2023 Aquatic Plant Survey and Invasive Species Detection Report

Prepared for the Big Sand Lake Association

Survey by Aquatic Survey Professionals – MN DNR Certified Aquatic Plant Surveyors

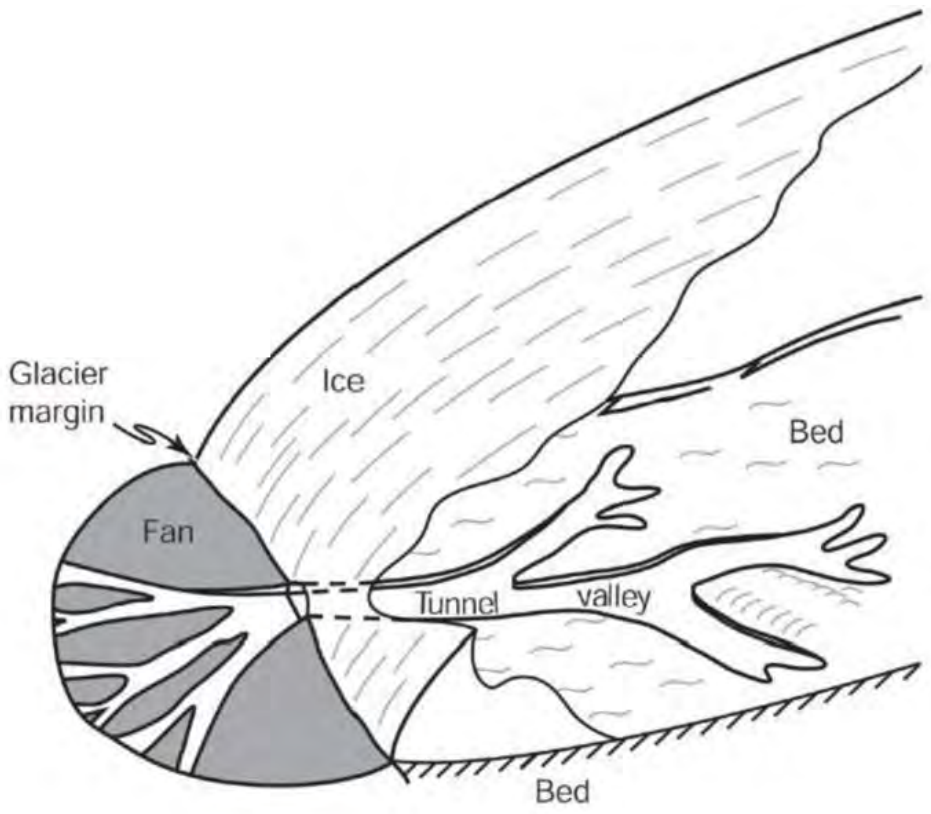
Survey Dates October 2nd 7th 8th 2023

Report by Aquatic Survey Professionals – Steve Henry

Lake and Watershed Characteristics

Big Sand Lake is in Hubbard County Minnesota just north of Dorset and south of County Highway 40. Big Sand Lake is known for it's deep and clear water providing unique fish habitat especially for walleye and small mouth bass. Stretching 2.3 miles in length east-west and 1.2 miles north-south the lake covers 1635 surface acres and is a significant recreational and fisheries resource for the area. Recreational use of Big Sand Lake started immediately after loggers moved through this area in the late 1800s. Early photos of the lake, the early 1900s, portray a generally bare shoreline with few large trees since almost all of the pines had been logged off. Access to Big Sand Lake is provided by a MN DNR public water access on the south end of the southeastern bay. This access has 22 parking spaces for vehicles with trailers which is an indication of the significant use the lake receives. Access for small boats is also possible from Lake Emma which is upstream and across County Highway 40.

Big Sand Lake is in the Pine Moraines and Outwash Plains subsection of the Northern Lakes and Forest ecoregion where White and Red Pines dominate the forests and deep sandy soils limit runoff by collecting rainfall into groundwater aquifers. . This ecoregion features deep coarse textured soils connected to groundwater networks that feed numerous lakes, streams, and rivers. Many lakes in this ecoregion occupy kettle depressions left behind by the drainage of meltwater from glaciers where ice blocks were deeply buried then melted later and the overlying sediments collapsed. Big Sand Lake lies between two ice margins created as the Itasca glacial lobe melted and drained to the south, this drainage water scoured out the deep channel occupied by the lake and left an outwash fan of sorted sediments both south of ans surrounding the lake. Sections of Big Sand Lake's shoreline feature large pine trees on the steep slopes of a collapsed glacial tunnel valley and the esker that was deposited within the collapsed tunnel valley. This esker forms the west side of the southeastern bay and much of the shallow bar located north of this area. Bad Axe, Mantrap, Upper & Lower Bottle, Little Sand, and Big Sand Lakes all lie within the collapsed tunnel valley formed by glacial meltwater. Long Lake to the south also lies within the same tunnel valley system and represents the terminus of the tunnel system at an earlier stage in the retreat of the glacier. The area around Mantrap Lake features sinuous ridges formed by pressurized meltwater escaping from beneath the glaciers edge. To the north of this area is the hilly terrain of the glacial moraine where the ice stagnated and melted leaving less sandy gravel and more of a rocky sticky mix of sediments.



Sketch of a tunnel valley in relation to glacial margin. (From Hooke and Jennings 2006)

High quality aquatic plant communities are present throughout Big Sand Lake but diversity is limited in most areas by the low fertility of the lake and consistent sandy gravel bottom type. Some small areas have higher levels of lake bottom fertility (silt) and support more diverse plant communities. One unique plant community present in Big Sand Lake is a deepwater Nitella/Chara community which was observed growing abundantly as deep as 38 feet during the 2023 survey. This plant community is rare and helps protect the lake's clarity by absorbing and storing any excess nutrients while also oxygenating the deep waters and limiting the internal release of stored nutrients. This deep water oxygenation supports a thriving deep water fish community. The diverse and unique aquatic plants and the high quality fish community have resulted in the lake being ranked as having outstanding biological significance by the Minnesota DNR.

The water quality in Big Sand Lake is considered low level mesotrophic, with low fertility and high clarity. The lake has lower fertility then most lakes in this area. Minnesota Pollution Control notes there is evidence that the lake's clarity has been improving by approximately 3.5 feet per decade over the period of record, 1984 to 2022. This improvement occurred as one jump in clarity between 1999 and 2000 with observations improving by 10 feet in that time period, this may indicate a change in the location of clarity observations versus an actual

improvement clarity. Visit Surface Water (state.mn.us)) to review the water quality data specific for Big Sand Lake.

Big Sand Lake is spring fed but also has a large 35,670 acre watershed that drains to the lake via the creek from Lake Emma. The lake's watershed has a significant amount of natural cover which provides natural protection to the water quality and lake health. Around 68% of the watershed is forested, 6% is wetlands, and only 4% is developed or agricultural. The State of Minnesota has done water quality modeling which indicates that watersheds with over 75% natural land cover can maintain their water quality and Big Sand Lake is right on the cusp of this protection level. The increase in runoff, erosion, nutrient loading, and human traffic associated with higher levels of development disturbs the lake's natural community and is associated with an increased risk of invasive species establishing in a lake. Maintaining the existing natural landscape is key to preserving the quality pf Big Sand Lake.

The Big Sand Lake Association's members work to preserve the quality of the lake with numerous programs to protect the fishery and loon population while preventing Aquatic Invasive Species (AIS) from impacting the lake users. This aquatic plant survey was implemented to monitor changes in the plant community that have occurred since the 2009 survey and could indicate changes in the health of the lake. The survey was also designed to detect any invasive species so rapid response efforts can be implemented to control them. Increased water temperatures, longer growing seasons, erratic precipitation, and increases in colored dissolved organic matter are combining to change the diversity, density, and distribution of plants in the lake and other characteristics of lakes across Minnesota. Long term monitoring is essential to provide an understanding of how these environmental changes will affect the future of Minnesota's lakes.

Lake Area	Area 15' deep or less	Maximum Depth	Shoreline Length	10 yr. Average Water Clarity
1639 acres	461 acres	135'	8.2 miles	25'

Survey Design

The 2023 aquatic plant survey sampled most of the sites sampled during the aquatic vegetation survey performed in 2009. Using ArcGIS software sample locations from the 2009 survey were filtered to eliminate most of the sites where no vegetation was present leaving a total of 485 sample locations for 2023. While on the lake the sonar was monitored and additional sample locations established where depths were suitable, resulting in 16 additional sample sites. Prior to the survey public access and resort areas were mapped and intensive survey sample sites established around them. The sample locations created were uploaded to a chart plotter GPS unit on our survey boat. Once on the water the boat was navigated to each sampling site and a double headed weighted garden rake attached to 50 feet of rope was used to collect a sample of the aquatic vegetation. Visual and sonar observations were also used to ensure the plants gathered fully reflected the vegetation present at each site. The plants sampled with the rake

were examined and all species sampled were identified and their abundance was ranked using a 1 to 3 scale with 1 being sparse, 2 being common, and 3 being abundant. Species abundance was calculated as the total number of species at each sample site. The frequency of occurrence is the number of sites where a species was observed divided by the total number of sampling sites. Additionally, all samples are extensively examined for the presence of aquatic invasive plants, fish, and mollusks. This final report was developed that outlines all the plant species encountered, the frequency of each species, and their average growth density. Maps are developed for the report that show the locations where each species that occurred at more than 4% of sample points was encountered and that species density at each of those points. Comparisons were made between the surveys completed in 2009 and 2023 to detect changes in the plant community.

Survey Objectives

This survey examines and physically samples the aquatic plant community of Big Sand Lake to:
1. Identify any invasive species present in the lake and determine their distribution.
2. Identify the native species present in the lake, their distribution, and growth density.
3. Determine the number of species present in the lake.
4. Determine the percentage of the lake occupied by vegetation.
5. Detect any changes occurring in the distribution, density, and diversity of the plant community.
6. Develop distribution and density maps for the common native species, unique native species, and any invasive plant species encountered.
7. Collect and voucher plant specimens for submission to the Bell Museum.

Survey Results – Intensive Areas

Public Access

The public access area is near the lake outlet and has significant vegetation in the offshore area. Near the shoreline very little vegetation was observed with the lake bottom featuring sand and gravel substrates. The offshore area features an inside bend in the drop off which collects nutrients and organic matter increasing vegetative diversity and growth. Several native species were found in this area including Northern Water Milfoil, Clasping Leaf Pondweed, and Narrow Leaf Pondweeds generally starting around 8 feet deep. No invasive species were found in this area.

Pine Cone Area

The bay and point in front of Pine Cone Lodge were searched carefully for any invasive species. There is a dramatic difference between the rocky point and the lake bottom in the bay which has collected sediment and nutrients over the years. The bay features diverse native vegetation that starts at depths of 5 feet and includes Northern Water Milfoil, Wild Celery, and

Whitestem Pondweed, see the picture below. Emergent aquatic plants are found along the Pine Cone Lodge shoreline demonstrating the environmental stewardship of the residents here and their efforts to limit impacts on the lake. No invasive species were found in this area.

The sample rake collected at Pine Cone Lodge with the aquatic community visible.

Evergreen Lodge Area

Much of the shoreline along Evergreen Lodge is shallow and sandy but has a good diversity of aquatic plants. Chara Spp, Bushy Pondweed, Bladderwort, and Variable Leaf Pondweed are common in this area. Bushy Pondweed and Bladderwort are both species tolerant of disturbance. Vegetation was more common in the shallow water of this area than other shallow water areas of the lake which may indicate some degree of nutrient transport into the lake, most likely by shallow groundwater flow. Offshore in this area is a dense bed of Nitella Spp extending down past depths of 30 feet. No invasive species were found in this area.

Emma Creek Inlet Area

The inflowing Emma Creek brings sand and organic matter into Big Sand Lake from the north. The sand rapidly deposits out of the flowing water creating the shallow sandbar found at

the creek mouth. Organic matter travels slightly farther into the lake contributing to the dense and diverse plant community observed adjacent to sandbar. Wild Celery, Northern Water Milfoil, and Clasping Leaf Pondweed are common in this area reflecting the greater availability of nutrients and presence of a silt layer over the sand which is the preferred habitat for Wild Celery. Deep water abuts this plant community and limits it's overall coverage, if the shallow water extended further into the lake this area would have even greater plant coverage. No invasive species were found in this area.

Survey Results – Full Lake

The weather was good for surveying with moderate winds generally from the southwest while the final day featured a very light breeze from the northeast. Visibility was very good with observations exceeding 10 foot depths in some areas. The first survey day featured temps as high as 80 degrees while the second two days of surveys had morning temperatures in the lower 40s and afternoon temperatures topping out in the 50s. Wave activity rarely impacted survey activity and we were able to proceed quite efficiently.

During the 2023 survey vegetation was observed at 393 of the 503 sample points which is 90.9% of sites. In the previous survey the sites with vegetation was very similar with 404 total occurrences observed. This represents a generally very stable plant community. Many lakes are seeing increased density, distribution, and diversity of aquatic vegetation in the past few years but that trend was not observed in Big Sand Lake. Vegetation was found as deep as 38 feet of water which is exceptional for Minnesota lakes but very close to what was observed in 2009. The average number of species per sample was 1.36 when comparing all sites and the maximum number of species at any one site was 6. These are low numbers compared to most Minnesota lakes and reflect the low fertility condition of the lake and generally sandy lake bottom. Looking at just the vegetated sample sites the average number of species was 1.73 and the most common number of species was 1. The most common species observed in 2023 were Chara Spp at 64.3% of sites, Nitella Spp at 11%, and Bladderwort at 10.8%. These species were also the most commonly observed species in the 2011 and 2018 surveys. There were some species that had significant changes in distribution when comparing the surveys. Bladderwort in particular dramatically increased in abundance going from 1% frequency in 2018 to a frequency of 20% in 2023. This species is most common in 2 to 7 feet of water and moves around the lake as a round winter bud that sprouts in the spring and will persist if the fertility in that location is high enough. Bladderwort is unique among aquatic plants in that is captures algae and zooplankton from the lake inside small bladders along the leaflets and digests them for additional nutrients. This species has a very fine leaf pattern almost a mesh and appears as a round tube along the lake bottom. A total of 30 species were observed in the lake with variable distribution see the following pages for more information.

Species Observed, Frequency, and Changes from previous Survey

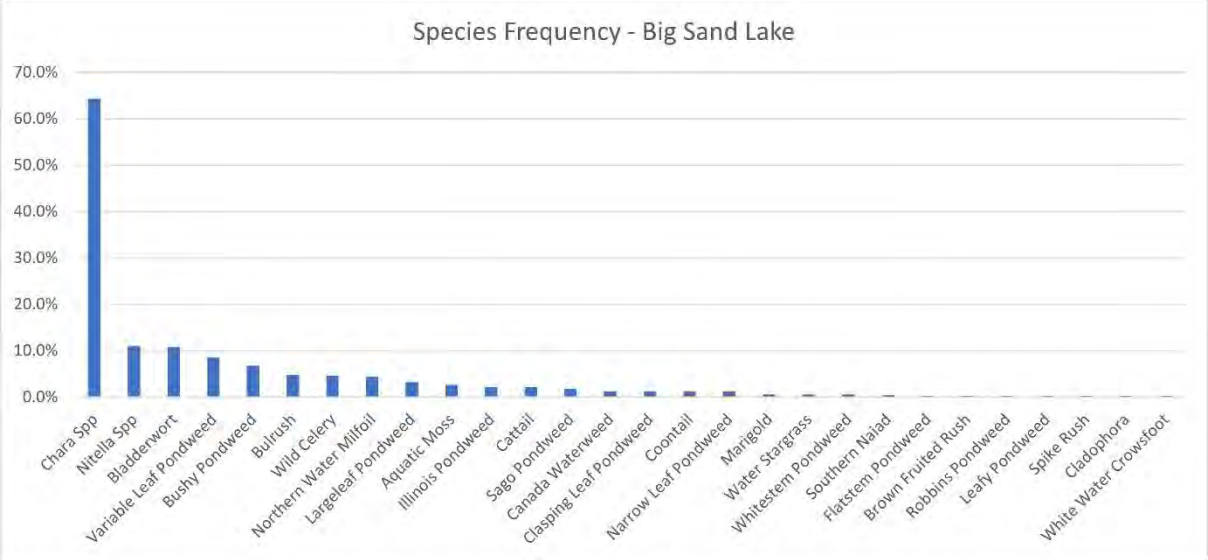
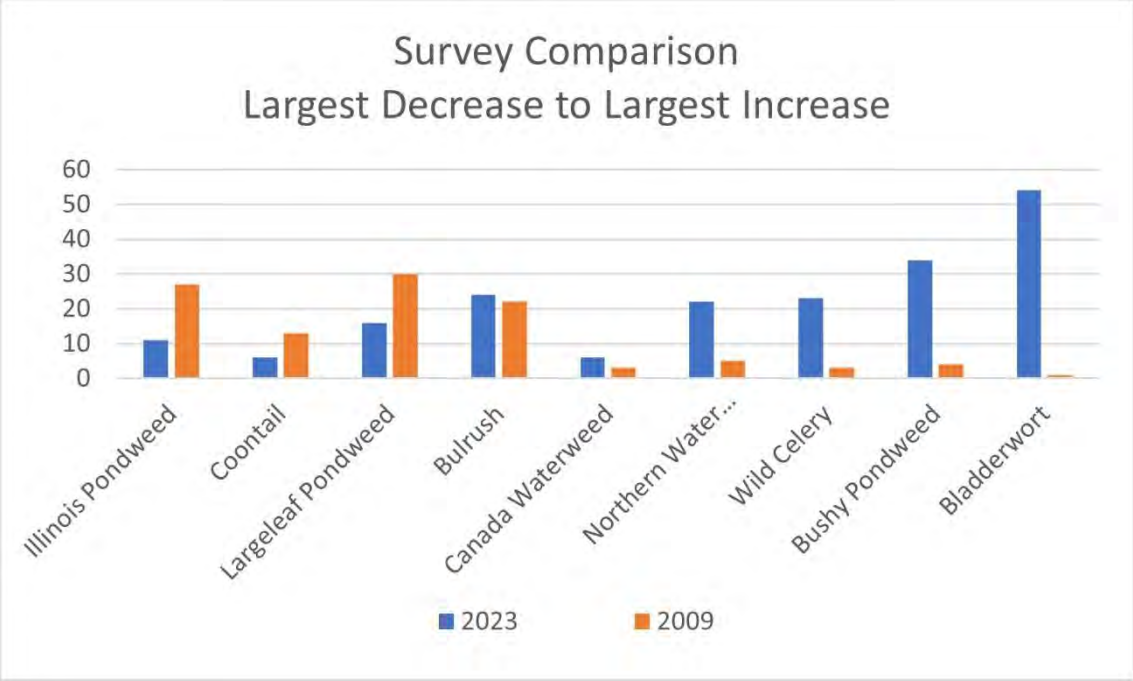


Table of Species and Occurrence

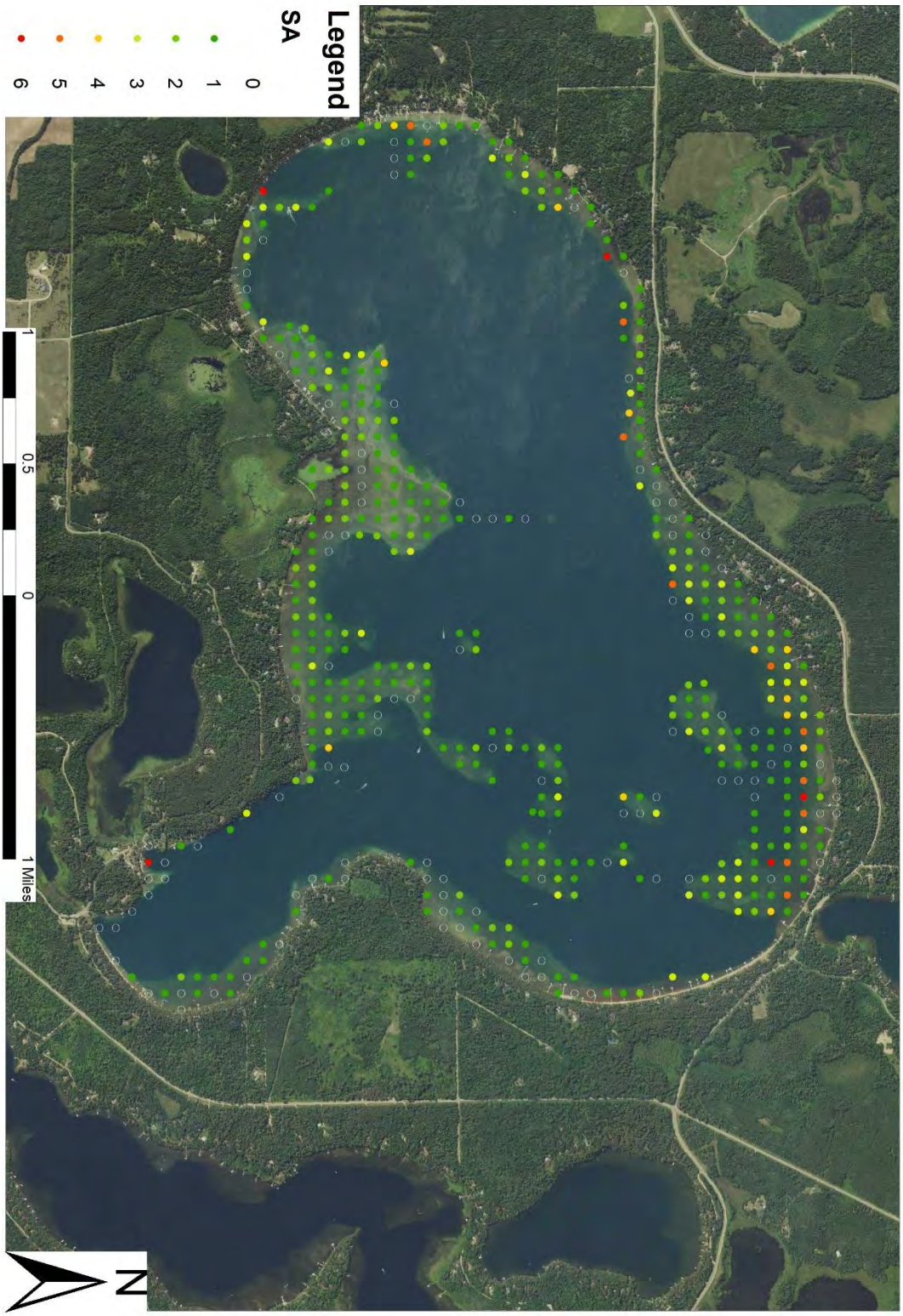
Emergent Species	**% Occurrence**	**Count of Occurrence**	**Density When Present**
Bulrush	4.8%	24	1.3
Cattail	2.2%	11	1.7
Floating Leaf Species	**% Occurrence**	**Count of Occurrence**	
White Water Lily	0.4%	2	2
Submerged Species	**% Occurrence**	**Count of Occurrence**	
Chara Spp	64.3%	323	1.06
Nitella Spp	11.0%	55	1.56
Bladderwort	10.8%	54	1.22
Variable Leaf Pondweed	8.6%	43	1
Bushy Pondweed	6.8%	34	1
Wild Celery	4.6%	23	1.08
Northern Water Milfoil	4.4%	22	1.32
Largeleaf Pondweed	3.2%	16	1
Aquatic Moss	2.6%	13	1
Illinois Pondweed	2.2%	11	1
Sago Pondweed	1.8%	9	1

Canada Waterweed	1.2%	6	1.33
Clasping Leaf Pondweed	1.2%	6	1.16
Coontail	1.2%	6	1
Narrow Leaf Pondweed	1.2%	6	1
Marigold	0.6%	3	1
Water Stargrass	0.6%	3	1
Whitestem Pondweed	0.6%	3	1
Southern Naiad	0.4%	2	1
Flatstem Pondweed	0.2%	1	1
Brown Fruited Rush	0.2%	1	1
Robbins Pondweed	0.2%	1	1
Leafy Pondweed	0.2%	1	1
Spike Rush	0.2%	1	1
Cladophora	0.2%	1	1
White Water Crowsfoot	0.2%	1	1
	Total Occurrences	682	

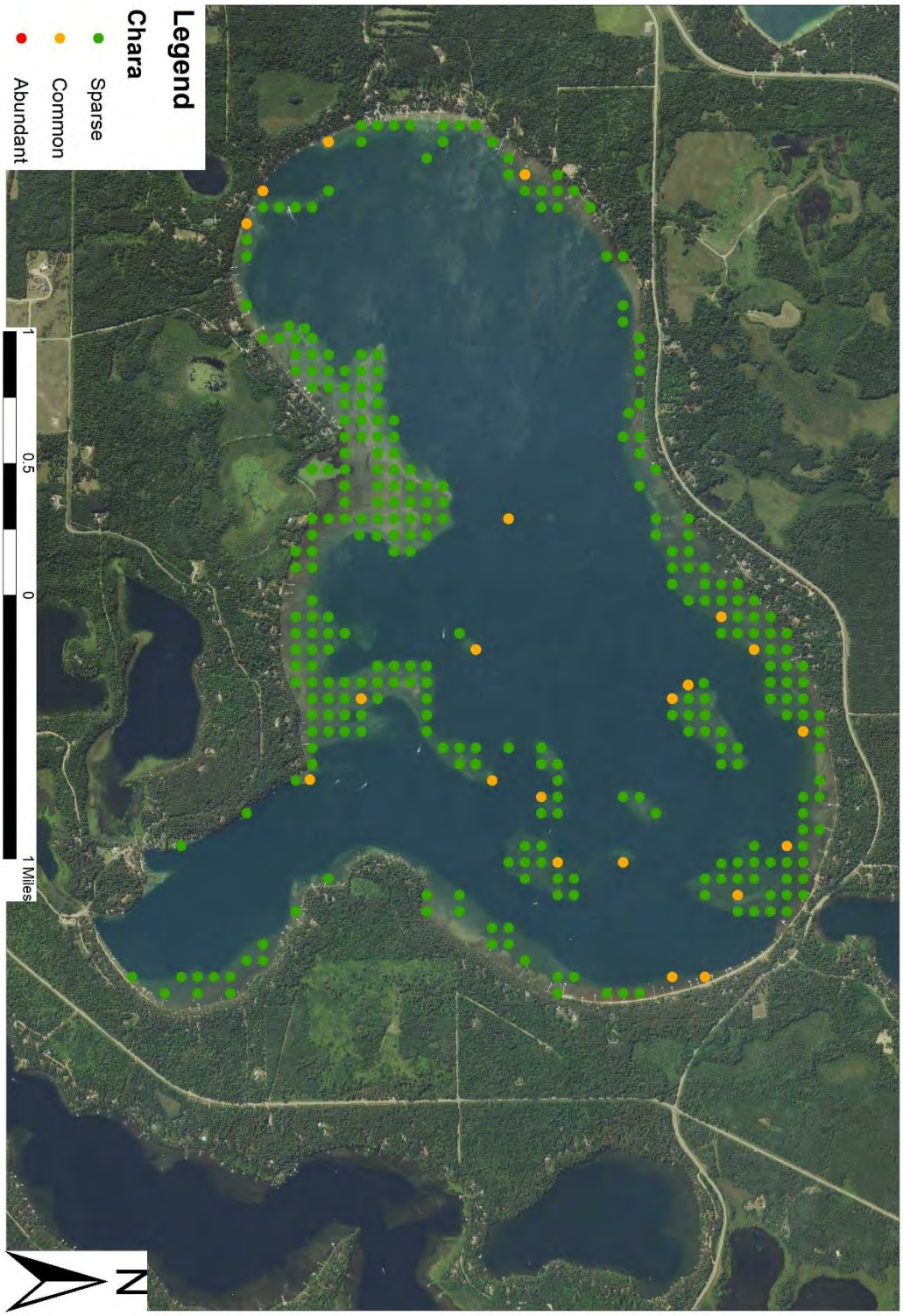


Comparing the surveys it appears that disturbance tolerant species are increasing in coverage. Species intolerant to disturbance have generally remained steady to slightly declined. Coontail is the exception to this since it is tolerant to disturbance but has declined in abundance. This trend was also seen in Long Lake where Coontail declined, contrary to the trend observed in that lake of generally increases in species tolerant to disturbance. The increase in Bladderwort is the most obvious since this species is readily sampled using standard rake sampling techniques and should have shown up in the 2009 survey if present. Wild Celery has been increasing in general across Minnesota and that pattern is also seen in Big Sand Lake.

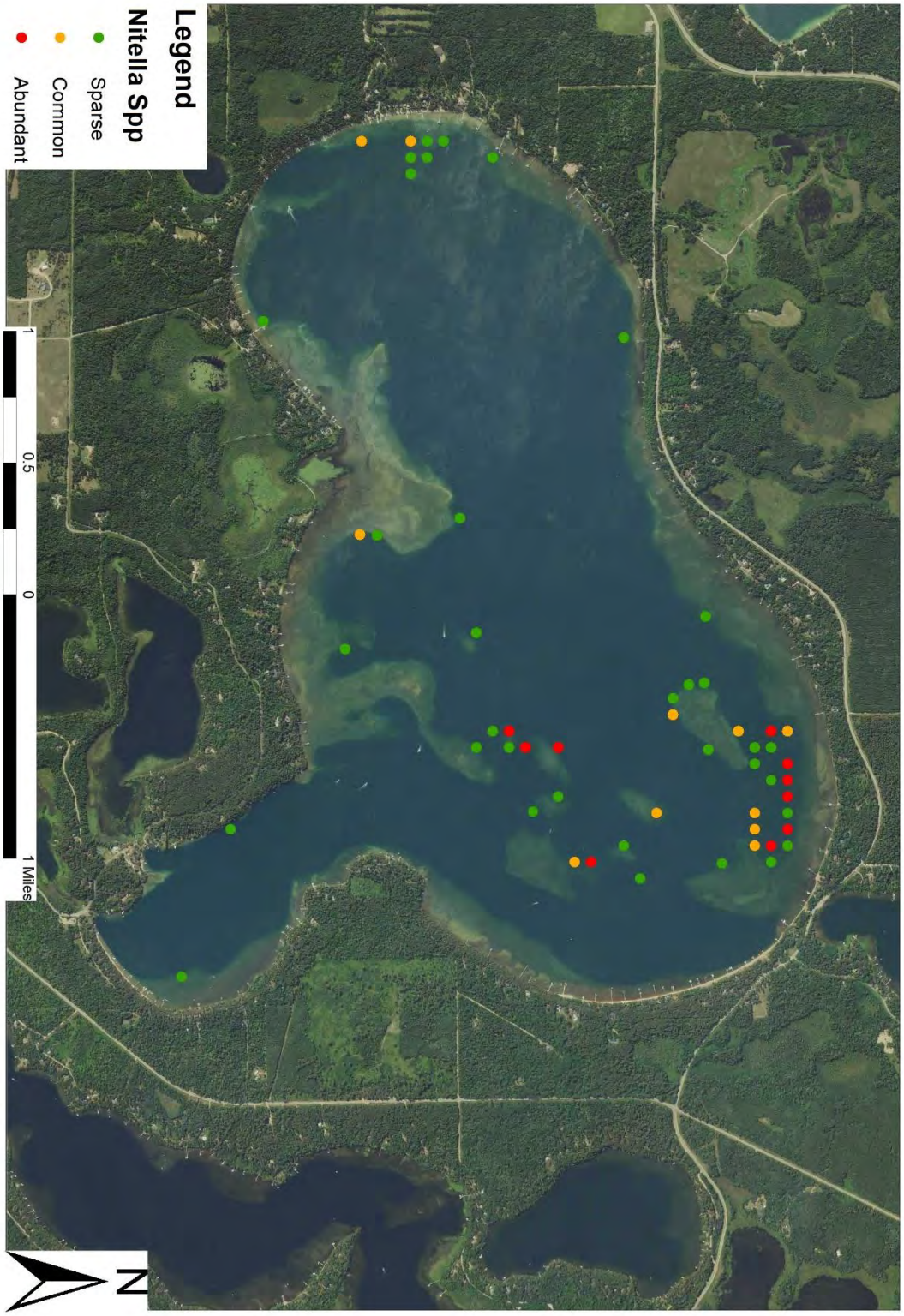
Abundance of Species – Whole Lake



Chara Spp in Big Sand Lake

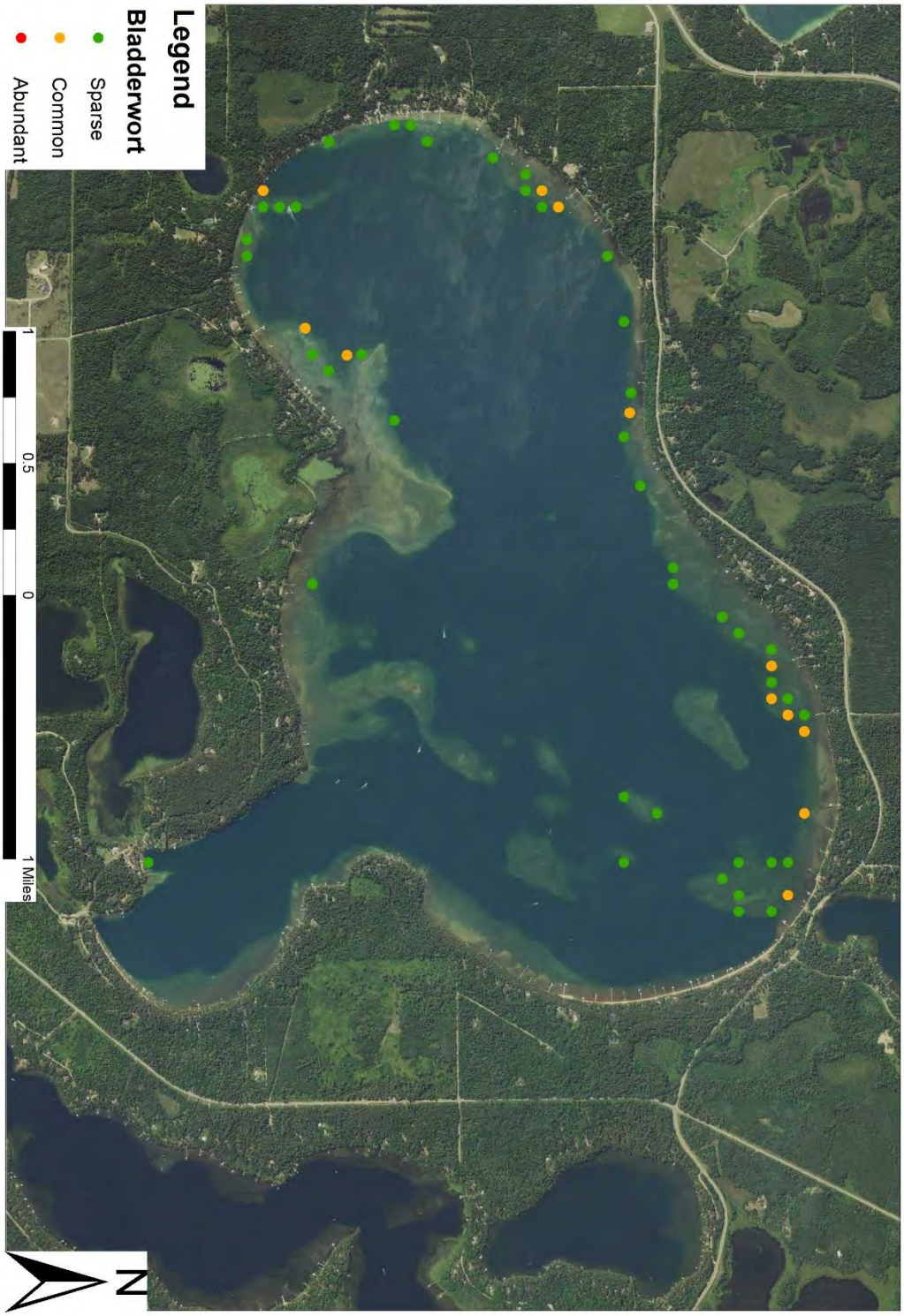


Nitella Spp in Big Sand Lake

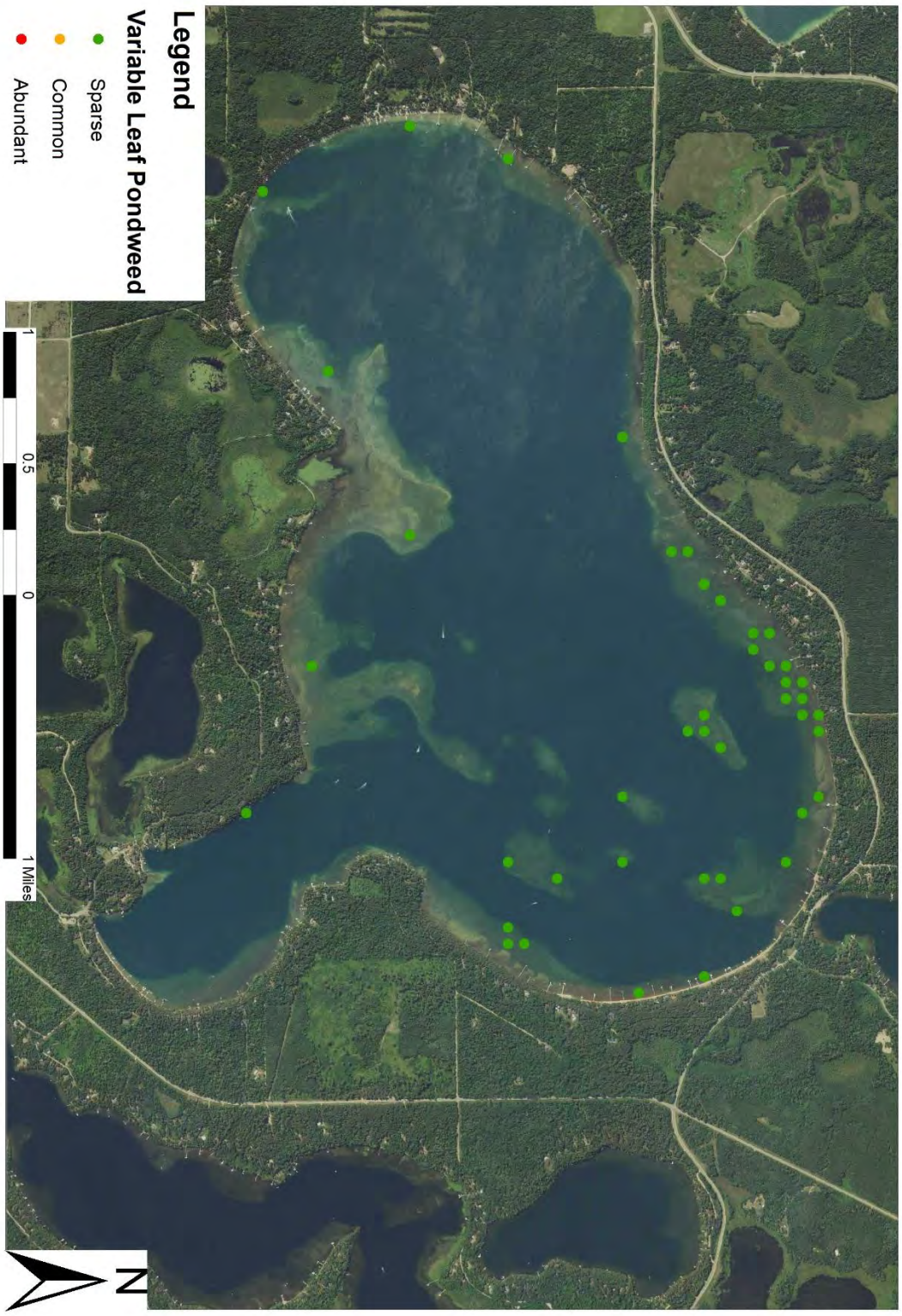


Dense Nitella Sampled at 28’ along the Northeastern Shoreline of Big Sand Lake

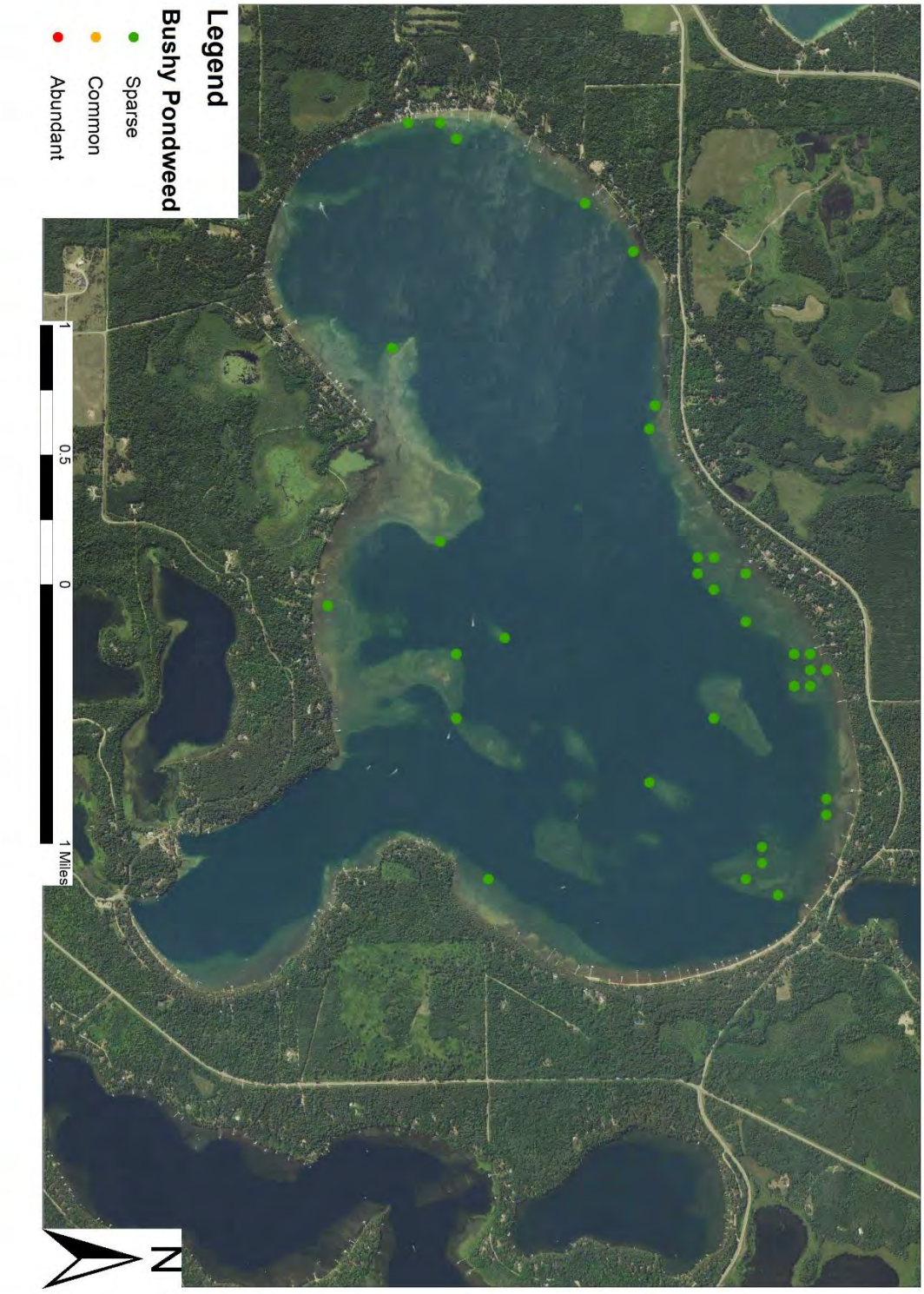
Bladderwort in Big Sand Lake



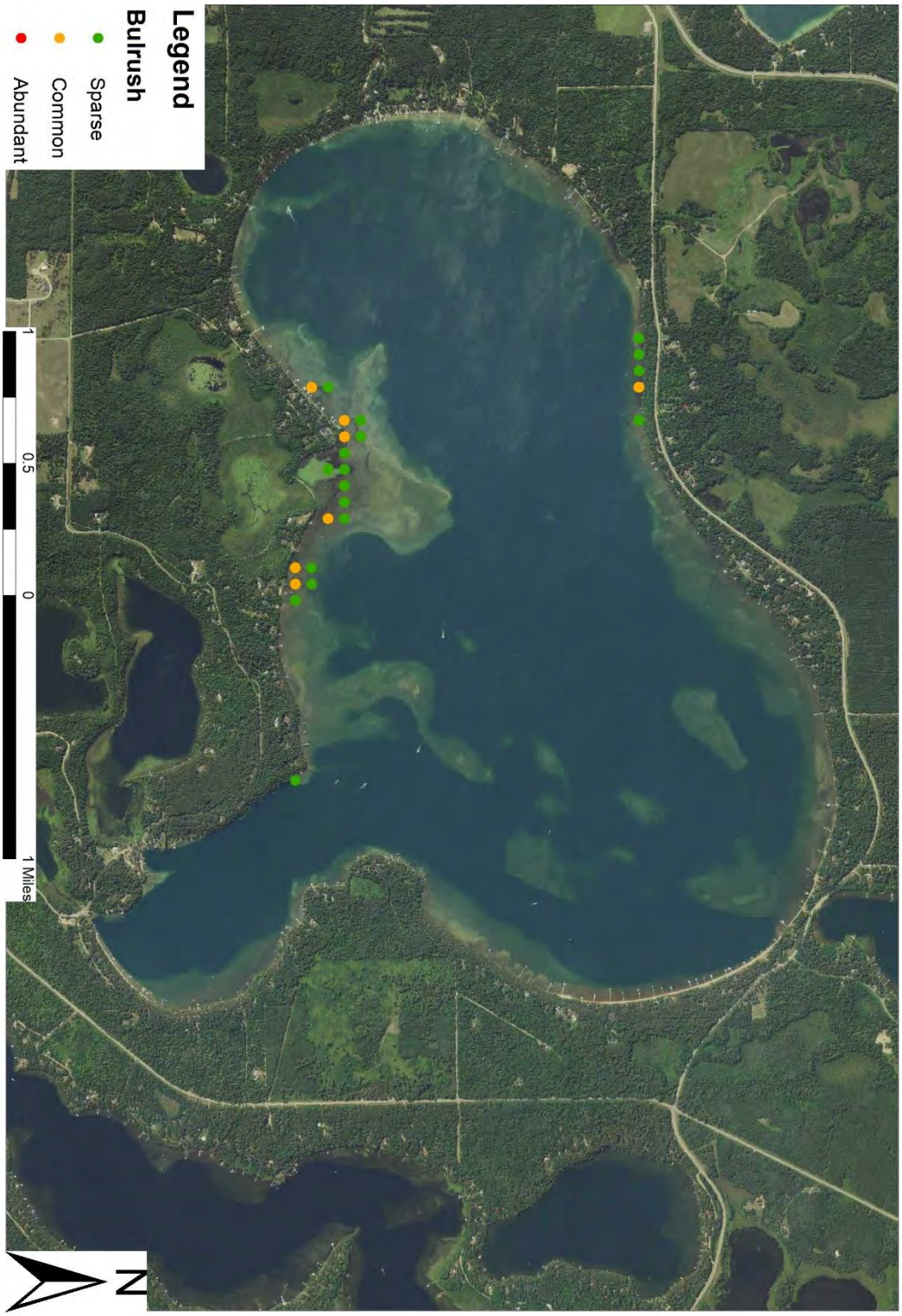
Variable Leaf Pondweed in Big Sand Lake



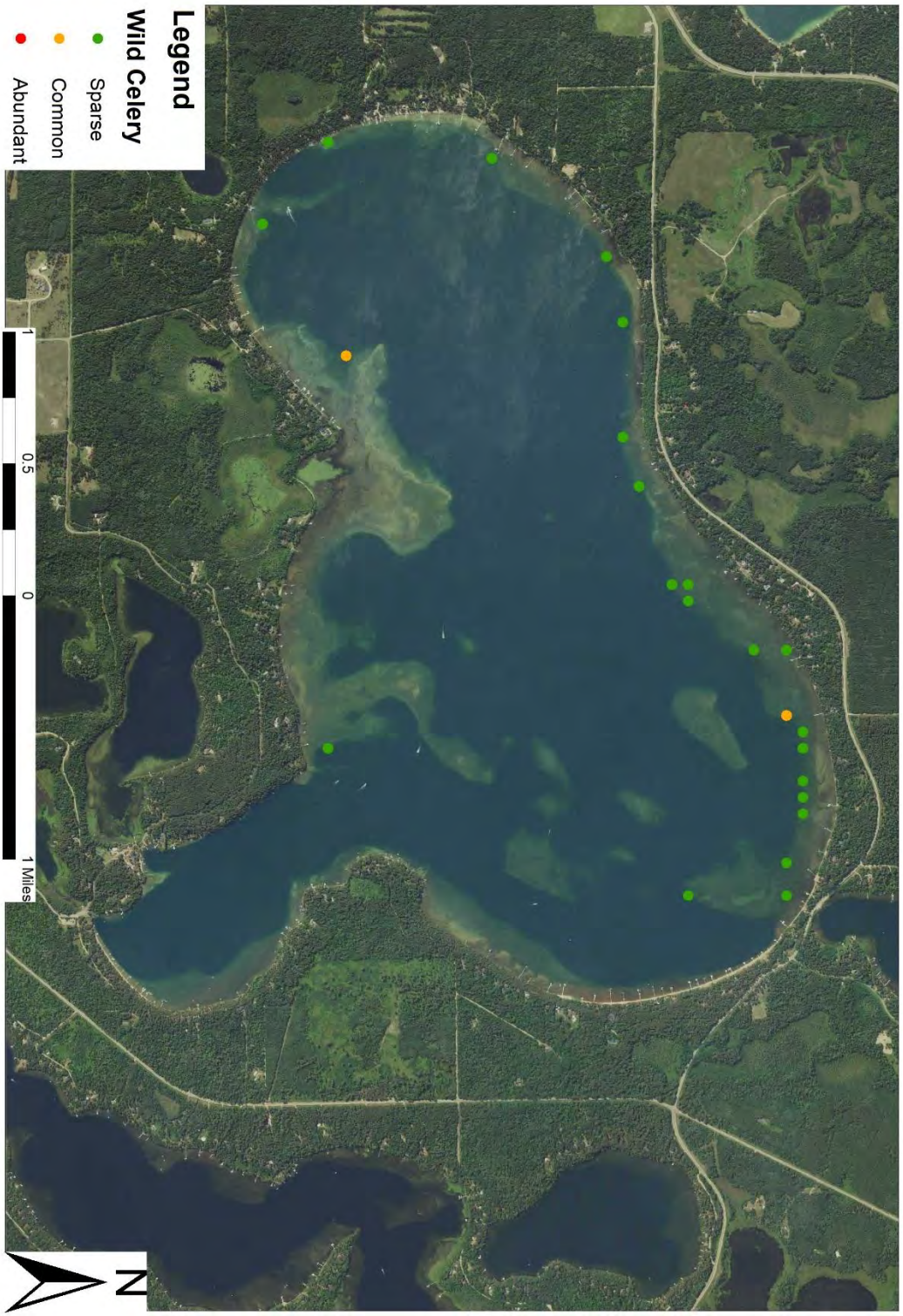
Bushy Pondweed in Big Sand



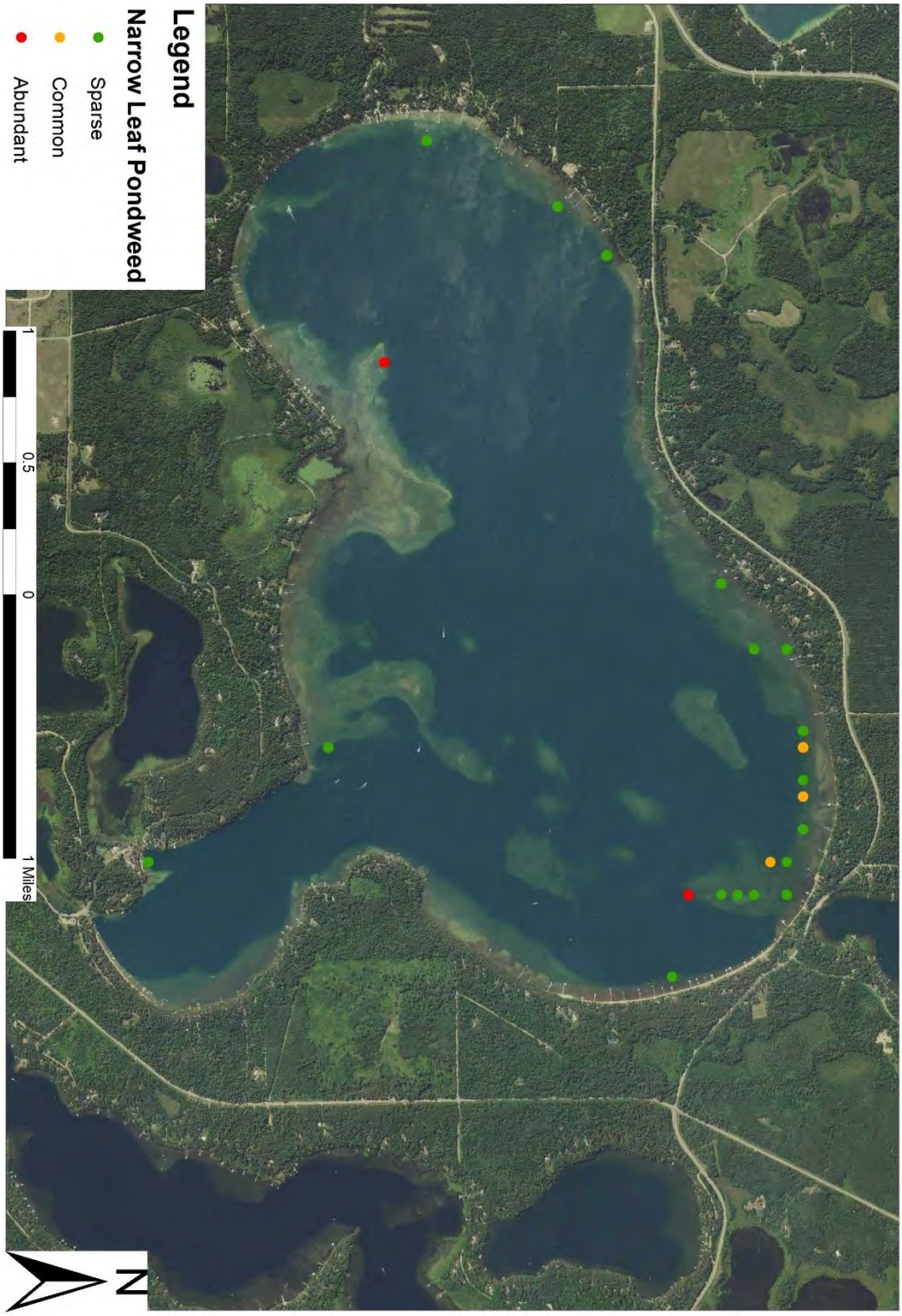
Bulrush in Big Sand Lake



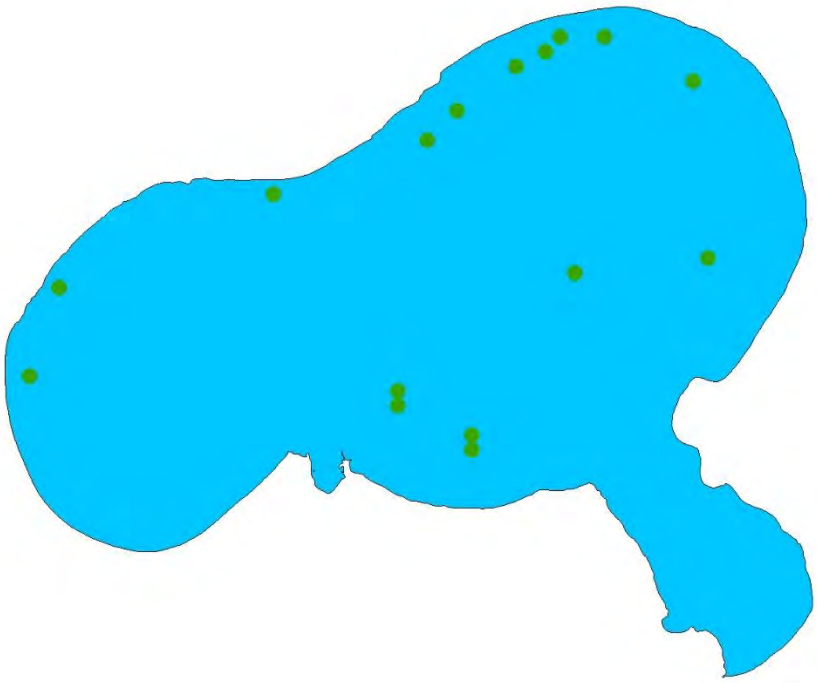
Wild Celery in Big Sand Lake



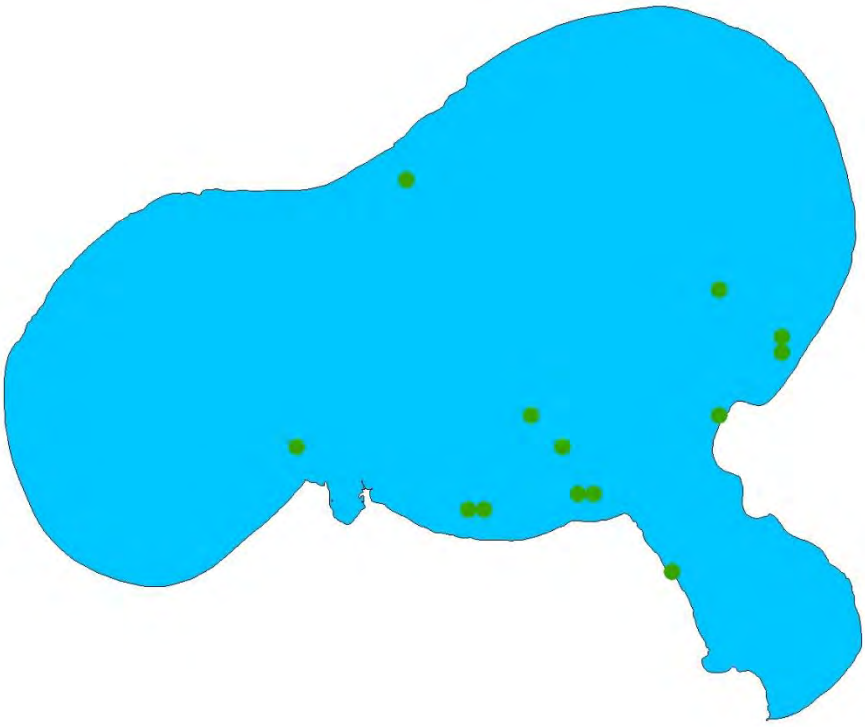
Northern Water Milfoil in Big Sand Lake



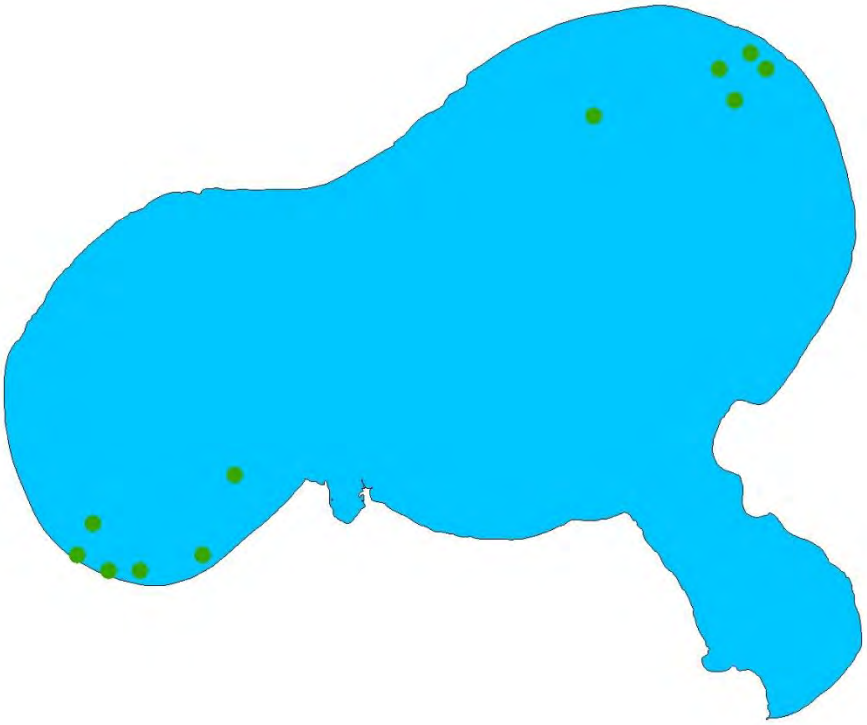
Large Leaf Pondweed



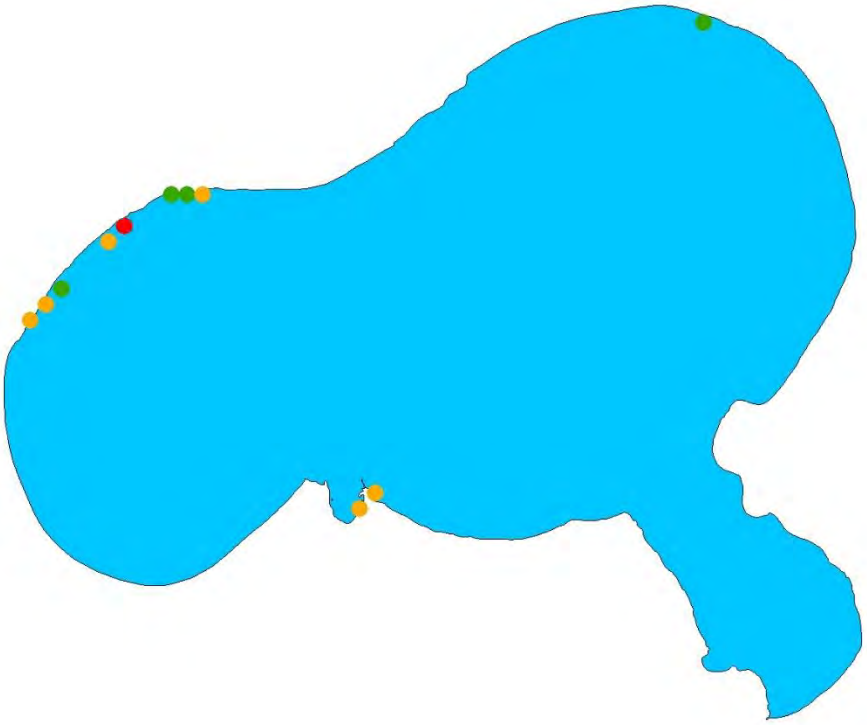
Aquatic Moss



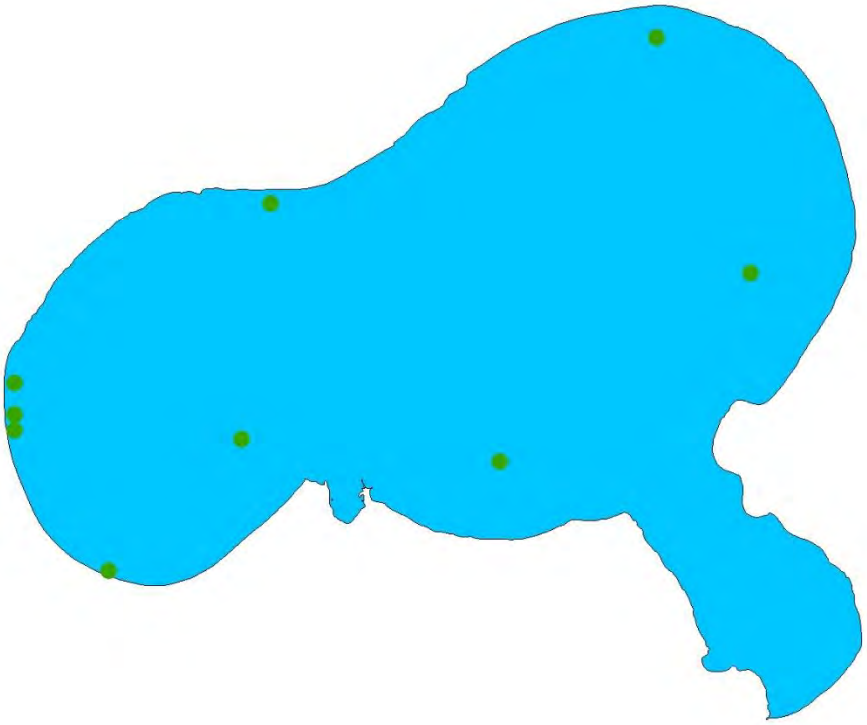
Illinois Pondweed



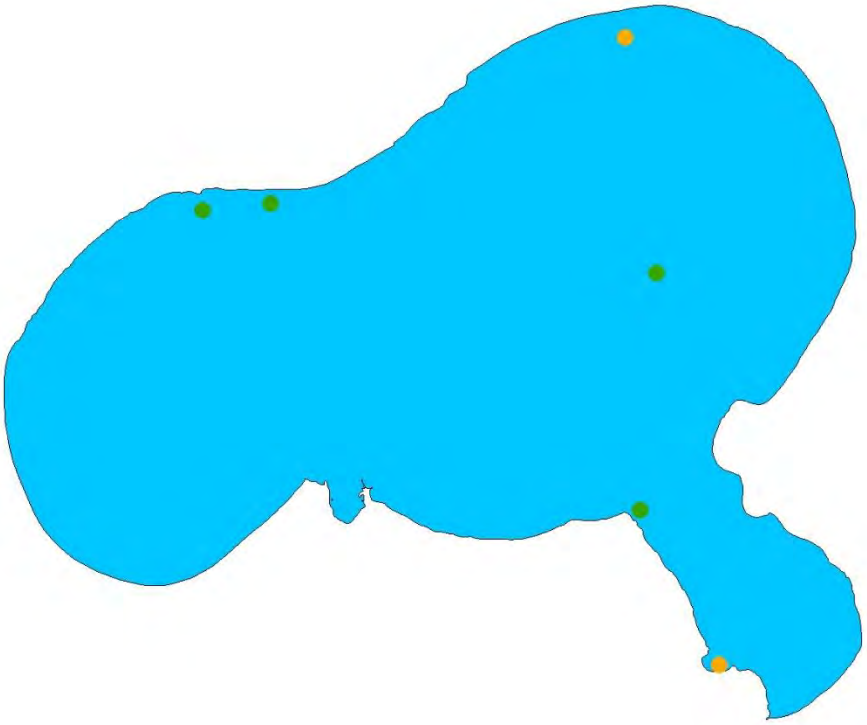
Cattail



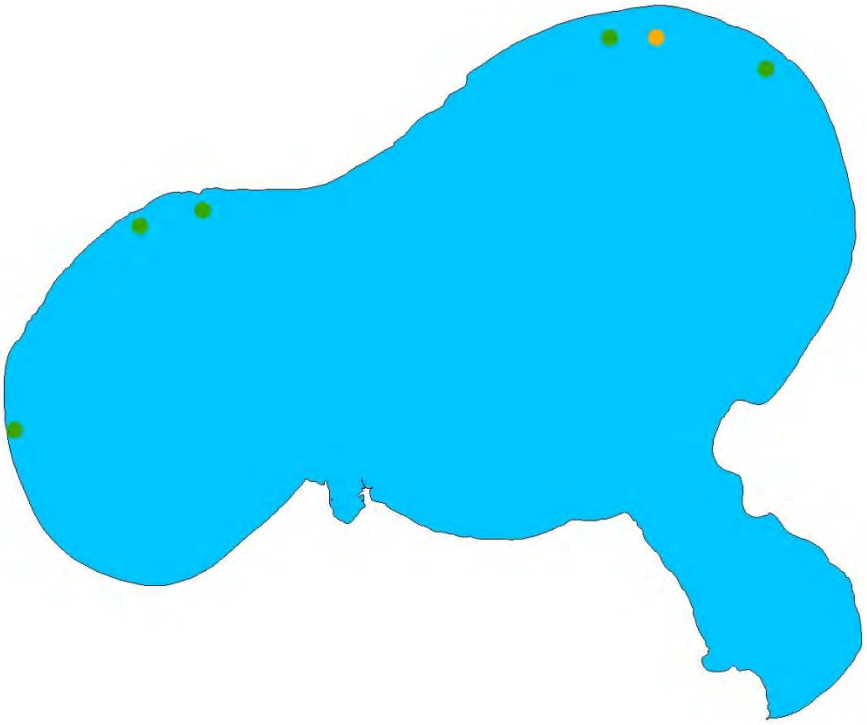
Sago Pondweed



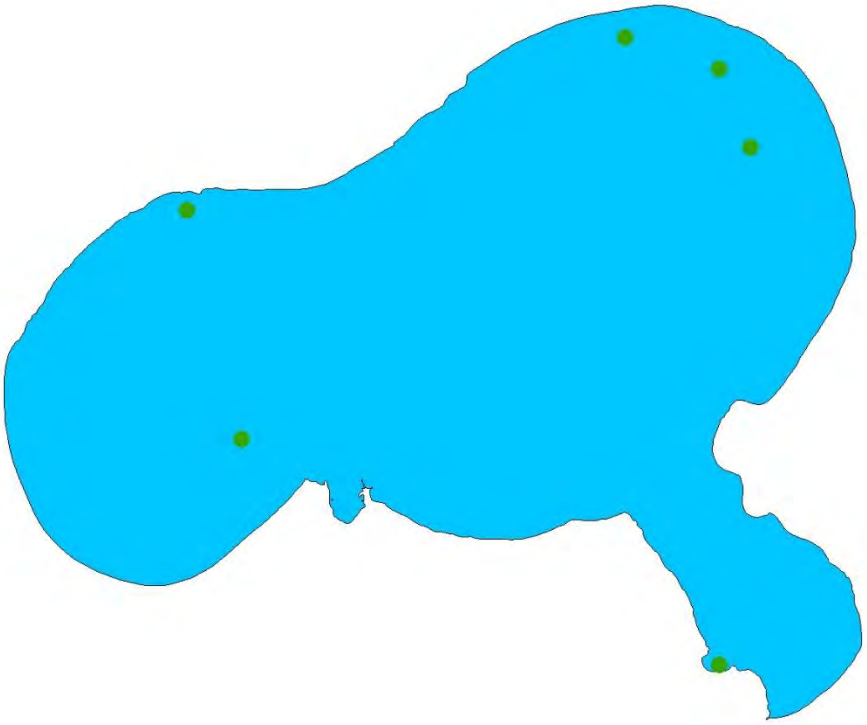
Canada Waterweed



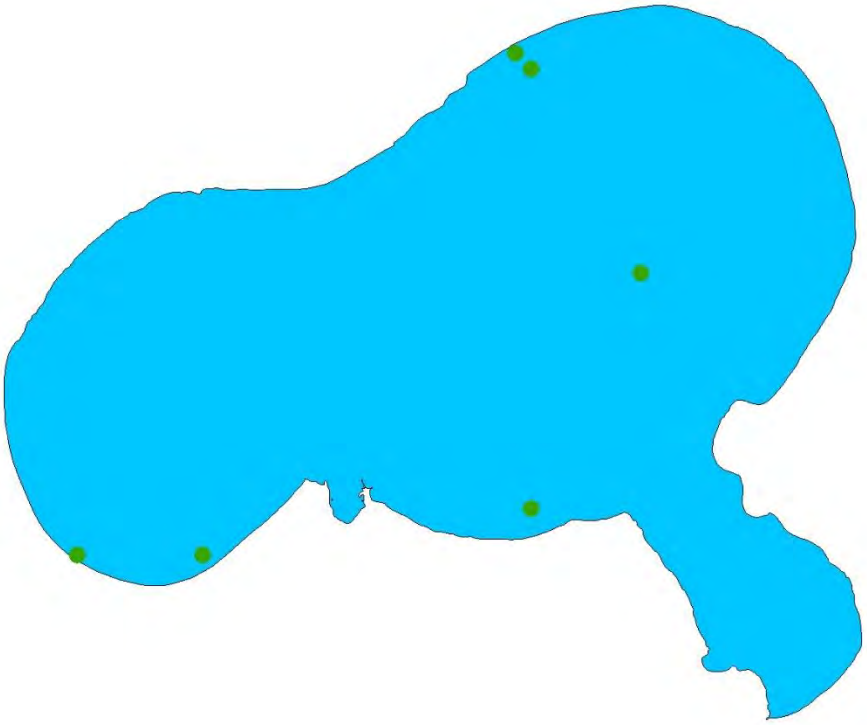
Clasping Leaf Pondweed



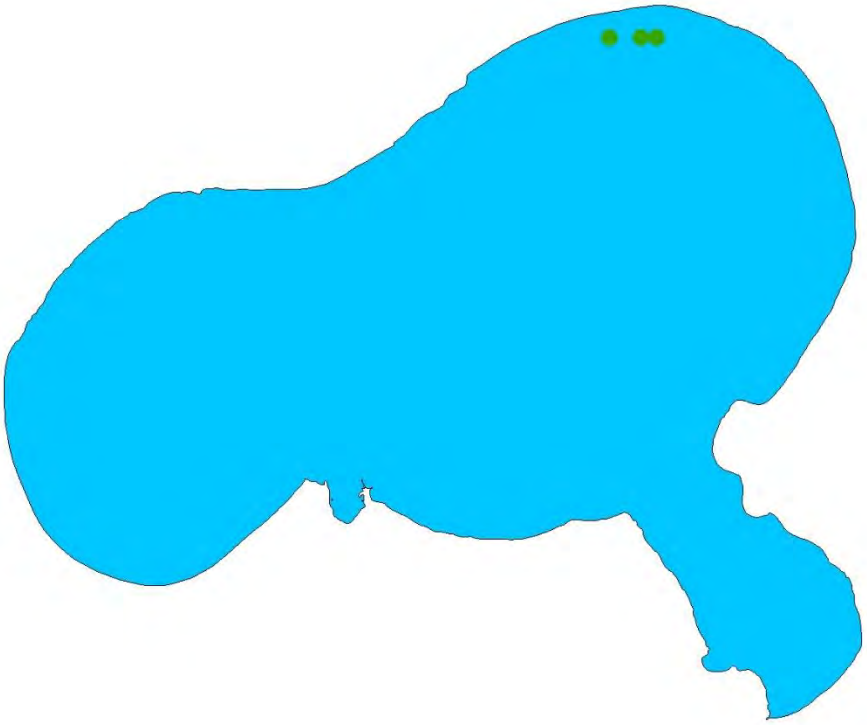
Coontail



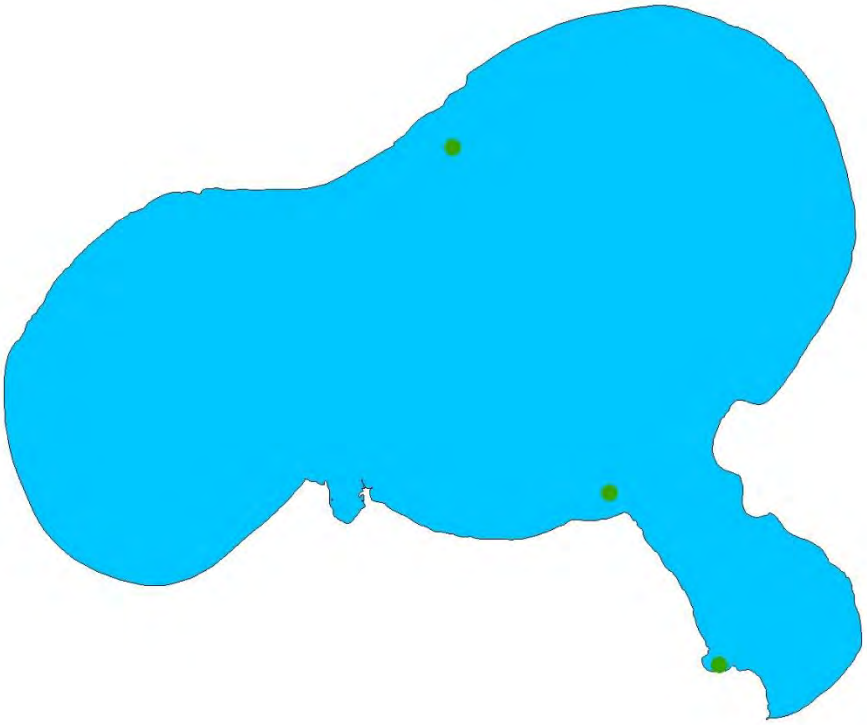
Narrow Leaf Pondweed



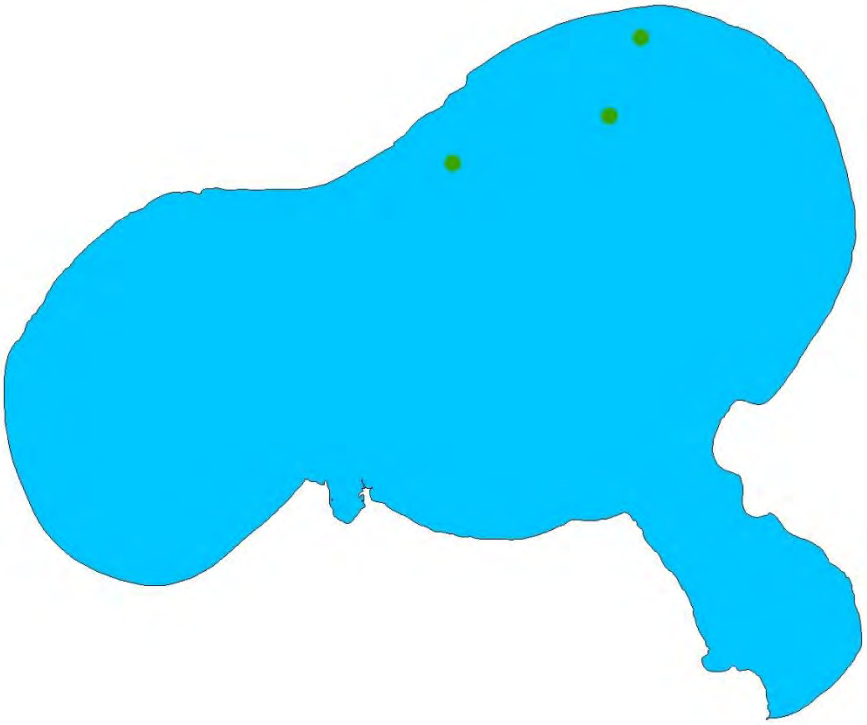
Water Marigold



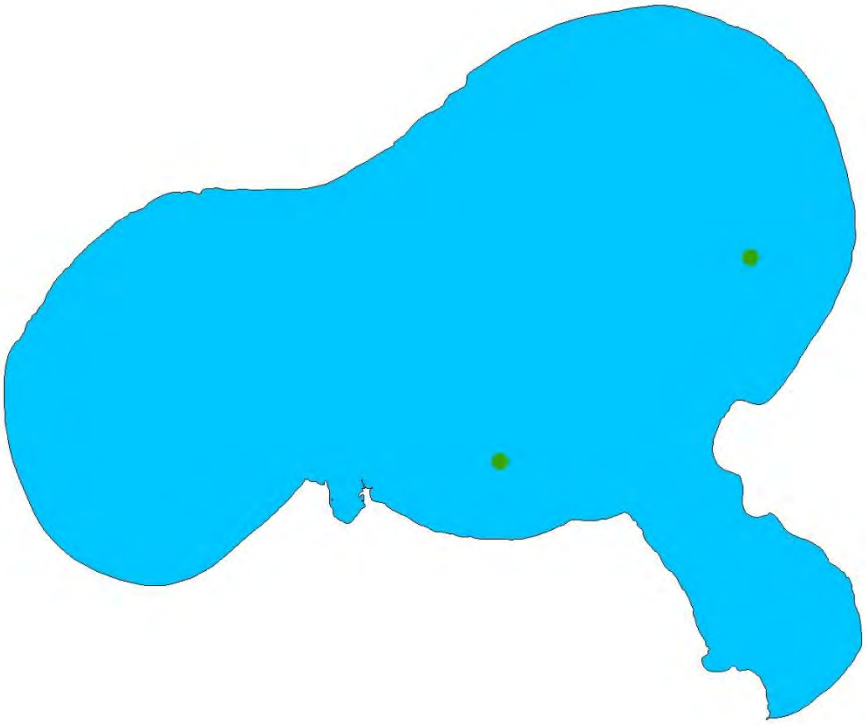
Water Stargrass



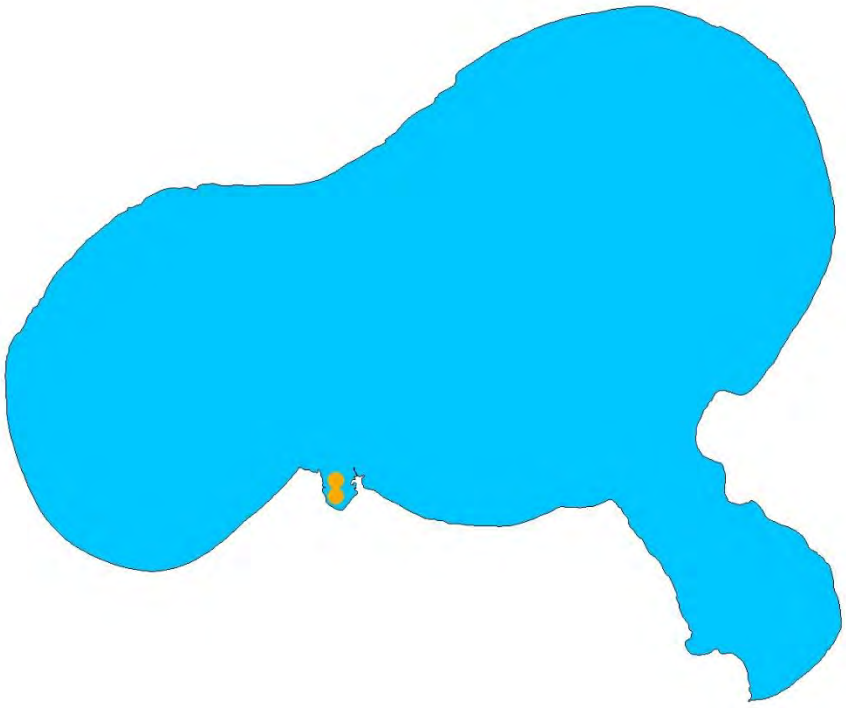
Whitestem Pondweed



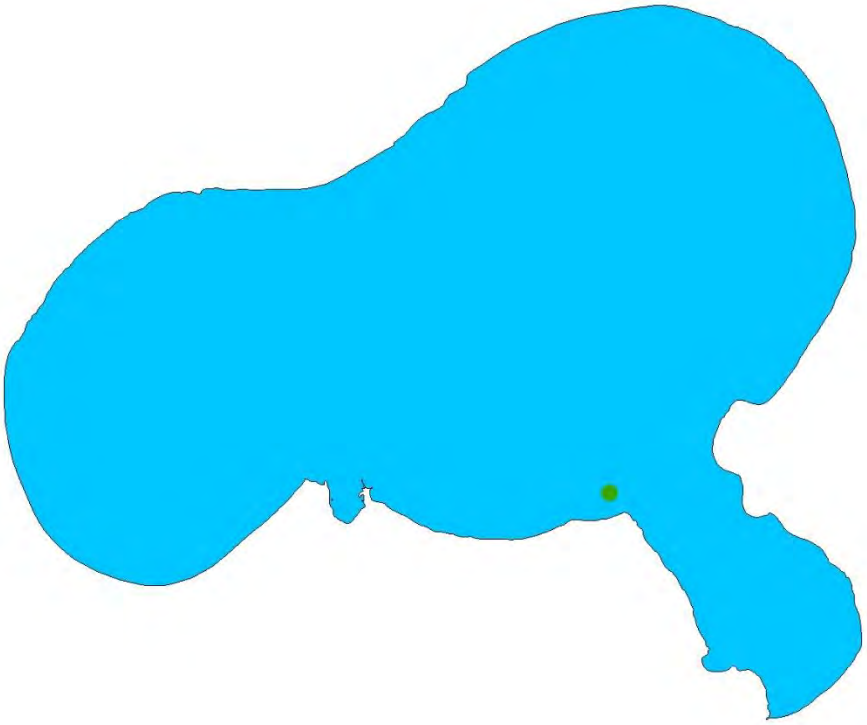
Southern Naiad



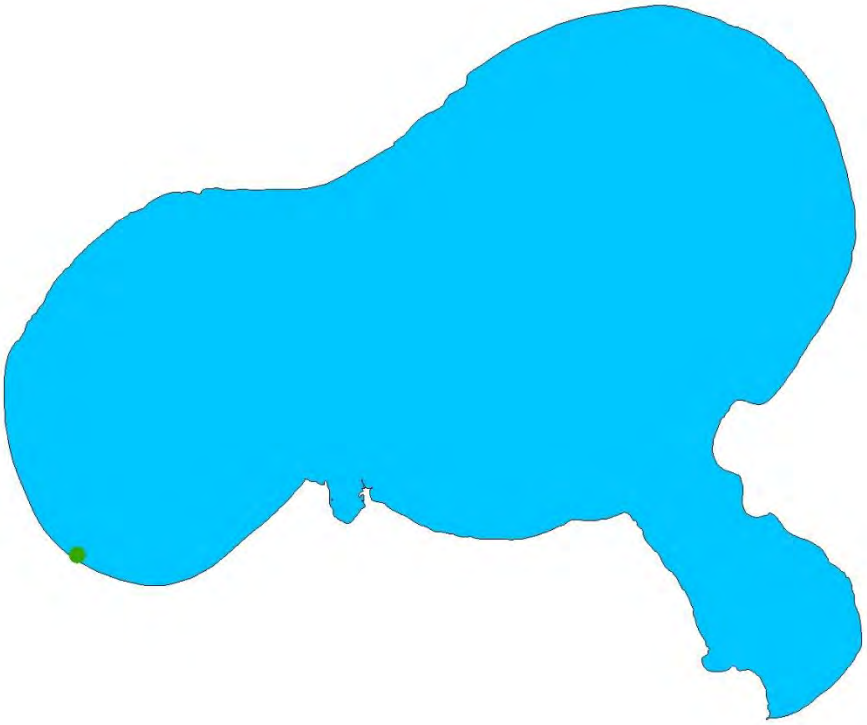
White Water Lily



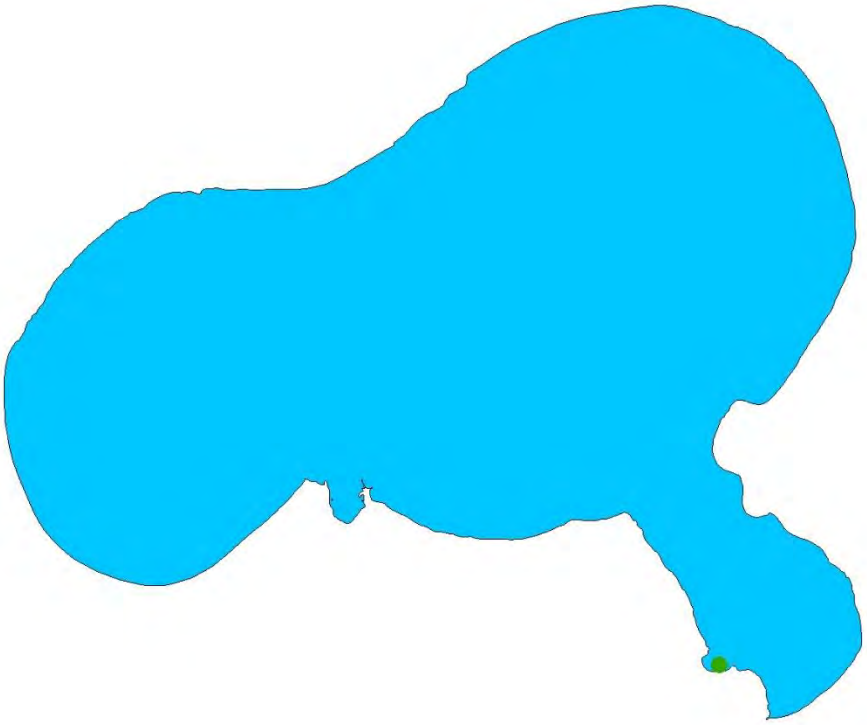
Flatstem Pondweed



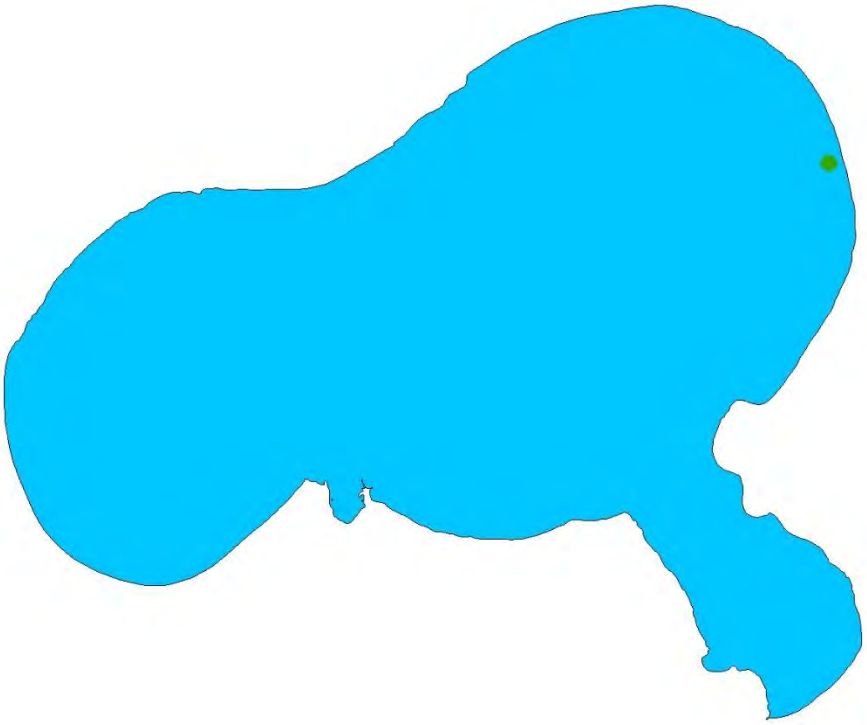
Brown Fruited Rush



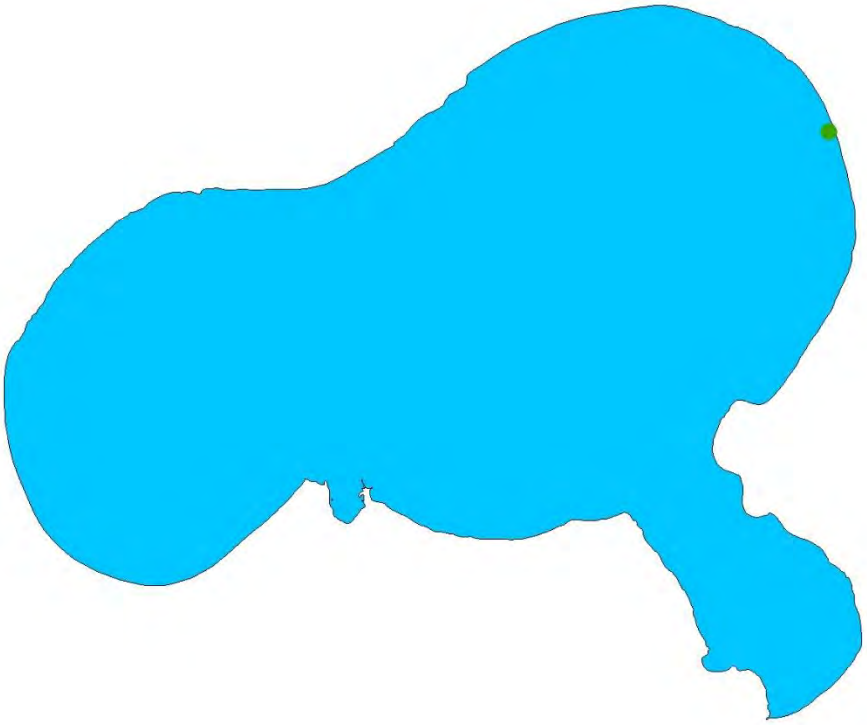
Robbins Pondweed



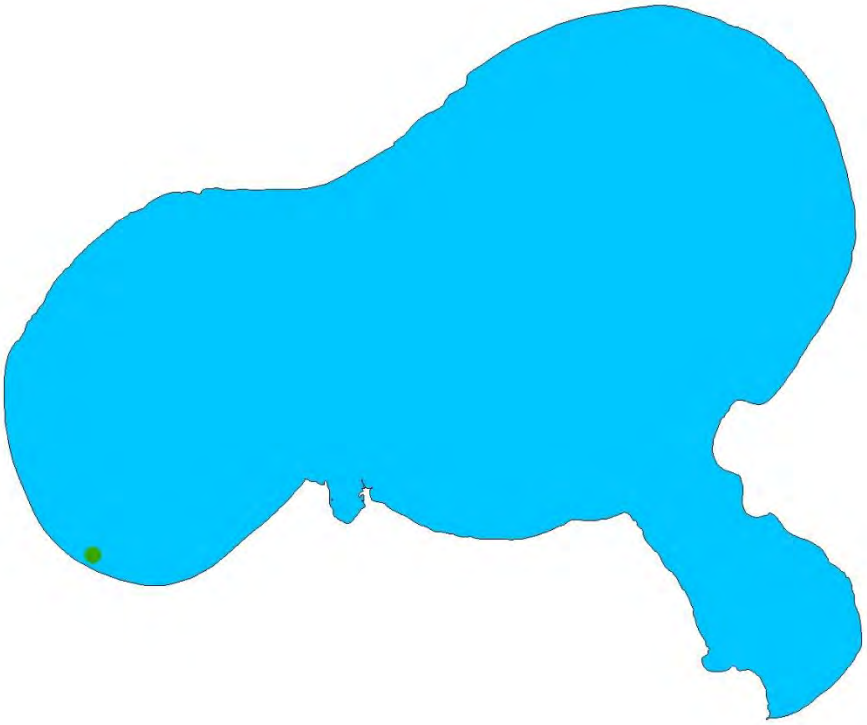
Leafy Pondweed



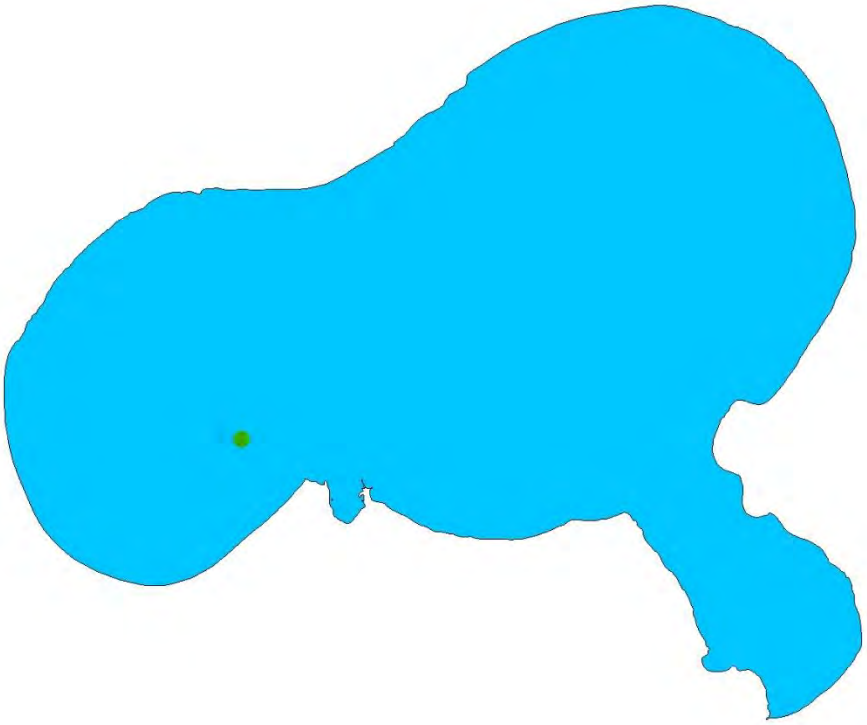
Spike Rush



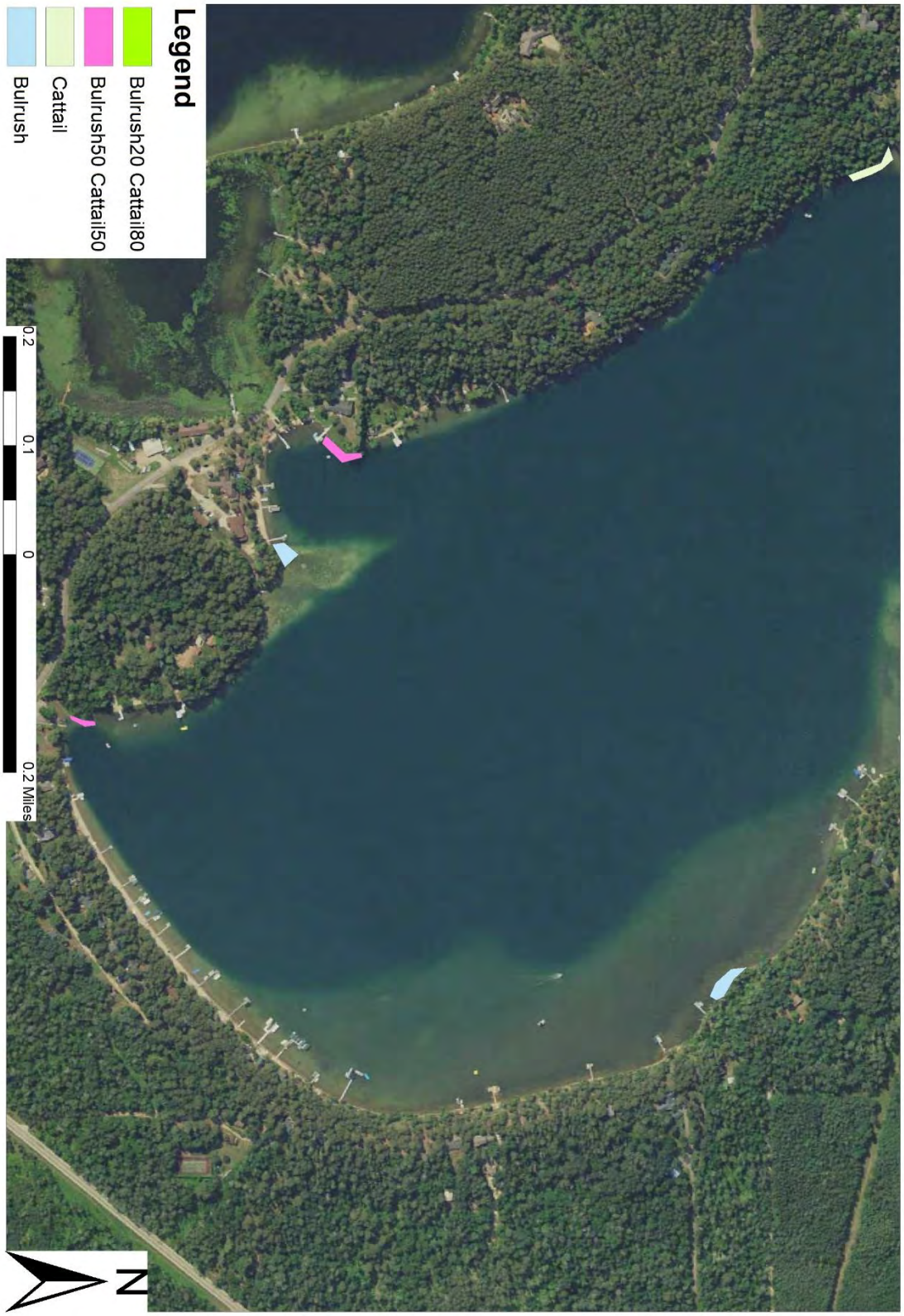
Cladophora



White Water Crowsfoot



Emergent Aquatic Plants



Emergent Aquatic Plants in South Eastern Bay of Big Sand Lake

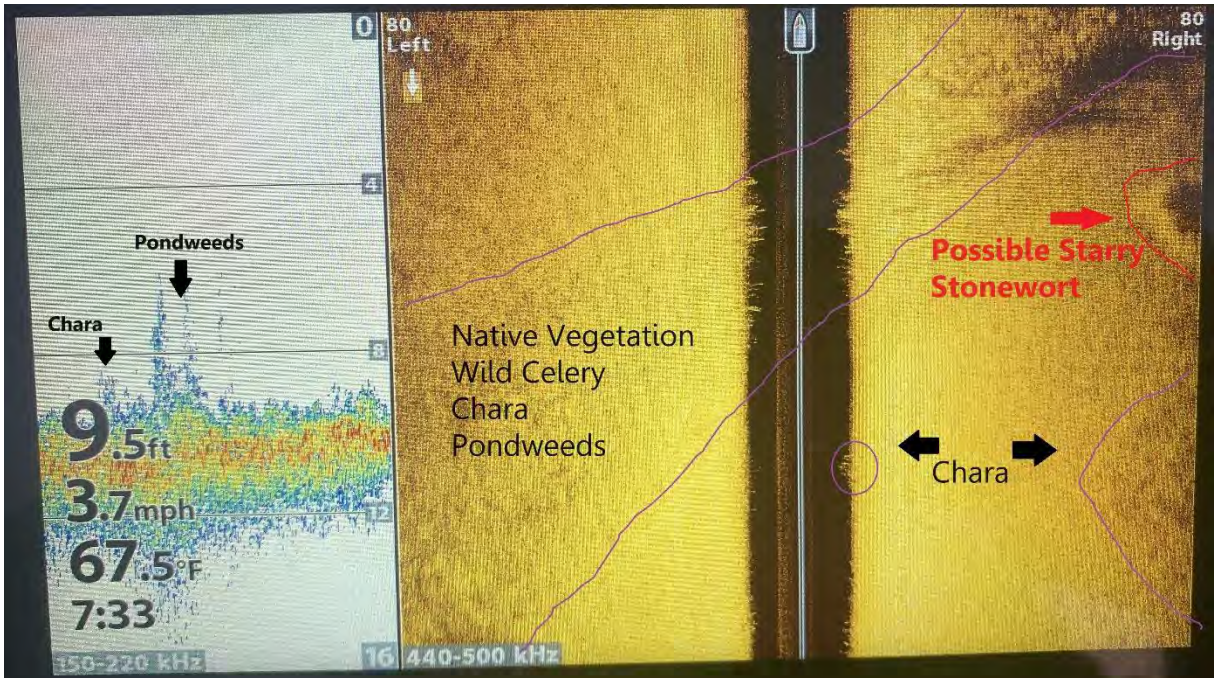
Down and Side Scanning Sonar for Aquatic Invasive Species Detection

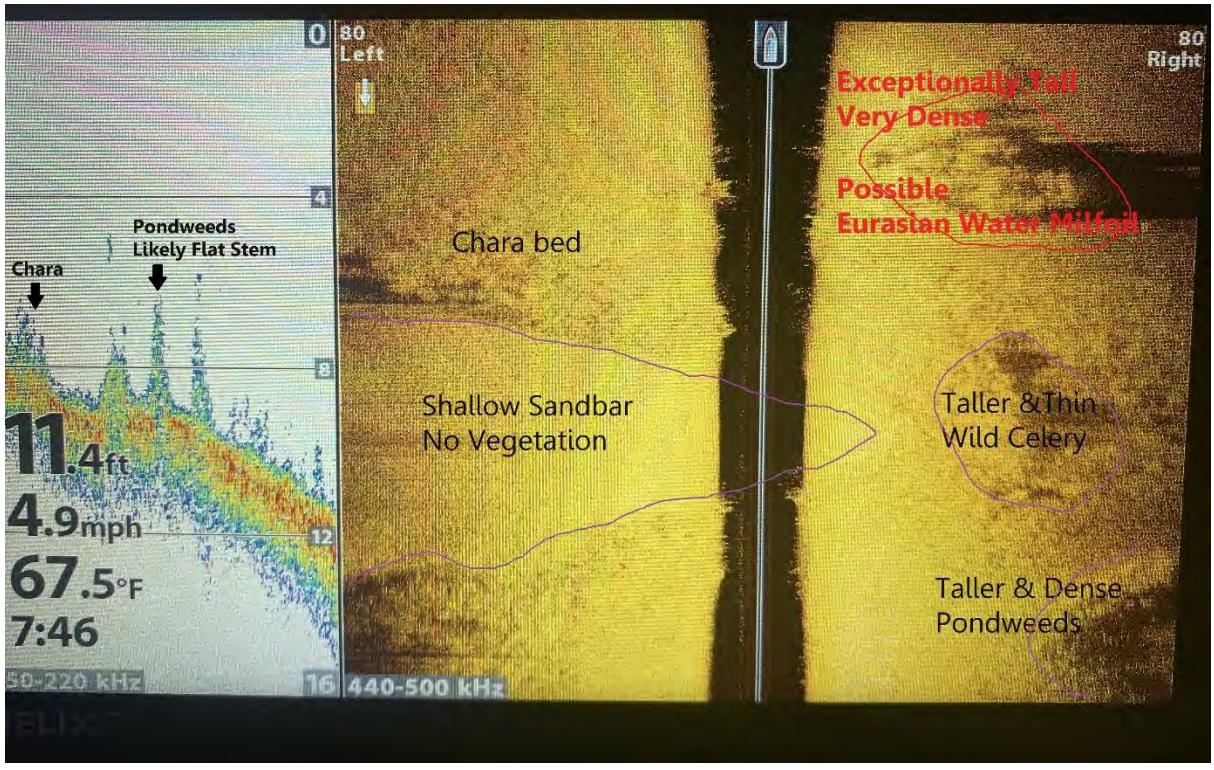
As technology has improved aquatic plant survey techniques have adjusted to incorporate those improvements. Until recently aquatic plant surveys were based solely on using a sample rake to document the plants at pre-established survey points. Those survey points were spaced 200 feet or further apart in an even grid across the lake providing only a limited snapshot of the plant community. In 2020 Minnesota DNR approved a new Standard Operating Procedure for Invasive Species Delineations that utilizes sonar and visual observations to continuously document the lake's plant community as the surveyor navigates around the lake. Aquatic Survey Professionals combines these two survey techniques to provide our clients with a data set comparable to their previous surveys while also continuously examining the lake bottom to detect any newly introduced invasive species.

Sonar images can appear grainy and coarse, seemingly of limited value in documenting a lake's plant community. Aquatic surveyors gain hundreds of hours of experience monitoring these sonar images alongside thousands of rake obtained plant samples. Over time surveyors learn that each species has a distinctive appearance that changes over the season. Eurasian Water Milfoil is taller and denser than most native species in spring returning images with a different color pattern. By mid-summer Eurasian Water Milfoil develops a dense head over moderate stems often in tall patches that are slightly open near the bottom with a unique appearance on the sonar images. Starry Stonewort is referred to as 'Super Chara' by researchers which matches it's sonar appearance. Starry Stonewort is taller and denser than Chara but generally shorter than other native species. Starry Stonewort grows very dense and usually in well-defined patches with no natives intermixed, it's appearance on sonar is distinctive. Eventually surveyors learn how to 'calibrate' each lake's plant community to the sonar images within 30 minutes of starting their survey on that lake. This allows surveyors to detect unusual sonar images, drop a new waypoint on top of that location, and carefully examine that unusual growth with multiple rake tosses and visually.

Side scanning sonar covers both sides of the boat track and has an adjustable scan width. Up to 200 feet in each direction can be displayed on the sonar unit which covers a track width of 400 feet. Normally the side scanning is set closer to 100 feet to keep the image clarity high, this increases the survey coverage from one small point every 200 feet to a continuous swath of observations 200 feet wide tracking back and forth across the lake. Combined with visual observations made continuously as the boat tracks the lake the 'density' of observations sky rockets compared with traditional point surveys. See the example images on the next page.

These images were produced with side scan set to 80 feet allowing the surveyor to see that far to each side of the boat track. The black area represents the water below the boat, the black area is equal to the water depth. Sample waypoints can be dropped on this screen to mark suspicious sites. Those waypoints are correctly offset to the side and behind the boat exactly on top of the suspicious growth allowing the surveyor to navigate back for additional sampling.


0
80
Left
80
Right
4
8
12
16
Pondweeds
Chara
9.5ft
3.7mph
67.5°F
7:33
150-220 kHz
440-500 kHz
Native Vegetation
Wild Celery
Chara
Pondweeds
Possible Starry
Stonewort
Chara


0
80
Left
80
Right
4
8
12
16
Pondweeds
Likely Flat Stem
Chara
11.4ft
4.9mph
67.5°F
7:46
50-220 kHz
440-500 kHz
Chara bed
Shallow Sandbar
No Vegetation
Exceptionally Tall
Very Dense
Possible
Eurasian Water Milfoil
Taller &Thin
Wild Celery
Taller & Dense
Pondweeds

Lake Health Stats – From MN DNR

Explore Watershed Lakes: Minnesota Department of Natural Resources (state.mn.us)

Minnesota DNR has developed a new lake health evaluation framework that draws together the results from numerous programs implemented through their various divisions. This framework is meant to be more comprehensive and informative while still stimulating the interest of lake residents in how each evaluation is performed and ranked. Following the link above will lead you to information on each evaluation and descriptions of the ranking system.

Informative Ranking added by Aquatic Survey Professionals Excellent Good Fair Poor

Lake Health Score	70
Lake Health Grade	B
Major Watershed Lake Health Mean Score	66
Major Watershed Lake Health Minimum Score	45
Major Watershed Lake Health Maximum Score	90
Water Quality Score	75
Major Watershed Water Quality Mean Score	55
Major Watershed Water Quality Minimum Score	25
Major Watershed Water Quality Maximum Score	94
Phosphorus Score	88
Major Watershed Phosphorus Mean Score	69
Major Watershed Phosphorus Minimum Score	35
Major Watershed Phosphorus Maximum Score	92
Total Phosphorus (µg/l)	8
Total Phosphorus Regional Goal (µg/l)	30
Total Phosphorus Percent Deviation from Goal	38
Total Phosphorus Goal Status	At or Above Goal
TP Sensitivity Index (inches)	6
TP Sensitivity Significance Priority Class	Highest
Water Clarity Score	62
Major Watershed Water Clarity Mean Score	42
Major Watershed Water Clarity Minimum Score	2
Major Watershed Water Clarity Maximum Score	97
Five-year mean Water Clarity Meters	6
Water Clarity Regional Goal	2
Water Clarity Percent Deviation from Goal	173
Water Clarity Goal Status	At or Above Goal
Water Clarity ID for Lake Browser	29018500
Impairments	Mercury in fish
Biology Score	57

Major Watershed Biology Mean Score	50
Major Watershed Biology Minimum Score	27
Major Watershed Biology Maximum Score	74
Fish Community Quality	69
Major Watershed Fish Community Quality Mean Score	68
Major Watershed Fish Community Quality Minimum Score	27
Major Watershed Fish Community Quality Maximum Score	100
Fish IBI Score	60
Fish IBI Threshold	45
Fish IBI Lake Type	Deep lakes with complex shorelines
Fish IBI % Deviation From Threshold	33
Fish IBI Status	At or Above Threshold
Fish IBI Aquatic Life Use Judgement	Full Support
Lake Plant Community Quality	46
Major Watershed Lake Plant Community Quality Mean Score	43
Major Watershed Lake Plant Community Quality Minimum Score	27
Major Watershed Lake Plant Community Quality Maximum Score	67
Plant FQI Score	31
Plant FQI Threshold	20
Plant FQI Ecoregion	3Bw
Plant FQI % Deviation From Threshold	54
Plant FQI Status	At or Above Threshold
Biological Significance Class	Outstanding
Hydrology Score	82
Major Watershed Hydrology Mean Score	88
Major Watershed Hydrology Minimum Score	62
Major Watershed Hydrology Maximum Score	100
Lake Watershed Health Index	97
Major Watershed Lake Watershed Health Index Mean	92
Major Watershed Lake Watershed Health Index Minimum	59
Major Watershed Lake Watershed Health Index Maximum	100
Lake Watershed Transport Capacity Class	6
Percent Disturbed	4
Watershed to Lake Area Ratio	21.8
Watershed to Lake Area Class	More than 10
Score the Shore	66

Major Watershed Score the Shore Mean	76
Major Watershed Score the Shore Minimum	53
Major Watershed Score the Shore Maximum	90
Shoreland Zone Score	24
Shoreline Zone Score	20
Aquatic Zone Score	22
Score the Shore Rating	Moderate
Stewardship	Not Scored
Benefit to Cost Assessment Class	Higher
Percent Forested	68
Percent Grass and Shrub	5
Percent Wetland	6
Percent Pasture and Hay	1
Predicted Total Phosphorus Load (pounds/year)	1,700
Phosphorus Load Reduction Goal (pounds/year)	90

Status of the Fishery

Big Sand is located 2.5 miles north of Dorset in Hubbard County. Big Sand has a surface area of 1,635 acres and a maximum depth of 135 feet. A public access is located on the southeast shore of the lake at the outlet. Big Sand is noted for its Walleye population and exceptional water clarity. Big Sand has a protected slot length limit regulation that requires the release of all Walleye between 20 to 28 inches, with only one fish allowed over 28.0 inches in possession.

The Minnesota Department of Natural Resources (DNR) has classified Minnesota's lakes into 43 different types based on physical, chemical, and other characteristics. Big Sand is in lake class 22. Class 22 lakes have the characteristics of being deep, having hard water, and small littoral zone (lake area less than 15 feet in depth). Other area lakes in this same classification include: Kabekona, Long, Lower Bottle, and Potato.

Walleye abundance was high for this lake class, similar to recent survey on Big Sand. An abundant 2017 and 2016 year classes are present and anglers will find good numbers of Walleye in the 12-16 size range. Sampled Walleye had an average length of 15.1 inches with fish measured up to 26 inches. Yellow Perch and Tullibee (Cisco) populations provide important forage for Walleye in Big Sand. Yellow Perch

were sampled in low numbers for this lake class and their abundance has been low since the 2011 survey. Yellow Perch are small in size, with few fish of an acceptable size for angling.

Big Sand has a low Northern Pike population, however, it is known for producing some large-sized fish. Northern Pike up to 34.4 inches were sampled. Tullibee (Cisco) and White Sucker provide an excellent forage base for growing large Northern Pike.

Both Smallmouth Bass and Largemouth Bass are present in Big Sand, with Smallmouth Bass the more abundant of the two species. Big Sand has excellent Smallmouth Bass habitat of rock, rubble, and sand bottom areas. Good size range of Smallmouth Bass are present in Big Sand. Largemouth Bass are present in low to moderate numbers and are concentrated in areas of preferred Largemouth Bass habitat.

Currently no aquatic invasive species (AIS) have been identified in Big Sand. To avoid spreading AIS, lake users are required to remove all aquatic plants or animals form their watercraft and drain all water form their boats before leaving the access.

For More Information

Park Rapids Area Fisheries Supervisor
301 S Grove Ave
Park Rapids, MN
Phone: 218-552-2311
Email: ParkRapids.Fisheries@state.mn.us
Website