Minocqua-Kawaguesaga Lakes Protection

UPPER TOMAHAWK WATERSHED (UW38)

This watershed has nearly pristine water quality conditions, hosting many miles of trout water, excellent cold water fisheries, an abundance of wetlands and indicators. The recreational value of this area may jeopardize its condition, as AIS species are increasingly found here. Efforts to stop the spread of aquatic invasive species are underway.

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

Contents

Watershed Details

About the Watershed

The Upper Tomahawk River Watershed is located in Oneida and Vilas counties. It is 119,568 acres in size and contains 139 miles of streams and rivers, 17,609 acres of lakes and 20,470 acres of wetlands. The watershed is dominated by forest (59%), wetlands (17%) and open water (14%) and is ranked high for nonpoint source issues affecting streams and lakes.

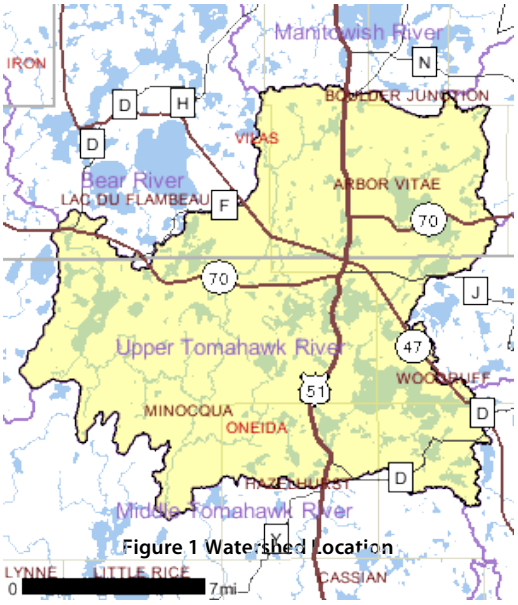


Figure 1 Watershed Location

Population and Land Use

This watershed is sparsely populated, with most residential development recreational or season.

Arrowhead Lake is located in the Upper Tomahawk River watershed which is 186.83 mi². Land use in the watershed is primarily forest (57.02%), wetland (32.38%) and a mix of open (6.17%) and other uses (4.42%). This watershed has 139.00 stream miles, 17,609.90 lake acres and 20,470.21 wetland acres.

Table 1 Upper Tomahawk Watershed (UW38) Land Use

Agriculture (%)	1.98
Urban (%)	0.52
Sub Urban (%)	0.96
Wetland (%)	32.38
Barren (%)	0.1
Grass Land (%)	0.86
Forest (%)	57.02
Open Land and Water (%)	6.17

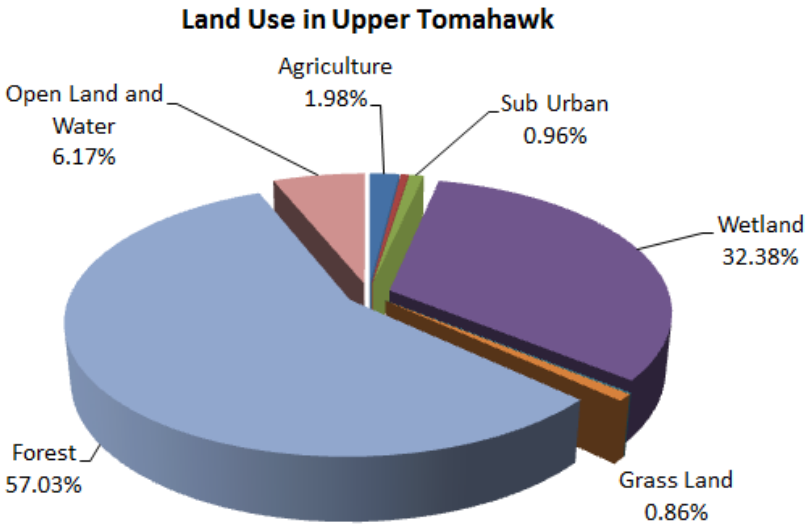


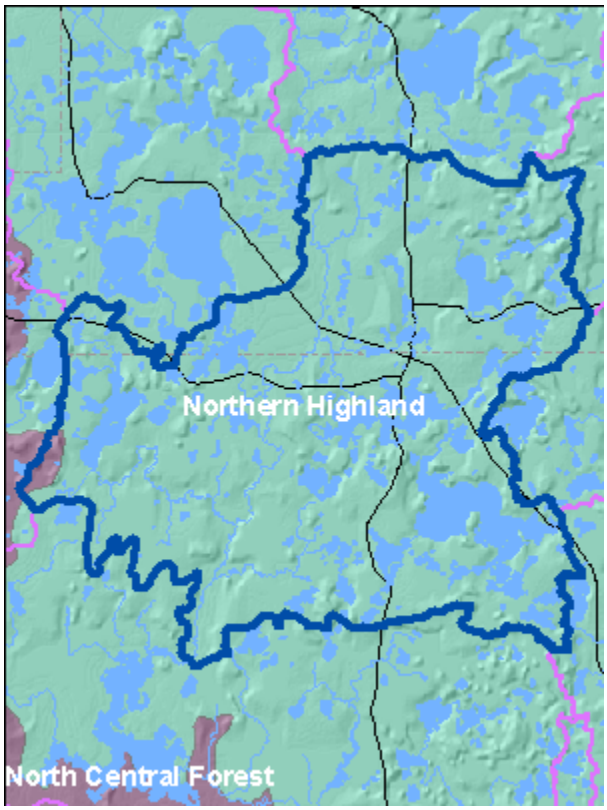
Figure 2 Land Use 2006 NAIP Land Cover

Hydrology

There is a globally significant concentration of glacial lakes in the Northern Highland: 4,291 lakes; 1,543 miles of streams, including the headwaters of the Wisconsin and Manitowish-Flambeau-Chippewa river systems. Many lakes are connected by small streams. Rare aquatic species and extensive wetlands (see below) occur here. Learn more from the chapter [PDF]

Ecological Landscapes

The Northern Highlands Ecological Landscape is located in northern central Wisconsin. It is known for its pitted outwash plains and kettle lakes mixed with extensive forests and large peatlands. Its landforms are characterized mainly by pitted outwash but also contain some coarse-textured moraines. Soils are acidic and relatively unproductive due to low moisture-holding capacity and lack of organic matter.



Historically, this was Wisconsin's greatest pinery. White and red pine forests largely dominated the vegetation, with some smaller pockets of jack pine. On the more mesic soils, hemlock-hardwood forests were common. Aspen-birch forests occurred in openings formed by disturbance events such as wind or fire. Current forest vegetation is primarily aspen, with some white, red and jack pine in both natural and plantation form. Northern hardwood forests, though reduced in extent, still occur on the more mesic soils. Lowland conifer occupies the many peatlands that are scattered throughout the Ecological Landscape.

Photo:

The Manitowish Waters in the northern Wisconsin area provide some of the most breathtaking views anywhere in the Midwest.

Watershed Condition

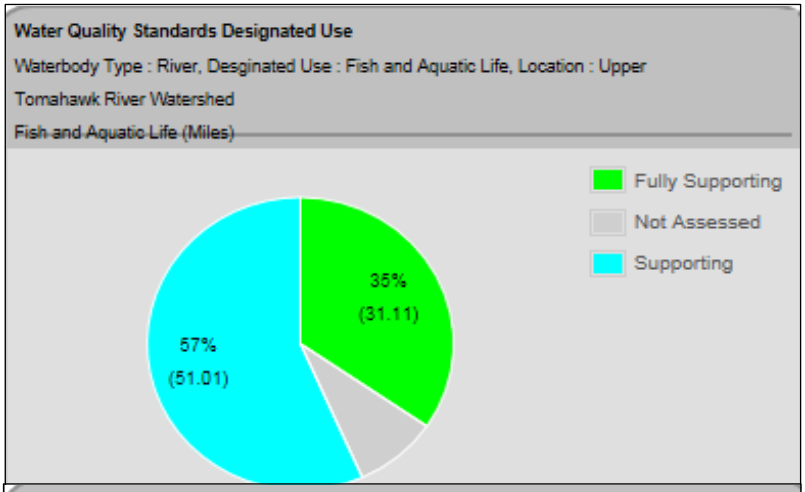
Overall Condition

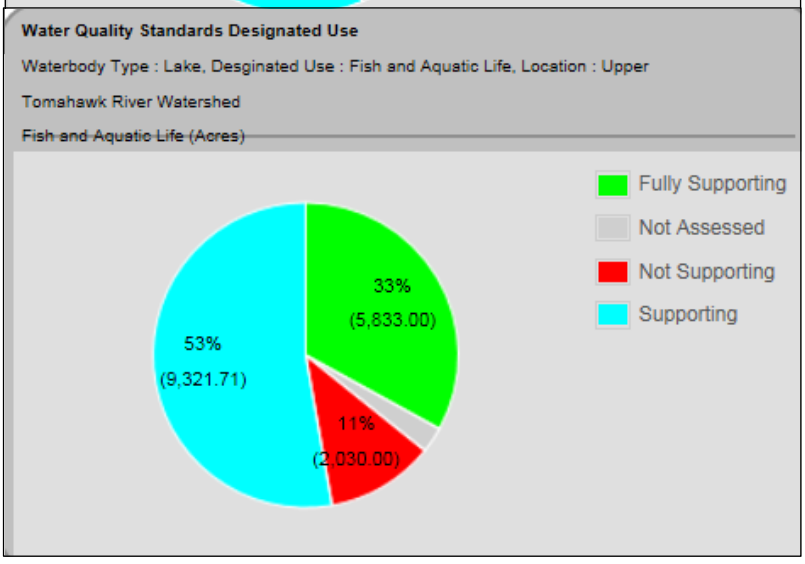
Overall water quality in this watershed is excellent to good, with a few selected waters identified as poor or impaired. Several lakes (20) have an "unknown" condition for fish and aquatic life. The table at right displays the overall condition. Over 196 waters have been monitored in the last ten years, with 47 of the waters indicated as "excellent", 51 lakes "good", and 154 lakes as "unknown."

	Number of Waters	Acres
Row Labels	Count of Waters	Sum (Acres)
Inland Beach	**1**	**0**
Unknown	1	0
Lake	**257**	**17,648**
Excellent	46	5,109
Fair	4	3,124
Good	51	6,800
Poor	2	1,894
Unknown	154	721
River	**29**	**90**
Excellent	1	2
Fair	1	2
Good	5	36
Suspected Poor	2	17
Unknown	20	33
Springs-Lake	**1**	**11**
Unknown	1	11
(blank)		
Grand Total	**288**	**17,749**

River and Stream Condition

The chart at right displays the results of stream assessments, with 97% of assessed stream miles either supporting or fully supporting and the remaining waters are not assessed. Below shows the macroinvertebrate IBI values for streams monitored between 2003 and 2013. Three streams had sufficient total phosphorus data to provide an assessment, with all streams assessed clearly meeting attainable uses (water quality standards).





Lake Health

More than 17,666 acres of lakes exist in this watershed; 11% of these lakes are not supporting fish and aquatic life use while the remaining 86% (over 15K acres) are supporting or fully supporting fish and aquatic life uses and the remaining percent are not assessed. The lakes listed as impaired for fish and aquatic life include: Kawaguesaga Lake and Minocqua Lake due to elevated total phosphorus levels.

Excellent waters in Oneida and Vilas Counties

Alice Lake	Oneida	Towanda Lake	Vilas
Arrowhead Lake	Vilas	Vandercook Lake	Vilas
Baker Lake	Oneida	Windowpane Lake	Oneida
Big Carr Lake	Oneida	Witches Lake	Vilas
Bird Lake	Oneida	Witches Lake	Vilas
Bolger Lake	Oneida	Yawkey Lake	Oneida
Carrol Lake	Oneida, Vilas		
Clawson Lake	Oneida		
David Lake	Oneida, Vilas		
Eagle Lake	Oneida		
Erickson Lake	Vilas		
Harriet Lake	Vilas		
Haskell Lake	Vilas		
Havener Lake	Oneida		
Hillis Lake	Vilas		
Inkpot Lake	Oneida		
Inkwell Lake	Oneida		
Katherine Lake	Oneida		
L Bass Lake	Vilas		
Lee Lake	Oneida		
Little Muskie Lake	Vilas		
Little Spider Lake	Vilas		
Little Tomahawk Lake	Oneida		
Lower Kaubashine Lake	Oneida		
Madeline Lake	Oneida, Vilas		
Marion Lake	Oneida		
Mercer Lake	Oneida		
Mid Lake	Oneida		
Mielke Lake	Vilas		
Mishonagon Creek	Vilas		
Mud Lake	Oneida		
Oberlin Lake	Vilas		
Papkee Lake	Oneida		
Pauto Lake	Vilas		
Prong Lake	Vilas		
Roach Lake	Vilas		
Ross Lake	Vilas		
Schlecht Lake	Oneida		
Shishebogama Lake	Oneida, Vilas		
Smith Lake	Vilas		
South Two Lakes	Oneida		

Macroinvertebrate IBI Wadeable Streams Assessment Report - General Assessment
Based on WisCALM 2014 Guidance - Previous 10 Years of Data **Date Report Ran: 03/20/2014**

WBIC: 1535700 **Official Name:** Howards Creek **Segment #:** 1
Local Name: Howards Creek **WATERS ID:** 12780
County: Oneida **Location:** Mile 0 to 2.36
Watershed: Upper Tomahawk River **Impaired:** No

Station ID	Name	# Results	Mean	Min	Max	Condition
10012923	Howards Creek - Remote Site Off Old Logging Road	1	6.938	6.938	6.938	Good

WBIC: 1533300 **Official Name:** Kaubashine Creek **Segment #:** 3
Local Name: Kaubashine Creek **WATERS ID:** 12776
County: Oneida **Location:** Mile 5.9 to 8.34
Watershed: Upper Tomahawk River **Impaired:** No

Station ID	Name	# Results	Mean	Min	Max	Condition
10012802	Kaubashine Creek - 3m Above Balsam Park Blvd	1	6.127	6.127	6.127	Good

WBIC: 1535300 **Official Name:** Squirrel River **Segment #:** 1
Local Name: Squirrel River **WATERS ID:** 12779
County: Oneida **Location:** Mile 0 to 14
Watershed: Upper Tomahawk River **Impaired:** No

Station ID	Name	# Results	Mean	Min	Max	Condition
10012801	Squirrel River 405m Below Scotchman Lake Rd.	1	2.130	2.130	2.130	Poor

WBIC: 1515800 **Official Name:** Tomahawk River **Segment #:** 3
Local Name: Tomahawk River **WATERS ID:** 314117
County: Oneida,Vilas **Location:** Mile 37 to 61.99
Watershed: Upper Tomahawk River,Middle Tomahawk River **Impaired:** No

Station ID	Name	# Results	Mean	Min	Max	Condition
10012799	Tomahawk River - 8m Above Highway 70	1	6.656	6.656	6.656	Good
10031772	Tomahawk River, adjacent to Cedar Falls Rd.	1	5.777	5.777	5.777	Good

Total Phosphorus Rivers/Streams Assessment Report
Streams 75 ug/L threshold, Rivers 100 ug/L threshold **Includes data from 2003 to 2012** **Date Report Ran: 03/20/2014**

WBIC: 1544400 **Official Name:** Minocqua Thoroughfare **Segment #:** 1
Local Name: Minocqua Thoroughfare **TP Threshhold (ug/L):** 75
County: Oneida,Vilas **Watershed:** Upper Tomahawk River

Station ID	Name	# Results	Median	Min	Max	Std Dev	90% CI Lower	90% CI Upper	Relation to Standard
10012546	Art Oehmcke Hatchery	18	37.5	29.0	60.0	9.0	37.0	42.7	Clearly Meets
10012237	Link Creek (Minocqua Thoroughfare) at Sth47 Near Woodruff	12	45.5	19.0	88.0	21.6	37.3	54.3	Clearly Meets*

WBIC: 1515800 **Official Name:** Tomahawk River **Segment #:** 3
Local Name: Tomahawk River **TP Threshhold (ug/L):** 100
County: Oneida,Vilas **Watershed:** Upper Tomahawk River,Middle Tomahawk River

Station ID	Name	# Results	Median	Min	Max	Std Dev	90% CI Lower	90% CI Upper	Relation to Standard
10031772	Tomahawk River, adjacent to Cedar Falls Rd.	6	51.5	25.0	60.0	12.8	40.6	56.0	Clearly Meets

WBIC: 1542500 **Official Name:** Tomahawk Thoroughfare **Segment #:** 1
Local Name: Tomahawk River Thoroughfare **TP Threshhold (ug/L):** 75
County: Oneida **Watershed:** Upper Tomahawk River

Station ID	Name	# Results	Median	Min	Max	Std Dev	90% CI Lower	90% CI Upper	Relation to Standard
443177	Tomahawk Thrufare at Thrufare Rd	6	16.5	15.0	23.0	3.2	15.7	19.6	Clearly Meets*

Total Phosphorus Lakes Assessment Report **Includes Data From 2003 to 2012** **Date Report Run: 03/20/2014**

WBIC: 986000 **Official Name:** Franklin Lake **Natural Community:** Deep Seepage
WATERS ID: 128117 **Local Name:** Franklin Lake **TP Threshhold (ug/L) REC:** 20 ug/l
County: Oneida **TP Threshhold (ug/L) FAL:** 60 ug/l
Watershed: Upper Tomahawk River

Station ID	Name	# Months	Mean (ug/L)	Min (ug/L)	Max (ug/L)	90% CI Lower	90% CI Upper	Earliest Month Used	Latest Month Used	Relation to Standard: REC	Relation to Standard: FAL
443100	Franklin Lake - Deep Hole	7	10.143	6.000	13.000	8.688	11.597	Jul 2008	Aug 2011	Clearly Meets	Clearly Meets

WBIC: 1539700 **Official Name:** Gunlock Lake **Natural Community:** Shallow Headwater
WATERS ID: 128484 **Local Name:** **TP Threshhold (ug/L) REC:** 40 ug/l
County: Vilas **TP Threshhold (ug/L) FAL:** 100 ug/l
Watershed: Upper Tomahawk River

Station ID	Name	# Months	Mean (ug/L)	Min (ug/L)	Max (ug/L)	90% CI Lower	90% CI Upper	Earliest Month Used	Latest Month Used	Relation to Standard: REC	Relation to Standard: FAL
643066	Gunlock Lake - Deep Hole -Site 1 - N End	9	24.778	17.000	32.000	22.219	27.337	Jun 2009	Aug 2012	Clearly Meets	Clearly Meets

WBIC: 1538600 **Official Name:** Blue Lake **Natural Community:** Two-Story
WATERS ID: 128048 **Local Name:** **TP Threshhold (ug/L) REC:** 15 ug/l
County: Oneida **TP Threshhold (ug/L) FAL:** 15 ug/l
Watershed: Upper Tomahawk River

Station ID	Name	# Months	Mean (ug/L)	Min (ug/L)	Max (ug/L)	90% CI Lower	90% CI Upper	Earliest Month Used	Latest Month Used	Relation to Standard: REC	Relation to Standard: FAL
443060	Blue Lake - West Basin	13	7.654	2.500	12.000	6.595	8.713	Jul 2008	Aug 2012	Clearly Meets	Clearly Meets

Total Phosphorus Lakes Assessment Report **Includes Data From 2003 to 2012** **Date Report Run: 03/20/2014**

WBIC: 1541100 **Official Name:** Johnson Lake **Natural Community:** Two-Story
WATERS ID: 128500 **Local Name:** **TP Threshhold (ug/L) REC:** 15 ug/l
County: Oneida,Vilas **TP Threshhold (ug/L) FAL:** 15 ug/l
Watershed: Upper Tomahawk River

Station ID	Name	# Months	Mean (ug/L)	Min (ug/L)	Max (ug/L)	90% CI Lower	90% CI Upper	Earliest Month Used	Latest Month Used	Relation to Standard: REC	Relation to Standard: FAL
643132	Johnson Lake - Deep Hole	6	12.833	11.000	16.000	11.795	13.871	Jun 2006	Sep 2007	Clearly Meets	Clearly Meets

WBIC: 997400 **Official Name:** Lee Lake **Natural Community:** Two-Story
WATERS ID: 128176 **Local Name:** **TP Threshhold (ug/L) REC:** 15 ug/l
County: Oneida **TP Threshhold (ug/L) FAL:** 15 ug/l
Watershed: Upper Tomahawk River

Station ID	Name	# Months	Mean (ug/L)	Min (ug/L)	Max (ug/L)	90% CI Lower	90% CI Upper	Earliest Month Used	Latest Month Used	Relation to Standard: REC	Relation to Standard: FAL
443332	Lee Lake - Deep Hole	14	7.304	2.500	10.000	6.561	8.046	Jul 2008	Aug 2012	Clearly Meets	Clearly Meets

WBIC: 1540400 **Official Name:** Little Spider Lake **Natural Community:** Shallow Seepage
WATERS ID: 128777 **Local Name:** **TP Threshhold (ug/L) REC:** 40 ug/l
County: Vilas **TP Threshhold (ug/L) FAL:** 100 ug/l
Watershed: Upper Tomahawk River

Station ID	Name	# Months	Mean (ug/L)	Min (ug/L)	Max (ug/L)	90% CI Lower	90% CI Upper	Earliest Month Used	Latest Month Used	Relation to Standard: REC	Relation to Standard: FAL
643077	Little Spider Lake - Deep Hole	14	15.536	6.000	24.000	13.723	17.349	Jun 2008	Sep 2012	Clearly Meets	Clearly Meets

WBIC: 1542600 **Official Name:** Mid Lake **Natural Community:** Shallow Lowland
WATERS ID: 128220 **Local Name:** **TP Threshhold (ug/L) REC:** 40 ug/l
County: Oneida **TP Threshhold (ug/L) FAL:** 100 ug/l
Watershed: Upper Tomahawk River

Station ID	Name	# Months	Mean (ug/L)	Min (ug/L)	Max (ug/L)	90% CI Lower	90% CI Upper	Earliest Month Used	Latest Month Used	Relation to Standard: REC	Relation to Standard: FAL
443469	Mid Lake - Deep Hole	13	28.192	21.000	40.000	26.127	30.257	Aug 2008	Aug 2012	Clearly Meets	Clearly Meets

WBIC: 1539600 **Official Name:** Shishebogama Lake **Natural Community:** Deep Lowland
WATERS ID: 128284 **Local Name:** **TP Threshhold (ug/L) REC:** 30 ug/l
County: Oneida,Vilas **TP Threshhold (ug/L) FAL:** 60 ug/l
Watershed: Upper Tomahawk River

Station ID	Name	# Months	Mean (ug/L)	Min (ug/L)	Max (ug/L)	90% CI Lower	90% CI Upper	Earliest Month Used	Latest Month Used	Relation to Standard: REC	Relation to Standard: FAL
643515	Shishebogama Lake - Deep Hole	13	18.154	12.000	29.000	16.183	20.125	Jun 2008	Aug 2012	Clearly Meets	Clearly Meets

WBIC: 1542700 **Official Name:** Tomahawk Lake **Natural Community:** Two-Story
WATERS ID: 128323 **Local Name:** **TP Threshhold (ug/L) REC:** 15 ug/l
County: Oneida **TP Threshhold (ug/L) FAL:** 15 ug/l
Watershed: Upper Tomahawk River

Station ID	Name	# Months	Mean (ug/L)	Min (ug/L)	Max (ug/L)	90% CI Lower	90% CI Upper	Earliest Month Used	Latest Month Used	Relation to Standard: REC	Relation to Standard: FAL
443146	Tomahawk Lake - Deep Hole	8	11.000	8.000	14.000	10.113	11.887	Jun 2010	Aug 2012	Clearly Meets	Clearly Meets

WBIC: 1022900 **Official Name:** Towanda Lake **Natural Community:** Deep Seepage
WATERS ID: 128787 **Local Name:** **TP Threshhold (ug/L) REC:** 20 ug/l
County: Vilas **TP Threshhold (ug/L) FAL:** 60 ug/l
Watershed: Upper Tomahawk River

Station ID	Name	# Months	Mean (ug/L)	Min (ug/L)	Max (ug/L)	90% CI Lower	90% CI Upper	Earliest Month Used	Latest Month Used	Relation to Standard: REC	Relation to Standard: FAL
643113	Towanda Lake - Deep Hole	15	14.667	11.000	18.000	13.940	15.394	Jun 2008	Aug 2012	Clearly Meets	Clearly Meets

WBIC: 1542400 **Official Name:** Minocqua Lake **Natural Community:** Two-Story
WATERS ID: 128227 **Local Name:** **TP Threshhold (ug/L) REC:** 15 ug/l
County: Oneida **TP Threshhold (ug/L) FAL:** 15 ug/l
Watershed: Upper Tomahawk River

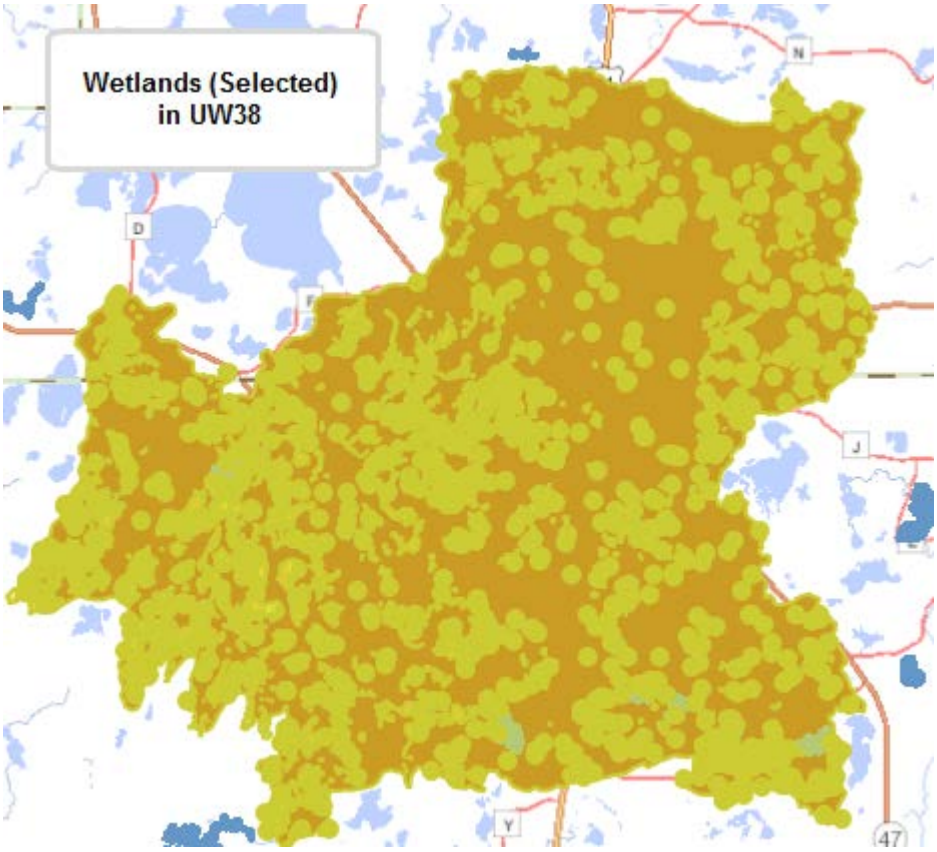
Station ID	Name	# Months	Mean (ug/L)	Min (ug/L)	Max (ug/L)	90% CI Lower	90% CI Upper	Earliest Month Used	Latest Month Used	Relation to Standard: REC	Relation to Standard: FAL
443134	Minocqua Lake - Center Basin	7	19.714	14.000	29.000	16.640	22.789	Jul 2008	Aug 2011	Clearly Exceeds	Clearly Exceeds
443226	Minocqua Lake - Deep Hole	1	13.000	13.000	13.000			Aug 2010	Aug 2010	Insuf Data: Only 1 value/StdDev = 0; cannot run stats	Insuf Data: Only 1 value/StdDev = 0; cannot run stats

WBIC: 1542300 **Official Name:** Kawaguesaga Lake **Natural Community:** Two-Story
WATERS ID: 128163 **Local Name:** **TP Threshhold (ug/L) REC:** 15 ug/l
County: Oneida **TP Threshhold (ug/L) FAL:** 15 ug/l
Watershed: Upper Tomahawk River

Station ID	Name	# Months	Mean (ug/L)	Min (ug/L)	Max (ug/L)	90% CI Lower	90% CI Upper	Earliest Month Used	Latest Month Used	Relation to Standard: REC	Relation to Standard: FAL
443129	Kawaguesaga Lake - Deep Hole	8	17.188	14.000	21.000	16.152	18.223	Jun 2010	Aug 2012	Clearly Exceeds	Clearly Exceeds

Wetland Health

There are thousands of wetlands in this watershed, which is water rich and highly diverse. Northern Wisconsin has a variety of wetland types providing habitat for aquatic and terrestrial animals.



Groundwater

This glaciated, water rich landscape underlain by ancient bedrock supports diverse and exceptional wetlands, springs and groundwater supply. This area does not have any high capacity wells located in the watershed.

Point and Nonpoint Pollution

Point source dischargers to surface waters in the watershed include the Lakeland Sanitary District and the Art Oehmcke State Fish Hatchery.

Waters of Note

Trout Waters

Class I trout streams are high quality trout waters that have sufficient natural reproduction to sustain populations of wild trout, at or near carry capacity. Consequently, streams in this category require no stocking of hatchery trout. These streams or stream sections are often small and may contain small or slow-growing trout, especially in the headwaters. Class II trout streams may have some natural reproduction, but not enough to utilize available food and space. Stocking is required to maintain a desirable sport fishery. These streams have good survival and carryover of adult trout, often producing some fish larger than average size. Class III trout streams have marginal habitat with no natural reproduction and require annual stocking, There is no carryover of trout from one year to the next. (http://dnr.wi.gov/fish/species/trout/streamclassification.html). This watershed has five separate streams that support trout – with six different segments. (See trout listings below).

Trout Waters Report: Watershed: Upper Tomahawk River

Local Waterbody Name	WBIC	Start Mile	End Mile	Trout Class	Trout ID	Counties
Howards Creek	1535700	0	2.36	CLASS III	3047	Oneida
Mishonagon Creek	1539900	0	5.32	CLASS I	956	Vilas
Mishonagon Creek	1539900	5.32	7.21	CLASS III	3048	Vilas
Kitty Creek	1534200	0	1.17	CLASS II	2217	Oneida
Creek 3-7 T38n R5e	1535750	0	.25	CLASS I	955	Oneida
Kaubashine Creek	1533300	2.68	5.9	CLASS II	2216	Oneida

Outstanding and Exceptional Resource Waters

Six waters are listed as ORW or ERW waters (listed below).

Outstanding and Exceptional Waters Report: Watershed: Upper Tomahawk River

Official Waterbody Name	WBIC	ORW/ERW	ORW/ERW ID	Start Mile	End Mile	Code Reference	Counties
Big Carr Lake	971600	ORW/	1674	null	null	102.10(1m)11	Oneida
Little Tomahawk Lake	1543900	ORW/	322	null	null	102.10(1m)11	Oneida
Mishonagon Creek	1539900	ORW/	320	0	5.32	102.10(1)(f)22 - Mishonagon Creek	Vilas
Squirrel River	1535300	ORW/	2561	0	14	102.10(1)(f)13	Oneida
Tomahawk Lake	1542700	ORW/	321	null	null	102.10(1m)11	Oneida
Unnamed	1535750	/ERW	319	0	.25	102.11(1)(a)	Oneida

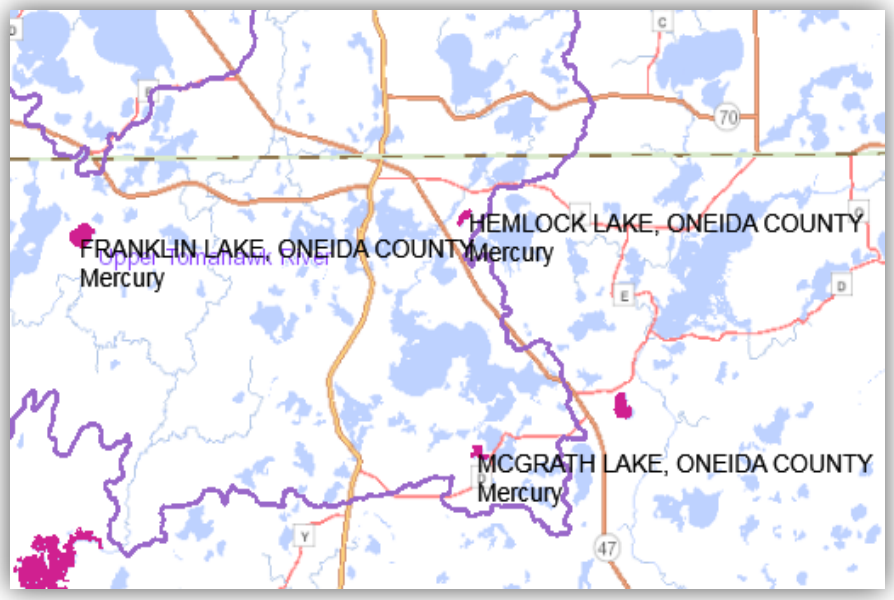
Impaired Waters

The waters listed below are assessed and found to be impaired (or have been listed and delisted). Many of these waters were originally listed for contaminated fish tissue with the exception of the two large lakes listed for total phosphorus.

Official Name (Click for Details)	Local Name (Click for Map)	WBIC	Water Type	County	Pollutant	Impairment	303 Status	Priority
Big Arbor Vitae Lake	Big Arbor Vitae Lake	1545600	Lake	Vilas	Mercury	Contaminated Fish Tissue	Water Delisted	Delisted 2006
Bird Lake	Bird Lake	972000	Lake	Oneida	Mercury	Contaminated Fish Tissue	303d Listed	Medium
Booth Lake	Booth Lake	1537800	Lake	Oneida	Mercury	Contaminated Fish Tissue	Water Delisted	Delisted 2008
Foster Lake	Foster Lake	985400	Lake	Oneida	Mercury	Contaminated Fish Tissue	303d Listed	Medium
Franklin Lake	Franklin Lake	986000	Lake	Oneida	Mercury	Contaminated Fish Tissue	303d Listed	Medium
Hemlock Lake	Hemlock Lake	989200	Lake	Oneida	Mercury	Contaminated Fish Tissue	303d Listed	Medium
Kawaguesaga Lake		1542300	Lake	Oneida	Total Phosphorus	Impairment Unknown	Proposed for List	High
McGrath Lake	Mcgrath Lake	1003900	Lake	Oneida	Mercury	Contaminated Fish Tissue	303d Listed	Medium
Minocqua Lake		1542400	Lake	Oneida	Total Phosphorus	Impairment Unknown	Proposed for List	High
North Two Lakes	North Two Lakes	1007500	Lake	Oneida	Mercury	Contaminated Fish Tissue	303d Listed	Medium
Squirrel Lake	Squirrel Lake	1536300	Lake	Oneida, Vilas	Mercury	Contaminated Fish Tissue	Water Delisted	Delisted 2006
Upper Kaubashine Lake	Upper Kaubashine Lake	1535000	Lake	Oneida	Mercury	Contaminated Fish Tissue	303d Listed	Medium

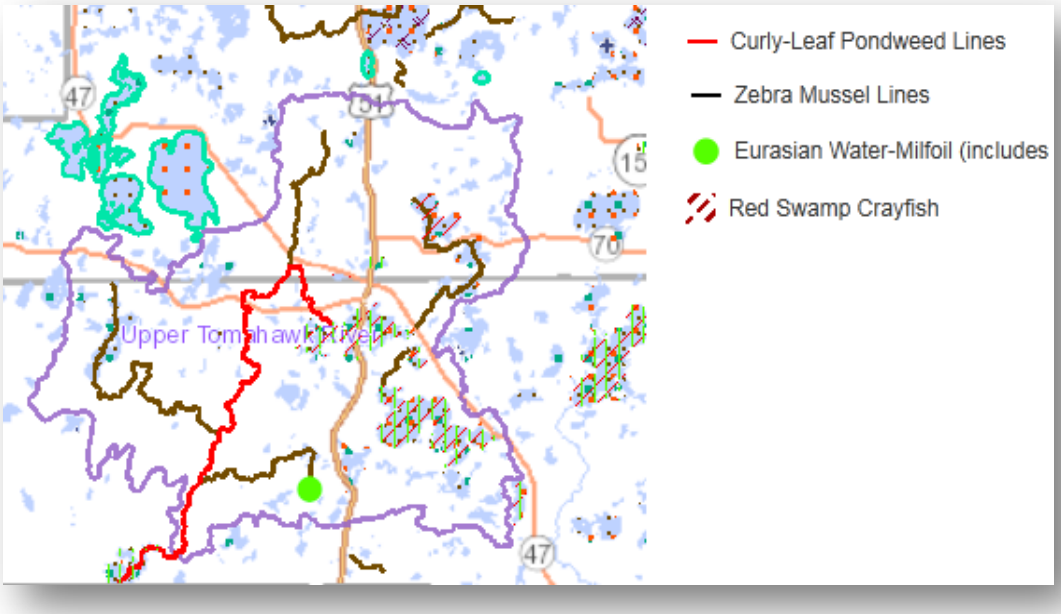
Fish Consumption

Wisconsin's fish consumption advisory is based on the work of public health, water quality, and fisheries experts from eight Great Lakes states. Based on the best available scientific evidence, these scientists determined how much fish is safe to eat over a lifetime based on the amount of contaminants found in the fish and how those contaminants affect human health. Advisories are based on concentrations of the following contaminants along with angler habits, fishing regulations, and other factors. Three lakes in the watershed have specific advice for mercury: Franklin Lake, Hemlock Lake and McGrath Lake.



Aquatic Invasive Species

Four or more invasive species are present in the watershed.



Species of Special Concern

Several threatened and endangered species are located in the watershed. A full list of special concern plants and animals for this watershed can be found on the state's Natural Heritage Inventory (NHI) at http://dnr.wi.gov/topic/nhi/. Click on the name of the species below to learn more.

Scientific Name	Common Name	Status	Group
Aeshna clepsydra	Mottled Darner	SC/N	Dragonfly
Ammodramus leconteii	Le Conte's Sparrow	SC/M	Bird
Asio otus	Long-eared Owl	SC/M	Bird
Banksiola dossuaria	A Giant Casemaker Caddisfly	SC/N	Caddisfly
Black spruce swamp	Black Spruce Swamp	NA	Community
Botaurus lentiginosus	American Bittern	SC/M	Bird
Buteo lineatus	Red-shouldered Hawk	THR	Bird
Caenis hilaris	A Small Square-gilled Mayfly	SC/N	Mayfly
Calamagrostis stricta	Slim-stem Small Reed Grass	SC	Plant
Callitriche heterophylla	Large Water-starwort	THR	Plant
Calypso bulbosa	Fairy Slipper	THR	Plant
Chlidonias niger	Black Tern	END	Bird
Cygnus buccinator	Trumpeter Swan	SC/M	Bird
Dubiraphia robusta	Robust Dubiraphian Riffle Beetle	SC/N	Beetle
Eleocharis robbinsii	Robbins' Spike-rush	SC	Plant
Falcipennis canadensis	Spruce Grouse	THR	Bird
Glaucomys sabrinus	Northern Flying Squirrel	SC/P	Mammal
Glyptemys insculpta	Wood Turtle	THR	Turtle
Juncus stygius	Moor Rush	END	Plant
Lake--deep, very soft, seepage	Lake--Deep, Very Soft, Seepage	NA	Community
Lake--shallow, soft, seepage	Lake--Shallow, Soft, Seepage	NA	Community
Lake--spring	Lake--Spring	NA	Community
Lioporeus triangularis	A Predaceous Diving Beetle	SC/N	Beetle
Littorella uniflora	American Shoreweed	SC	Plant
Myotis lucifugus	Little Brown Bat	THR	Mammal
Napaeozapus insignis	Woodland Jumping Mouse	SC/N	Mammal
Northern dry-mesic forest	Northern Dry-mesic Forest	NA	Community
Northern mesic forest	Northern Mesic Forest	NA	Community
Northern sedge meadow	Northern Sedge Meadow	NA	Community
Northern wet forest	Northern Wet Forest	NA	Community
Open bog	Open Bog	NA	Community
Poecile hudsonicus	Boreal Chickadee	SC/M	Bird
Poor fen	Poor Fen	NA	Community
Potamogeton confervoides	Algae-like Pondweed	THR	Plant
Potamogeton diversifolius	Water-thread Pondweed	SC	Plant
Potamogeton vaseyi	Vasey's Pondweed	SC	Plant
Regulus calendula	Ruby-crowned Kinglet	SC/M	Bird
Setophaga cerulea	Cerulean Warbler	THR	Bird
Sorex palustris	Water Shrew	SC/N	Mammal
Stream--slow, soft, warm	Stream--Slow, Soft, Warm	NA	Community
Utricularia resupinata	Northeastern Bladderwort	SC	Plant

State Natural and Wildlife Areas

For information please visit the Wisconsin Wetlands Association.

Watershed Actions

Note that only projects that have been funded in the last five years are shown.

Project Name (Click for Details)	Year Awarded
TOMAHAWK LAKE ASSOCIATION: Tomahawk Lake Comprehensive Lake Management Plant Update - Phase 1	2014
TOMAHAWK LAKE ASSOCIATION: Tomahawk Lake Comprehensive Lake Management Plan Update - Phase 2	2014
LITTLE ARBOR VITAE LAKE P & R DISTRICT: Little Arbor Vitae Lake Clean Boats Clean Waters Project 2014	2014
BIG ARBOR VITAE LAKE ASSOC: Big Arbor Vitae Lake Beaver Dam Phosphorus Monitoring	2014
MINOCQUA/KAWAGUESAGA LAKES PROTECTION ASSN.: Minocqua/Kawaguesaga Lakes Eurasian Water Milfoil Control	2014
MID LAKE PROTECTION & MANAGEMENT DISTRICT: Mid Lake AIS Control & Prevention Project phase 2, 2014-2017	2013
TOWN OF HAZELHURST: Upper Kaubashine Lake AIS Early Detection & Response: 2014 - 2016	2013
VILAS COUNTY LAND & WATER CONSERV COMMITTEE: Vilas County AIS Education, Prevention, & Planning Project 2013-2016	2013
MID LAKE PROTECTION & MANAGEMENT DISTRICT: Mid Lake AIS Control & Prevention Project Phase 1 2013	2013
BIG ARBOR VITAE LAKE ASSOC: Big Arbor Vitae Clean Boats Clean Waters 2013	2013
TOMAHAWK LAKE ASSOCIATION: Tomahawk Lake AIS Grant 2013 & 2014	2013
BIG ARBOR VITAE LAKE ASSOC: Big Arbor Vitae Lake Management Planning Project, Phase 3	2011
TOWN OF ARBOR VITAE: Arrowhead Lake EWM EDR Project - Phase II	2011
Citizen Lake Monitoring - Training - Kemp Station 6/24/2011	2011
Clean Boats, Clean Waters Workshop at Minocqua Municipal Building 6/15/2011	2011
TOMAHAWK LAKE ASSOCIATION: The Tomahawk Lake AIS Control Grant 2011 & 2012	2011
BIG ARBOR VITAE LAKE ASSOC: Big Arbor Vitae Lake Management Planning Project, Phase 2	2011
BIG ARBOR VITAE LAKE ASSOC: Big Arbor Vitae Lake Management Planning Project, Phase 1	2011
TOWN OF HAZELHURST: Town of Hazelhurst AIS Monitoring & Inspection Program	2011
VILAS COUNTY LAKES ASSOCIATION: Guide to Good Stewardship in North Central Wisconsin - Conserving Waters Edge, Phase 1	2011
MID LAKE PROTECTION & MANAGEMENT DISTRICT: Mid Lake Early Season CLP Harvesting Program & AIS Project	2011
TOWN OF LAC DU FLAMBEAU: Lake Steward Program	2011
Aquatic Invasives County Coordinator - Oneida County	2011
LITTLE ARBOR VITAE LAKE P & R DISTRICT: Lt. Arbor Vitae Management Planning Project, Phase 3	2010
ONEIDA COUNTY LWCD: Oneida County AIS Prevention & Control: Education, Prevention & Planning	2010
VILAS COUNTY: Vilas County AIS Education , Prevention & Planning	2010
VILAS COUNTY: Vilas County General Shoreland Ordinance Revisions	2010

Project Name (Click for Details)	Year Awarded
Clean Boats, Clean Waters Workshop in Minocqua 5/28/2010	2010
ONEIDA COUNTY LWCD: Oneida County DO Meter Acquisition Project	2010
LITTLE ARBOR VITAE LAKE P & R DISTRICT: Little Arbor Vitae Management Planning Project, Phase 1	2010
TOWN OF LAC DU FLAMBEAU: AIS Watercraft Inspection, Education & Lake Monitoring Project	2010
LITTLE ARBOR VITAE LAKE P & R DISTRICT: Little Arbor Vitae Management Plan, Phase 2	2010
MID LAKE PROTECTION & MANAGEMENT DISTRICT: Mid Lake Permit Fee Reimbursement	2010
ONEIDA COUNTY LWCD: AIS Public Awareness Education	2009
Citizen Lake Monitoring Training - Minocqua - 07/23/2009	2009
Aquatic Plant Management Training - Kemp Station - 06/24/2009	2009
Clean Boats, Clean Waters Workshop in Minocqua, WI - 5/29/2009	2009
VILAS COUNTY: Vilas County Aquatic Plant Survey Support	2009
SHISHEBOGAMA & GUNLOCK LAKE ASSOCIATION, INC: Shishebogama & Gunlock Lake Management Planning Project, Phase 2	2009
SHISHEBOGAMA & GUNLOCK LAKE ASSOCIATION, INC: Shishebogama & Gunlock Lake Management Planning Project, Phase 3	2009
MINOCQUA/KAWAGUESAGA LAKES PROTECTION ASSN.: Minocqua/Kawaguesaga Lakes AIS Control Project	2009
TOWN OF LAC DU FLAMBEAU: AIS Watercraft Inspection, Education & Lake Monitoring Project	2009
TOMAHAWK LAKE ASSOCIATION: Lake Tomahawk AIS Control Project	2009

Grants and Projects - Highlights

TOMAHAWK LAKE ASSOCIATION: Tomahawk Lake Comprehensive Lake Management Plant Update –

Tomahawk Lake Association is sponsoring phased LPL grants to study Lake Tomahawk, in Oneida County, with a study completion date of December 31, 2015. The project will focus on developing a Lake Management Plan (LMP) for Lake Tomahawk. Project activities include: 1) Lake user participation \2013 lake user survey, planning meetings; 2) Water quality sampling, analysis and modeling; 3) Shoreline assessment; 4) Aquatic plant surveys (PI survey, community mapping, substrate mapping). Project deliverables include: 1) Stakeholder survey; 2) Water chemistry and modeling data; 3) PI and shoreland data; 4) Aquatic plant community and substrate maps. Specific conditions for this project: Draft of stakeholder survey needs to be submitted to Lakes Management Coordinator for review and approval before sending to public. WDNR Lakes Management Coordinator will be provided with an electronic (pdf or word) news release(s), newsletter article, stakeholder survey, data from PI, shoreland assessment, and water quality sampling, all maps from project, and all GIS data.

TOMAHAWK LAKE ASSOCIATION: Comprehensive Lake Management Plan Update - Phase 2

Tomahawk Lake Association is sponsoring phased LPL grants to study Lake Tomahawk, in Oneida County. The project will focus on developing a Lake Management Plan (LMP) for Lake Tomahawk. Project activities include: 1) Planning meetings; 2) Water quality modeling; 3) Watershed assessment; 4) Fisheries assessment; 5) Data analysis; 6) Develop LMP. Project deliverables include: 1) Watershed maps and modeling data; 2) LMP. Specific conditions for this project: Draft of LMP needs departmental review and approval. WDNR Lakes Management Coordinator will be provided with an electronic (pdf or word) copy of LMP, news release(s), newsletter article, watershed assessment data, all maps from project, and all GIS data.

LITTLE ARBOR VITAE LAKE P & R DISTRICT: Clean Boats Clean Waters Project 2014

Little Arbor Vitae (at right) P&R District will sponsor a Clean Boats Clean Water landing inspection program at one public access in 2014.

BIG ARBOR VITAE LAKE ASSOC: Beaver Dam Phosphorus Monitoring 2014

Big Arbor Vitae Lake (at right) Association is sponsoring a small scale lake planning grant to conduct a phosphorous monitoring study on Big Arbor Vitae Lake in Vilas County. Project activities include: 1) Phosphorous sampling; 2) Data analysis; 3) Develop final report. Project deliverables include: 1) Phosphorous samples and data; 2) Final report. Specific conditions for this project: - Final report needs Dept review and approval. WDNR Lakes Management Coordinator will be provided with an electronic (pdf or word) copy of final report.

Monitoring

Aquatic Invasive Species Monitoring - Bridge Snapshot Day 2014 10/29/2014

The River Alliance in partnership with more than two dozen local AIS coordinators and partners around the state are hosting a statewide AIS Bridge Snapshot Day on September 13, 2014. The River Alliance and the Wisconsin DNR, and local AIS coordinators are working to ensure that our volunteers' data compliments the new efforts of WDNR watershed biologist staff to monitor for AIS in rivers. On a single day in the fall volunteers will gather in rendezvous sites around the state (organized by local partners), be trained on invasive species monitoring, disperse to priority bridge crossing, monitor for prohibited and restricted NR 40 invasive species, and reconvene to submit their findings/celebrate. In addition to gathering important baseline data regarding the distribution of invasive species in our waterways, this effort will also focus on the early detection of aquarium plant releases that are not uncommon in the fall.

Baseline Statewide Monitoring - Aquatic Invasive Species Early Detection 2014

DNR Baseline Monitoring / Early Detection

Monitoring for “early detection” for a wide variety of aquatic invasive species: two hundred twenty-eight (228) stations were monitored to look for the presence of a wide variety of species.

Aquatic Invasive Species Monitoring 2009

The AIS Incident Report forms are designed for citizens, partners and staff to notify DNR of a new aquatic invasive species in a waterbody (where the species has not previously been found). Designated AIS Coordinators enter the information on the forms into SWIMS under these Incident Report County projects. Routinely, the database manager creates Resource of Interest records in SWIMS for the new findings. The Surface Water Viewer and AIS Lists on the web are based on the Resource of Interest records.

MID LAKE PROTECTION & MANAGEMENT DISTRICT: Mid Lake AIS Control & Prevention Project phase 2, 2014-2017 01/09/2014

The Mid Lake P&R District is sponsoring an AIS ACEI grant on Mid Lake, in Oneida County. This project will focus on Curly Leaf Pondweed and Purple Loosestrife management in Mid Lake and also update the Mid Lake Management Plan (LMP). Project activities include: 1) Annual chemical treatments and manual removal of CLP; 2) Annual Pre/Post treatment monitoring and analysis; 3) Annual volunteer AIS and herbicide concentration monitoring; 4) PL mapping and control; 5) Early-season AIS surveys; 6) Conduct volunteer and paid watercraft inspections; 7) Entry of inspection and monitoring data onto SWIMS; 8) Point-intercept (PI) aquatic plant survey and community mapping; 9) Develop annual project report and an updated LMP plan; 10) Stakeholder participation: budget and grant meeting and project status/informational meeting; 11) Develop annual project report and a final report. Project deliverables include: 1) Chemical and manual removal of CLP and PL; 2) Pre/post treatment, PI survey and community mapping data; 3) Entered inspection and monitoring data onto SWIMS; 4) AIS educational, prevention and monitoring activities; 5) Annual reports and an updated LMP plan summarizing EWM management during project and future EWM management direction, boat washing activities, inspection activities, AIS monitoring and AIS educational activities. Specific Conditions for this project: Annual reports and LMP need Dept. review and approval. WDNR Lakes Management Coordinator will be provided with an electronic (pdf or word) copy of updated LMP, all annual reports, all maps, all GIS, survey data (pre/post treatment, early-season and PI), samples of educational and outreach products, and aquatic plant vouchers.

BIG ARBOR VITAE LAKE ASSOC: Big Arbor Vitae Clean Boats Clean Waters 2013 10/21/2013

The Big Arbor Vitae Lake Association will sponsor a 2013 Clean Boats Clean Waters project for one public landing on Big Arbor Vitae Lake.

TOMAHAWK LAKE ASSOCIATION: Tomahawk Lake AIS Grant 2013 & 2014 04/09/2013

Tomahawk Lake Association, Inc. (TLA) is sponsoring an ACEI grant on the Tomahawk Lake system, in Oneida County. This is a five year project focusing on EWM management, and AIS education, prevention and monitoring. This grant covers the costs of year\2019s 5 and 6 of implementation. The goal is to reduce the treatable EWM coverage by 80%. This will allow TLA to continue management of EWM with minimal state financial assistance. An updated management plan will need to be submitted before applying for further AIS control grant assistance. Project activities include: 1) Annual chemical treatments of EWM; 2) Manual removal of EWM with hydraulic conveyor; 3) Annual pre/post treatment monitoring and analysis; 4) Conduct paid and

volunteer watercraft inspections; 5) Mapping and control of purple loosestrife (PL); 6) Annual volunteer AIS training and monitoring; 7) Entry of inspection and monitoring forms into SWIMS; 8) Educational outreach activities as listed on pages 25-34 of proposal; 9) Volunteer herbicide concentration monitoring; 10) Develop annual project reports and a final report. Project deliverables include: 1) Chemical, biological and manual control of AIS, including mapping; 2) Pre/post treatment survey and chemical concentration sampling data; 3) Entered inspection and monitoring data into SWIMS; 4) AIS educational activities; 5) Annual reports and final report summarizing AIS management and future AIS management suggestions, inspection activities, AIS monitoring, and AIS educational activities. Specific project conditions: Annual reports and final report needs Dept review and approval. WDNR Lakes Management Coordinator will be provided with an electronic (pdf or word) copy of final report and annual reports, educational outreach products, survey data (includes: pre/post treatment and PL), and all maps from the project.

EPA National Lakes Survey 2012 06/28/2012

During the summer of 2012, the U.S. Environmental Protection Agency (EPA), states, tribes and other partners will conduct the second nationwide survey of the condition of the nation's lakes. The National Lakes Assessment (NLA) will help citizens and governments measure the health of our waters, take actions to prevent pollution, and evaluate the effectiveness of protection and restoration efforts. The NLA 2012 is one in a series of national surveys of the condition of the nation's waters (see www.epa.gov/aquaticsurveys). Designed to estimate the percentage of lakes that are in good, fair, or poor condition, the survey will serve as a scientific report card on America s lakes. It will examine ecological, water quality, and recreational indicators, and assess how widespread key stressors (such as nitrogen, phosphorus, and acidification) are across the country. The survey is a collaborative effort that involves dozens of state environmental and natural resource agencies, federal agencies, universities and other organizations. In most states, state water quality staff will conduct the water quality sampling and habitat assessments.

NOR NC Stream Stratified Sites 2010, 2011 05/24/2010

This project selects sites from all wadeable streams (83,500 miles, which includes ephemeral and macroinvertebrate streams). The random sites stratified by natural community (nc) and Region by Weigel. Two-hundred sites are sampled per year (approximately 25 sites per natural community per basin). This is a five year study. The sites are mapped on SWDV.

National Lake Survey - Habitat Surveys 09/11/2007

Baseline Monitoring EPA and its state and tribal partners conducted a survey of the nation's lakes, ponds and reservoirs in 2007 and began a second survey in 2012. This National Lakes Assessment is designed to provide statistically valid regional and national estimates of the condition of lakes. It uses a probability-based sampling design to represent the condition of all lakes in similar regions sharing similar ecological characteristics. Consistent sampling and analytical procedures ensure that the results can be compared across the country. The National Lakes Assessment helps build state and tribal capacity for monitoring and assessment and promotes collaboration across jurisdictional boundaries in the assessment of water quality.

Volunteer Monitoring

There are no citizen monitors in the Suamico/Little Suamico River Watershed. For information on how to become a Water Action Volunteer Stream Monitor, visit- http://watermonitoring.uwex.edu/index.html.

Basin/Watershed Partners

- Lake property owners, districts
- County conservationists
- Regional and local planning agencies
- Interested public organizations

Priority Issues

- Water level changes, water level management.
- Recreational enjoyment of resources, user conflicts.
- Wetland and riparian lake habitat protection.

Recommendations

- Restore Wetlands to prevent altered food webs, a loss of biodiversity, and a poorly functioning ecosystem.
- Continue monitoring and controlling AIS species.
- Water levels and river flows in the region should be monitored and managed to maximize protection of aquatic life and public enjoyment of natural resources.

Contributors

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WISCONSIN DEPT. OF NATURAL RESOURCES

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