THE WHITEFISHES OF WISCONSIN'S INLAND LAKES:

The 2011-2014 Wisconsin Department of Natural Resources Cisco and Lake Whitefish Survey



Cisco (10") caught by ice fishing from Spencer Lake, Waupaca County, December 15, 2010. J. Lyons photo.



Lake Whitefish (26") caught by vertical gill net from Little Star Lake (Manitowish Lake Chain), Vilas County, July 9, 2014. J. Lyons photo.

John Lyons, Jeff Kampa, Tim Parks, & Greg Sass

Fisheries and Aquatic Research Section, Wisconsin Department Natural Resources

FEBRUARY 2015

Summary

Cisco (Coregonus artedi) and lake whitefish (Coregonus clupeaformis) require cold, well-oxygenated water and are found in relatively few inland lakes in Wisconsin, but where they occur they may play important roles in the lake ecosystem. The current distribution and population status of both species are poorly known. Consequently, beginning in 2011, the Wisconsin Department of Natural Resources undertook a standardized vertical gill net survey of cisco and lake whitefish populations in Wisconsin's inland lakes. Historically, cisco were reported from 188 individual lakes that were part of 141 lake systems, and the lake whitefish was reported from nine lakes that were part of nine lake systems. The two species have been found together in five of these lakes. Collectively these represent only 1.3% of the total lakes in the state. Lakes with cisco are located throughout Wisconsin, but are most numerous in the north. Lakes with lake whitefish are limited to the northern third of the state. A total of 133 of the 141 cisco lake systems (94%) and all nine of the lake whitefish lake systems were sampled for at least one overnight set with vertical gill nets during 2011-2014. Cisco were captured from 94 of 133 lake systems (71%) and lake whitefish from six of nine (67%), suggesting that the range of both species has shrunk. Lake systems where cisco were not collected were located in all areas of the state, but were relatively more common in southern Wisconsin. Average cisco gill net catches varied greatly among lake systems, ranging from 0 to 137 fish per night of netting. The highest average cisco catch rate was in Elkhart Lake, Sheboygan County, (137 per night per net gang), followed by Spencer Lake, Waupaca County (80/night-gang), Pike Lake, Iron County (58/night-gang), Okauchee Lake, Waukesha County (56/night-gang), Atkins Lake, Bayfield County (53/night-gang) and Lake Geneva, Walworth County (51/night-gang). Maximum size of adult cisco collected also differed, varying from 7.5" in Atkins Lake, which has a dwarf population, to 19.5" in Crystal Lake, Sheboygan County, Forest Lake, Vilas County, and Pine Lake, Waushara County. Average lake whitefish catches were low, ranging from 0/night-gang in three lakes to 3/night-gang in Franklin Lake, Forest County. Maximum size of captured adult lake whitefish varied from 14" in Franklin Lake to 26" in the Manitowish Lake Chain, Vilas County.

Introduction

Cisco (*Coregonus artedi*) and lake whitefish (*Coregonus clupeaformis*) are native species of whitefishes found throughout the Great Lakes region including Wisconsin. Cisco are the smaller of the two, with a typical adult length of 9-18" and a weight of ¼ to 1.5 lb. with maximums of about 20" and 2 lbs. Lake whitefish have a typical adult length of 14-26" and weight of 1 to 7 lbs. with maximums of about 30" and over 12 lbs. Both species have specific and narrow habitat requirements and in Wisconsin are usually limited to deeper lakes where the waters near the bottom remain cold and well-oxygenated year-round. Only a small fraction of Wisconsin lakes have these characteristics, and consequently cisco and lake whitefish are found in relatively few lakes in the state.

In lakes where they are common, cisco and lake whitefish may play key roles in the aquatic ecosystem. Cisco generally eat zooplankton, microscopic animals that drift throughout the lake's water, and cisco feeding can determine the types and abundance of zooplankton that are present, which in turn can influence the type and amount of microscopic algae in the lake, affecting water clarity. Zooplankton are also an important food for many other fishes, including the young of many gamefish species such as walleye (*Sander vitreus*), yellow perch (*Perca flavescens*), bluegills (*Lepomis macrochirus*), and crappies (*Pomoxis* species), and zooplankton consumption by cisco may influence the growth and survival of these species. Lake whitefish consume some zooplankton but mainly bottom-dwelling aquatic insects, mollusks, other invertebrates, and occasionally fish or fish eggs. Cisco and to a lesser extent lake whitefish are the prey of gamefish such as walleye, northern pike (*Esox lucius*), muskellunge (*Esox masquinongy*), and lake trout (*Salvelinus namaycush*), and can be a key food item for large individuals. Abundant cisco and lake whitefish populations may help produce trophy walleyes and muskellunge. Both cisco and lake whitefish are eaten by people and support locally popular fisheries. Cisco are fairly oily and delicious smoked, whereas lake whitefish are a delicacy when boiled, fried, baked, or grilled. Both species can be captured with nets along the shoreline during their late-fall spawning runs or through the ice with hook and line during the winter. Because the two species require cold welloxygenated waters, they are sentinels of the health of the lakes they inhabit, and if they decrease in number or disappear it may indicate that the quality of the lake ecosystem is in decline.

The future of cisco and lake whitefish in Wisconsin's inland lakes is far from certain. As the shorelines and watersheds of many lakes have become developed, increased runoff of sediment and nutrients has reduced water quality and oxygen levels in lake-bottom waters making habitat less suitable for cisco and lake whitefish. Rising air temperatures over the last 50 years have increased lake water temperatures, further shrinking appropriate habitat. A harmful non-native species, rainbow smelt (*Osmerus mordax*), has invaded several inland lakes to the detriment of cisco and lake whitefish populations. Cisco and lake whitefish have already disappeared from some lakes they once thrived in, and there is concern that more populations are at risk. However, current knowledge of most cisco and lake whitefish populations in Wisconsin is very limited, hampering efforts to conserve them.

Because of the potential importance of cisco and lake whitefish in the lakes they inhabit, the increasing threats to their continued existence, and the limited information on their current status, the Wisconsin Department of Natural Resources (WDNR) began a research study of the two species in Wisconsin's inland lakes in 2011. Goals of the study were to determine the current distribution and population status of cisco and lake whitefish in inland waters, to identify the environmental factors that might explain why some populations were thriving while others were not in order to develop conservation strategies, and to better understand the relationships between cisco and lake whitefish and gamefish species such as walleye and muskellunge. This report summarizes progress towards the first goal and presents data and analyses from a 2011-2014 standardized survey of nearly all of the inland cisco and lake whitefish lakes in the state. Work on the second and third goals has just begun, and those results will be presented in future reports.

Survey Procedures

The goal of the 2011-2014 survey was to sample, in an effective and standardized manner, as many of the inland lakes of Wisconsin as possible that were known or suspected to have (or once have had) cisco or lake whitefish populations. The historical distribution of cisco and lake whitefish in Wisconsin's inland lakes was estimated based on reports from scientific and popular publications and unpublished data from previous WDNR and University of Wisconsin fish surveys. Additional lakes without any previous records of cisco or lake whitefish but with depth, temperature, and oxygen characteristics suitable for the species were also included in the list of lakes to be sampled.

Each lake was surveyed by WDNR Fisheries Research staff with a gang of vertical gill nets, a sampling gear particularly well-suited to capturing cisco. A gill net is a sheet of thin monofilament netting that is suspended in the water column. Fish do not see the net and swim into it and become entangled, typically by the gill covers, hence the name of the net. Different mesh sizes of gill net tend to catch different sizes of fish. A vertical gill net is a curtain of netting that is suspended from a floating boom on the water surface all the way to the bottom (see photos below). For the WDNR survey, a gang of seven different mesh-sizes of vertical gill nets attached to five booms were fished together overnight in the middle of each lake where depths were at or near the lake maximum. The seven mesh sizes were chosen such that fish from about 2" to 26" could be captured. Each lake was sampled during the summer for at least one overnight set with at least one gang of nets. Large or complex lakes received extra sampling effort. All fish caught in the nets were identified, counted, and measured for total length. A subsample of any cisco or lake whitefish captured had their otoliths (ear bones) removed to determine their age and growth rates. Aging otoliths is a complicated and time consuming process that is not yet complete for most lakes, and age and growth results will be presented in a later report. The average catch of cisco and lake whitefish per gang of nets per night was used as an index of relative abundance for comparisons among lakes.



Vertical gill net being unrolled from the floating boom, Manitowish Lake (Manitowish Lake Chain), Vilas County, July98, 2014. Photo by J. Lyons



Close-up of vertical gill netting, Little Star Lake (Manitowish Lake Chain), Vilas County, July 9, 2014. Photo by J. Lyons



Gang of five floating booms with vertical gill nets attached, Middle Kimball Lake, Washburn County, August 11, 2011. J. Lyons photo.



Cisco entangled in a vertical gill net, Middle Kimball Lake, Washburn County, August 11, 2011. J. Lyons photo.

Results

From available information, 188 lakes were likely to have or at least once have had cisco, and nine were likely to have or once have had lake whitefish. Five of these lakes had reports of both cisco and lake whitefish, giving a total of 192 lakes with one or both species. Some of the cisco or lake whitefish lakes were part of lake chains, and from a fish's perspective they could be thought of as the same lake system. Pooling the lakes within lake chains resulted in a total of 141 cisco and nine lake whitefish lake systems, five of which had both species (see map), giving a total of 145 lake systems with one or both species. Cisco lake systems were located statewide with the exception of the Driftless Area of southwestern Wisconsin, which has no deep natural lakes, but were most common in the north. All nine lake whitefish lake systems were found in the northern third of Wisconsin.

During the 2011-2014 surveys, cisco and lake whitefish were captured from only some of the lake systems where they were believed to have once occurred. An attempt was made to sample as many of the lake systems as possible, but because some lacked public boat access, vertical gill nets could be deployed in only 133 of the 141 cisco (94%) and in all nine of the lake whitefish lake systems (see attached Appendix Table). Of the lake systems that could be sampled, cisco were captured in 94 of the 133 (71%) and lake whitefish in six of the nine (67%). Three of the five lakes that historically had both cisco and lake whitefish, Whitefish Lake, Sawyer County, Little Star Lake in the Manitowish Lake Chain, Vilas County, and Trout Lake, Vilas County, produced both species during the gill net survey. In the other two lakes, Grindstone Lake, Sawyer County, and Lac Court Oreilles Lake, Sawyer County, cisco were captured but lake whitefish were not. Cisco were collected from lakes in all areas of the state, but lakes where cisco were not captured were relatively more frequent in the southern two thirds of the state (11 of 28 lakes lacked cisco; 39%) than in the northern third (28 of 105 lakes lacked cisco; 27%).

Cisco catches varied substantially among lakes, but lake whitefish catches were always low. Average cisco catch rates for individual lake systems ranged from 0 to 137 individuals per night per gang of vertical gill nets. Of the 133 cisco lake systems that were sampled, 39 (29%) had an average catch of 0 cisco per night per net gang, 46 (35%) had an average catch of less than 10 cisco per night per net gang, which is relatively low, 20 (15%) had an average catch between 10 and 25 cisco per night per net gang, which is medium, 22 (17%) had an average catch between 25 and 50 cisco per night per net gang, which is high, and six (4.5%) had average catches greater than 50 cisco per night per net gang, which is very high (see bar chart). The six highest average cisco catch rates were from Elkhart Lake, Sheboygan County (137/night-gang), Spencer Lake, Waupaca County (80/night-gang), Pike Lake, Iron County (58/nightgang), Okauchee Lake, Waukesha County (56/night-gang), Atkins Lake, Bayfield County, (53/night-gang), and Lake Geneva, Walworth County (51/night-gang). Average lake whitefish catch rates ranged from 0 to 3 individuals per night per gang of vertical nets. For the nine lake whitefish lake systems, three lakes (33%) had an average catch of 0 lake whitefish per night per net gang and the remaining six lakes (67%) had an average catch of less than 10 lake whitefish per night per net gang, which is low. The highest average lake whitefish catch was from Franklin Lake, Forest County, at 3/night-gang, followed by Trout Lake, Vilas County, at 2/night-gang.



Map of lakes where cisco, lake whitefish, or both species have been reported or are suspected to occur or to have once occurred.



Map of cisco relative abundance in lakes sampled with vertical gill nets in 2011-2014.



Map of lake whitefish relative abundance in lakes sampled with vertical gill nets in 2011-2014.



Number of lake systems with different relative catch rates of cisco (brown bars) and lake whitefish (blue bars). Relative catch rate: None = 0, Low = < 10, Moderate = 10-25, High = 25-50, and Very High = > 50 fish per gang of vertical gill nets per night of sampling.

Maximum sizes of cisco and lake whitefish collected varied substantially among lakes. The smallest maximum sizes for cisco were from Fowler Lake, Waukesha County at 4" and North Turtle Lake, Vilas County at 6". These fish were juveniles. The smallest adults were encountered in Atkins Lake, Bayfield County, and ranged from 5" to 7.5". The next smallest adults were 9" and came from Pallette Lake Vilas County, Lake Twenty-Six, Burnett County, and Whitefish Lake, Sawyer County. The largest adult cisco encountered was 19.5", and individuals of this size were collected from Crystal Lake, Sheboygan County, Forest Lake, Vilas County, and Pine Lake, Waushara County. Other lakes with cisco equal to or greater than 18" were Balsam Lake, Washburn County, Bardon Lake, Douglas County, Big Green Lake, Green Lake County, Gilbert Lake, Waushara County. Oconomowoc Lake, Waukesha County, Lake Owen, Bayfield County, and Stormy Lake, Vilas County. Maximum sizes of lake whitefish collected ranged from 14" in Franklin Lake, Forest County, to 26" in Little Star Lake in the Manitowish Lake Chain, Vilas County.

Conclusions

Cisco and lake whitefish lakes are uncommon in Wisconsin. There are about 15,000 inland lakes greater than 2 acres in surface area in the state, but only 188 of these lakes, or about 1.25% of the total, are likely to have once had cisco, and only nine, or 0.06%, are likely to have once had lake whitefish. Just five of these lakes (0.03%) had reports of both cisco and lake whitefish. Thus, collectively, cisco or lake whitefish occupy no more than 192 lakes representing only about 1.3% of the inland lakes in Wisconsin.

Cisco and lake whitefish populations still persist in most of the inland lakes in Wisconsin where they occurred historically, but overall their distribution appears to have shrunk, especially in southern Wisconsin. Statewide, 29% of the lake systems that once had cisco and 33% of those that once had lake whitefish did not yield any individuals during the 2011-2104 vertical gill net survey. Thus, it is possible that a substantial portion of the range of these two species in the state has been lost. However, it is important to note that the vertical gill net catches are only a rough index of relative abundance, and the failure to collect cisco or lake whitefish from a lake is not conclusive proof that either species is actually absent. In lakes with small populations, the nets might not catch any individuals even if the species were still present. That being said, populations small enough to be missed by the gill nets are likely to be vulnerable to disappearing in the future.

Where they still occur, cisco populations vary greatly among lakes. During the 2011-2014 survey, cisco catches differed more than 250-fold between the lakes with the lowest and highest catches. Lengths of adult cisco ranged from 5" to 19.5" among lakes, which encompasses nearly the entire span of adult sizes ever reported for the species. Atkins Lake, Bayfield County, had what appeared to be a "dwarf" population of cisco. Normally, cisco first mature at a length of about 9", but the largest adult collected from Atkins Lake was 7.5", and mature adults as short as 5" were observed. No other dwarf cisco populations were encountered in the survey, but dwarf cisco populations have been collected previously from northeastern Minnesota. The high variation in cisco catches and maximum sizes suggests that a rich diversity of cisco populations exists in Wisconsin's inland lakes and that some populations still thrive.

Based on the survey results, cisco are clearly more widespread and more abundant than lake whitefish in Wisconsin's inland lakes. However, direct comparisons of cisco vertical gill net catch rates with lake whitefish catch rates are not valid because the vertical gill nets were more effective at catching cisco, which tend to occupy more of the water column, than lake whitefish, which are usually concentrated near the bottom. Lake whitefish undoubtedly have a very limited distribution in Wisconsin's inland lakes, but they may be more common than the survey results suggest.

Acknowledgments

We thank the many current or former WDNR employees who provided information on cisco and lake whitefish distribution and/or helped with the lake surveys and data summarization: Chris Bailey, Dave Bartz, Heath Benike, Sue Beyler, Todd Brecka, Larry Damman, Matt Diebel, Steve Gilbert, Jeremiah Gorne, Justin Haglund, Gene Hatzenbeler, Ben Heussner, Katie Jardine, Martin Jennings, Shelby Kail, Paul Kanehl, Avery Koblings, John Kubisiak, Matt Lorenzoni, Travis Motl, Al Niebur, Aaron Nolan, Austin Noring, Rachel Peacher, Frank Pratt, Matt Schlapper, Dave Seibel, Peggy Snyder, Scott Toshner, Dan Walchak, Doug Welch, Jamison Wendel, Max Wolter, and Bob Young. This study was funded in part by the Federal Aid in Sportfish Restoration program, Project F-95-P, Study SSSO.

Appendix Table. The attached table lists all 145 inland lake systems in Wisconsin from which cisco or lake whitefish have been reported or are suspected, their surface area and maximum depth, the species reported, the date they were last sampled by WDNR (those that were not sampled did not have public access), the total number of nights and gangs of vertical gill nets that were fished (e.g., 2 gangs for 1 night = 2; 1 gang for 2 nights = 2; 2 gangs for 2 nights = 4), the average catch per night and gang of nets for cisco, the relative abundance of cisco based on the average catch (NA=Not Applicable, 0=None, <10=Low, 10-25=medium, 25-50=high, >50=very high), the maximum total length of cisco captured (NA=Not Applicable), the average catch per night and gang of nets for lake whitefish, the relative abundance of lake whitefish based on the average catch (NA=Not applicable, 0=None, <10=Low), and the maximum total length of lake whitefish captured (NA=Not Applicable). Lakes are listed alphabetically by county and within county by lake name.

Lake or Lake System	County	Area (acres)	Max Depth (feet)	Species Reported	Sample Date	Total Nights	Cisco Catch	Cisco Relative	Cisco Max	Lake Whitefish	Lake Whitefish	Lake Whitefish
		(acies)	(1000)	Reported	Dute	and Net	Gang	Abundance	(inches)	catch per	Relative	Max Length
lordan	Adams	222	02	Cisco	08/05/2012	Gangs	0.0	Nono	ΝΑ	Night-Gang	Abundance	(inches)
	Auditis	233	32	Cisco	08/03/2013	2	0.0	None	16.5	0.00	None	NA
Bear (Little Bear)	Barron	1358	87	Cisco	09/12/2013	6	32.3	Hign	16.5	0.00	None	NA
Beaver Dam	Barron	1112	106	Cisco	06/12/2012	5	7.2	Low	13	0.00	None	NA
Big Moon	Barron	191	48	Cisco	06/07/2012	2	0.0	None	NA	0.00	None	NA
Red Cedar	Barron	1841	53	Cisco	07/12/2012	2	8.5	Low	15	0.00	None	NA
Silver	Barron	337	91	Cisco	08/17/2011	1	8.0	Low	14.5	0.00	None	NA
Atkins	Bayfield	176	80	Cisco	06/28/2012	3	52.7	Very High	7	0.00	None	NA
Bony	Bayfield	191	55	Cisco	07/20/2012	1	18.0	Medium	14	0.00	None	NA
Cisco (First Bass)	Bayfield	95	105	Cisco	07/25/2011	1	8.0	Low	15	0.00	None	NA
Diamond	Bayfield	341	83	Cisco	09/28/2011	3	0.0	None	NA	0.00	None	NA
George	Bayfield	46	50	Cisco	06/18/2014	2	0.0	None	NA	0.00	None	NA
Hammil	Bayfield	83	47	Cisco	Not Sampled	0	0.0	None	NA	0.00	None	NA
Island	Bayfield	59	51	Cisco	08/16/2012	2	0.0	None	NA	0.00	None	NA
Middle Eau Claire	Bayfield	902	66	Cisco	07/18/2012	2	2.5	Low	11.5	0.00	None	NA
Namekagon	Bayfield	3227	50	Cisco	07/22/2013	3	0.0	None	NA	0.00	None	NA
Owen	Bayfield	1323	95	Cisco	09/18/2012	7	1.7	Low	19	0.00	None	NA
Priest	Bayfield	29	52	Cisco	Not Sampled	2	0.0	None	NA	0.00	None	NA
Sand Bar	Bayfield	118	49	Cisco	06/18/2014	2	0.0	None	NA	0.00	None	NA
Tomahawk (Pike)	Bayfield	134	42	Cisco	08/14/2012	2	0.0	None	NA	0.00	None	NA
Upper Eau Claire	Bayfield	996	92	Cisco	07/24/2012	3	23.0	Medium	17	0.00	None	NA
Benoit	Burnett	297	41	Cisco	08/28/2013	2	2.5	Low	14.5	0.00	None	NA
Dunham	Burnett	243	63	Cisco	06/26/2012	1	4.0	Low	10	0.00	None	NA
Little Bear	Burnett	128	55	Cisco	09/09/2013	1	9.0	Low	8.5	0.00	None	NA
Love-Falk	Burnett	335	65	Cisco	06/25/2014	22	10.0	Medium	9	0.00	None	NA
McKenzie (Big McKenzie)	Burnett	1185	71	Cisco	08/22/2013	3	0.0	None	NA	0.00	None	NA
Middle McKenzie	Burnett	530	45	Cisco	06/21/2012	2	11.5	Medium	9.5	0.00	None	NA
Miniature	Burnett	38	69	Cisco	06/16/2014	1	6.0	Low	10	0.00	None	NA
Sand (North Sand)	Burnett	962	73	Cisco	09/10/2013	2	0.0	None	NA	0.00	None	NA
Twentysix (Twenty-Six)	Burnett	230	45	Cisco	07/08/2013	1	19.0	Medium	9	0.00	None	NA
Wood (Big Wood)	Burnett	521	35	Cisco	07/01/2013	1	1.0	Low	16.5	0.00	None	NA
Yellow Chain (Yellow, L. Yellow, Danbury FL)	Burnett	2891	31	Cisco	08/21/2012	2	12.5	Medium	15.5	0.00	None	NA

Long	Chippewa	1052	101	Cisco	07/29/2013	4	5.5	Low	12	0.00	None	NA
Fish	Dane	216	62	Cisco	06/24/2013	4	0.0	None	NA	0.00	None	NA
Mendota	Dane	9842	82	Cisco	08/14/2013	2	0.5	Low	12	0.00	None	NA
Monona	Dane	3274	64	Cisco	08/12/2013	2	0.0	None	NA	0.00	None	NA
Bardon (Whitefish)	Douglas	832	102	Cisco	08/28/2012	4	8.0	Low	18.5	0.00	None	NA
Lower Eau Claire	Douglas	802	41	Cisco	07/17/2012	1	1.0	Low	7.5	0.00	None	NA
Keyes	Florence	202	77	Lake Whitefish	07/15/2014	2	0.0	None	NA	1.00	Low	22
Butternut	Forest	1292	42	Lake Whitefish	07/15/2015	2	0.0	None	NA	0.50	Low	20.5
Franklin	Forest	892	46	Lake Whitefish	07/15/2014	2	0.0	None	NA	3.00	Low	14
Julia	Forest	392	45	Cisco	07/08/2014	1	1.0	Low	10	0.00	None	NA
Lucerne (Stone)	Forest	1026	73	Lake Whitefish	08/13/2013	2	0.0	None	NA	0.00	None	NA
Green (Big Green)	Green Lake	7346	236	Cisco	09/16/2013	2	35.0	High	19	0.00	None	NA
Pike (Big Pike)	Iron	194	82	Cisco	08/19/2013	1	58.0	Very High	13	0.00	None	NA
Turtle-Flambeau Flowage	Iron	13545	50	Cisco	08/12/2013	4	8.3	Low	13.5	0.00	None	NA
Deer	Lincoln	152	53	Cisco	06/23/2014	2	16.0	Medium	12.5	0.00	None	NA
Emerick	Marquette	37	79	Cisco	Not Sampled	0	NA	NA	NA	NA	NA	NA
Wood	Marquette	91	53	Cisco	08/05/2013	2	0.0	None	NA	0.00	None	NA
Big Carr	Oneida	213	71	Cisco	06/24/2014	2	41.5	High	10	0.00	None	NA
Blue (Rusk)	Oneida	456	49	Cisco	06/24/2014	2	0.0	None	NA	0.00	None	NA
Clear	Oneida	846	95	Cisco	06/25/2014	2	43.5	High	15.5	0.00	None	NA
Katherine	Oneida	590	30	Cisco	06/25/2014	2	0.0	None	NA	0.00	None	NA
Lee	Oneida	69	39	Cisco	Not Sampled	0	NA	NA	NA	NA	NA	NA
Little Bass	Oneida	47	65	Cisco	Not Sampled	0	NA	NA	NA	NA	NA	NA
Minocqua-Kawaguesaga	Oneida	2030	60	Cisco	07/07/2014	2	3.5	Low	14.5	0.00	None	NA
North Nokomis (Swamp)	Oneida	476	73	Cisco	07/01/2014	1	33.0	High	12.5	0.00	None	NA
Sevenmile	Oneida	503	43	Cisco	07/23/2014	1	7.0	Low	12	0.00	None	NA
Sugar Camp Chain (Chain, Echo, Stone, Sand, Dam)	Oneida	1503	32	Cisco	07/01/2014	5	1.6	Low	12	0.00	None	NA
Three Lakes Chain (Big, Dog, Deer, Big Stone, Laurel, Medicine, Big Fork, Little Fork, Fourmile, Island, Round)	Oneida	4117	57	Cisco	07/21/2014	3	16.3	Medium	12.5	0.00	None	NA

Tomahawk (including Little Tomahawk)	Oneida	3552	84	Cisco	08/19/2013	2	37.0	High	13.5	0.00	None	NA
Two Sisters	Oneida	719	63	Cisco	07/01/2014	1	21.0	Medium	16.5	0.00	None	NA
Yawkey	Oneida	97	71	Cisco	Not Sampled	0	NA	NA	NA	NA	NA	NA
Lower Pine (Pine)	Polk	90	102	Cisco	06/05/2012	2	0.0	None	NA	0.00	None	NA
Pipe	Polk	345	68	Cisco	08/18/2014	2	0.0	None	NA	0.00	None	NA
Sunset	Portage	61	55	Cisco	08/27/2013	2	0.5	Low	11	0.00	None	NA
Sand	Rusk	262	100	Cisco	09/03/2013	3	7.0	Low	10	0.00	None	NA
Ashegon (Bass)	Sawyer	74	56	Cisco	06/24/2013	2	5.5	Low	15.5	0.00	None	NA
Grindstone	Sawyer	3111	60	Both Species	08/27/2013	1	26.0	High	15	0.00	None	NA
Lac Courte Oreilles (Big & Little Lac Courte Oreilles)	Sawyer	5279	90	Both Species	07/15/2013	3	11.3	Medium	14	0.00	None	NA
Little Round	Sawyer	229	38	Cisco	08/08/2013	1	0.0	None	NA	0.00	None	NA
Round (Big Round)	Sawyer	3054	74	Cisco	08/05/2013	3	0.3	Low	8.5	0.00	None	NA
Whitefish	Sawyer	786	105	Both Species	08/07/2012	3	47.7	High	7.5	0.67	Low	17
Crystal	Sheboygan	152	61	Cisco	08/12/2013	2	1.0	Low	19.5	0.00	None	NA
Elkhart (Big Elkhart)	Sheboygan	286	119	Cisco	08/12/2013	2	137.0	Very High	11.5	0.00	None	NA
Allequash	Vilas	426	24	Cisco	06/09/2014	2	0.0	None	NA	0.00	None	NA
Arrowhead (Little Star)	Vilas	99	43	Cisco	07/10/2014	2	7.5	Low	13.5	0.00	None	NA
Big	Vilas	835	61	Cisco	08/05/2013	2	2.0	Low	14	0.00	None	NA
Big Crooked	Vilas	384	87	Cisco	08/05/2014	2	2.0	Low	15.5	0.00	None	NA
Big Muskellunge	Vilas	930	70	Cisco	07/25/2013	2	4.5	Low	14.5	0.00	None	NA
Big Saint Germain	Vilas	1617	42	Cisco	07/15/2014	2	0.5	Low	12	0.00	None	NA
Big Sand	Vilas	1408	65	Cisco	07/07/2014	2	0.0	None	NA	0.00	None	NA
Black Oak	Vilas	584	85	Cisco	07/22/2013	4	2.0	Low	11	0.00	None	NA
Boulder	Vilas	524	23	Cisco	06/19/2014	2	0.0	None	NA	0.00	None	NA
Brandy (Cecilia, Branley)	Vilas	110	44	Cisco	07/07/2014	1	21.0	Medium	13	0.00	None	NA
Buckatabon (Lower & Upper)	Vilas	846	47	Cisco	06/26/2014	1	37.0	High	14.5	0.00	None	NA
Crab	Vilas	959	60	Cisco	07/18/2014	1	17.0	Medium	13	0.00	None	NA
Dead Pike	Vilas	297	80	Cisco	08/07/2013	2	0.0	None	NA	0.00	None	NA
Eagle River Chain (Catfish, Voyageur, Eagle, Scattering Rice, Otter, Duck)	Vilas	1584	34	Cisco	07/16/2014	4	0.0	None	NA	0.00	None	NA

Fence	Vilas	3555	86	Cisco	07/30/2014	1	31.0	High	12.5	0.00	None	NA
Forest (Goose)	Vilas	466	60	Cisco	06/26/2014	1	1.0	Low	19.5	0.00	None	NA
Harris	Vilas	507	57	Cisco	06/20/2014	2	0.0	None	NA	0.00	None	NA
Johnson	Vilas	78	42	Cisco	07/07/2014	1	25.0	High	12.5	0.00	None	NA
Kentuck	Vilas	957	40	Cisco	07/23/2014	2	0.0	None	NA	0.00	None	NA
Lac de Flambeau Chain (Crawling Stone, Long Interlaken, Flambeau, Pokegama)	Vilas	4169	87	Cisco	07/30/2014	4	29.0	High	15.5	0.00	None	NA
Little Saint Germain	Vilas	980	53	Cisco	07/15/2014	1	5.0	Low	12	0.00	None	NA
Little Trout	Vilas	978	98	Cisco	8/5/2014	2	0.0	None	NA	0.00	None	NA
Long	Vilas	872	95	Cisco	08/12/2013	1	5.0	Low	13.5	0.00	None	NA
Mamie	Vilas	400	15	Cisco	07/01/2014	2	0.0	None	NA	0.00	None	NA
Manitowish Chain (Rest, Clear, Fawn, Spider, Island, Manitowish, Little Star)	Vilas	3399	67	Both Species	07/08/2014	7	25.3	High	15	0.17	Low	26
Norwood (Boot)	Vilas	125	89	Cisco	Not Sampled	0	NA	NA	NA	NA	NA	NA
Oxbow	Vilas	511	44	Cisco	06/17/2014	2	0.0	None	NA	0.00	None	NA
Pallette (Clear)	Vilas	173	65	Cisco	08/12/2014	5	2.0	Low	9	0.00	None	NA
Papoose	Vilas	428	65	Cisco	07/08/2014	1	35.0	High	13	0.00	None	NA
Plum	Vilas	1108	57	Cisco	06/05/2014	1	47.0	High	17.5	0.00	None	NA
Presque Isle	Vilas	1280	80	Cisco	06/12/2014	1	2.0	Low	7.5	0.00	None	NA
Smoky	Vilas	610	39	Cisco	07/07/2014	1	1.0	Low	10.5	0.00	None	NA
Sparkling (Silver)	Vilas	127	64	Cisco	07/10/2013	2	0.0	None	NA	0.00	None	NA
Star	Vilas	1206	67	Cisco	06/10/2014	1	3.0	Low	17.5	0.00	None	NA
Stormy	Vilas	522	63	Cisco	08/21/2014	2	1.5	Low	18	0.00	None	NA
Sugarbush Chain (Lower, Middle, & Upper)	Vilas	612	57	Cisco	07/30/2014	1	7.0	Low	14.5	0.00	None	NA
Trout	Vilas	3816	117	Both Species	07/31/2013	2	18.0	Medium	13	2.00	Low	16.5
Turtle (North & South)	Vilas	823	58	Cisco	07/22/2014	2	0.5	Low	6	0.00	None	NA
Twin (North & South)	Vilas	3430	60	Cisco	09/16/2013	1	27.0	High	16	0.00	None	NA
White Sand	Vilas	734	71	Cisco	07/31/2013	1	36.0	High	13	0.00	None	NA
White Sand	Vilas	1229	63	Cisco	07/29/2014	1	1.0	Low	9	0.00	None	NA

Whitefish	Vilas	196	40	Cisco	08/19/2014	1	14.0	Medium	14.5	0.00	None	NA
Beulah	Walworth	834	58	Cisco	09/10/2013	2	0.0	None	NA	0.00	None	NA
Geneva	Walworth	5262	135	Cisco	09/09/2013	3	51.0	Very High	14	0.00	None	NA
Balsam	Washburn	295	49	Cisco	08/24/2011	1	27.0	High	18	0.00	None	NA
Big Devil (Audubon)	Washburn	166	75	Cisco	07/10/2012	2	37.5	High	13.5	0.00	None	NA
Gilmore	Washburn	389	36	Cisco	08/02/2011	2	17.0	Medium	17	0.00	None	NA
Long	Washburn	3290	74	Cisco	09/13/2011	3	21.0	Medium	16.5	0.00	None	NA
Middle Kimball	Washburn	98	77	Cisco	08/10/2011	1	22.0	Medium	12	0.00	None	NA
Shell	Washburn	2580	36	Cisco	07/09/2013	2	0.0	None	NA	0.00	None	NA
Slim	Washburn	224	42	Cisco	07/27/2011	1	12.0	Medium	16.5	0.00	None	NA
Twin (East Twin, West Twin)	Washburn	23	44	Cisco	06/11/2014	1	2.0	Low	17	0.00	None	NA
Big Cedar	Washington	935	105	Cisco	08/21/2013	3	0.0	None	NA	0.00	None	NA
Dutchman	Waukesha	31	43	Cisco	09/10/2013	2	0.0	None	NA	0.00	None	NA
Fowler	Waukesha	78	50	Cisco	07/23/2013	2	1.0	Low	4	0.00	None	NA
Golden	Waukesha	250	46	Cisco	07/22/2013	2	0.0	None	NA	0.00	None	NA
La Belle (Lac La Belle)	Waukesha	1164	45	Cisco	07/31/2013	4	0.0	None	NA	0.00	None	NA
Lower Nashotah	Waukesha	90	43	Cisco	07/10/2013	2	0.0	None	NA	0.00	None	NA
Nagawicka	Waukesha	917	90	Cisco	07/08/2013	2	0.0	None	NA	0.00	None	NA
Nemahbin (Lower & Upper)	Waukesha	554	61	Cisco	07/09/2013	3	0.0	None	NA	0.00	None	NA
North	Waukesha	437	78	Cisco	07/29/2013	2	3.0	Low	15.5	0.00	None	NA
Oconomowoc	Waukesha	767	62	Cisco	07/27/2013	2	42.0	High	19	0.00	None	NA
Okauchee	Waukesha	1187	94	Cisco	07/08/2013	2	56.0	Very High	14	0.00	None	NA
Pine	Waukesha	703	85	Cisco	07/29/2013	1	4.0	Low	15.5	0.00	None	NA
Silver	Waukesha	222	44	Cisco	07/30/2013	2	0.0	None	NA	0.00	None	NA
Upper Nashotah	Waukesha	133	54	Cisco	Not Sampled	0	NA	NA	NA	NA	NA	NA
Chain of Lakes (Taylor, Otter, Sunset, Rainbow, McCrossen, Round, Columbia, Long, Miner)	Waupaca	605	95	Cisco	07/15/2013	2	22.5	Medium	11	0.00	None	NA
Spencer (Silver)	Waupaca	69	53	Cisco	07/16/2013	1	80.0	Very High	11.5	0.00	None	NA
Gilbert	Waushara	141	65	Cisco	07/17/2013	3	20.7	Medium	18	0.00	None	NA
Long	Waushara	272	71	Cisco	08/06/2013	2	44.0	High	15	0.00	None	NA
Pine (Springwater)	Waushara	143	48	Cisco	08/07/2013	2	28.5	High	19.5	0.00	None	NA