STH 113	Sauk	Unmuth	1261200	10010989	S	32
Crooked Creek	STH 61	Grant	Unmuth	1205600	10030032	S	33
North Branch Wilson Creek	County Highway Q	Dunn	Hazuga	2067200	173243	W	34
Beaver Creek	140th	Eau Claire	Hazuga	2129400	183079	W	35
Cady creek	us cty p	Pierce	Hazuga	2058000	10009648	W	36
Graham Creek	Spruce Rd	Eau Claire	Hazuga	2124700	10009825	W	37
Rock Creek	us Owen ave/Rock Ck rd	Clark	Hazuga	1750800	10030170	W	38
Elk Creek	35th st	Chippewa	Hazuga	2124700	10030130	W	39
Hoton Creek	Jacobson Rd	Juneau	Provost	1307000	10012172	W	40
Eau Claire River	County Road Z	Marathon	Provost	1437600	10028972	W	41
Unnamed Trib to W Fk Little Rib	US North Road	Marathon	Provost	1453200	10029421	W	42
Unnamed trib Mormon Coulee	Breidel Valley Road	La Crosse	Rasmussen	1648400	10014051	W	43
Billings creek	us cty f	Vernon	Rasmussen	1196900	10009007	W	44

H. Updates and Tracking

Version Number	Date	Sections	Name	Approval
1.1	05/27/14	All	Streams Tech Team	Mike Shupryt, 2/26/15
1.2	04/25/17	D & E (algae and chloride added)	Streams Tech Team	Mike Shupryt, 04/25/17
1.3	05/23/2022	D.2 – Replaced TKN with TN		Mike Shupryt, 05/23/2022
1.4	04/18/2023	G – Clarified SWIMS data management	Streams Tech Team	Mike Shupryt, 04/18/2023