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

8.10 Stone Lake

An Introduction to Stone Lake

Stone Lake, Vilas County, is a deep, lowland drainage lake with a maximum depth of 43 feet, a mean depth of 12 feet, and a surface area of approximately 145 acres. Stone Lake is considered to be mesotrophic and its watershed encompasses approximately 137,942 acres. In 2017, 33 native aquatic plant species were found in the lake, of which wild celery (*Vallisneria americana*) is the most common. One non-native plant, curly-leaf pondweed, was found during surveys.

Field Survey Notes

Primarily sandy and rocky substrate observed during the 2017 point-intercept survey. Abundant coarse woody habitat was also observed along the lake's shoreline.

Photo 8.10. Stone Lake, Vilas County

Lake at a Glance* – Stone Lake

Morphology	
Acreage	145
Maximum Depth (ft)	43
Mean Depth (ft)	12
Volume (acre-feet)	1,681
Shoreline Complexity	5.3
Vegetation	
Curly-leaf Survey Date	June 13, 2017
Comprehensive Survey Date	August 9, 2017
Number of Native Species	33
Threatened/Special Concern Species	-
Exotic Plant Species	Curly-leaf pondweed
Simpson's Diversity	0.9
Average Conservatism	6.5
Water Quality	
Wisconsin Lake Classification	Deep, Lowland Drainage
Trophic State	Mesotrophic
Limiting Nutrient	Nitrogen
Watershed to Lake Area Ratio	950:1

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

8.10.1 Stone Lake Water Quality

Water quality data was collected from Stone Lake on six occasions in 2017/2018. 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 2017/2018, any historical data was researched and are included within this report as available.

Very little historical data exist for two water quality parameters of interest – total phosphorus and chlorophyll-*a*. In 2017, average summer phosphorus concentrations (23.0 μg/L) were the same as the median value (23.0 μg/L) for other deep lowland drainage lakes in the state (Figure 8.10.1-1). This value is slightly higher than the median value (21.0 μg/L) for other lakes within the Northern Lakes and Forests ecoregion. The 2017 average summer phosphorus concentration falls in the *good* category for deep lowland drainage lakes in the state.

Total phosphorus surface values from 2017 are compared with bottom-lake samples collected during this same time frame in Figure 8.10.1-2. As displayed in this figure, during the spring turnover in April 2017 (lake vertical mixing) and during July 2017 surface and bottom total phosphorus concentrations were similar. However, during the remaining sampling events, the bottom phosphorus concentrations were greater than the relatively low surface concentrations. During these periods, anoxic conditions were recorded near the bottom of the lake through measurement of dissolved oxygen (refer to Figure 8.10.1-6 and associated text). This is an indication of hypolimnetic nutrient recycling, or internal nutrient loading, which is a process discussed further in the Manitowish Waters Chain of Lakes-wide document. This is a natural process that most lakes have. While the hypolimnetic concentrations are higher than surface water concentrations, these relatively higher levels are not high enough to negatively impact Stone Lake's surface water quality. Typically, lake managers do not become concerned unless these concentrations near 200 μg/L)

In 2017, the average summer chlorophyll-*a* concentration (6.2 μg/L) was slightly lower than the median value (7.0 μg/L) for other lakes of this type (Figure 8.10.1-3). This value is slightly higher than the median value (5.6 μg/L) for other lakes within the Northern Lakes and Forests ecoregion. The weighted average summer chlorophyll-*a* concentration (6.1 μg/L) falls in the *good* category for deep lowland drainage lakes in the state.

Both of these parameters, total phosphorus and chlorophyll-*a*, rank within a TSI category of *good*, 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.

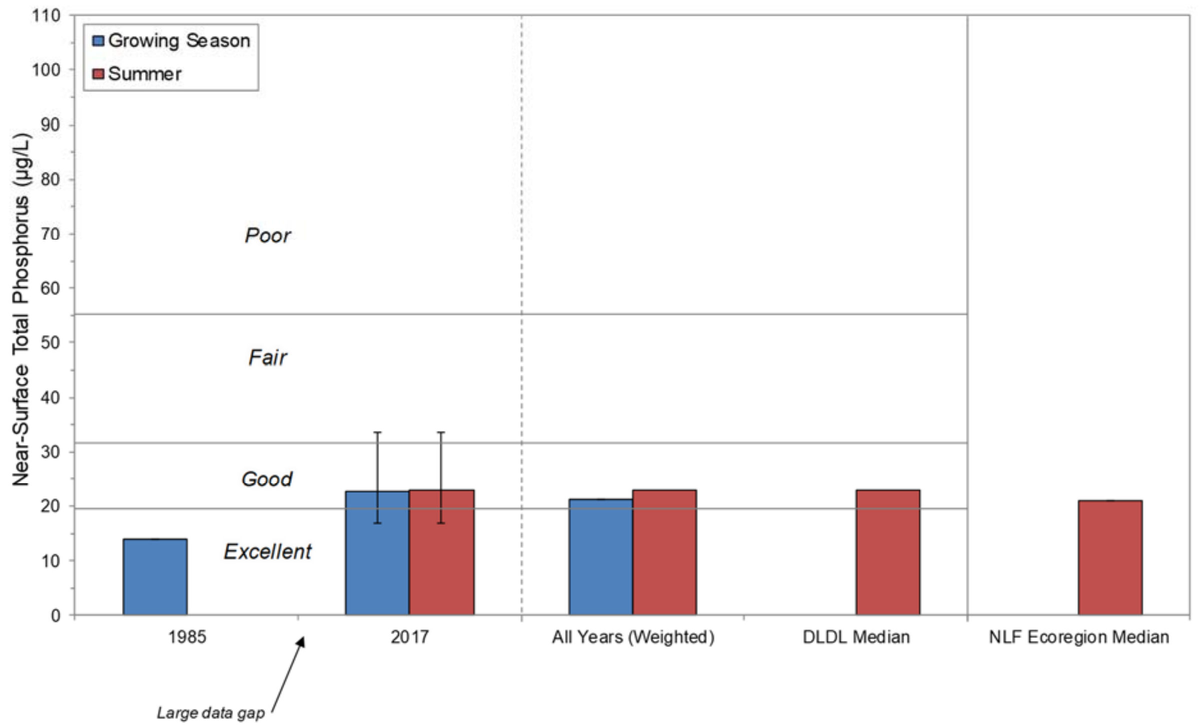

Figure 8.10.1-1. Stone Lake, state-wide deep lowland drainage lakes, and regional total phosphorus concentrations. Mean values calculated with summer month surface sample data. Water Quality Index values adapted from WDNR PUB WT-913.

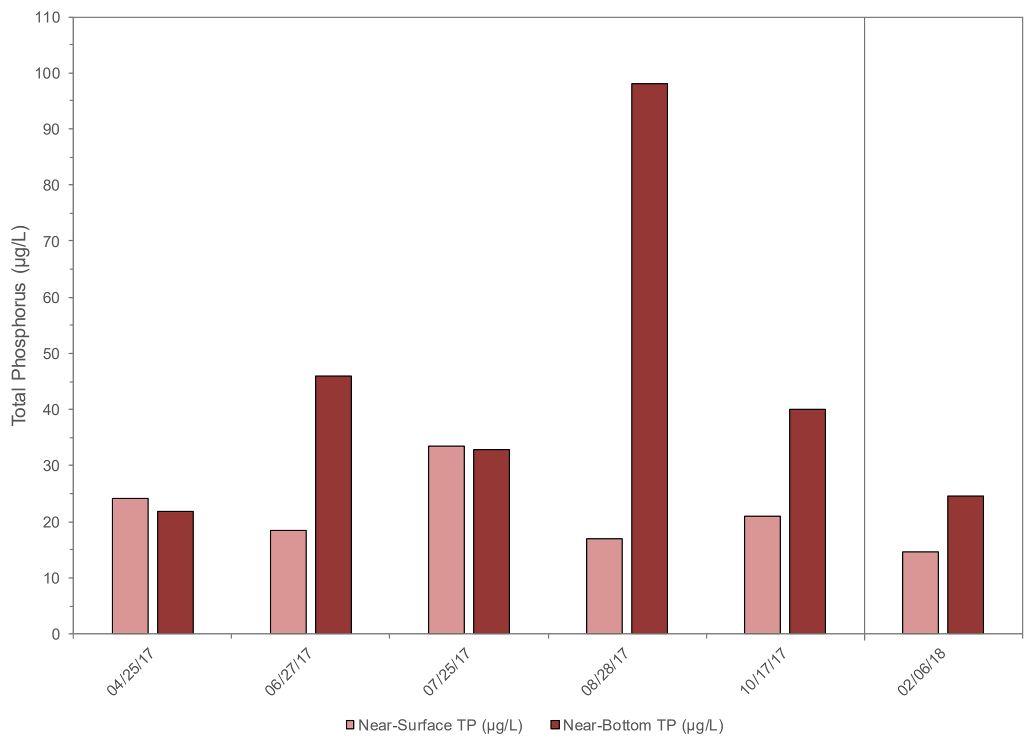

Figure 8.10.1-2. Stone Lake surface and bottom total phosphorus values.

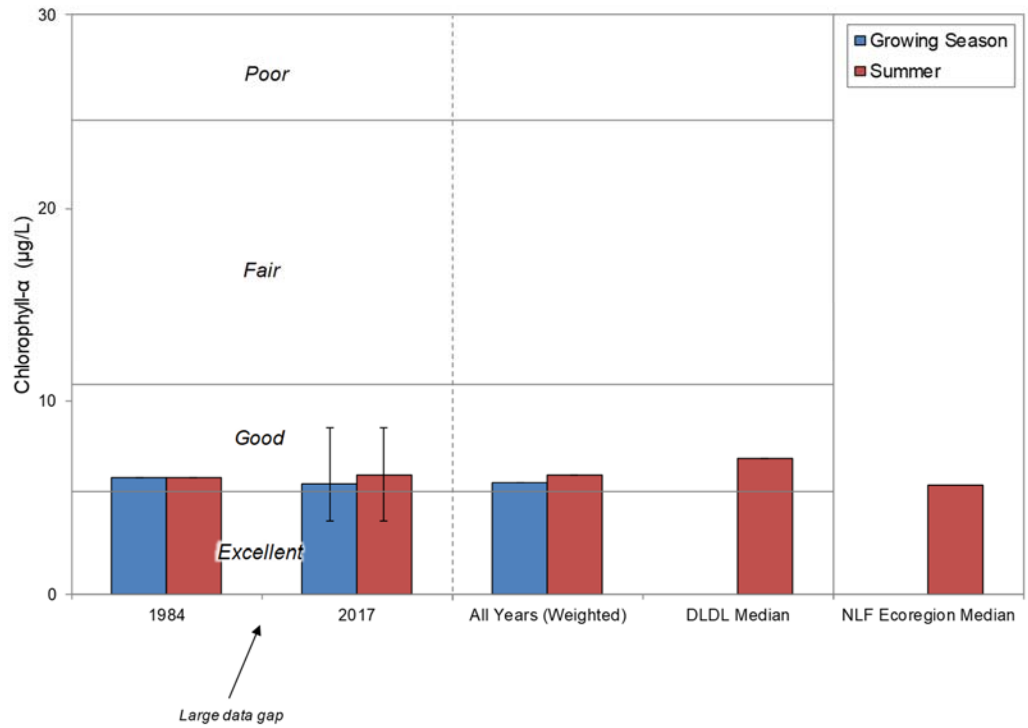

Figure 8.10.1-3. Stone Lake, state-wide deep lowland drainage lakes, and regional chlorophyll-*a* concentrations. Mean values calculated with summer month surface sample data. Water Quality Index values adapted from WDNR PUB WT-913.

The clarity of Stone Lake's water can be described as *excellent* during the summer months in which data has been collected (Figure 8.10.1-4). A weighted average over this timeframe (8.8 feet) is similar to the median value for other deep lowland drainage lakes in the state (8.5 feet) and the regional median (8.9 feet). 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 Stone Lake as well as the 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 Stone 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 April and July of 2017 were measured for this parameter, and were found to be 30 SU (Standard Units), for both months indicating the lake's water is *lightly tea-colored*.

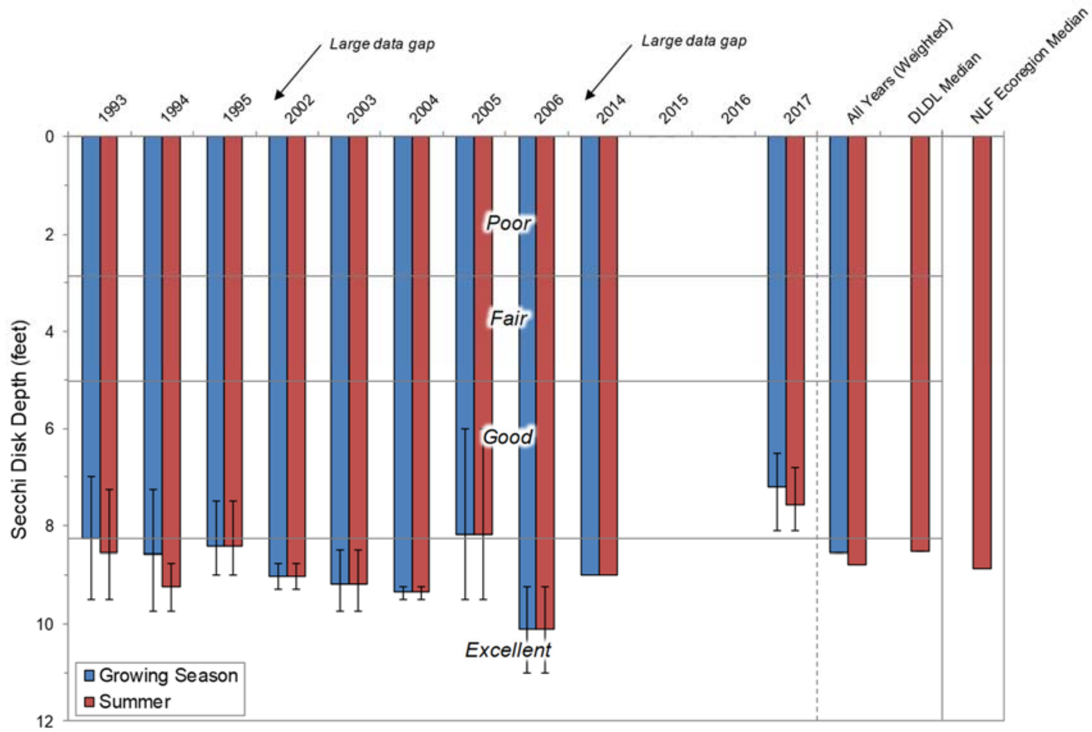

Figure. 8.10.1-4. Stone Lake, state-wide deep lowland drainage lakes, and regional Secchi disk clarity values. Mean values calculated with summer month surface sample data. Water Quality Index values adapted from WDNR PUB WT-913.

Stone Lake Trophic State

The TSI values calculated with Secchi disk, chlorophyll-*a*, and total phosphorus values range in values spanning from lower mesotrophic to upper mesotrophic (Figure 8.10.1-5). 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 Stone Lake is in an upper mesotrophic state.

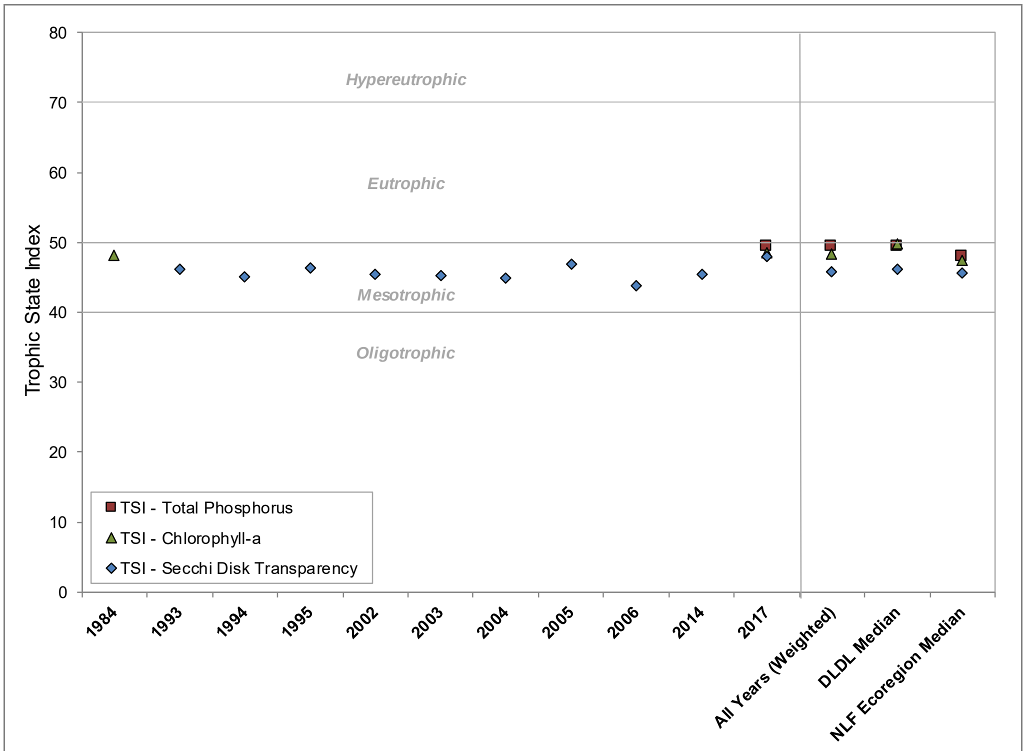

Figure 8.10.1-5. Stone Lake, state-wide deep lowland drainage lakes, and regional Trophic State Index values. Values calculated with summer month surface sample data using WDNR PUB-WT-193.

Dissolved Oxygen and Temperature in Stone Lake

Dissolved oxygen and temperature profiles were created during each water quality sampling trip made to Stone Lake by Onterra staff. Graphs of those data are displayed in Figure 8.10.1-6 for all sampling events.

Stone 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 lake remained thermally stratified, developing an anoxic hypolimnion. 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 2018, oxygen levels remained sufficient throughout the water column to support most aquatic life in northern Wisconsin lakes.

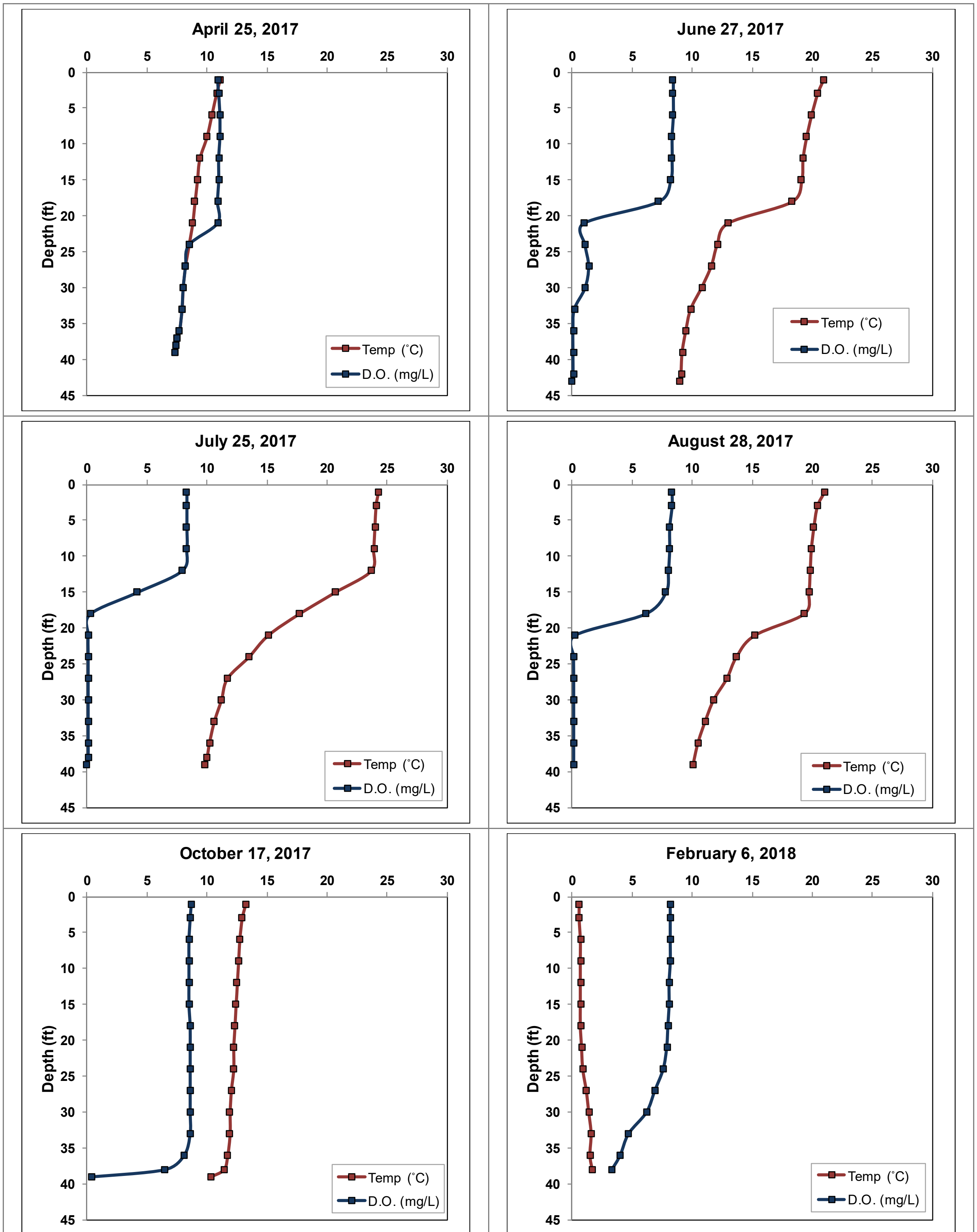

Figure 8.10.1-6. Stone Lake dissolved oxygen and temperature profiles.

Additional Water Quality Data Collected at Stone 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 Stone 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. Stone Lake's surface water pH was measured at roughly 7.4 during April and 7.7 in July of 2017. 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 adds 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 Stone Lake was measured at 38.1 and 37.2 mg/L as $CaCO_3$ in April and July of 2017, 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 Stone Lake during 2017. 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 Stone Lake's pH of 7.7 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 Stone was found to be 10.5 mg/L in July of 2017, which is below the optimal range for zebra mussels. Plankton tows were completed by Onterra staff during the summer of 2017 and these samples were processed by the WDNR for larval zebra mussels. No veligers (larval zebra mussels) were found within these samples.

8.10.2 Stone Lake Watershed Assessment

Stone Lake's watershed is 137,942 acres in size. Compared to Stone Lake's size of 145 acres, this makes for a very large watershed to lake area ratio of 950:1. Similar to most lakes that are downstream of other lakes, the large majority of the lake's watershed consists of the lake immediately upstream. This means that 134,041 acres (97%) of Stone Lake's watershed is the Spider Lake subwatershed and 3,440 acres (3%) is the Fawn Lake subwatershed. The direct watershed of Stone Lake is a very small part of the lake's total watershed (Figure 8.10.2-1). Wisconsin Lakes Modeling Suite (WiLMS) modeling indicates that Stone Lake's residence time is approximately 4 days, or that the water within the lake is completely replaced 88 times per year.

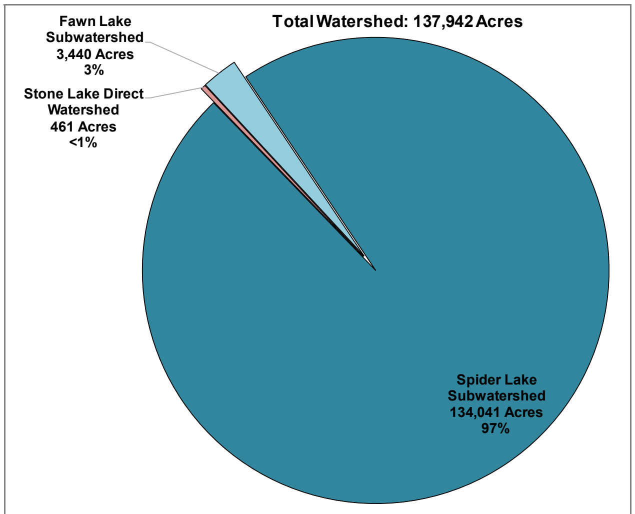

Figure 8.10.2-1. Stone Lake watershed proportion of land cover types. Based upon National Land Cover Database (NLCD – Fry et. al 2011).

Of the estimated 5,998 pounds of phosphorus being delivered to Stone Lake on an annual basis, nearly all of it originates from Spider Lake and Fawn Lake, which are immediately upstream of Stone Lake (Figure 8.10.2-2). Using the estimated annual potential phosphorus load, WiLMS predicted an in-lake growing season average total phosphorus concentration of 14 µg/L, which is lower than the measured growing season average total phosphorus concentration of 21 µg/L. This means the model underestimates phosphorus loading to Stone Lake.

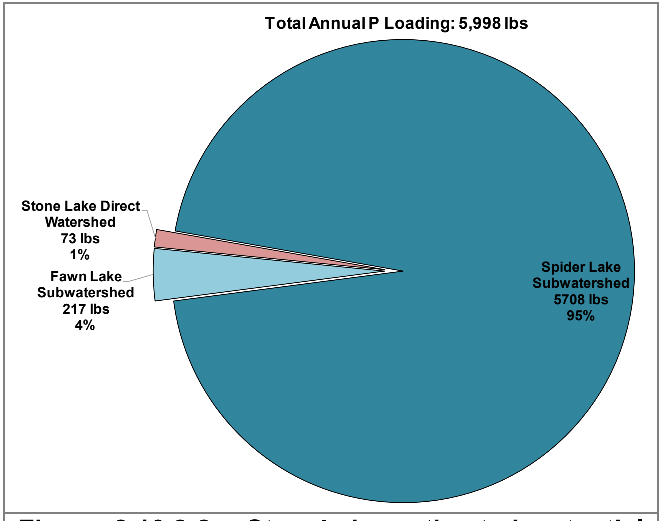

Figure 8.10.2-2. StoneLake estimated potential annual phosphorus loading. Based upon Wisconsin Lake Modeling Suite (WiLMS) estimates.

Because the nearly all of the phosphorus that enters Stone Lake comes from the upstream Spider and Fawn Lakes, efforts to reduce phosphorus levels in Stone Lake should concentrate on reducing phosphorus inputs to Spider and Fawn Lakes.

8.10.3 Stone 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 fall of 2017, Stone Lake's immediate shoreline was assessed in terms of its development. Stone Lake has stretches of shoreland that fit all of the five shoreland assessment categories. In all, 4.7 miles of natural/undeveloped and developed-natural shoreline were observed during the survey (Figure 8.10.3-1). This constitutes about 60% of Stone 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, 1.8 miles of urbanized and developed–unnatural shoreline (23%) was observed. If restoration of the Stone 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. Stone Lake Map 1 displays the location of these shoreline lengths around the entire lake.

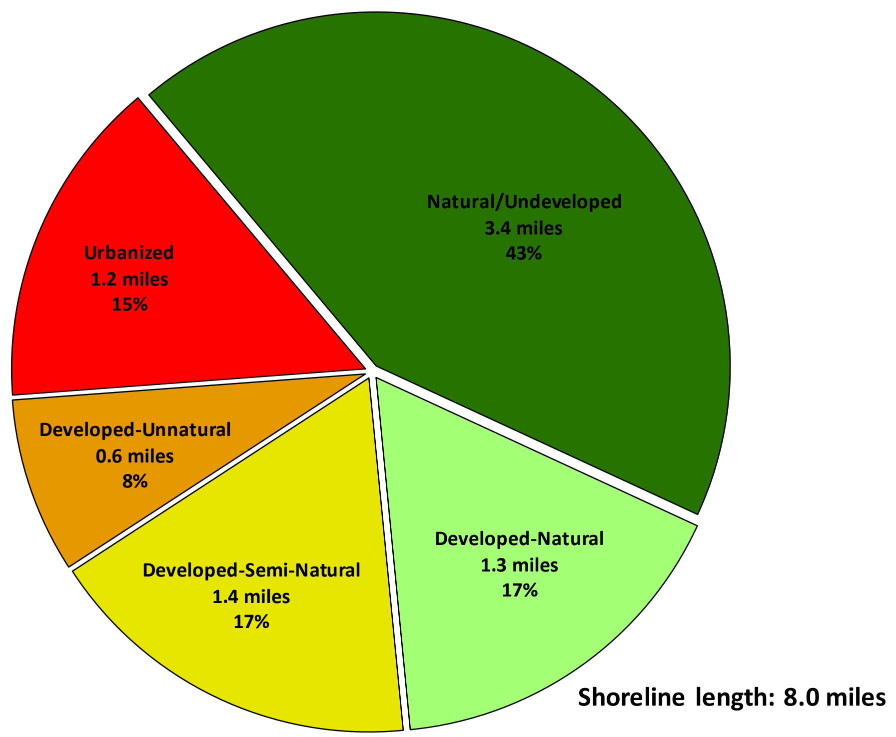

Figure 8.10.3-1. Stone Lake shoreland categories and total lengths. Based upon a fall 2017 survey. Locations of these categorized shorelands can be found on Stone Lake Map 1.

Coarse Woody Habitat

As part of the shoreland condition assessment, Stone 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, 447 total pieces of coarse woody habitat were observed along 8.0 miles of shoreline (Stone Lake Map 2), which gives Stone Lake a coarse woody habitat to shoreline mile ratio of 56:1 (Figure 8.10.3-2). Only instances where emergent coarse woody habitat extended from shore into the water were recorded during the survey. Two hundred and eight-four pieces of 2-8 inches in diameter pieces of coarse woody habitat were found, 163 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 Stone 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 Stone Lake falls well above the 75th percentile of these 98 lakes and had one of the highest coarse woody habitat pieces per shoreline mile recorded since these surveys began in 2012 (Figure 8.10.3-2).

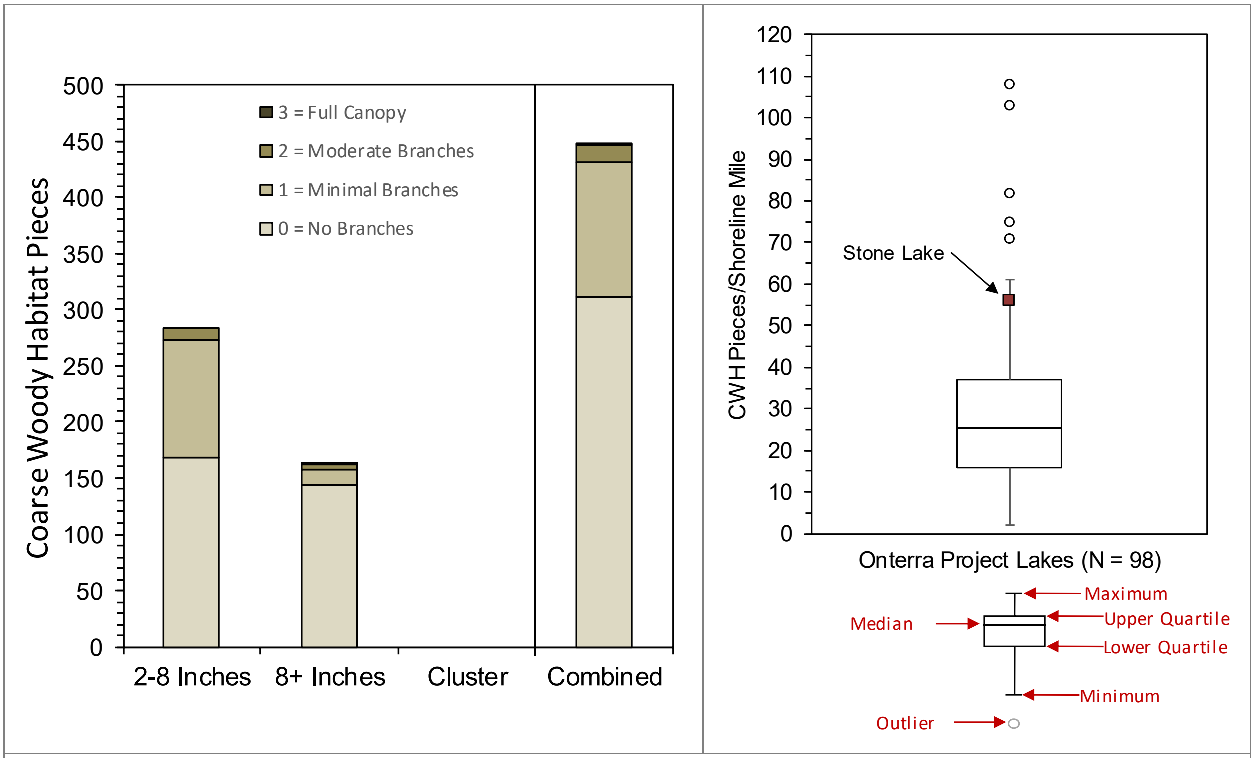

Figure 8.10.3-2. Stone Lake coarse woody habitat survey results. Based upon a fall 2017 survey. Locations of the Stone Lake coarse woody habitat can be found on Stone Lake Map 2.

8.10.4 Stone Lake Aquatic Vegetation

An early season aquatic invasive species survey was conducted on Stone Lake on June 13, 2017. 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 located a single plant and a clump of curly-leaf pondweed during the early season survey. Due to the nature of curly-leaf pondweed, it will be discussed in the Non-Native Aquatic Plant Section. Further discussion regarding curly-leaf pondweed and its management can be found in the Manitowish Waters AIS Monitoring & Control Strategy Assessment Reports, which can be found on the MWLA website.

The aquatic plant point-intercept survey and floating-leaf and emergent plant community mapping survey were conducted on Stone Lake on August 9, 2017 by Onterra. During these surveys, 33 species of native aquatic plants were located in Stone Lake (Table 8.10.4-1). Twenty-three of these species were sampled directly during the point-intercept survey and are used in the analysis that follows, while 10 species were observed incidentally during visits to Stone Lake.

Aquatic plants were found growing to a depth of 13 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 178 point-intercept locations sampled within the littoral zone, roughly 68% contained aquatic vegetation. Stone Lake Map 3 indicates that most of the point-intercept locations that contained aquatic vegetation are located in northern bay that is more likely to hold organic substrates. Approximately 40% of the point-intercept sampling locations where sediment data was collected at were sand, 48% consisted of a fine, organic substrate (muck) and 12% were determined to be rocky (Chain-wide Fisheries Section, Table 3.5-5).

Table 8.10.4-1. Aquatic plant species located in Stone Lake during 2017 plant surveys.

Growth Form	Scientific Name	Common Name	Coefficient of Conservatism (C)	2017 (Onterra)
Emergent	*Carex gynandra*	Nodding sedge	6	I
	Iris versicolor	Northern blue flag	5	I
	Scirpus cyperinus	Wool grass	4	I
FL	*Brasenia schreberi*	Watershield	7	I
	Nuphar variegata	Spatterdock	6	I
	Nymphaea odorata	White water lily	6	X
	Persicaria amphibia	Water smartweed	5	I
	Sparganium fluctuans	Floating-leaf bur-reed	10	I
FL/E	*Sparganium acaule*	Short-stemmed bur-reed	8	I
	Sparganium sp. (sterile)	Bur-reed sp.	N/A	I
Submergent	*Bidens beckii*	Water marigold	8	X
	Ceratophyllum demersum	Coontail	3	X
	Chara spp.	Muskgrasses	7	X
	Elatine minima	Waterwort	9	I
	Elodea canadensis	Common waterweed	3	X
	Heteranthera dubia	Water stargrass	6	X
	Myriophyllum sibiricum	Northern watermilfoil	7	X
	Najas flexilis	Slender naiad	6	X
	Nitella spp.	Stoneworts	7	X
	Potamogeton amplifolius	Large-leaf pondweed	7	X
	Potamogeton crispus	Curly-leaf pondweed	Exotic	I
	Potamogeton epihydrus	Ribbon-leaf pondweed	8	X
	Potamogeton friesii	Fries' pondweed	8	X
	Potamogeton gramineus	Variable-leaf pondweed	7	X
	Potamogeton illinoensis	Illinois pondweed	6	X
	Potamogeton praelongus	White-stem pondweed	8	X
	Potamogeton pusillus	Small pondweed	7	X
	Potamogeton richardsonii	Clasping-leaf pondweed	5	X
	Potamogeton robbinsii	Fern-leaf pondweed	8	X
	Potamogeton spirillus	Spiral-fruited pondweed	8	X
	Potamogeton zosteriformis	Flat-stem pondweed	6	X
	Sagittaria sp. (rosette)	Arrowhead sp. (rosette)	N/A	X
	Utricularia vulgaris	Common bladderwort	7	X
	Vallisneria americana	Wild celery	6	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

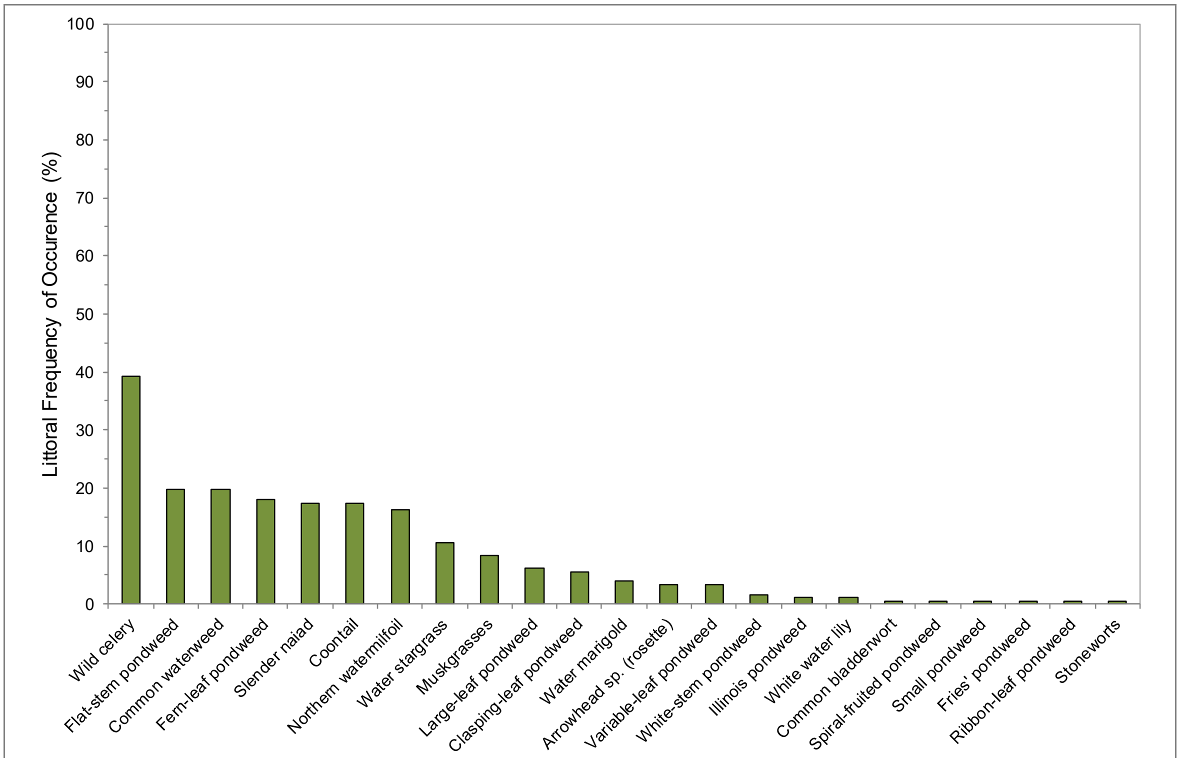

Figure 8.10.4-1. Stone Lake aquatic plant littoral frequency of occurrence analysis. Created using data from a 2017 point-intercept survey.

Figure 8.10.4-1 shows that wild celery, flat-stem pondweed, common waterweed, and fern-leaf pondweed were the most frequently encountered plants within Stone Lake. Wild celery is a long, limp, ribbon-leaved turbidity-tolerant species that is a premiere food source for ducks, marsh birds, shore birds and muskrats. Animals may eat the entire plant, including the tubers that reside within the sediment. Flat-stem pondweed, as its name implies, is a freely branched plant with strongly flattened stems and long, stiff leaves. Flat-stem pondweed lacks floating leaves, a feature many plants in the *Potamogeton* genus have. This plant can be a locally important food source to many aquatic and terrestrial organisms. Common waterweed is a largely un-rooted (although do sometimes possess structures that function similar to roots or become partially buried in the sediment) and its locations can be largely a product of water movement. 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.

During aquatic plant inventories, 33 species of native aquatic plants (including incidentals) were found in Stone 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 Stone Lake's plant community (0.90) 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 wild celery was found at 39% of the sampling locations, its relative frequency of occurrence is 20%. Explained another way, if 100 plants were randomly sampled from Stone Lake, 20 of them would be wild celery. This distribution can be observed in Figure 8.10.4-2, where together five native species account for 58% of the aquatic plant population within Stone Lake, while the other 18 species account for the remaining 42%. Ten additional native species were found incidentally from the lake but not from of the point-intercept survey, and are indicated in Table 8.10.4-1 as incidentals.

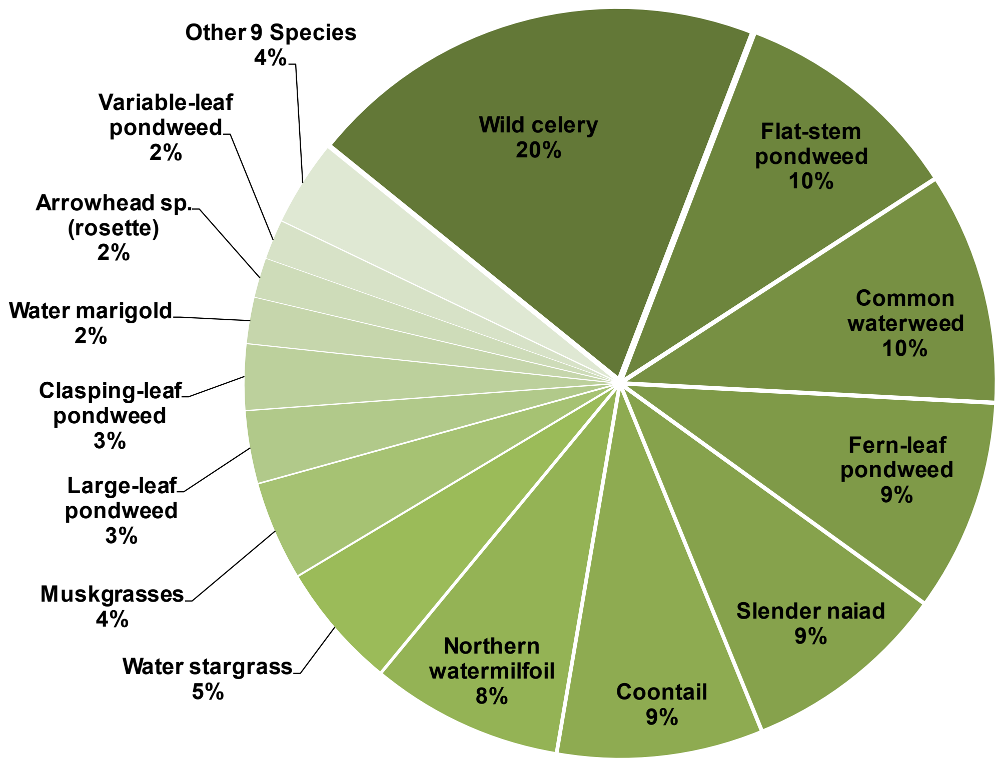

Figure 8.10.4-2. Stone Lake aquatic plant relative frequency of occurrence analysis. Created using data from 2017 point-intercept survey.

Stone Lake's average conservatism value (6.5) is higher than median for the state (6.3) and lower than the median for Northern Lakes and Forests ecoregion (6.7). This indicates that the plant community of Stone Lake is indicative of a moderately disturbed system. Combining Stone Lake's species richness and average conservatism values to produce its Floristic Quality Index (FQI) results in a value of 31.4 which is above the median values of the ecoregion and state.

The quality of Stone Lake is also indicated by the incidence of emergent and floating-leaf plant communities that occur in many areas. The 2017 community map indicates that approximately 4.5 acres of the lake contains these types of plant communities (Stone Lake Map 4, Table 8.10.4-2). Ten floating-leaf and emergent species were located on Stone Lake (Table 8.10.4-1), all of which provide valuable wildlife habitat.

Table 8.10.4-2. Stone Lake acres of emergent and floating-leaf plant communities from the 2017 community mapping survey.

Plant Community	Acres
Emergent	0.0
Floating-leaf	4.1
Mixed Emergent & Floating-leaf	0.3
Total	**4.5**

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 Stone 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 Stone Lake

Curly-leaf Pondweed

Curly-leaf pondweed (*Potamogeton crispus*) is discussed in detail at the end of the Aquatic Plant Section 3.4. Monitoring results, control actions, and a description of the plant's lifecycle are contained in that section.

Curly-leaf pondweed was first discovered in Stone Lake during 2013. Through 2019, the infrequent occurrences of this exotic were managed through volunteer and professional hand-harvesting. As a part of the Manitowish Waters Comprehensive Management Plan, Stone Lake's curly-leaf pondweed population will be monitored by volunteers and professionals with control actions being implemented as appropriate.

8.10.5 Stone 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 Stone 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 8.10.5-1). 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. Stone Lake has only been stocked in 1976 with 4,000 fingerling walleye.

Photograph 8.10.5-1. Fingerling Muskellunge.

Stone Lake Spear Harvest Records

Walleye open water spear harvest records are provided in Figure 8.10.5-1 from 2010 to 2017. As many as 25 walleye have been harvested from the lake in the past (2016), but the average harvest is roughly one fish in a given year. Spear harvesters on average have taken 10% of the declared quota.

Muskellunge open water spear harvest records are provided in Figure 8.10.5-2 from 2010 to 2017. As many as two muskellunge have been harvested from the lake in the past (2016), however the average harvest is zero fish in a given year. Spear harvesters on average have taken 13% of the declared quota.

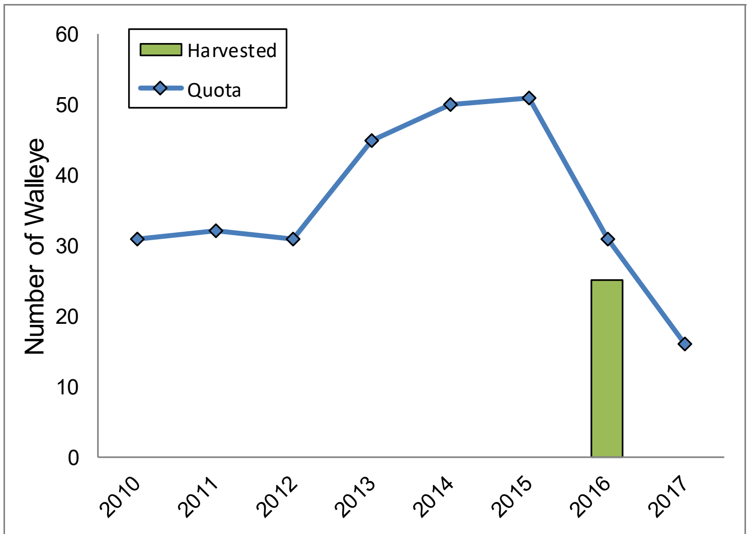

Figure 8.10.5-1. Stone Lake walleye spear harvest data. (GLIFWC 1999-2017).

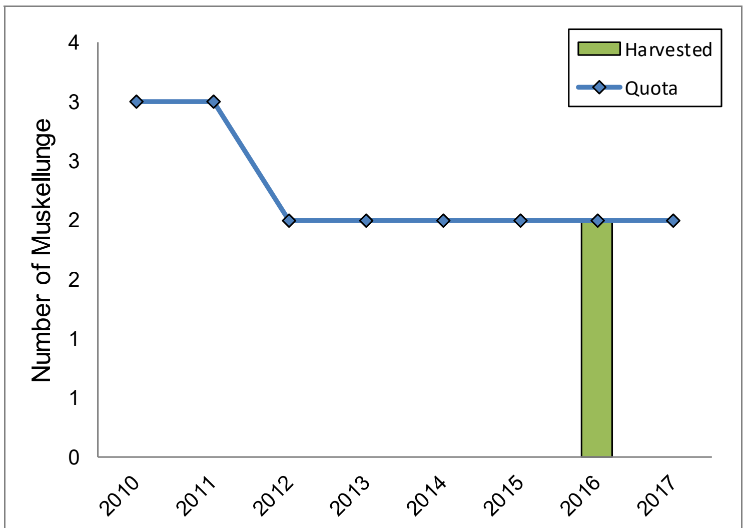

Figure 8.10.5-2. Stone Lake muskellunge spear harvest data. (GLIFWC 1999-2017).

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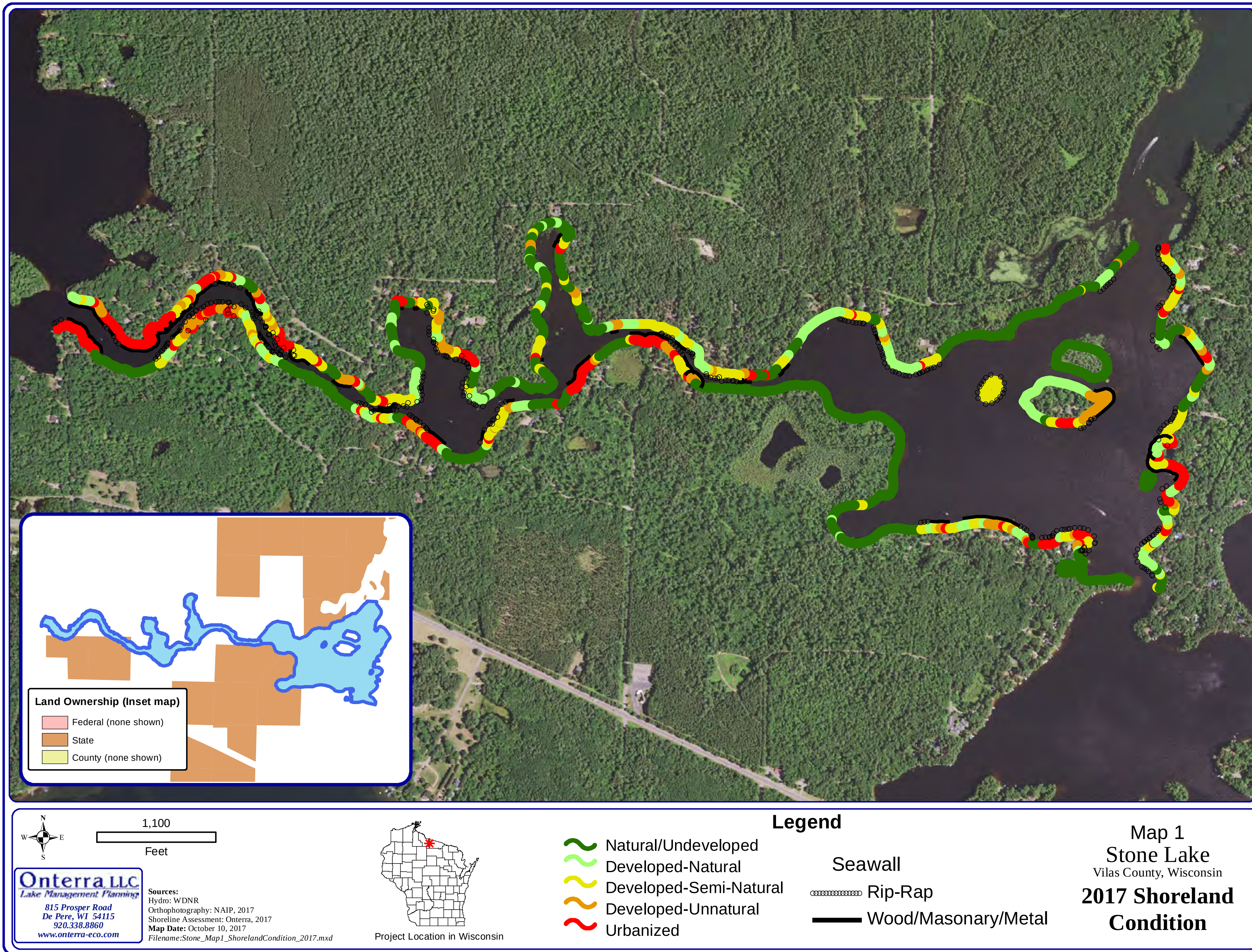

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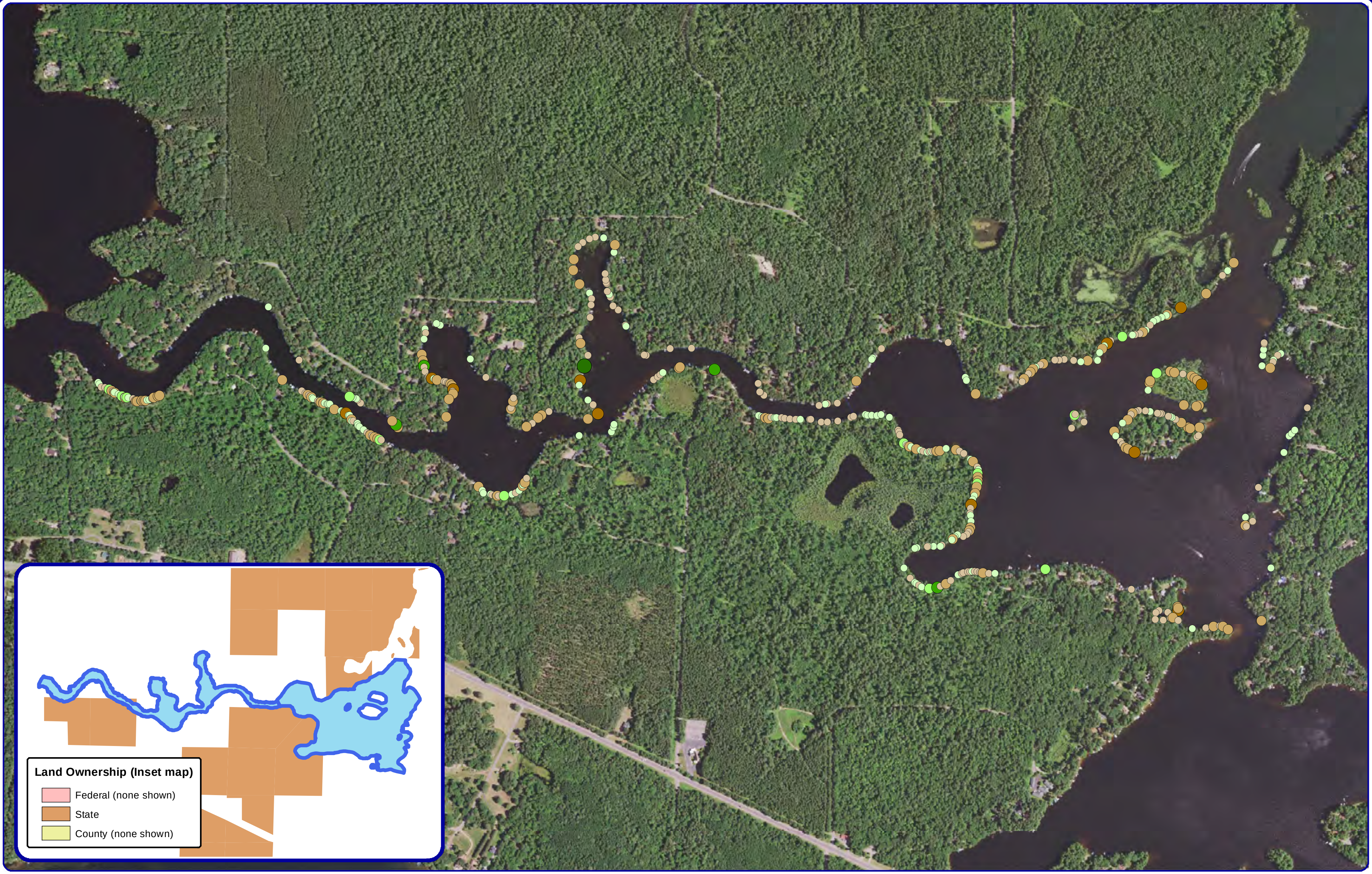
Sources:
Hydro: WDNR
Orthophotography: NAIP, 2017
Shoreline Assessment: Onterra, 2017
Map Date: October 10, 2017
Filename:Stone_Map1_ShorelandCondition_2017.mxd

Map 1
Stone Lake
Vilas County, Wisconsin
2017 Shoreland Condition



Legend

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

Map 2
Stone Lake
Vilas County, Wisconsin

Coarse Woody Habitat

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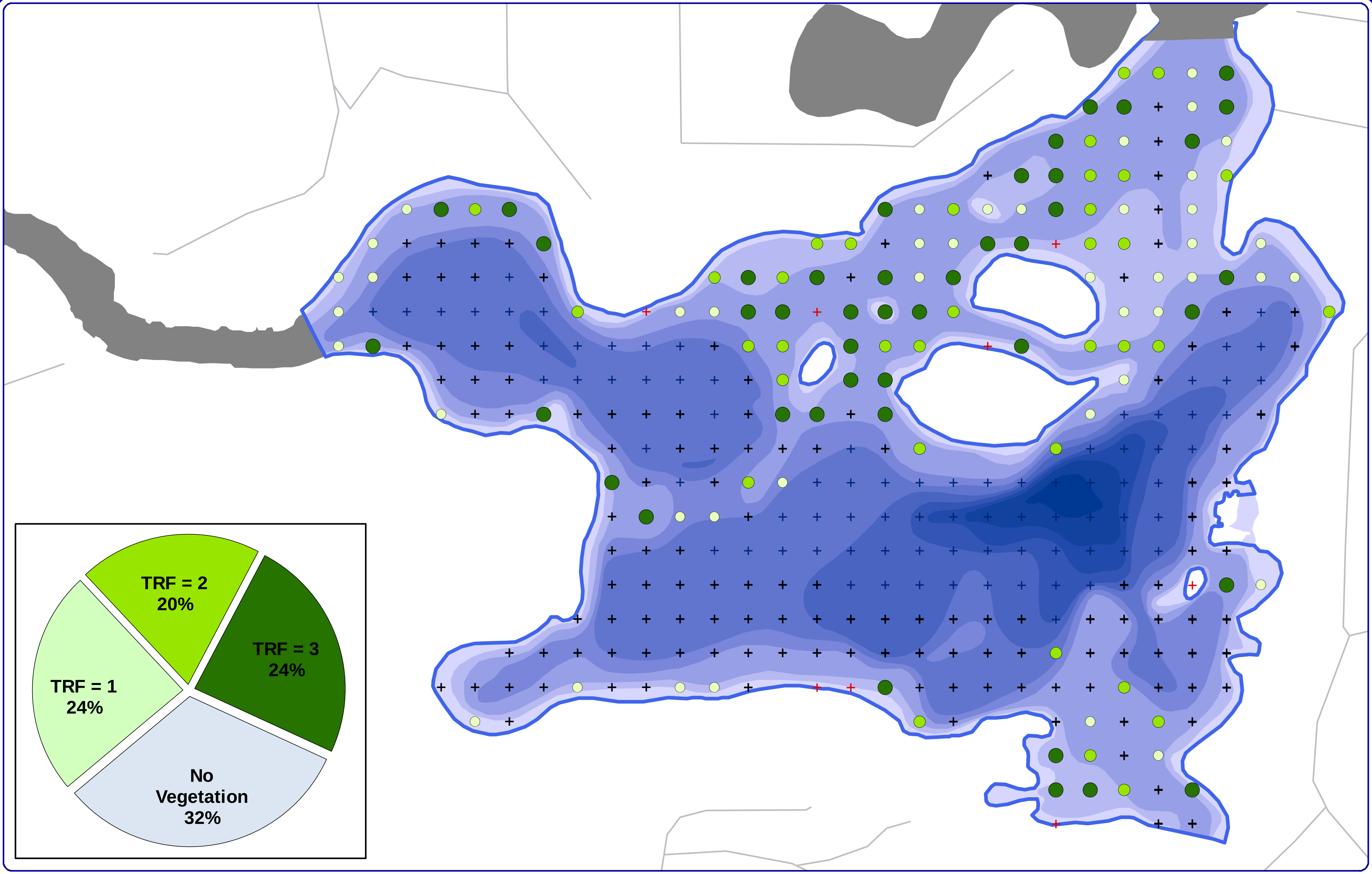
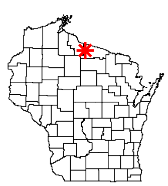
Sources:
Hydro: WDNR
Orthophotography: NAIP, 2017
Coarse Woody Habitat Survey: Onterra, 2017
Map Date: October 10, 2017
Filename:Stone_Map2_CWH_2017.mxd



N
W E
S

600
Feet



Project Location in Wisconsin

Legend

- Total Rake Fullness = 1
- Total Rake Fullness = 2
- Total Rake Fullness = 3
- + No Vegetation
- + Non-Navigable

Map 3
Stone Lake
Vilas County, Wisconsin

2017 PI Survey: Aquatic Vegetation Distribution

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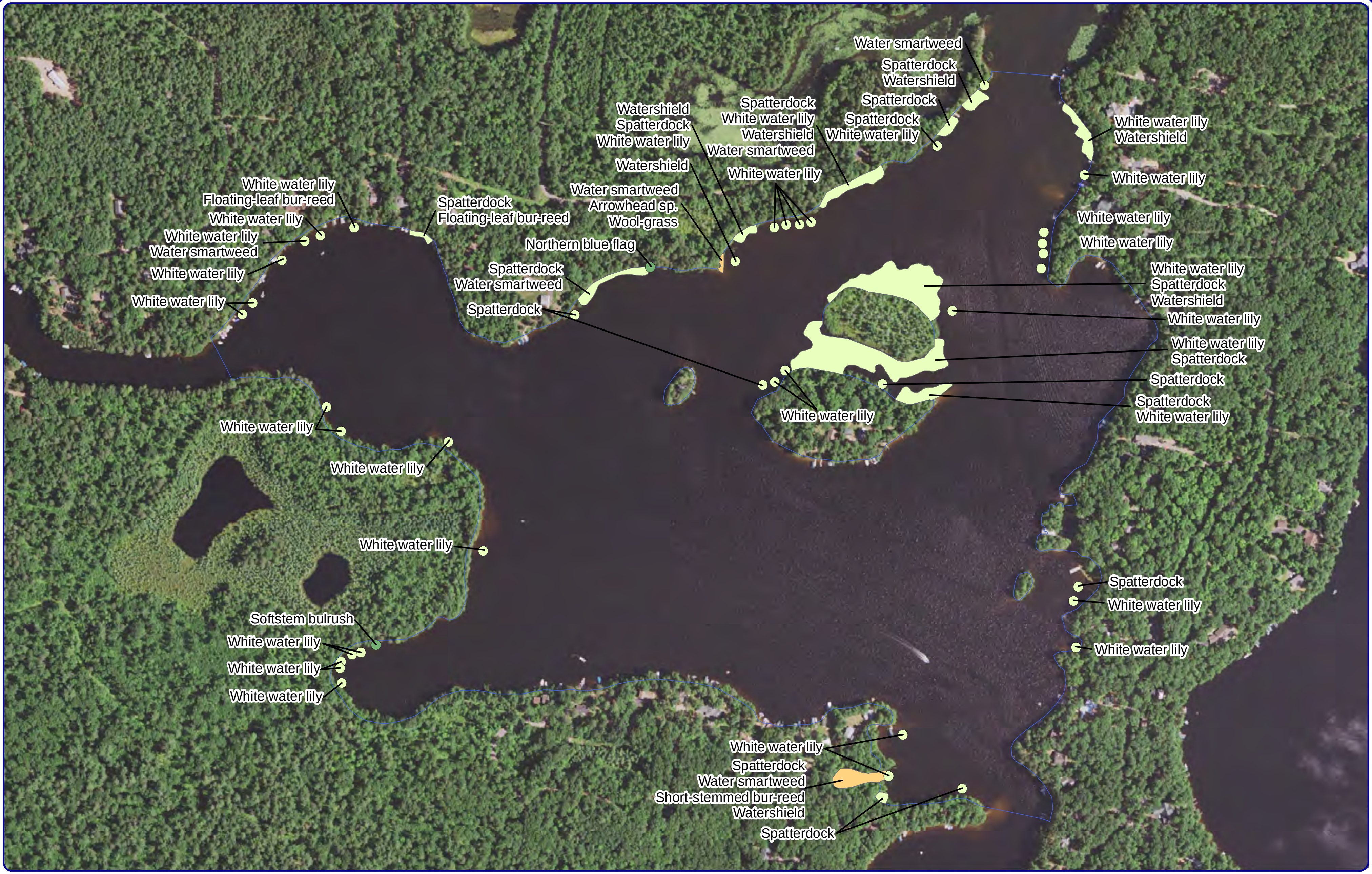
Sources:
Roads and Hydro: WDNR
Plant Survey: Onterra, 2017

Map Date: November 17, 2017

Filename: *MapX_Stone_TRFPI_2017.mxd*



N
W E
S

550
Feet

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Sources:
Aquatic Plants: Onterra, 2017
Orthophotography: NAIP, 2015
Map date: October 20, 2017
Filename: Stone_Comm_2017.mxd

Project Location in Wisconsin

Legend

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

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

Map 4

Stone Lake
Vilas County, Wisconsin

Emergent & Floating-leaf Aquatic Plant Communities