Note: Methodology, explanation of analysis and biological background on Wild Rice Lake studies are contained within the Manitowish Waters Chain of Lakes-wide Management Plan document.

8.6 Wild Rice Lake

An Introduction to Wild Rice Lake

Wild Rice Lake, Vilas County, is a shallow, lowland drainage lake with a maximum depth of 26 feet, a mean depth of 11.3 feet, and a surface area of approximately 384 acres. The Trout River enters the lake from the southeast, and continues out of the western side of the lake on its way to downstream Alder Lake. Wild Rice Lake is considered to be mesotrophic and its watershed is approximately 47,381 acres. In 2014, 47 native aquatic plant species were found in the lake, of which fern pondweed (*Potamogeton robbinsii*) was the most common. No aquatic invasive plant species were observed growing in or along the shorelines of Wild Rice Lake in 2014.

Field Survey Notes

Stained water and abundant natural shoreline observed during 2014 surveys. Several shoreland birds and bald eagle's nest spotted along western wetland area – great natural habitat!

Photo 8.6. *Nuphar x rubrodisca* (hybrid yellow pond lily) flower, Wild Rice Lake, Vilas County

Lake at a Glance* – Wild Rice Lake

Morphology	
Acreage	384
Maximum Depth (ft)	26.0
Mean Depth (ft)	11.3
Volume (acre-feet)	4,329
Shoreline Complexity	2.4
Vegetation	
Curly-leaf Survey Date	July 2, 2014
Comprehensive Survey Date	July 29, 2014
Number of Native Species	47
Threatened/Special Concern Species	-
Exotic Plant Species	-
Simpson's Diversity	0.93
Average Conservatism	6.8
Water Quality	
Wisconsin Lake Classification	Shallow, Lowland Drainage
Trophic State	Mesotrophic
Limiting Nutrient	Phosphorus
Watershed to Lake Area Ratio	46:1

**These parameters/surveys are discussed within the Chain-wide portion of the management plan.*

8.6.1 Wild Rice Lake Water Quality

Water quality data was collected from Wild Rice Lake on six occasions in 2014/2015. Onterra staff sampled the lake for a variety of water quality parameters including total phosphorus, chlorophyll-*a*, Secchi disk clarity, temperature, and dissolved oxygen. Please note that the data in these graphs represent concentrations and depths taken during the growing season (April-October), summer months (June-August) or winter (February-March) as indicated with each dataset. Furthermore, unless otherwise noted the phosphorus and chlorophyll-*a* data represent only surface samples. In addition to sampling efforts completed in 2014/2015, any historical data was researched and are included within this report as available.

Unfortunately, very limited data exists for two water quality parameters of interest – total phosphorus and chlorophyll-*a* concentrations. In 2014, average summer phosphorus concentrations (18.5 µg/L) were less than the median value (33.0 µg/L) for other shallow, lowland drainage lakes in the state (Figure 8.6.1-1). This value is also lower than the value for other lakes within the Northern Lakes and Forests ecoregion. A weighted value from all available data ranks as *Excellent* for a shallow, lowland drainage lake.

Total phosphorus surface values from 2014-2015 are compared with bottom-lake samples collected during this same time frame in Figure 8.6.1-2. Concentrations from the epilimnion were found to be similar to those in the hypolimnion during these time periods. As explained in the Chainwide Report (Water Quality Section Primer), sediments within a lake often release phosphorus under anoxic conditions. When mixing occurs in the lake, these nutrients may be transported to the upper water column for use by algae or aquatic plants. The data in Figure 8.6.1-2 indicate that a minimal amount of phosphorus release is occurring in Wild Rice Lake.

Similar to what has been observed with the total phosphorus dataset, summer average chlorophyll-*a* concentrations (6.0 µg/L) were lower than the median value (7.0 µg/L) for other lakes of this type (Figure 8.6.1-3), as well as lower than the median for all lakes in the ecoregion. Both of these parameters, total phosphorus and chlorophyll-*a*, rank within a TSI category of *Excellent*, indicating the lake has enough nutrients for production of aquatic plants, algae, and other organisms but not so much that a water quality issue is present. During 2014 visits to the lake, Onterra ecologists recorded field notes describing very good water conditions. The staining of the lake's water is natural, and described further below.

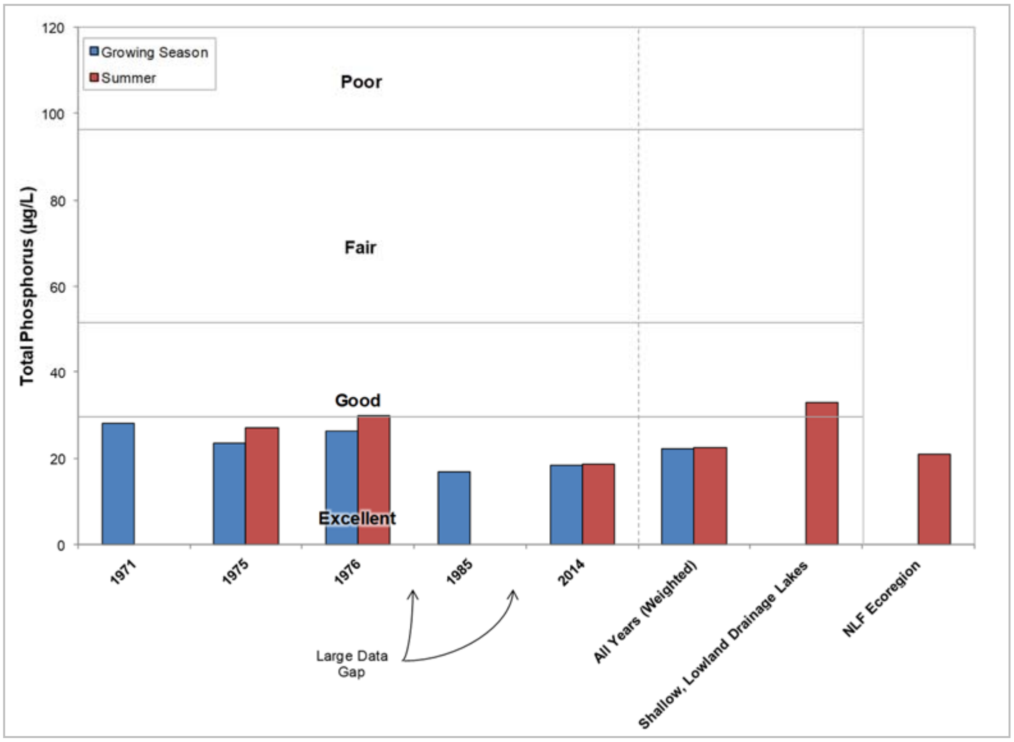


Figure 8.6.1-1. Wild Rice Lake, state-wide shallow, lowland drainage lakes, and regional total phosphorus concentrations. Mean values calculated with summer month surface sample data. Water Quality Index values adapted from WDNR PUB WT-913.

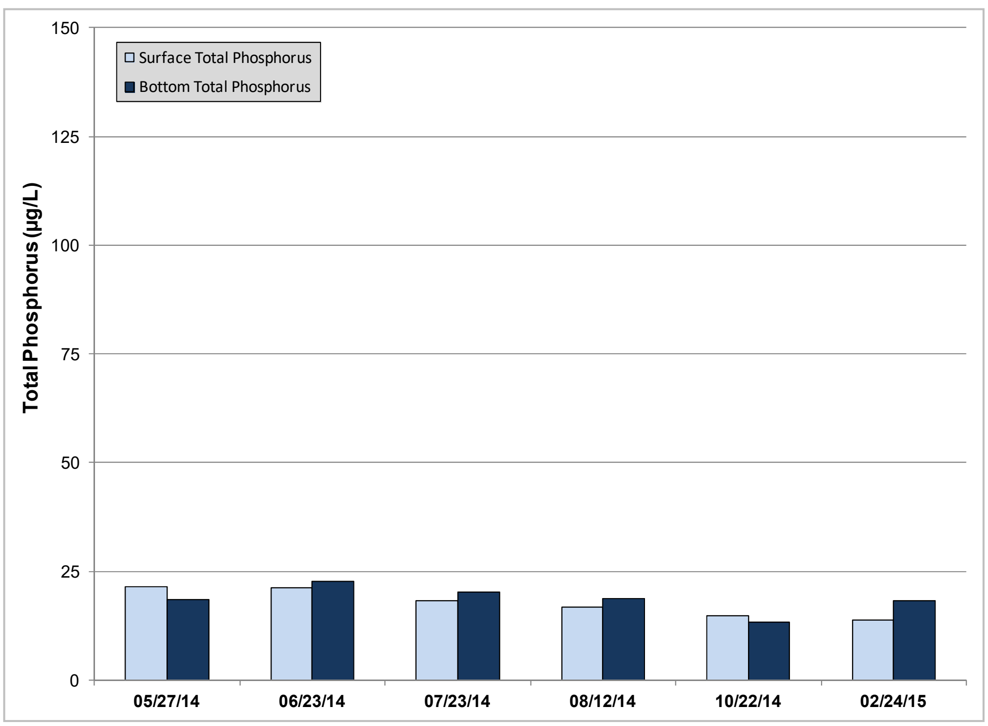


Figure 8.6.1-2. Wild Rice Lake surface and bottom total phosphorus values, 2014-2015. Anoxia was observed in the hypolimnion of the lake during August and February sampling visits.

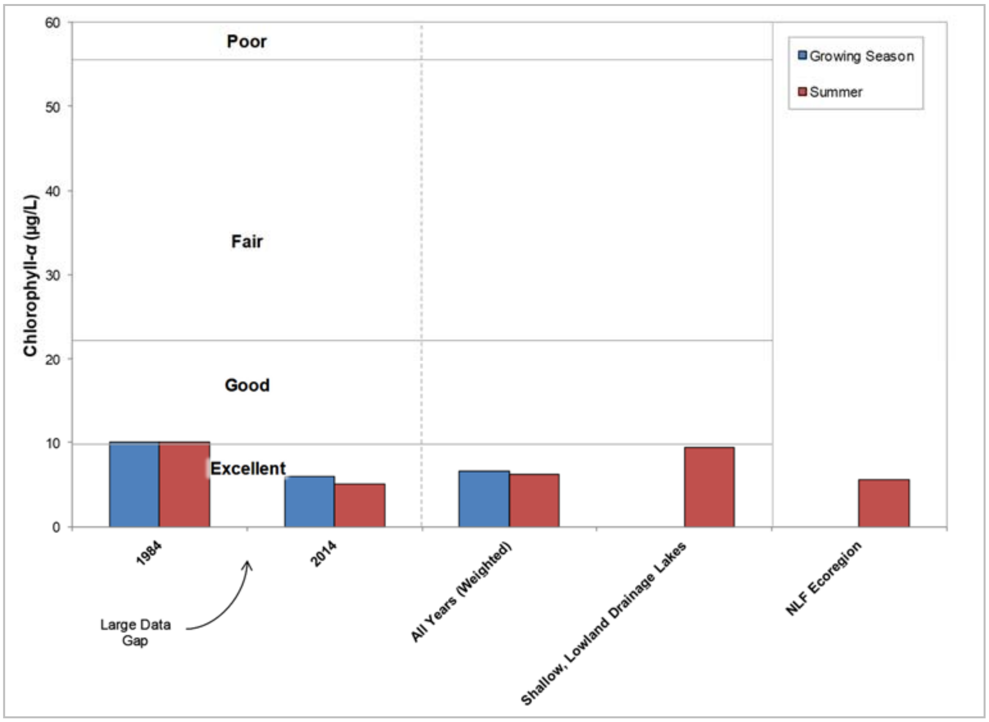


Figure 8.6.1-3. Wild Rice Lake, state-wide shallow, lowland drainage lakes, and regional chlorophyll-*a* concentrations. Mean values calculated with summer month surface sample data. Water Quality Index values adapted from WDNR PUB WT-913.

The clarity of Wild Rice Lake's water can be described as *Excellent* during the summer months in which data has been collected (Figure 8.6.1-4). A weighted average over this timeframe is greater than the median value for other shallow, lowland drainage lakes in the state but is slightly below the regional median. Secchi disk clarity is influenced by many factors, including plankton production and suspended sediments, which themselves vary due to several environmental conditions such as precipitation, sunlight, and nutrient availability. In Wild Rice Lake as well as many other lakes in the Manitowish Waters Chain of Lakes, a natural staining of the water plays a role in light penetration, and thus water clarity, as well. The waters of Wild Rice Lake contain naturally occurring organic acids that are washed into the lake from nearby wetlands. The acids are not harmful to humans or aquatic species; they are by-products of decomposing terrestrial and wetland plant species. This natural staining may reduce light penetration into the water column, which reduces visibility and also reduces the growing depth of aquatic vegetation within the lake.

"True color" measures the dissolved organic materials in water. Water samples collected in May and July of 2014 were measured for this parameter, and were found to be 40 and 50 Platinum-cobalt units (Pt-co units, or PCU), respectively. Lillie and Mason (1983) categorized lakes with 0-40 PCU as having "low" color, 40-100 PCU as "medium" color, and >100 PCU as high color.

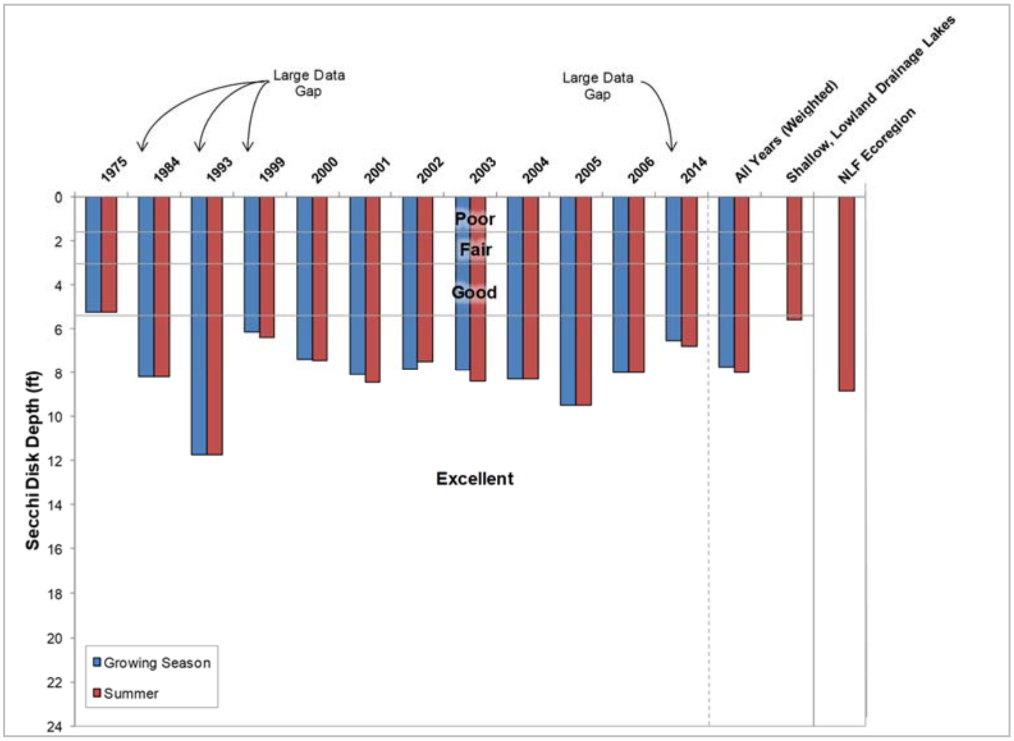


Figure 8.6.1-4. Wild Rice Lake, state-wide shallow, lowland drainage lakes, and regional Secchi disk clarity values. Mean values calculated with summer month surface sample data. Water Quality Index values adapted from WDNR PUB WT-913.

Wild Rice Lake Trophic State

The TSI values calculated with Secchi disk, chlorophyll-*a*, and total phosphorus values range in values spanning from lower mesotrophic to eutrophic (Figure 8.6.1-5). In general, the best values to use in judging a lake's trophic state are the biological parameters; therefore, relying primarily on total phosphorus and chlorophyll-*a* TSI values, it can be concluded that Wild Rice Lake is in a mesotrophic state.

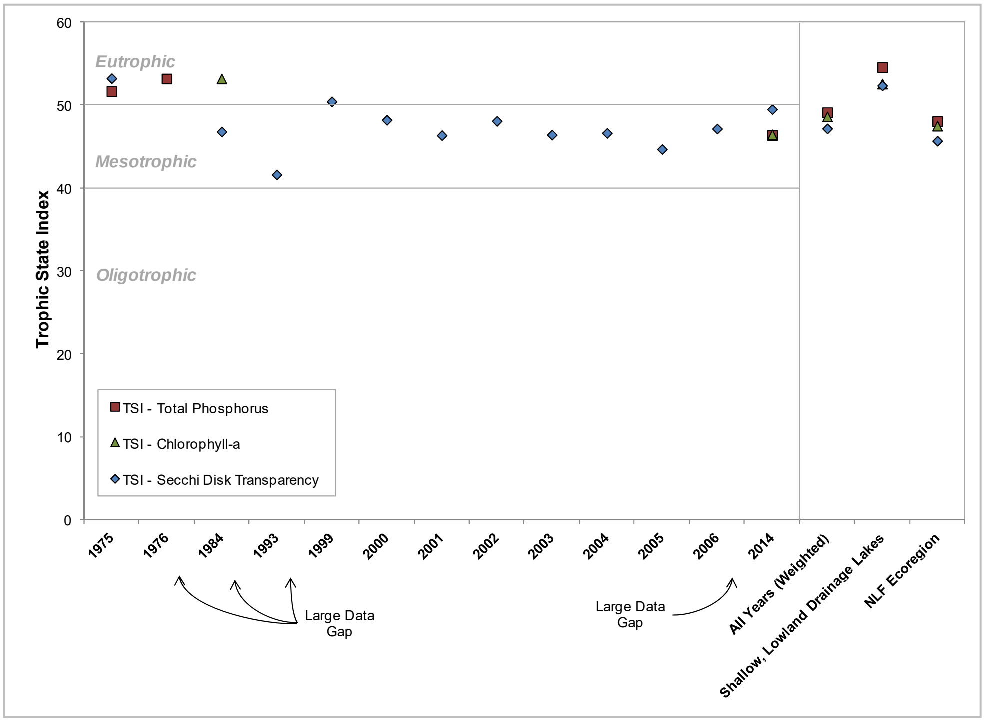


Figure 8.6.1-5. Wild Rice Lake, state-wide shallow, lowland drainage lakes, and regional Trophic State Index values. Values calculated with summer month surface sample data using WDNR PUB-WT-193.

Dissolved Oxygen and Temperature in Wild Rice Lake

Dissolved oxygen and temperature profiles were created during each water quality sampling trip made to Wild Rice Lake by Onterra staff. Graphs of those data are displayed in Figure 8.6.1-6 for all sampling events.

Wild Rice Lake mixes thoroughly during the spring and fall, when changing air temperatures and gusty winds help to mix the water column. During the summer months, the shallow lake likely mixes often as well. The bottom of the lake was found to become void of oxygen (anoxic) several times during the year. This occurrence is not uncommon in Wisconsin lakes, as bacteria break down organic matter that has collected at the bottom of the lake and in doing so utilize any available oxygen. If the lake mixes completely, oxygen will be reintroduced to the lower levels of the water column.

The lake mixes completely again in the fall, re-oxygenating the water in the lower part of the water column. During the winter months, the coldest temperatures are found just under the overlying ice, while oxygen gradually diminishes once again towards the bottom of the lake. In February of 2014, oxygen levels remained sufficient throughout most of the water column to support most aquatic life in northern Wisconsin lakes.

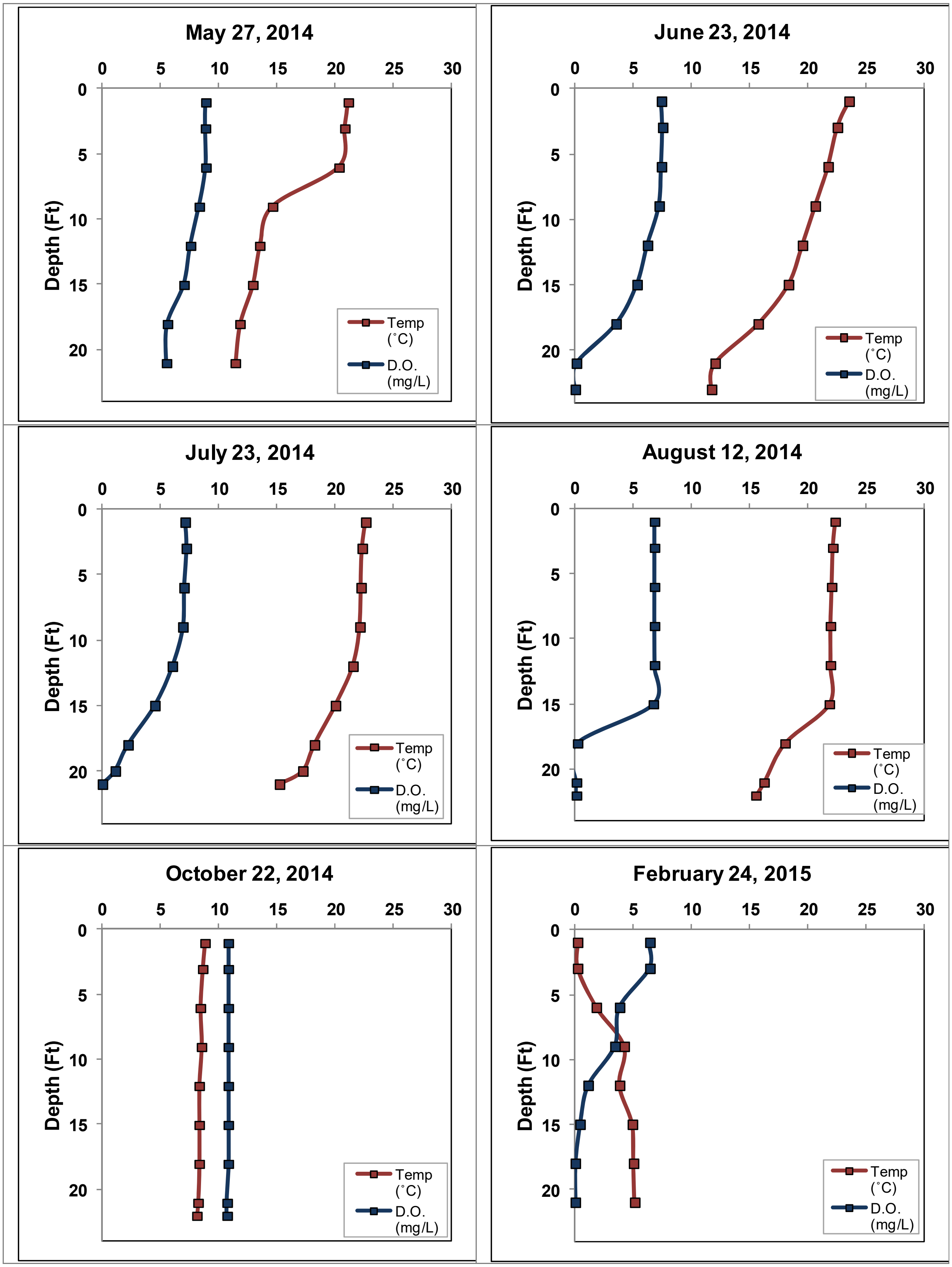


Figure 8.6.1-6. Wild Rice Lake dissolved oxygen and temperature profiles.

Additional Water Quality Data Collected at Wild Rice Lake

The water quality section is centered on lake eutrophication. However, parameters other than water clarity, nutrients, and chlorophyll-*a* were collected as part of the project. These other parameters were collected to increase the understanding of Wild Rice Lake's water quality and are recommended as a part of the WDNR long-term lake trends monitoring protocol. These parameters include; pH, alkalinity, and calcium.

As the Chain-wide Water Quality Section explains, the pH scale ranges from 0 to 14 and indicates the concentration of hydrogen ions (H^+) within the lake's water and is thus an index of the lake's acidity. Wild Rice Lake's surface water pH was measured at roughly 7.5 during May and 8.6 during July of 2014. These values are slightly above neutral and fall within the normal range for Wisconsin lakes. Fluctuations in pH with respect to seasonality is common; in-lake processes such as photosynthesis by plants act to reduce acidity by carbon dioxide removal while decomposition of organic matter add carbon dioxide to water, thereby increasing acidity.

A lake's pH is primarily determined by the amount of alkalinity that is held within the water. Alkalinity is a lake's capacity to resist fluctuations in pH by neutralizing or buffering against inputs such as acid rain. Lakes with low alkalinity have higher amounts of the bicarbonate compound (HCO_3^-) while lakes with a higher alkalinity have more of the carbonate compound of alkalinity ($CO_3^=$). The carbonate form is better at buffering acidity, so lakes with higher alkalinity are less sensitive to acid rain than those with lower alkalinity. The alkalinity in Wild Rice Lake was measured at 36.8 and 43.0 mg/L as $CaCO_3$ in May and July of 2014, respectively. This indicates that the lake has a substantial capacity to resist fluctuations in pH and has a low sensitivity to acid rain.

Samples of calcium were also collected from Wild Rice Lake during 2013. Calcium is commonly examined because invasive and native mussels use the element for shell building and in reproduction. Invasive mussels typically require higher calcium concentrations than native mussels. The commonly accepted pH range for zebra mussels is 7.0 to 9.0, so Wild Rice Lake's pH of 7.5 – 7.6 falls within this range. Lakes with calcium concentrations of less than 12 mg/L are considered to have very low susceptibility to zebra mussel establishment. The calcium concentration of Wild Rice Lake was found to be 11.5 mg/L in July of 2014, which is below but near the optimal range for zebra mussels. Plankton tows were completed by Onterra staff during the summer of 2014 and these samples were processed by the WDNR for larval zebra mussels. No veligers (larval zebra mussels) were found within these samples.

8.6.2 Wild Rice Lake Watershed Assessment

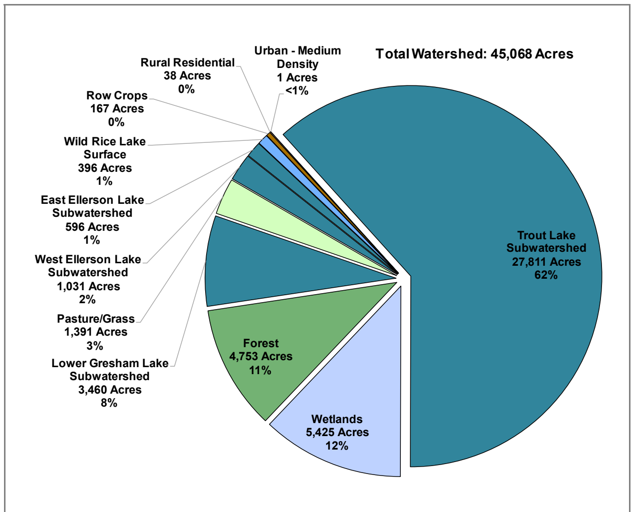


Figure 8.6.2-1. Wild Rice Lake watershed boundary (red line) and proportion of land cover types. Based upon National Land Cover Database (NLCD – Fry et. al 2011).

Wild Rice Lake's watershed is 45,068 acres in size. Compared to Wild Rice Lake's size of 396 acres, this makes for a large watershed to lake area ratio of 46:1. Similar to most lakes that are downstream of other lakes, the large majority of the lake's watershed consists of the lakes immediately upstream. For Wild Rice Lake this means that 27,811 acres (62%) of the lake's watershed is the Trout Lake subwatershed while 5,425 acres (12%) is from wetlands, 4,753 (11%) is from forests, 3,460 acres (8%) from the Lower Gresham Lake subwatershed, 1,391 acres (3%) from pasture/grass, 1,031 acres (2%) from West Ellerson Lake subwatershed, and the rest from various landuses and the lake surface (Figure 8.6.2-1). Wisconsin Lakes Modeling Suite (WiLMS) modeling indicates that Wild Rice Lake's residence time is approximately 31 days, or the water within the lake is completely replaced 11.6 times per year.

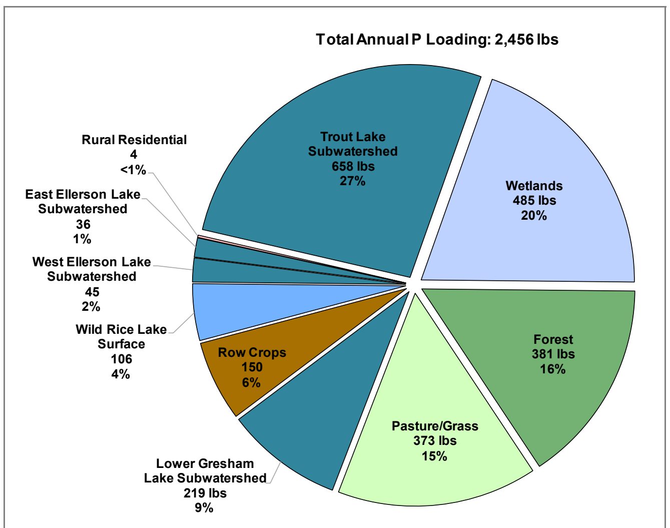


Figure 8.6.2-2. Wild Rice Lake estimated potential annual phosphorus loading. Based upon Wisconsin Lake Modeling Suite (WiLMS) estimates.

Of the estimated 2,456 pounds of phosphorus being delivered to Wild Rice Lake on an annual basis, approximately 658 pounds (27%) originates from the Trout Lake subwatershed, 485 pounds (20%) from wetlands, 381 pounds (16%) from forests, 373 pounds (15%) from pasture and grass, 219 pounds (9%) from the Lower Gresham Lake subwatershed, 150 pounds (6%) from row crops, and the rest from the lake surface itself and East and West Ellerson subwatersheds (Figure 8.6.2-2). Using the estimated annual potential phosphorus load, WiLMS predicted an in-lake growing season average total phosphorus concentration of 16 μg/L, which is very similar to the measured growing season average total phosphorus concentration of 18 μg/L. This means the model works reasonably well for Wild Rice Lake.

Because the large majority of the phosphorus that enters Wild Rice Lake comes from the upstream lakes, especially Trout Lake, efforts to reduce phosphorus levels in Wild Rice Lake should concentrate on reducing phosphorus inputs to the upstream lakes.

8.6.3 Wild Rice Lake Shoreland Condition

Shoreland Development

As mentioned previously in the Chain-wide Shoreland Condition Section, one of the most sensitive areas of the watershed is the immediate shoreland area. This area of land is the last source of protection for a lake against surface water runoff, and is also a critical area for wildlife habitat. In late summer of 2014, Wild Rice Lake's immediate shoreline was assessed in terms of its development. Wild Rice Lake has stretches of shoreland that fit all of the five shoreland assessment categories. In all, 3.0 miles of natural/undeveloped and developed-natural shoreline were observed during the survey (Figure 8.6.3-1). This constitutes about 74% of Wild Rice Lake's shoreline. These shoreland types provide the most benefit to the lake and should be left in their natural state if at all possible. During the survey, 0.5 miles of urbanized and developed–unnatural shoreline (13%) was observed. If restoration of the Wild Rice Lake shoreline is to occur, primary focus should be placed on these shoreland areas as they currently provide little benefit to, and actually may harm, the lake ecosystem. Wild Rice Lake Map 1 displays the location of these shoreline lengths around the entire lake.

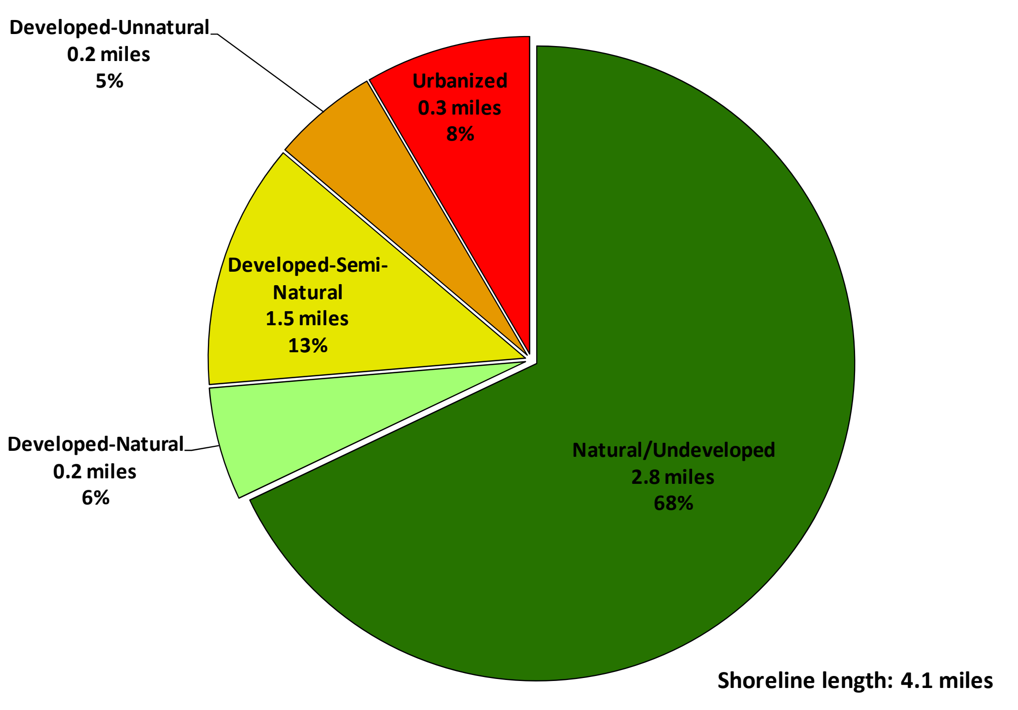


Figure 8.6.3-1. Wild Rice Lake shoreland categories and total lengths. Based upon a late summer 2014 survey. Locations of these categorized shorelands can be found on Wild Rice Lake Map 1.

Coarse Woody Habitat

As part of the shoreland condition assessment, Wild Rice Lake was also surveyed to determine the extent of its coarse woody habitat. Coarse woody habitat was identified and classified in three size categories (2-8 inches in diameter, 8+ inches in diameter, or clusters of pieces) as well as four branching categories: no branches, minimal branches, moderate branches, and full canopy. As discussed earlier, research indicates that fish species prefer some branching as opposed to no branching on coarse woody habitat, and increasing complexity is positively correlated with higher fish species richness, diversity and abundance (Newbrey et al. 2005).

During this survey, 85 total pieces of coarse woody habitat were observed along 4.1 miles of shoreline (Wild Rice Lake Map 2), which gives Wild Rice Lake a coarse woody habitat to shoreline mile ratio of 21:1 (Figure 8.6.3-2). Only instances where emergent coarse woody habitat extended from shore into the water were recorded during the survey. Sixty-four pieces of 2-8 inches in diameter pieces of coarse woody habitat were found, twenty-one pieces of 8+ inches in diameter pieces of coarse woody habitat were found, and no instances of clusters of coarse woody habitat were found.

To put this into perspective, Wisconsin researchers have found that in completely undeveloped lakes, an average of 345 coarse woody habitat structures may be found per mile (Christensen et al. 1996). Please note the methodologies between the surveys done on Wild Rice Lake and those cited in this literature comparison are much different, but still provide a valuable insight into what undisturbed shorelines may have in terms of coarse woody habitat.

Onterra has completed coarse woody habitat surveys on 98 lakes throughout Wisconsin since 2012, with the majority occurring in the NLF ecoregion on lakes with public access. The number of coarse woody habitat pieces per shoreline mile in Wild Rice Lake falls below the median of these 98 lakes (Figure 8.6.3-2).

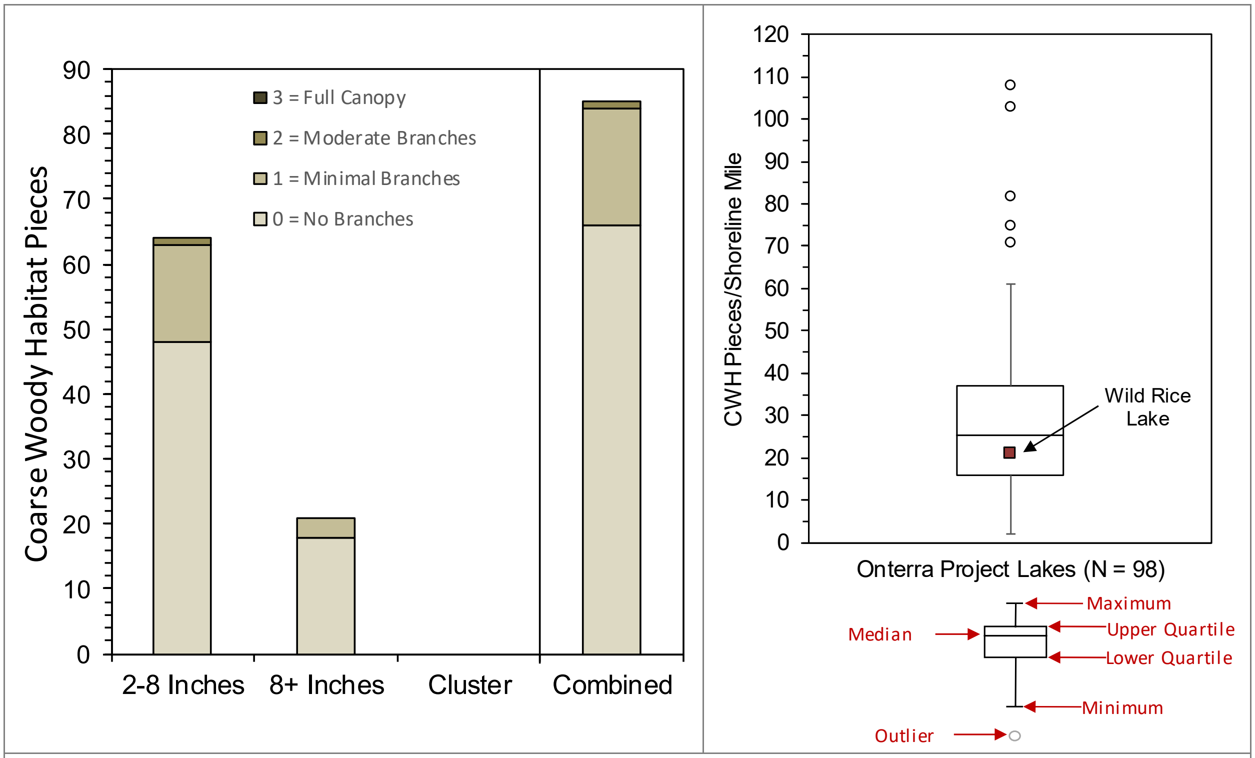


Figure 8.6.3-2. Wild Rice Lake coarse woody habitat survey results. Based upon a late summer 2014 survey. Locations of the Wild Rice Lake coarse woody habitat can be found on Wild Rice Lake Map 2.

8.6.4 Wild Rice Lake Aquatic Vegetation

An early season aquatic invasive species survey was conducted on Wild Rice Lake on July 2, 2014. While the intent of this survey is to locate *any* potential non-native species within the lake, the primary focus is to locate occurrences of curly-leaf pondweed which should be at or near its peak growth at this time. During this meander-based survey of the littoral zone, Onterra ecologists did not locate any occurrences of curly-leaf pondweed or any other submersed non-native aquatic plant species.

The aquatic plant point-intercept survey was conducted on Wild Rice Lake on July 29, 2014 by Onterra. The floating-leaf and emergent plant community mapping survey was completed on that same day to map these community types. During all surveys, 47 species of native aquatic plants were located in Wild Rice Lake (Table 8.6.4-1). 35 of these species were sampled directly during the point-intercept survey and are used in the analysis that follows, while 12 species were observed incidentally during visits to Wild Rice Lake.

Aquatic plants were found growing to a depth of 14 feet. As discussed later on within this section, many of the plants found in this survey indicate that the overall community is healthy, diverse and in one species case somewhat rare. Of the 222 point-intercept locations sampled within the littoral zone, roughly 77% contained aquatic vegetation. Wild Rice Lake Map 3 indicates that most of the point-intercept locations that contained aquatic vegetation are located in shallow bays that are more likely to hold organic substrates. Approximately 26% of the point-intercept sampling locations where sediment data was collected at were sand, 65% consisted of a fine, organic substrate (muck) and 10% were determined to be rocky (Chain-wide Fisheries Section, Table 3.5-5).

Table 8.6.4-1. Aquatic plant species located in Wild Rice Lake during 2013 plant surveys.

Growth Form	Scientific Name	Common Name	Coefficient of Conservatism (C)	2014 (Onterra)
Emergent	*Dulichium arundinaceum*	Three-way sedge	9	X
	Eleocharis palustris	Creeping spikerush	6	X
	Glyceria borealis	Northern manna grass	8	I
	Iris versicolor	Northern blue flag	5	I
	Lythrum salicaria	Purple loosestrife	Exotic	I
	Myrica gale	Sweet gale	9	I
	Pontederia cordata	Pickerelweed	9	I
	Sagittaria latifolia	Common arrowhead	3	I
	Schoenoplectus tabernaemontani	Softstem bulrush	4	X
	Zizania sp.	Wild rice Species	8	X
FL	*Brasenia schreberi*	Watershield	7	X
	Nuphar variegata	Spatterdock	6	I
	Nuphar x *rubrodisca*	Intermediate pond-lily	9	I
	Nymphaea odorata	White water lily	6	X
	Nuphar microphylla	Yellow water lily	9	I
FL/E	*Sparganium eurycarpum*	Common bur-reed	5	I
	Sparganium fluctuans	Floating-leaf bur-reed	10	X
Submergent	*Bidens beckii*	Water marigold	8	X
	Chara spp.	Muskgrasses	7	X
	Ceratophyllum demersum	Coontail	3	X
	Elodea canadensis	Common waterweed	3	X
	Heteranthera dubia	Water stargrass	6	X
	Isoetes spp.	Quillwort species	N/A	X
	Myriophyllum sibiricum	Northern watermilfoil	7	X
	Nitella spp.	Stoneworts	7	X
	Najas flexilis	Slender naiad	6	X
	Potamogeton pusillus	Small pondweed	7	X
	Potamogeton epihydrus	Ribbon-leaf pondweed	8	X
	Potamogeton friesii	Fries' pondweed	8	X
	Potamogeton gramineus	Variable pondweed	7	X
	Potamogeton natans	Floating-leaf pondweed	5	X
	Potamogeton spirillus	Spiral-fruited pondweed	8	X
	Potamogeton praelongus	White-stem pondweed	8	X
	Potamogeton berchtoldii	Slender pondweed	7	X
	Potamogeton amplifolius	Large-leaf pondweed	7	X
	Potamogeton richardsonii	Clasping-leaf pondweed	5	X
	Potamogeton zosteriformis	Flat-stem pondweed	6	X
	Potamogeton robbinsii	Fern pondweed	8	X
	Stuckenia pectinata	Sago pondweed	3	X
	Utricularia minor	Small bladderwort	10	X
	Utricularia vulgaris	Common bladderwort	7	X
	Vallisneria americana	Wild celery	6	X
S/E	*Eleocharis acicularis*	Needle spikerush	5	X
	Juncus pelocarpus	Brown-fruited rush	8	X
	Sagittaria graminea	Grass-leaved arrowhead	9	I
	Sagittaria cristata	Crested arrowhead	9	I
FF	*Spirodela polyrhiza*	Greater duckweed	5	X

FL = Floating Leaf; FL/E = Floating Leaf and Emergent; S/E = Submergent and Emergent; FF = Free Floating
X = Located on rake during point-intercept survey; I = Incidental Species

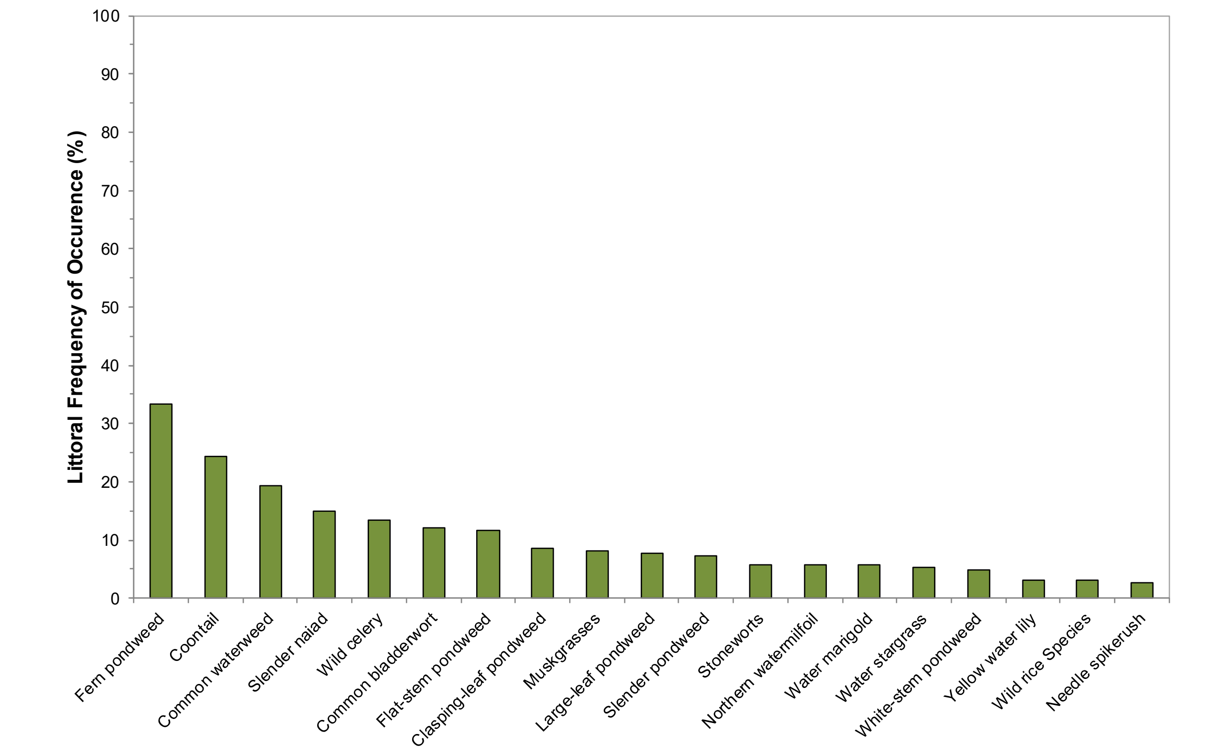


Figure 8.6.4-1. Wild Rice Lake aquatic plant littoral frequency of occurrence analysis. Created using data from a 2014 point-intercept survey. Please note that only species with a frequency of occurrence greater than 2% are depicted.

Figure 8.6.4-1 (above) shows that fern pondweed, coontail and common waterweed were the most frequently encountered plants within Wild Rice Lake. Fern pondweed is a low-growing plant that was likely named after its palm-frond or fern-like appearance. This plant is known to provide habitat for smaller aquatic animals that are used as food by larger, predatory fishes. Coontail and common waterweed are largely un-rooted (although do sometimes possess structures that function similar to roots or become partially buried in the sediment) and their locations can be largely a product of water movement.

During aquatic plant inventories, 47 species of native aquatic plants (including incidentals) were found in Wild Rice Lake. Because of this, one may assume that the system would also have a high diversity. As discussed earlier, how evenly the species are distributed throughout the system also influence the diversity. The diversity index for Wild Rice Lake's plant community (0.93) lies above the Northern Lakes and Forest Lakes ecoregion value (0.86), indicating the lake holds exceptional diversity.

As explained earlier in the Manitowish Waters Chain of Lakes-wide document, the littoral frequency of occurrence analysis allows for an understanding of how often each of the plants is located during the point-intercept survey. Because each sampling location may contain numerous plant species, relative frequency of occurrence is one tool to evaluate how often each plant species is found in relation to all other species found (composition of population). For instance, while fern pondweed was found at 33% of the sampling locations, its relative frequency of occurrence is 16%. Explained another way, if 100 plants were randomly sampled from Wild Rice Lake, 16 of them would be fern pondweed. This distribution can be observed in Figure 8.6.4-2, where together 11 native (and one non-native) species account for 75% of the aquatic plant population within Wild Rice Lake, while the other 26 species account for the remaining 25%. 12 additional native species were found incidentally from the lake but not from of the point-intercept survey, and are indicated in Table 8.6.4-1 as incidentals.

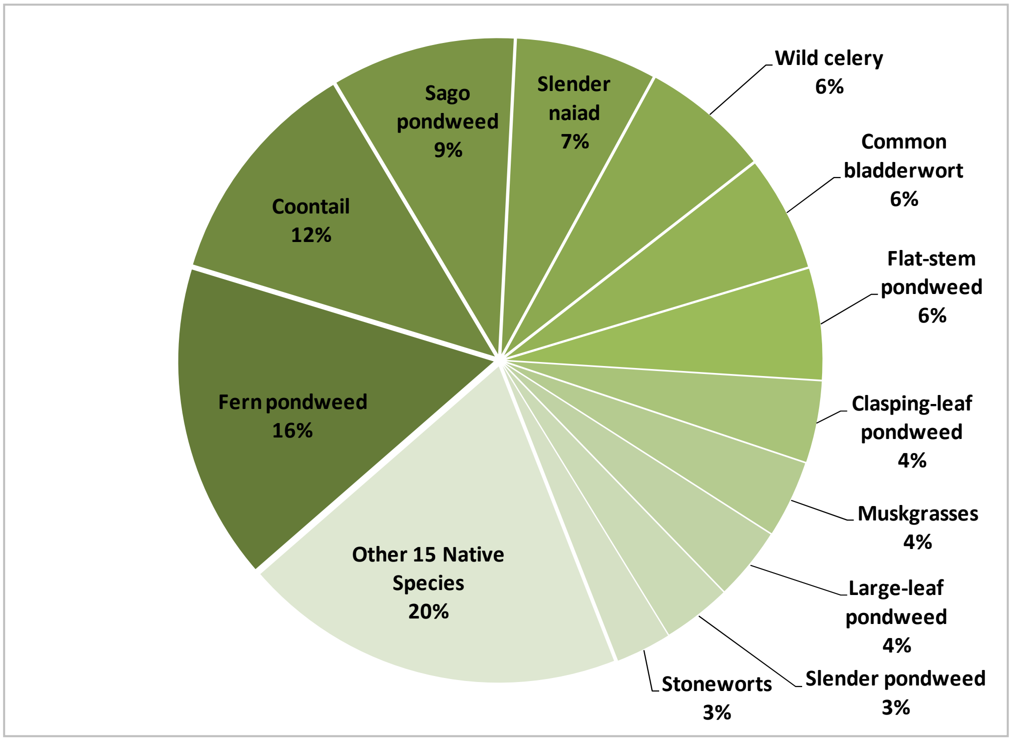


Figure 8.6.4-2. Wild Rice Lake aquatic plant relative frequency of occurrence analysis. Created using data from 2014 point-intercept survey.

Wild Rice Lake's average conservatism value (6.8) is higher than the state (6.0) and the Northern Lakes and Forests ecoregion median (6.7). This indicates that the plant community of Wild Rice Lake is indicative of a moderately disturbed system. Combining Wild Rice Lake's species richness and average conservatism values to produce its Floristic Quality Index (FQI) results in a value of 38.3 which is above the median values of the ecoregion and state.

The quality of Wild Rice Lake is also indicated by the high incidence of emergent and floating-leaf plant communities that occur in many areas. The 2014 community map indicates that approximately 27.0 acres of the lake contains these types of plant communities (Wild Rice Lake Map 4, Table 8.6.4-2). Seventeen floating-leaf and emergent species were located on Wild Rice Lake (Table 8.6.4-1), all of which provide valuable wildlife habitat.

Table 8.6.4-2. Wild Rice Lake acres of emergent and floating-leaf plant communities from the 2014 community mapping survey.

Plant Community	Acres
Emergent	8.3
Floating-leaf	4.9
Mixed Floating-leaf and Emergent	13.8
Total	27.0

The community map represents a 'snapshot' of the emergent and floating-leaf plant communities, replications of this survey through time will provide a valuable understanding of the dynamics of these communities within Wild Rice Lake. This is important, because these communities are often negatively affected by recreational use and shoreland development. Radomski and Goeman (2001) found a 66% reduction in vegetation coverage on developed shorelines when compared to undeveloped shorelines in Minnesota Lakes. Furthermore, they also found a significant reduction in abundance and size of northern pike (*Esox lucius*), bluegill (*Lepomis macrochirus*), and pumpkinseed (*Lepomis gibbosus*) associated with these developed shorelines.

Non-Native Aquatic Plants in Wild Rice Lake

Purple loosestrife

Purple loosestrife (*Lythrum salicaria*) is a perennial herbaceous plant native to Europe and was likely brought over to North America as a garden ornamental. This plant escaped from its garden landscape into wetland environments where it is able to out-compete our native plants for space and resources. First detected in Wisconsin in the 1930's, it has now spread to 70 of the state's 72 counties. Purple loosestrife largely spreads by seed, but also can vegetatively spread from root or stem fragments.

In Wild Rice Lake, purple loosestrife was located along the western shoreline of the lake (Wild Rice Lake – Map 4). There are a number of effective control strategies for combating this aggressive plant, including herbicide application, biological control by native beetles, and manual hand removal. Due to the low occurrence and distribution of plants, hand removal by volunteers is likely the best option as it would decrease costs significantly. Additional purple loosestrife monitoring would be required to ensure the eradication of the plant from the shorelines and wetland areas around Wild Rice Lake.

8.6.5 Wild Rice Lake Fisheries Data Integration

Fishery management is an important aspect in the comprehensive management of a lake ecosystem; therefore, a brief summary of available data is included here and within each lake's individual report section as a reference. The following section is not intended to be a comprehensive plan for the lake's fishery, as those aspects are currently being conducted by the fisheries biologists overseeing Wild Rice Lake. The goal of this section is to provide an overview of some of the data that exists. Although current fish data were not collected as a part of this project, the following information was compiled based upon data available from the Wisconsin Department of Natural Resources (WDNR) the Great Lakes Indian Fish and Wildlife Commission (GLIFWC) and personal communications with DNR Fisheries Biologist Hadley Boehm (WDNR 2018 & GLIFWC 2017).

Fish Stocking

To assist in meeting fisheries management goals, the WDNR may stock fry, fingerling or adult fish in a waterbody that were raised in nearby permitted hatcheries (Photograph 8.6.5-1). Stocking of a lake may be done to assist the population of a species due to a lack of natural reproduction in the system, or to otherwise enhance angling opportunities. Wild Rice Lake has been stocked from 1974 to 2016 with walleye and muskellunge (Table 8.6.5-1).

Photograph 8.6.5-1. Fingerling Muskellunge.

Table 8.6.5-1. Stocking data available for Wild Rice Lake (1974-2016).

Year	Species	Strain (Stock)	Age Class	# Fish Stocked	Avg Fish Length (in)
1974	Walleye	Unspecified	Fingerling	14,385	5
1975	Walleye	Unspecified	Fingerling	8,000	3
1975	Muskellunge	Unspecified	Fingerling	400	9
1988	Muskellunge	Unspecified	Fingerling	400	10.5
1990	Muskellunge	Unspecified	Fingerling	400	10
1991	Muskellunge	Unspecified	Fingerling	200	11
1992	Muskellunge	Unspecified	Fingerling	200	10
1993	Muskellunge	Unspecified	Fingerling	200	12
1996	Muskellunge	Unspecified	Fingerling	400	9.8
1998	Muskellunge	Unspecified	Large Fingerling	400	12.2
2000	Muskellunge	Unspecified	Large Fingerling	396	10.3
2002	Muskellunge	Unspecified	Large Fingerling	400	10.1
2004	Muskellunge	Unspecified	Large Fingerling	400	10.5
2006	Muskellunge	Upper Wisconsin River	Large Fingerling	400	10.2
2008	Muskellunge	Upper Wisconsin River	Large Fingerling	400	10.1
2010	Muskellunge	Upper Wisconsin River	Large Fingerling	332	13.1
2012	Muskellunge	Upper Wisconsin River	Large Fingerling	400	10.2
2014	Muskellunge	Upper Wisconsin River	Large Fingerling	398	10.4
2016	Muskellunge	Upper Wisconsin River	Large Fingerling	360	10.9

Wild Rice Lake Spear Harvest Records

Walleye open water spear harvest records are provided in Figure 8.6.5-1 from 1999 to 2017. As many as 65 walleye have been harvested from the lake in the past (1999), but the average harvest is roughly 16 fish in a given year. Spear harvesters on average have taken 89% of the declared quota. Additionally, on average 29% of walleye harvested have been female.

Muskellunge open water spear harvest records are provided in Figure 8.6.5-2 from 1999 to 2017. As many as four muskellunge have been harvested from the lake in the past (2007), however the average harvest is one fish in a given year. Spear harvesters on average have taken 20% of the declared quota.

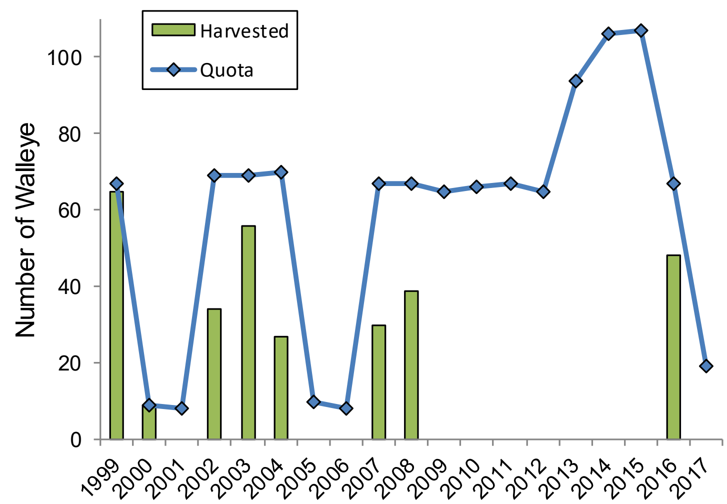


Figure 8.6.5-1. Wild Rice Lake walleye spear harvest data. (GLIFWC 1999-2017).

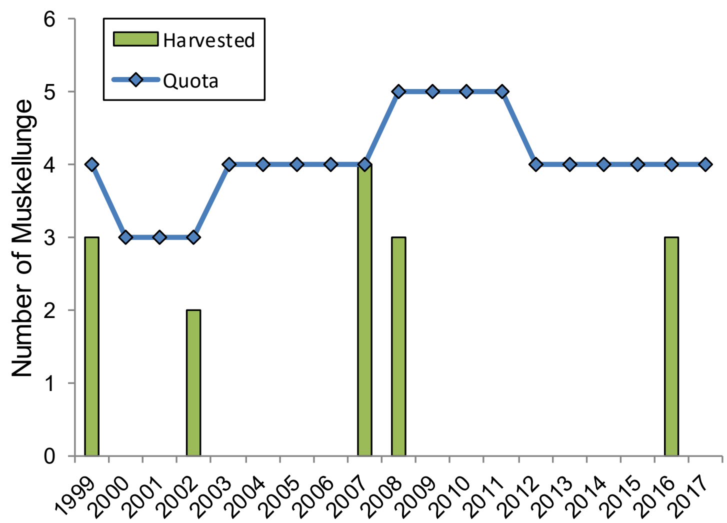
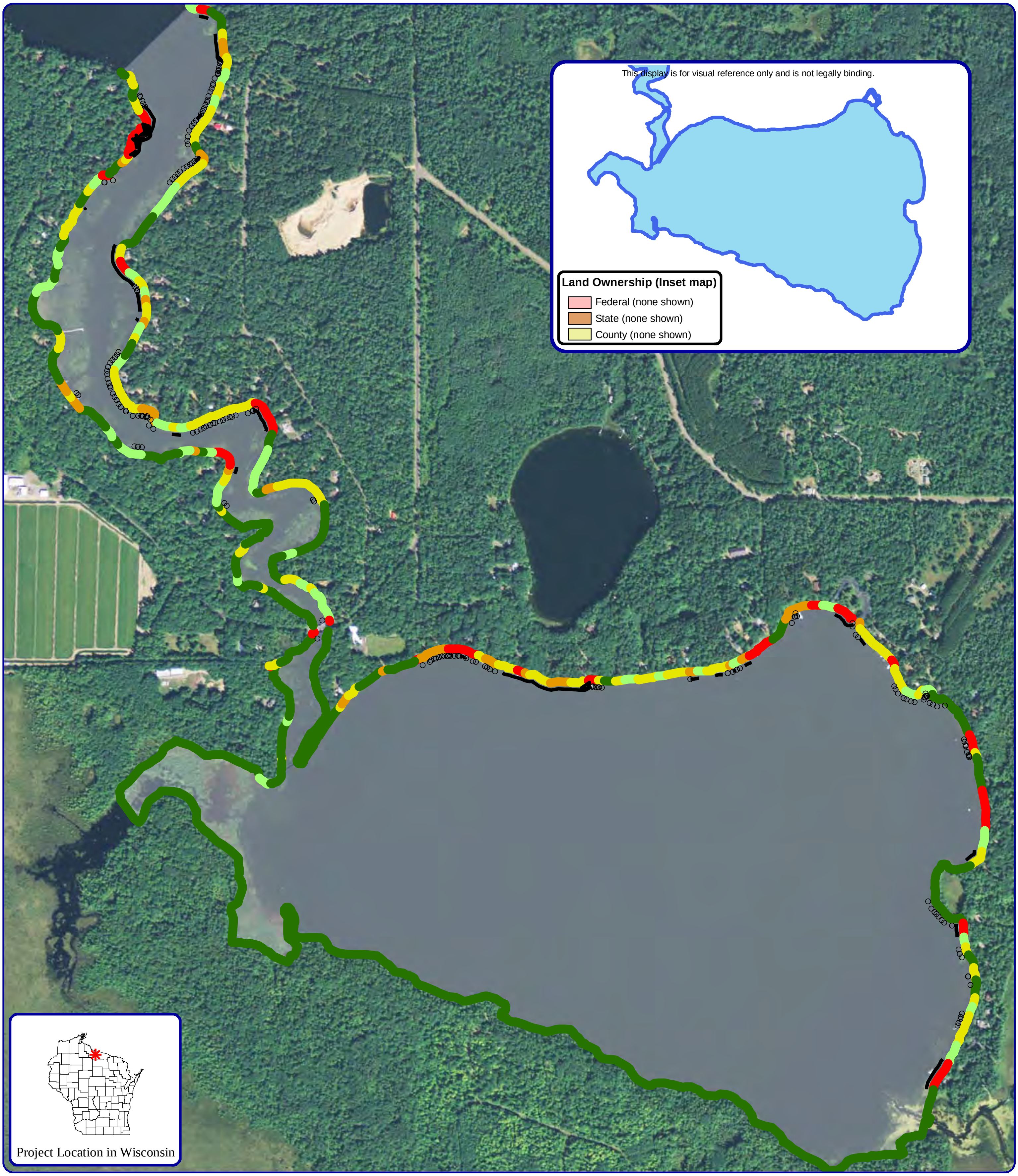


Figure 8.6.5-2. Wild Rice Lake muskellunge spear harvest data. (GLIFWC 1999-2017).



1,000
Feet

Legend

- Natural/Undeveloped
- Developed-Natural
- Developed-Semi-Natural
- Developed-Unnatural
- Urbanized

Seawall

- Masonry/Metal/Wood
- Rip-Rap

Onterra LLC
Lake Management Planning
815 Prosper Road
De Pere, WI 54115
920.338.8860
www.onterra-eco.com

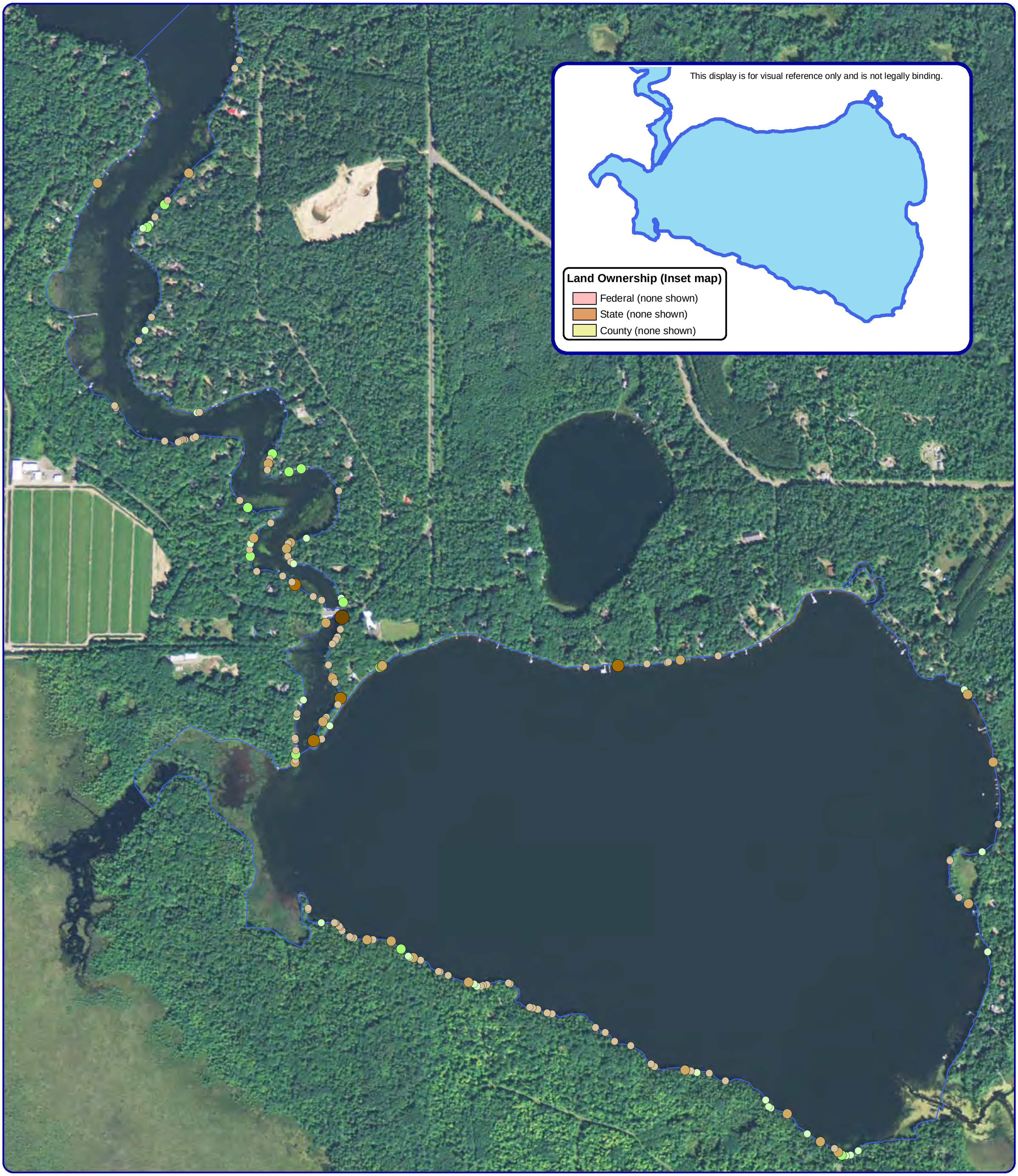
Sources:
Hydro: WDNR
CWH Survey: Onterra, 2014
Orthophotography: NAIP, 2013
Map date: October 21, 2014
Filename: MapX_WildRice_SCA_2014.mxd

Map 1

Wild Rice Lake

Vilas County, Wisconsin

2014 Shoreland Condition Assessment

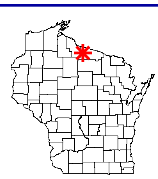


1,000

Feet

Onterra LLC
Lake Management Planning
815 Prosper Road
De Pere, WI 54115
920.338.8860
www.onterra-eco.com

Sources:
Hydro: WDNR
CWH Survey: Onterra, 2014
Orthophotography: NAIP, 2013
Map date: October 21, 2014
Filename: MapX_WildRice_CWH_2014.mxd



Project Location in Wisconsin

Legend

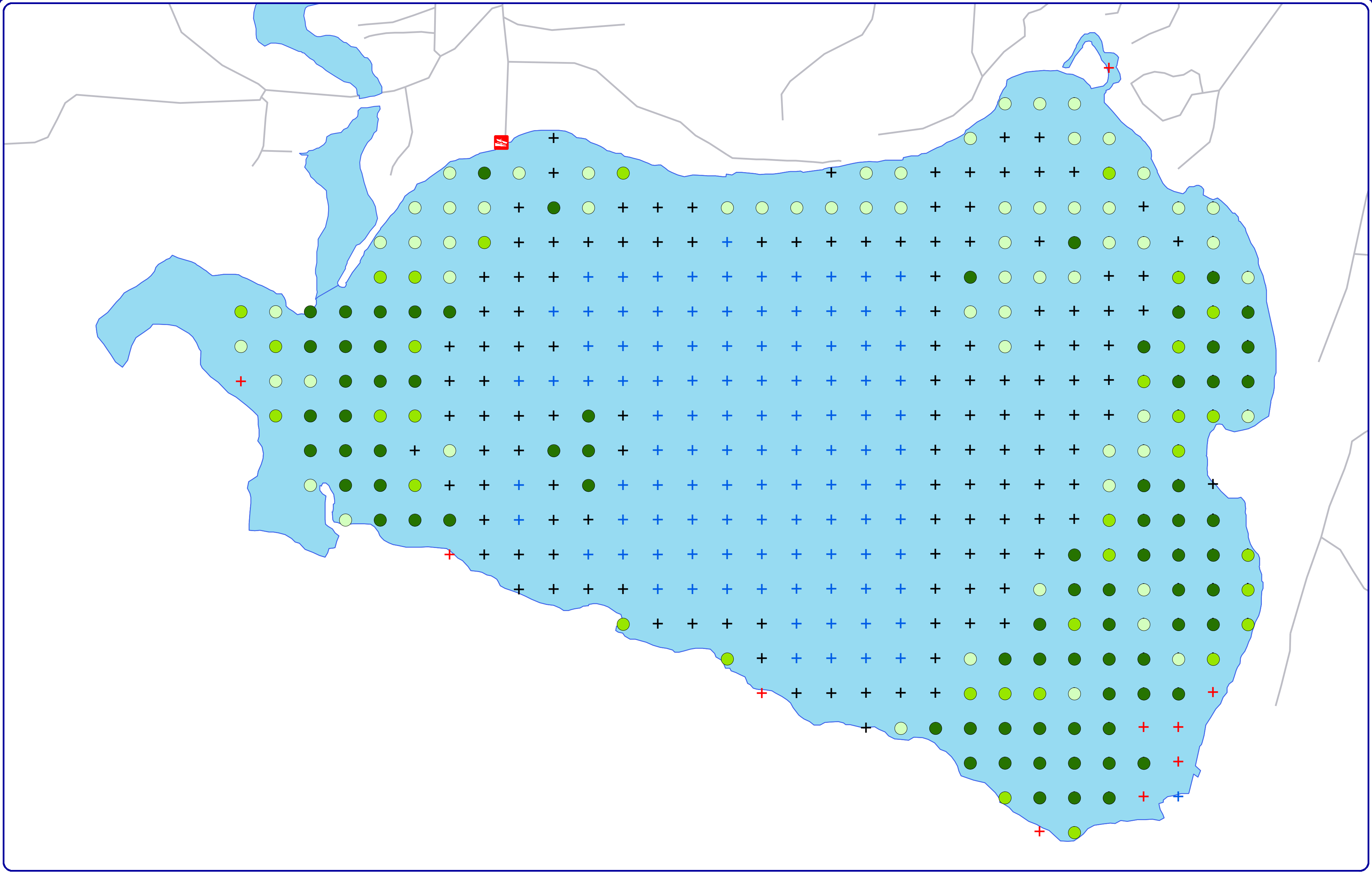
2-8 Inch Pieces	**8+ Inch Pieces**
No Branches	No Branches
Minimal Branches	Minimal Branches
Moderate Branches	Moderate Branches (none)
Full Canopy	Full Canopy (none)

Map 2

Wild Rice Lake

Vilas County, Wisconsin

2014 Coarse Woody Habitat

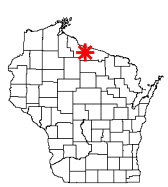


N
W E
S

750
Feet

Onterra LLC
Lake Management Planning
815 Prosper Road
De Pere, WI 54115
920.338.8860
www.onterra-eco.com

Sources:
Hydro and Roads: WDNR
Bathymetry: WDNR, digitized by Onterra
Aquatic Plant Survey: Onterra, 2014
Map Date: December 16, 2014
Filename: *MapX_WildRice_TRFPI_2014.mxd*

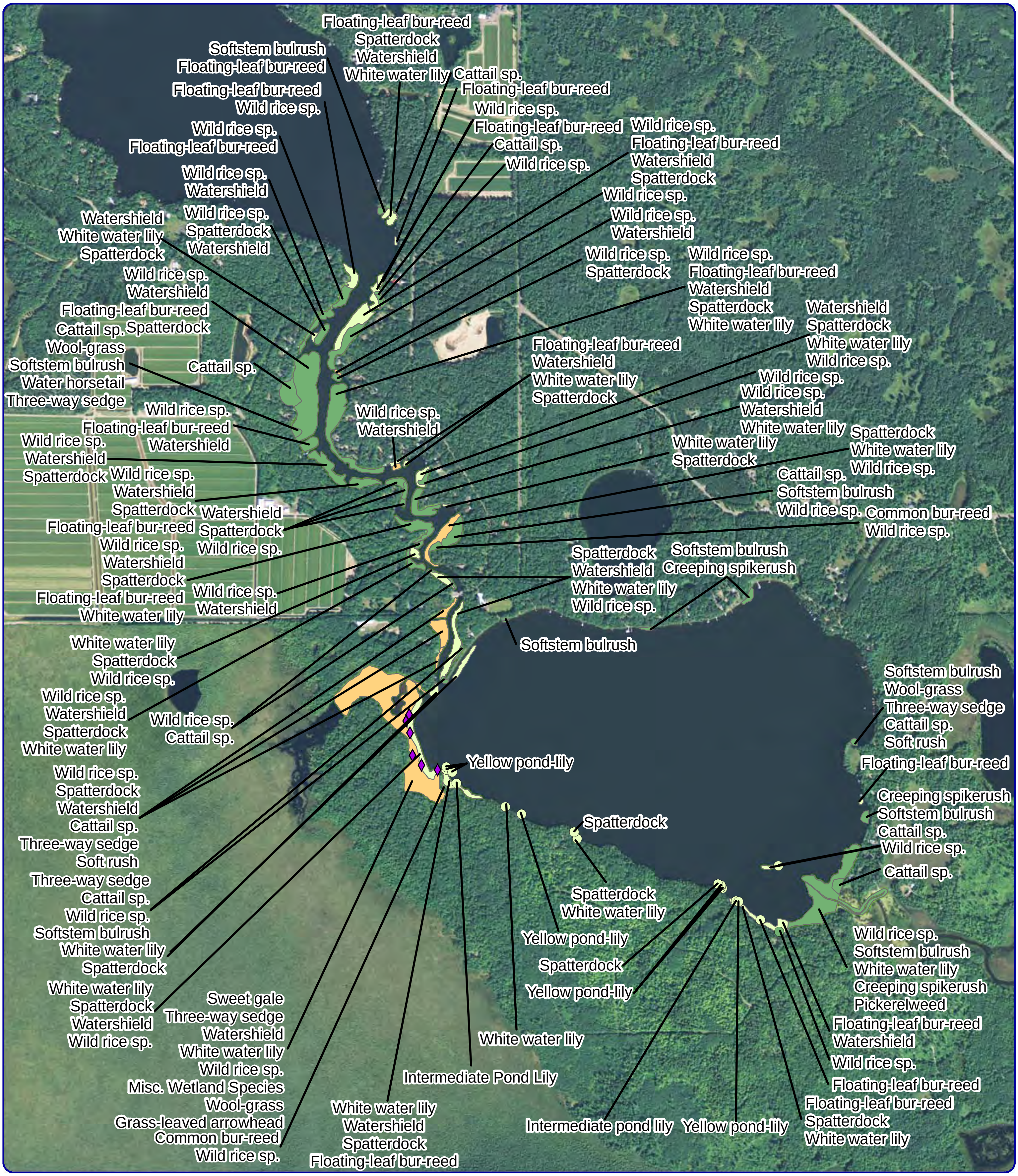

Project Location in Wisconsin

Legend

2014 Point-intercept Survey

Total Rake Fullness = 1
Total Rake Fullness = 2
Total Rake Fullness = 3
No Vegetation
Non-navigable
Deep

Map 3
Wild Rice Lake
Vilas County, Wisconsin
2014 Point-Intercept Survey: Aquatic Vegetation Distribution



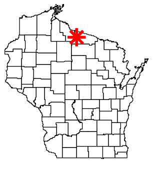
N
W E
S

1,600

Feet

Onterra LLC
Lake Management Planning
815 Prosper Road
De Pere, WI 54115
920.338.8860
www.onterra-eco.com

Sources:
Hydro: WDNR
Aquatic Plants: Onterra, 2014
Orthophotography: NAIP, 2013
Map date: October 14, 2014
Filename: MapX_WildRice_Comm_2014.mxd



Project Location in Wisconsin

Legend

Small Plant Communities
- Emergent
- Floating-leaf
- Mixed Floating-leaf & Emergent
- Purple Loosestrife

Large Plant Communities
- Emergent
- Floating-leaf
- Mixed Floating-leaf & Emergent

Map 4
Wild Rice Lake
Vilas County, Wisconsin

Aquatic Plant Communities