Note: Methodology, explanation of analysis and scientific background on Range Line Lake studies are contained within the Three Lakes Chain-wide Management Plan document.

8.21 Range Line Lake

An Introduction to Range Line Lake

Range Line Lake, Oneida County, is a deep, headwater drainage lake with a maximum depth of 28 feet and a surface area of 123 acres. This lower-eutrophic lake has a relatively large watershed when compared to the size of the lake. Range Line Lake contains 29 native plant species, of which wild celery was the most common plant.

Field Survey Notes

Photo 8.21.1-1 Range Line Lake, Oneida County

Lake at a Glance* – Range Line Lake

Morphology	
Acreage	123
Maximum Depth (ft)	28
Mean Depth (ft)	14
Volume (acre-feet)	
Shoreline Complexity	1.6
Vegetation	
Curly-leaf Survey Date	June 22, 2016
Comprehensive Survey Date	July 21, 2016
Number of Native Species	29
Threatened/Special Concern Species	-
Exotic Plant Species	Pale yellow iris (*Iris pseudacorus*)
Simpson's Diversity	0.83
Average Conservatism	7.2
Water Quality	
Wisconsin Lake Classification	Deep, headwater drainage
Trophic State	Lower-Eutrophic
Limiting Nutrient	Phosphorus
Watershed to Lake Area Ratio	8:1

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

8.21.1 Range Line Lake Water Quality

As a part of this project, water quality data was collected from Range Line Lake on six occasions. 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. The WDNR online water quality database SWIMS was accessed as well to search for historical data that may have been collected on the lake. In addition to this project, data has been collected by the WDNR, WVIC and the Citizens Lake Monitoring Network (CLMN).

A small amount of volunteer-collected data exists for Range Line Lake, spanning 1979-2016 with most of the data being collected from 2010-2016. This data is useful because it gives lake managers a perspective of what conditions were in the past, compared to the data collected through this planning project (2016). Volunteer-based monitoring cannot be emphasized enough; these efforts provide consistent, reliable data on which a comparable database may be built. Monitoring should be continued in order to understand trends in the water quality of Range Line Lake for years to come.

During the years in which data has been collected, summer average total phosphorus concentrations have fluctuated a bit, ranging between 9.0 and 31.0 µg/L (Figure 8.21.1-1). These average values rank within the TSI categories of *Good* to *Excellent* categories. A weighted value across all years is comparable to the median for deep, headwater drainage lakes in the state of Wisconsin. As with the total phosphorus values, average chlorophyll-*a* concentrations also rank in the *Good* and *Excellent* categories, and a weighted average is less than the median concentration for similar lakes across the state (Figure 8.21.1-2). As with phosphorus, some fluctuation can be observed within this dataset.

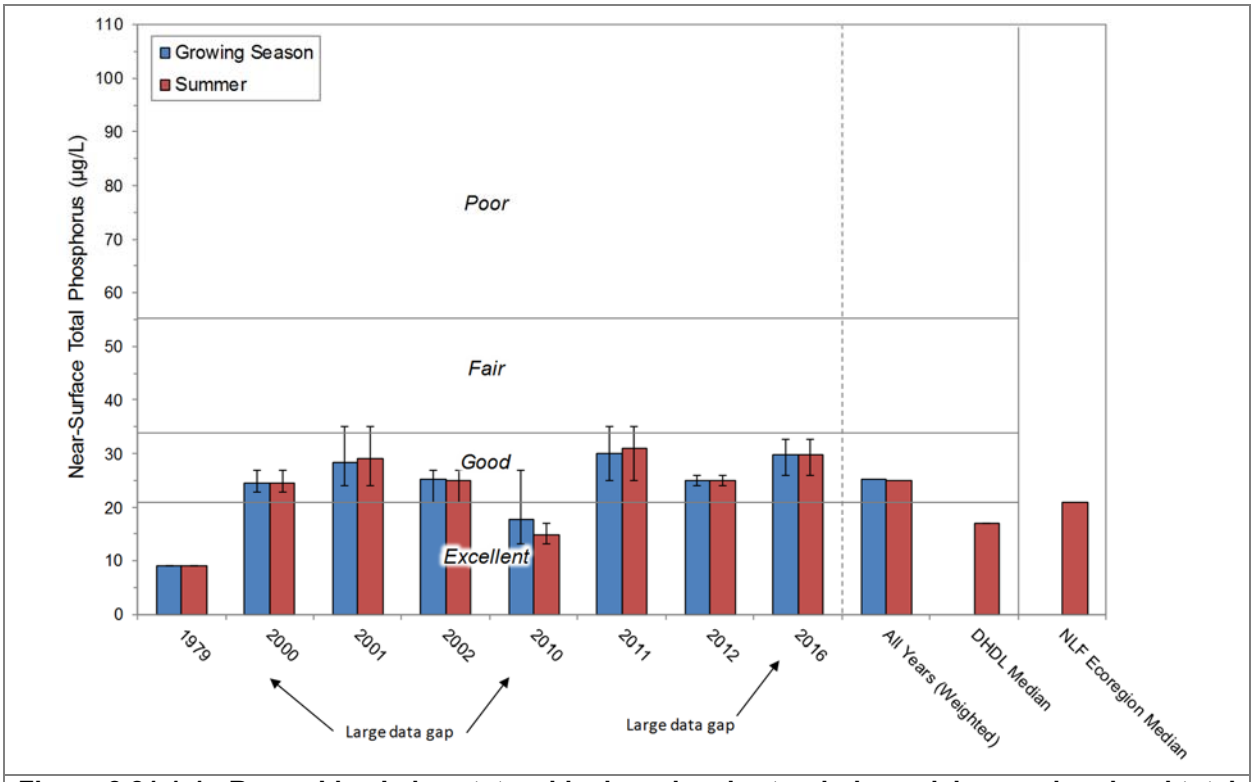

Figure 8.21.1-1. Range Line Lake, state-wide deep, headwater drainage lakes, and regional total phosphorus concentrations. Mean values calculated with summer and growing season surface sample data. Water Quality Index values adapted from WDNR 2013.

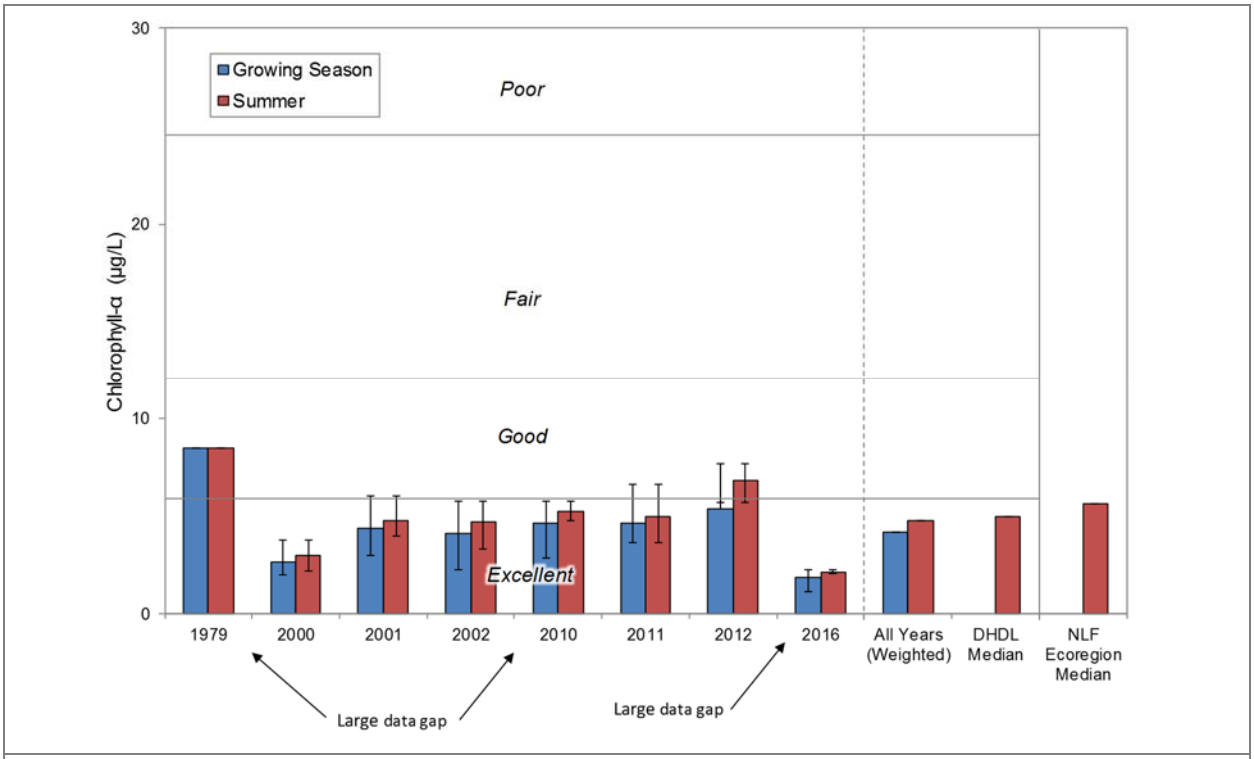

Figure 8.21.1-2. Range Line Lake, state-wide deep, headwater drainage lakes, and regional chlorophyll-*a* concentrations. Mean values calculated with summer and growing season surface sample data. Water Quality Index values adapted from WDNR 2013.

Measurements of Secchi disk clarity span a little larger timeframe than the other two primary water quality parameters (Figure 8.21.1-3). All summer averages fall within the *Fair* to *Excellent* categories with most of the years falling into the *Fair* to *Good* categories, and a weighted average across all years is much less than the median for deep, headwater drainage lakes statewide.

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 lakes, such as the Three Lakes Chain, a natural staining of the water plays a role in light penetration, and thus water clarity, as well. The darker waters of Range Line Lake contain many 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 wetland plant species. This natural staining reduces light penetration into the water column, which reduces visibility but also reduces the growing depth of aquatic vegetation within the lake.

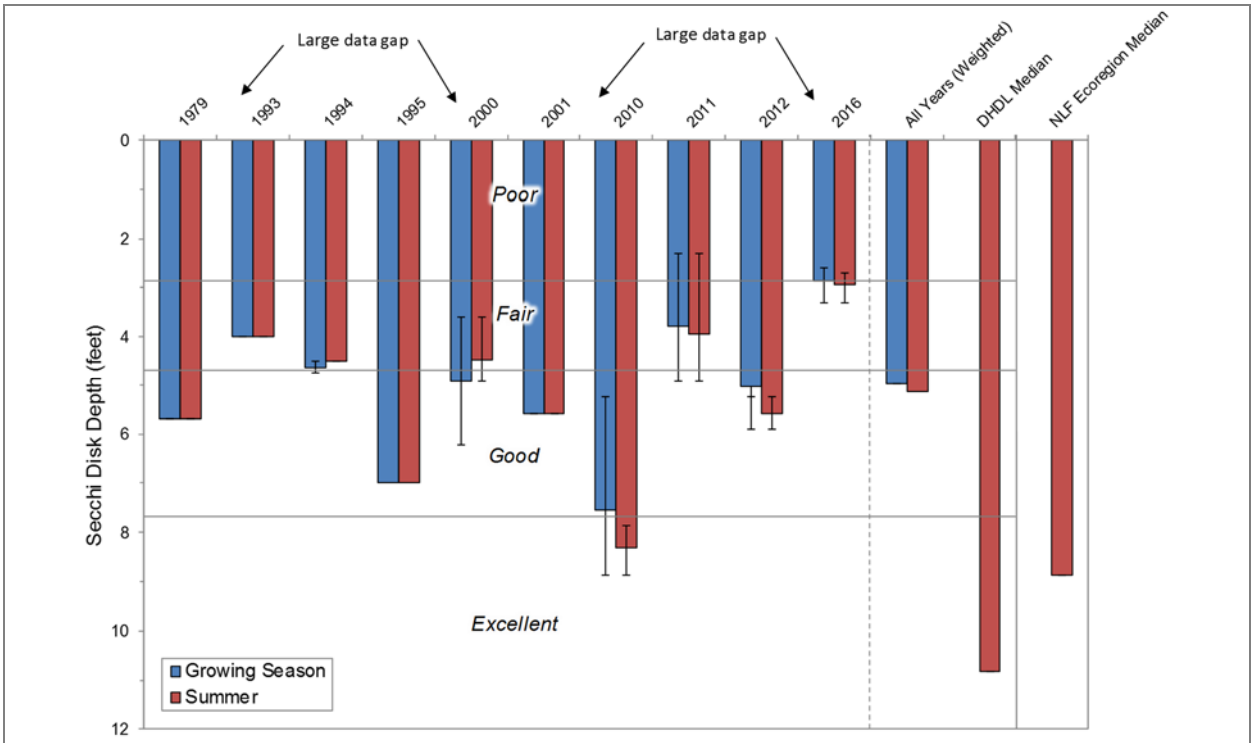

Figure 8.21.1-3. Range Line Lake, state-wide deep, headwater drainage lakes, and regional Secchi disk clarity values. Mean values calculated with summer and growing season surface sample data. Water Quality Index values adapted from WDNR 2013.

Range Line Lake Trophic State

The TSI values calculated with Secchi disk, chlorophyll-*a*, and total phosphorus values range in values spanning from mesotrophic to lower eutrophic (Figure 8.21.1-4). 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 Range Line Lake is in an lower-eutrophic state.

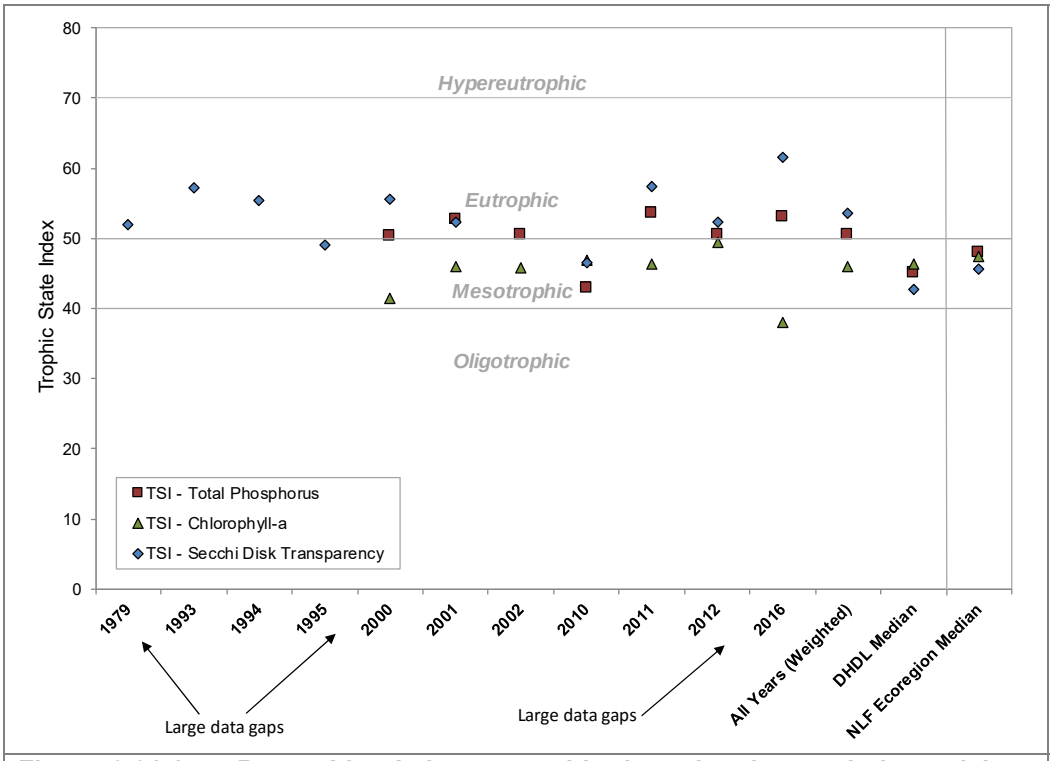

Figure 8.21.1-4. Range Line Lake, state-wide deep, headwater drainage lakes, and regional Wisconsin Trophic State Index values. Values calculated with summer month surface sample data using WDNR 2013.

Dissolved Oxygen and Temperature in Range Line Lake

Dissolved oxygen and temperature profiles were created during each water quality sampling trip made to Range Line Lake by Onterra staff. Graphs of those data are displayed in Figure 8.21.1-5 for all sampling events. Deep lakes such as Range Line Lake stratify during the summer months, meaning that they develop a warmer water layer near the surface and a colder, denser water layer remains near the bottom of the lake. The sampling location in Range Line Lake stratified during the summer months typical of deep, headwater drainage lakes. Ample oxygen concentrations were also present within the winter months of 2017 as well, when dissolved oxygen is of most concern.

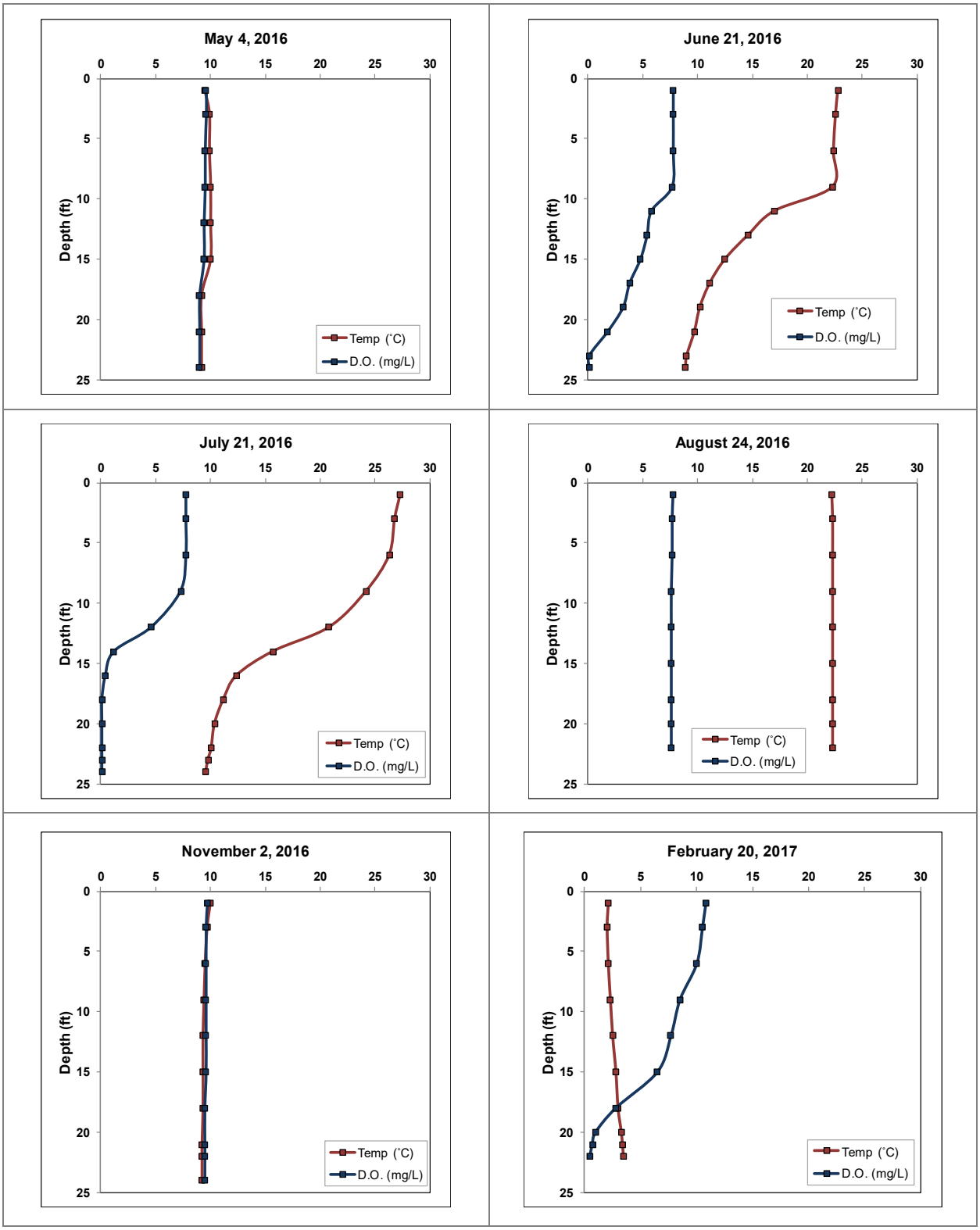

Figure 8.21.1-5. Range Line Lake dissolved oxygen and temperature profiles.

Additional Water Quality Data Collected at Range Line 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 Range Line 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. Range Line Lake's pH was measured at 7.4 in July 2016. This value is near neutral and falls within the normal range for Wisconsin lakes.

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 Range Line Lake was measured at 21.3 (mg/L as $CaCO_3$) near the surface in July, indicating 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 Range Line Lake during the summer of 2016. Calcium is commonly examined because invasive and native mussels use the element to build shells 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 Range Line Lake's pH of 7.4 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 Range Line Lake was found to be 7.4 mg/L, falling below the optimal range for zebra mussels. Plankton tows were completed by Onterra staff during the summer of 2016 and these samples were processed by the WDNR for larval zebra mussels. No veligers (larval zebra mussels) were found within these samples.

8.21.2 Range Line Lake Watershed Assessment

Range Line Lake's watershed is 1,084 acres in size. Compared to the lakes size of 128 acres, this makes for a small watershed to lake area ratio of 8:1.

Exact land cover calculation and modeling of nutrient input to Range Line Lake will be completed towards the end of this project (in 2016-2017). By this time, the latest satellite imagery (and thus the most accurate land cover delineation) will be available. Additionally, when water quality sampling of the upper reaches of the chain is completed, these results will be input to predictive models and thus make the modeling of nutrient input to the entire chain more accurate.

8.21.3 Range Line Lake Shoreland Condition Assessment

Shoreland Development

As mentioned previously in the Chain-wide Watershed 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 the fall of 2016, Range Line Lake's immediate shoreline was assessed in terms of its development. Range Line Lake has stretches of shoreland that fit all of the five shoreland assessment categories. In all, 0.9 miles of natural/undeveloped and developed-natural shoreline (45% of the entire shoreline) were observed during the survey (Figure 8.21.3-1). 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, 0.8 miles of urbanized and developed–unnatural shoreline (37% of the total shoreline) was observed. If restoration of the Range Line 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. Range Line Lake Map 1 displays the location of these shoreline lengths around the entire lake.

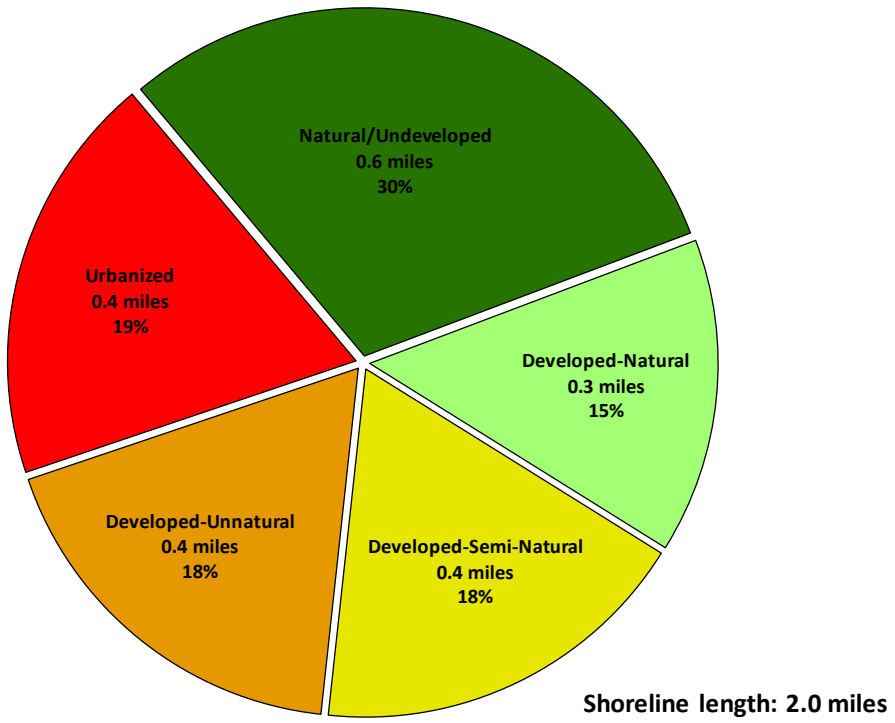

Figure 8.21.3-1. Range Line Lake shoreland categories and total lengths. Based upon a Fall 2016 survey. Locations of these categorized shorelands can be found on the Range Line Lake Map 1.

Coarse Woody Habitat

Range Line Lake was surveyed in 2016 to determine the extent of its coarse woody habitat. A survey for coarse woody habitat was conducted in conjunction with the shoreland assessment (development) survey. Coarse woody habitat was identified, and classified in three size categories (2-8 inches diameter, >8 inches diameter and cluster) 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.

During this survey, 24 total pieces of coarse woody habitat were observed along 2.0 miles of shoreline, which gives Range Line Lake a coarse woody habitat to shoreline mile ratio of 12:1 (Figure 8.21.3-2). Locations of coarse woody habitat are displayed on the Range Line Lake Map 2.

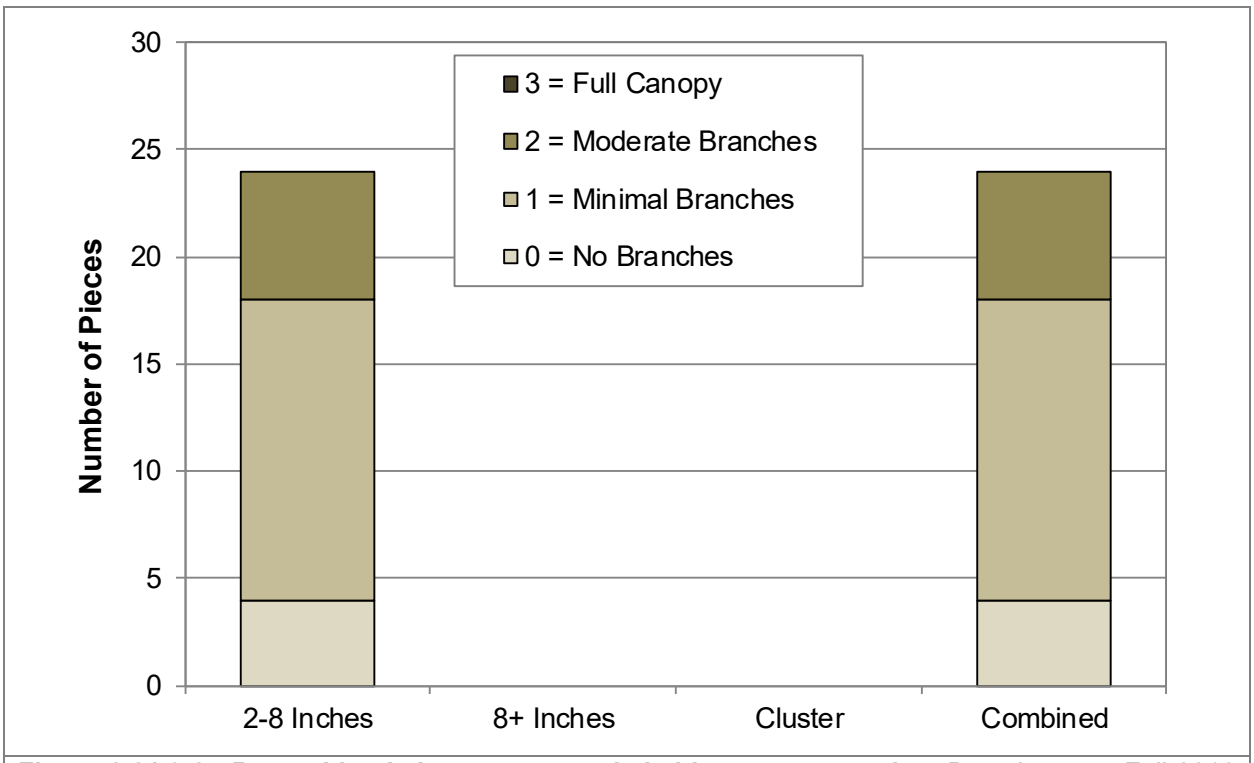

Figure 8.21.3-2. Range Line Lake coarse woody habitat survey results. Based upon a Fall 2016 survey. Locations of Range Line Lake coarse woody habitat can be found on Range Line Lake Map 2.

8.21.4 Range Line Lake Aquatic Vegetation

An Early-Season Aquatic Invasive Species (ESAIS) Survey was conducted by Onterra ecologists on Range Line Lake on June 22, 2016. While the intent of this meander-based survey is to locate any potential non-native species within the lake, the primary focus is to locate occurrences of the non-native curly-leaf pondweed, which should be at or near its peak growth at this time. No non-native aquatic plant species were located in Range Line Lake during this survey.

The whole-lake aquatic plant point-intercept survey and emergent and floating-leaf aquatic plant community mapping survey were conducted on Range Line Lake by Onterra ecologists on July 21, 2016. During these surveys, a total of 29 aquatic plant species were located, one of which was considered to be a non-native, invasive species: pale-yellow iris (Table 8.21.4-1). Lakes in Wisconsin vary in their morphometry, water chemistry, and substrate composition, and all of these factors influence aquatic plant community composition. During the whole-lake aquatic plant point-intercept survey, data regarding sediment type were collected and indicate that approximately 12% of sampling locations contained soft sediments, 76% contained sand, and 12% contained rock. Like terrestrial plants, different aquatic plant species are adapted to grow in certain substrate types; some species are only found growing in soft substrates, others only in sandy areas, and some can be found growing in either. Lakes that have varying substrate types generally support a higher number of plant species because of the different habitat types that are available.

As is discussed in the *Chain-Wide Water Quality* section, the water in many of the lakes within the Three Lakes Chain is stained, or contains a high concentration of dissolved organic acids. These naturally-occurring compounds darken the water reducing light penetration and the depth to which aquatic plants can grow. In 2016, aquatic plants were found growing to a maximum depth of 10.0 feet in Range Line Lake. Of the 66 sampling locations that were at or shallower than the maximum depth of plant growth (the littoral zone), approximately 76% contained aquatic vegetation.

Of the 29 aquatic plant species located in Range Line Lake in 2016, 21 were encountered directly on the rake during the whole-lake point-intercept survey (Figure 8.21.4-1). The remaining 8 plants were located incidentally, meaning they were observed by Onterra ecologists while on the lake but they were not directly sampled on the rake at any of the point-intercept sampling locations. Incidental species typically include emergent and floating-leaf species that are often found growing on the margins of the lake and submersed species that are relatively rare within the plant community. Of the 21 species directly sampled with the rake during the point-intercept survey, wild celery, quillwort spp., and slender naiad were the three most frequently encountered species (Figure 8.21.4-1).

Wild celery, also known as tape or eel grass, was the most frequently encountered aquatic plant species in Range Line Lake in 2016. Wild celery is tolerant of low-light conditions, and its long leaves provide excellent structural habitat for numerous aquatic organisms while its extensive root systems stabilize bottom sediments. Additionally, the leaves, fruit, tubers, and winter buds of wild celery are food sources for numerous species of waterfowl and other wildlife.

Table 8.21.4-1. Aquatic plant species located in Range Line Lake during the 2016 aquatic plant surveys.

Growth Form	Scientific Name	Common Name	Coefficient of Conservatism (C)	2016 (Onterra)
Emergent	*Iris pseudacorus*	Pale-yellow iris	Exotic	I
	Pontederia cordata	Pickerelweed	9	I
	Schoenoplectus acutus	Hardstem bulrush	5	X
	Zizania spp.	Wild rice sp.	8	I
FL	*Nuphar variegata*	Spatterdock	6	X
	Nymphaea odorata	White water lily	6	I
	Sparganium fluctuans	Floating-leaf bur-reed	10	X
Submergent	*Bidens beckii*	Water marigold	8	X
	Chara spp.	Muskgrasses	7	X
	Elodea nuttallii	Slender waterweed	7	X
	Isoetes spp.	Quillwort spp.	8	X
	Myriophyllum sibiricum	Northern water milfoil	7	X
	Najas flexilis	Slender naiad	6	X
	Potamogeton alpinus	Alpine pondweed	9	I
	Potamogeton amplifolius	Large-leaf pondweed	7	I
	Potamogeton berchtoldii	Slender pondweed	7	I
	Potamogeton epihydrus	Ribbon-leaf pondweed	8	X
	Potamogeton gramineus	Variable-leaf pondweed	7	X
	Potamogeton natans	Floating-leaf pondweed	5	X
	Potamogeton praelongus	White-stem pondweed	8	I
	Potamogeton richardsonii	Clasping-leaf pondweed	5	I
	Potamogeton robbinsii	Fern-leaf pondweed	8	X
	Potamogeton spirillus	Spiral-fruited pondweed	8	X
	Potamogeton zosteriformis	Flat-stem pondweed	6	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 cristata	Crested arrowhead	9	I
	Schoenoplectus subterminalis	Water bulrush	9	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

Quillwort spp., the second-most frequently encountered plant located in Range Line Lake, is one of several isoetid species found in Wisconsin. Quillwort is a small, slow growing, inconspicuous plant with evergreen leaves located in a rosette and is usually found growing in sandy soils within the near-shore areas of a lake (Boston and Adams 1987, Vestergaard and Sand-Jensen 2000).

Slender naiad, a common annual species in Wisconsin, was the third-most frequently encountered aquatic plant species in Range Line Lake is considered to be one of the most important food sources for a number of migratory waterfowl species (Borman et al. 1997). Their numerous seeds, leaves, and stems all provide sources of food. The small, condensed network of leaves provide excellent habitat for aquatic invertebrates.

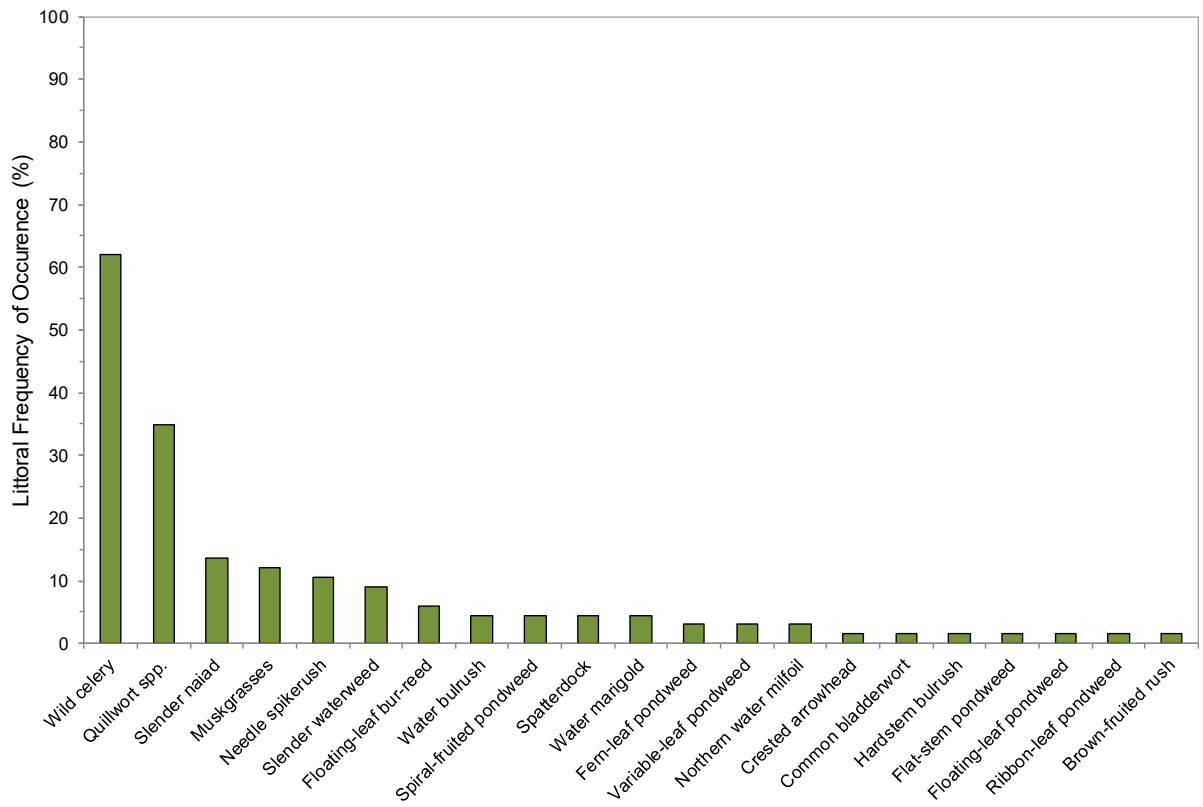

Figure 8.21.4-1. Range Line Lake 2016 littoral frequency of occurrence of aquatic plant species. Created using data from 2016 whole-lake point-intercept survey.

The calculations used to create the Floristic Quality Index (FQI) for a lake's aquatic plant community are based on the aquatic plant species that were encountered on the rake during the point-intercept survey and do not include incidental species. The native species encountered on the rake during the 2016 point-intercept surveys and their conservatism values were used to calculate the FQI of Range Line Lake's aquatic plant community (equation shown below).

$$\text{FQI} = \text{Average Coefficient of Conservatism} * \sqrt{\text{Number of Native Species}}$$

Figure 8.21.4-2 compares Range Line Lake's 2016 FQI components to median values of lakes within the Northern Lakes and Forests Lakes (NLFL) ecoregion and lakes throughout Wisconsin. The number of native species (21), or native species richness, in Range Line Lake is the same as the median value for lakes within the ecoregion and the state. Range Line Lake's average conservatism value of 7.1 also falls above the median value for lakes within the NLFL ecoregion and lakes state-wide. Using Range Line Lake's native species richness and average conservatism yields a Floristic Quality Index value of 32.7, which falls above the median value for lakes within the ecoregion and the state.

This analysis indicates that Range Line Lake contains a higher number of aquatic plant species that are considered to be sensitive to environmental disturbance when compared to other lakes within the NLFL ecoregion and lakes throughout Wisconsin. While Range Line Lake has low water clarity which restricts aquatic plant growth to shallower areas and reduces the amount of

area in which they can grow, the lake possesses a couple shallower bays which contained a higher number of aquatic plant species.

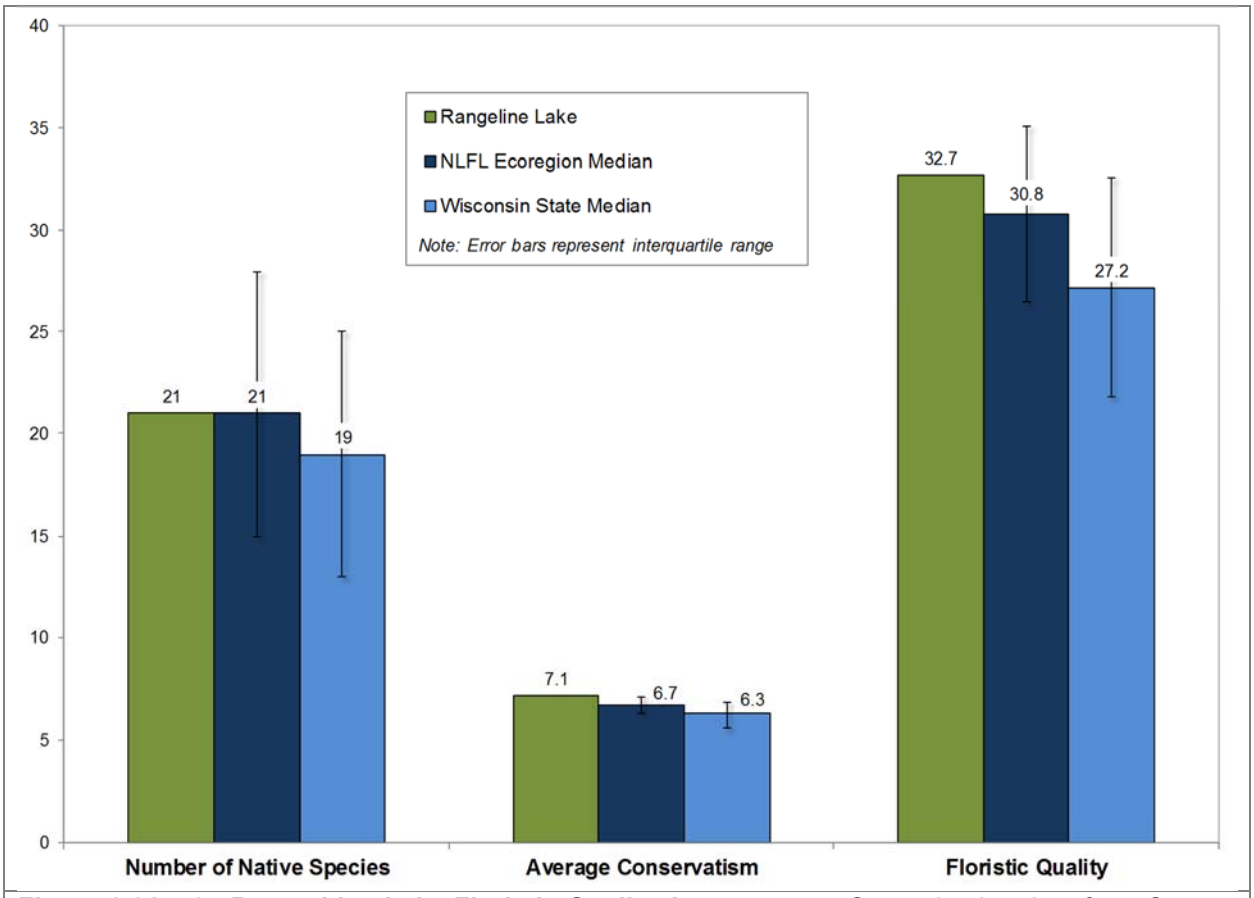

Figure 8.21.4-2. Range Line Lake Floristic Quality Assessment. Created using data from Onterra 2016 whole-lake point-intercept surveys. Analysis follows Nichols (1999).

Lakes with diverse aquatic plant communities have higher resilience to environmental disturbances and greater resistance to invasion by non-native plants. In addition, a plant community with a mosaic of species with differing morphological attributes provides zooplankton, macroinvertebrates, fish, and other wildlife with diverse structural habitat and various sources of food. Species diversity of Range Line Lake's aquatic plant community was also calculated using the data collected in 2016. Unlike species richness, species diversity also takes into account how evenly the species are distributed within the community.

While a method for characterizing diversity values of fair, poor, etc. does not exist, lakes within the same ecoregion may be compared to provide an idea of how Range Line Lake's diversity value ranks. Using data collected by Onterra and WDNR Science Services, quartiles were calculated for 212 lakes within the NLFL ecoregion (Figure 8.21.4-3). Using the data collected from the

2016 point-intercept survey, Range Line Lake's aquatic plant is shown to have a lower species diversity with Simpson's Diversity Index value 0.83. In other words, if two individual aquatic plants were randomly sampled from Range Line Lake in 2016, there would be an 83% probability that they would be different species. This diversity value falls below the median value for lakes within the NLFL ecoregion (0.88) and lakes throughout Wisconsin (0.86).

One way to visualize Range Line Lake's species diversity is to look at the relative occurrence of aquatic plant species. Figure 8.21.4-4 displays the relative frequency of occurrence of aquatic plant species created from the 2016 whole-lake point-intercept survey and illustrates the relatively uneven distribution of aquatic plant species within the community. Approximately 52% of Range Line Lake's aquatic plant community is comprised of just two species: wild celery and quillwort spp. Low species diversity occurs when the plant community is dominated by just one or a few species. Explained another way, if 100 plants were randomly sampled from Range Line Lake, 33 would be wild celery, 19 would be quillwort spp., 7 would be slender naiad, etc.

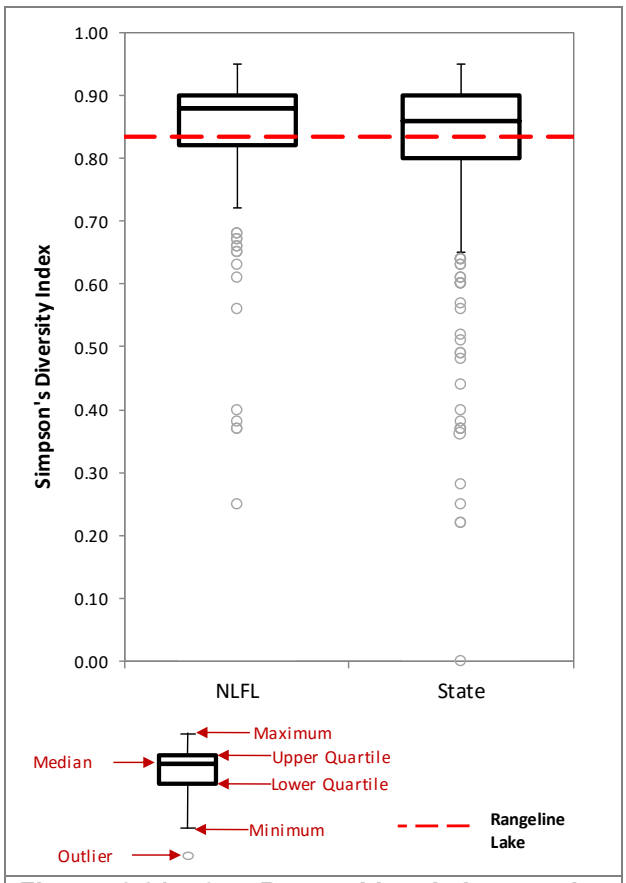

Figure 8.21.4-3. Range Line Lake species diversity index. Created using data from Onterra 2016 point-intercept surveys.

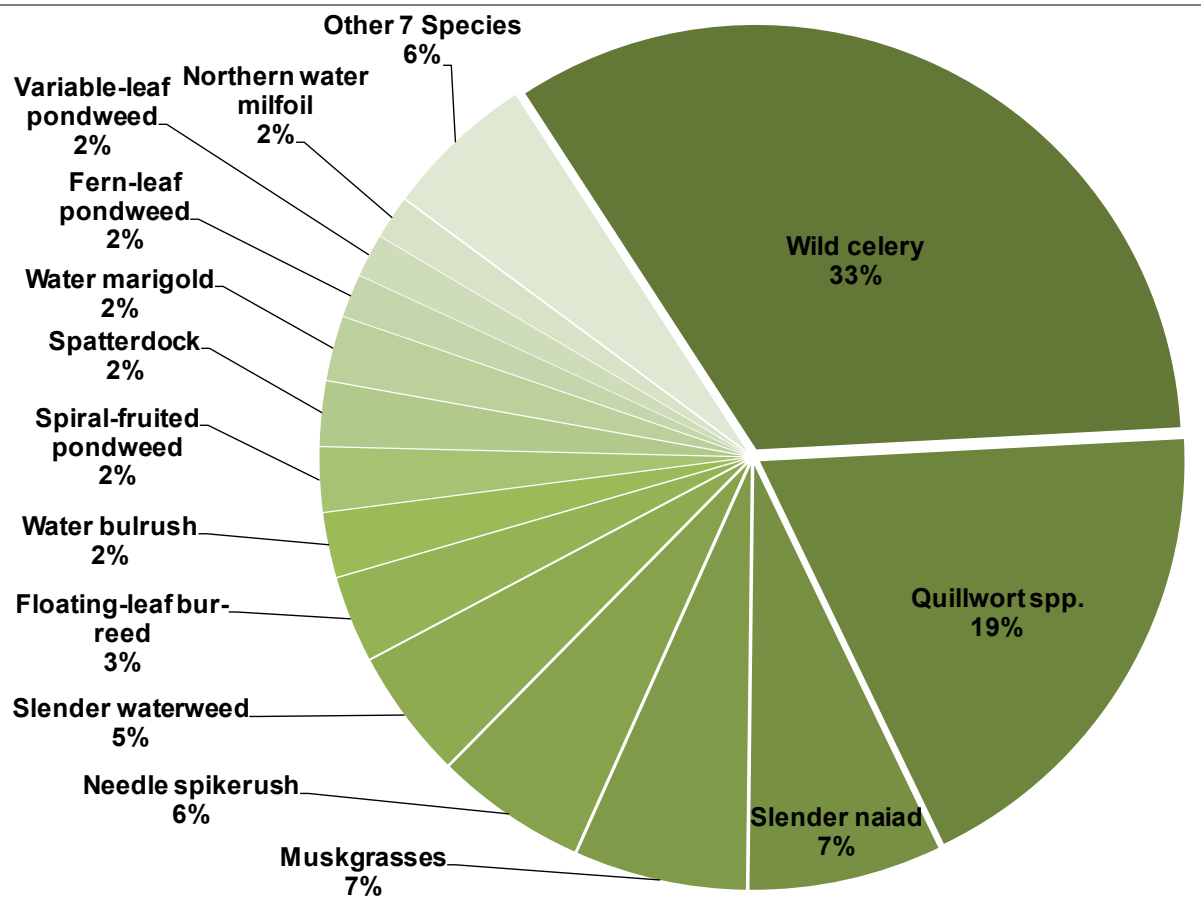

Figure 8.21.4-4. Range Line Lake 2016 relative frequency of occurrence of aquatic plant species. Created using data from 2016 point-intercept survey.

In 2016, Onterra ecologists also conducted a survey aimed at mapping emergent and floating-leaf aquatic plant communities in Range Line Lake. This survey revealed Range Line Lake contains approximately 2.9 acres of these communities comprised of seven different aquatic plant species (Range Line Lake – Map 3 and Table 8.21.4-2). These native emergent and floating-leaf plant communities provide valuable fish and wildlife habitat that is important to the ecosystem of the lake. These areas are particularly important during times of fluctuating water levels, since structural habitat of fallen trees and other forms of course-woody habitat can be quite sparse along the shores of receding water lines.

Table 8.21.4-2. Range Line Lake 2016 acres of emergent and floating-leaf aquatic plant communities. Created using data from 2016 aquatic plant community mapping survey.

Plant Community	Acres
Emergent	0.0
Floating-leaf	2.5
Mixed Emergent & Floating-leaf	0.4
Total	2.9

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 Range Line 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 Range Line Lake

Pale-yellow iris

Pale-yellow iris (*Iris pseudacorus*) is a large, showy iris with bright yellow flowers. Native to Europe and Asia, this species was sold commercially in the United States for ornamental use and has since escaped into Wisconsin's wetland areas forming large monotypic colonies and displacing valuable native wetland species. This species was observed flowering along the shoreline areas on the lake during the early-season aquatic invasive species survey. The locations of pale yellow iris on Range Line Lake can be viewed on Range Line Lake Map 3.

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8.21.5 Range Line Lake Implementation Plan

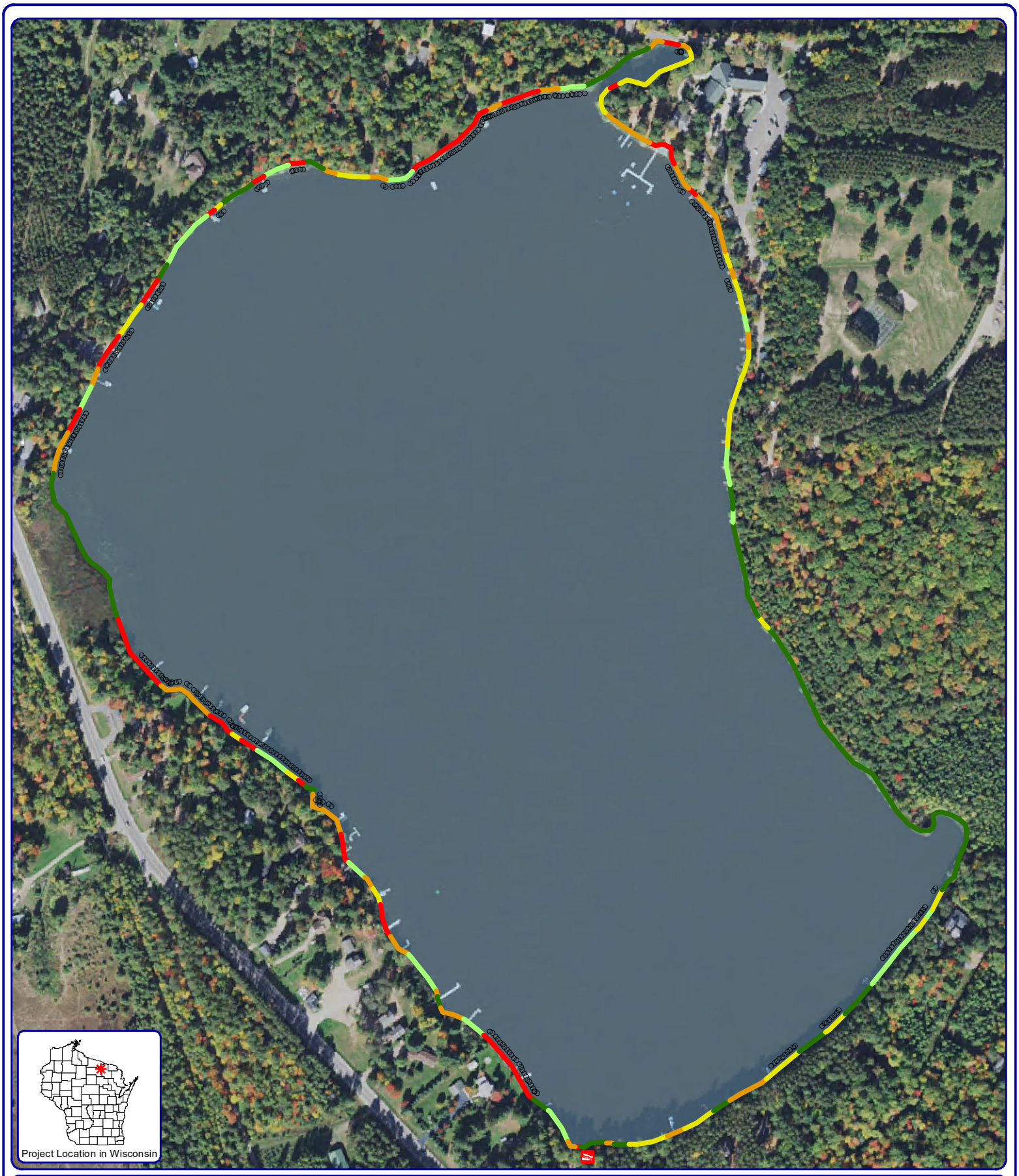
Chain-wide Management Goal 1: Maintain Current Water Quality Conditions

Management Action: Investigate sources of phosphorus to Big, Crystal (Mud), Range Line and Townline Lakes.

Description: As mentioned within the Chain-wide Implementation Plan, evidence of elevated nutrient levels in Range Line Lake was discussed during planning meetings associated with this project. To begin understanding dynamics that may play a role in producing these high nutrient levels, further studies are needed to quantify nutrient inputs to the lake.

In order to identify the source of nutrients in Range Line Lake further studies must be conducted which would consist of a top/bottom paleocore sample analysis of the lake. These studies will help to determine if anthropogenic change is at fault for the differing water quality within Range Line Lake. Maple Lake is similar in morphology to Range Line Lake and will be used as a control to determine naturally occurring total phosphorus increases.

Should the changes in Range Line Lake be significant and believed to be anthropogenic, a full core analysis may be completed under a separate project to determine the time the change first appeared. This timeframe for changes in water quality could assist in determining the anthropogenic cause and potentially provide a resolution.



N
W E
S

400
Feet

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

Sources:
Roads and Hyrdo: WDNR
Ortho: NAIP 2013
Shoreland Condition: Onterra, 2016
Map Date: December 1, 2016
Filename: Rangeline_ShorelandCondition_2016.mxd

Legend

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

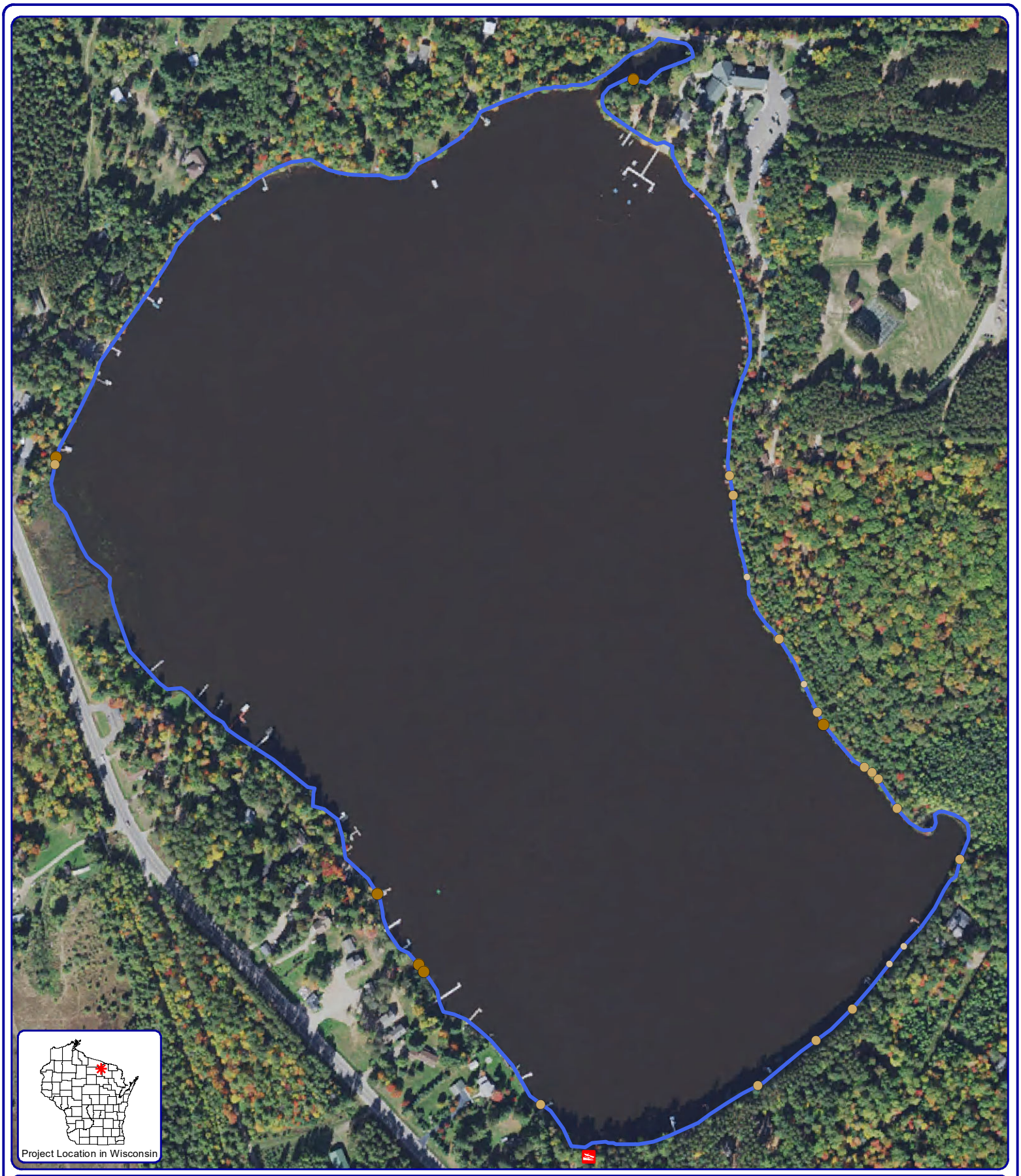
Seawall
Rip-Rap

Range Line Lake - Map 1

Three Lakes Chain

Oneida County, Wisconsin

2016 Shoreline Condition Assessment



N
W E
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400
Feet

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

Sources:
Roads and Hyrdo: WDNR
Ortho: NAIP 2013
CWH Survey: Onterra, 2016
Map Date: December 1, 2016
Filename: Rangeline_CWH_2016.mxd

Legend

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

Range Line Lake - Map 2

Three Lakes Chain

Oneida County, Wisconsin

2016 Coarse Woody Habitat

N
W E
S

450
Feet

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

Sources:
Roads and Hyrdo: WDNR
Aquatic Plants: Onterra, 2016
Map Date: October 24, 2016
Filename: Rangeline_Comm_2016.mxd

Project Location in Wisconsin

Legend

Small Plant Communities
- Emergent
- Floating-leaf
- Mixed Floating-leaf & Emergent
- Pale yellow iris

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

Range Line Lake - Map 3

Three Lakes Chain

Vilas County, Wisconsin

2016 Plant Survey: Community Mapping