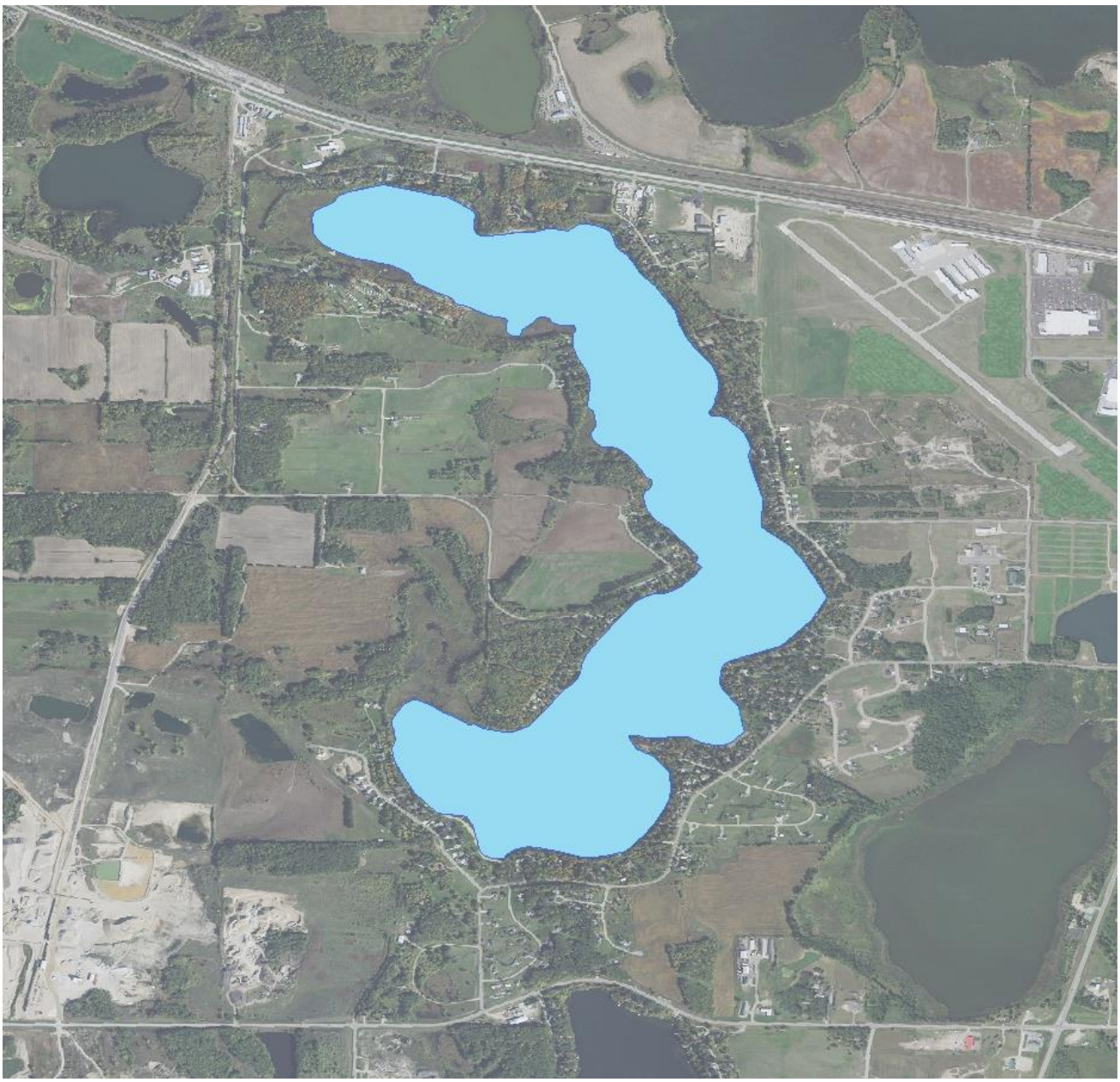
Pelican River Watershed District

Aquatic Vegetation Survey Report

Long Lake
Becker County

August 2 & 3, 2018



Introduction

Long Lake is a 408-acre recreational development lake located that head if it's watershed area, with no surface water inputs, such as a river or a stream. Long Lake is feed primarily be stormwater runoff and groundwater interactions. It a narrow, deep lake with a maximum depth of 61 feet and with 37% of the lake surface area is classified at littoral.

Long Lake is classified as mesotrophic that fully supports both recreational and fishing activities. Nutrient and water clarity summer averages show that Long Lake has good water quality with annual phosphorus level ranging from 11 ppb to 16 ppb and water clarity between 12 and 19 feet, over the last 10-year period. The 10-year summer mean for phosphorus and clarity is 12 ppb and 14.5 feet, respectively.

The purpose of the vegetation survey of Long is describe the current aquatic plant community including the plant species, the frequency, and investigate any invasive plant infestations.

Methods

Pelican River Watershed District staff, Brent Alcott with interns Alissa Chalberg and Eli Disse, conducted a survey of aquatic vegetation on August 2 & 3, 2018. The point-intercept survey followed the methods described by Madsen (1999). Geographic Information System (GIS) software was used to create grid of points across the littoral zone (≥ 15ft.) of Long Lake at 65 meter intervals for a total of 158 survey points(Figure 1). A Global Positioning System (GPS) was used to navigate to each point where the water depth was recorded at 1-foot increments using an electronic depth finder.

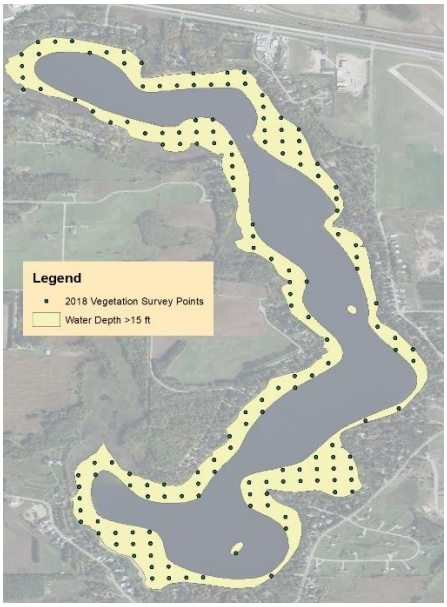


Figure 1. Vegetation point intercept survey point on Detroit Lake

Surveyors recorded all plant species found in a one meter squared sample site at the pre-designated side of the boat. A double-headed garden rake attached to a rope was used to survey vegetation not visible from the surface(Figure 2). Each plant occurrence and relative abundance water recorded at survey points. Relative abundance was documented on a scale of 0-3 (Table 1). Plant identification followed Skawinski (2018). Data was entered in an Excel database. Frequency of occurrence was calculated for each species.

Scale	Descriptions
0	No plants present
1	Low Abundance, plant coverage ≤ 1/3 of the survey site or rake head
2	Moderate Abundance, plant coverage ≥ 1/3 but ≤ 2/3 of the site or rake head), and 3 indicated greatest abundance ≥ 2/3 of rake head or survey site
3	Great Abundance, plant coverage ≥ 2/3 of rake head or survey site

Table 1:

Figure 2: Double headed garden rake attached to rope

Figure 3: Double headed garden rake holding and Muskgrass sample, an abundance indicator of 3.

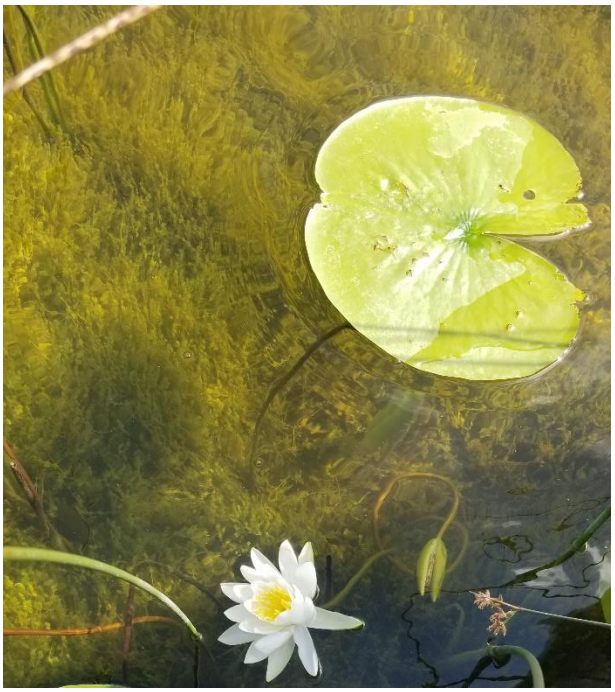


Figure 4: Sample site with sporadic White waterlily, an abundance indicator of 1

Results

A total of 21 native aquatic plant species were recorded on Long Lake, including 3 emergent, 1 free floating, and 3 floating leafed (Table 1). The most common occurring plants included muskgrass, bladderwort, sago pondweed, northern watermilfoil, Illinois pondweed, and yellow waterlily. No invasive plant species were observed.

Muskgrass (*Char sp.)* was the most frequently found plant in the Long Lake survey and a major component of the aquatic plant community, where is occurred at 80% of the sample sites (Table 1, Figure 5). Muskgrass is a submerged, macroscopic algae that is common in many hard water Minnesota lakes. It has a characteristic musky odor. It can form dense growths on the lake bottom even though though they true stems or roots. Muskgrass is able to adapt to a variety of sediment and depths and helps stabilize the lake bottom sediments a provides fish habitat.

Greater Bladderwort *(Uticularia vulgaris*) was found at 46% of the sample sites (Table 1, Figure 6). Bladderwort is a free-floating carnivorous plant that is found in a variety of depths, but are most common in still water where the finely divided stems are not easily torn by wave action. This plant feeds on a variety of organisms ranging in size from one-celled protozoan to mosquito larvae and water flea. Bladderwort feed by using specialized glands that create a negative water pressure to sweep prey into its bladder after contact special sensitive trigger hairs. Once inside the bladder, the plant releases digestive enzymes to consume its prey. They also produce small yellow flowers that emerge at the water surface.

Sago Pondweed *(Stuckenia pectinate)* grows in a wide variety of sediment and water conditions and was observed at 19% of the survey sites (Table 1, Figure 7). In very turbid water, in is often the last rooted plant that can survive. The plant overwinters by its hardy rhizomes and tubers which are produced throughout the growing season before the foliage dies back in the fall. Sago pondweed is considered one of the top food producers for waterfowl, which graze on both the fruit and the tubers of the plant. It also provides shelter for a variety of juvenile fish species.

Northern Milfoil *(Myriophyllum sibiricum)* was found on Long Lake at 12% of the survey sites (Table 1, Figure 8). It is a submerged plant that is characterized with five to 11 pairs of thread-like leaflets on each leaf. The leaves are arranged with four to five whorls around the stem. Stems emerge in the spring and produce flower spikes by mid-summer. Winter buds are produced in early fall and remain dormant until spring. Leaves and fruit of northern milfoil are consumed by a variety of waterfowl. The feathery foliage traps detritus and provide habitat for invertebrates. Beds of the plant also provide shade, shelter, and foraging opportunities for fish.

White waterlily *(Nympaea odorata),* which is often generalized at a "lily pad", is floating leaf plant that emerges from fleshy, buried rhizome, producing round leaves and white flowers. This plant was found at 12% of the survey sites (Table 1, Figure 9). It was usually found on quiet water in water less than 2 meters (6.5ft). The white flowers occur throughout the summer, where they will open in the morning and close by midafternoon. When done blooming, the flowers dip below the surface of the water where the seeds mature into fruit (Figure 4). The seeds provide food for waterfowl while the fleshy rhizome is consumed by deer, muskrat, beaver, and porcupine. The leaves provide shade and shelter for fish, amphibians, reptiles, and invertebrates.

Illinois pondweed *(Potamogeton illioensis)* has stout stems that emerge from thick rhizomes and was observed at 11% of the sample sites (Table 1, Figure 10). They are usually found in water that has a high pH and has good water clarity and can grow in shallow water up to 3 meters (10 ft) deep. It can overwinter by winter-hardy rhizomes and, in some cases, may survive green below ice cover. The fruit is an important food source for waterfowl and is often grazed by muskrat, deer, and beaver. Illinois pondweed offers excellent shade and cover for fish and good surface area (large leaves) for invertebrates.

stands around the lake (Table 1, Figure 11). This plant produces sturdy stems that are 1-3 m (3 – 10 feet) tall that emerge from the water. They prefer firm substrate will good water movement in the root zone. These plants are very efficient at dissipating wave energy and will help prevent shoreline erosion. Hardstem bulrush offers habitat for invertebrate and shelter for young fish, especially northern pike. The nutlets are consumed by a wide variety of waterfowl, marsh birds, and upland birds. Stems and rhizomes are eaten by geese and muskrats. Bulrushes also provides nesting material and cover for waterfowl, loon, marsh birds, and muskrats.

Discussion

The overall results of the aquatic vegetation survey show that Long Lake is a macrophyte-dominated lake with a healthy and diverse plant community, good water clarity, and low nutrient levels. Of the 141 points surveyed that were greater that 15-feet deep, 51% (72) of them had 3 or more plants present. There were two sites with either 6 or 7 plant and one with 8 plants identified. 49% (66) of the sites had one or two plants presents while 2% (3) had no plants present. Do to discrepancies between the actual lake bathymetry and the GIS map layer, there were 17 points that were excluded, which were deeper than 20-feet where no plants were present.

Healthy native aquatic vegetation is important to lakes because of their ability to maintain water clarity and good habitat. Plant uptake nutrients from sediment and store in their tissues which limit algae growth. They produce oxygen as a byproduct of photosynthesis, which oxygenates the water column, allow to a more robust fishery. Plant root structure stabilizes lake sediments and prevent them from being disturbed and mixing into the water, reducing water clarity and resuspending nutrients. Emergent plants help dissipate water energy and prevent shoreline erosion. The plant communities also provide habitat for invertebrates, waterfowl, loon, and cover for fish. Aquatic plants provide food and shelter for a variety of animals, some more obvious that other, but all are essential to a balanced ecosystem. A native and diverse plant community is important for the maintaining the good water quality and ecosystem balance of Long Lake.

Oftentimes, without understanding the complexities if a lake's ecosystem, people view aquatic plants as a problem "weed" that should be removed to help "clean up the lake". Unfortunately, this misunderstanding actually has they opposite effect of the intended action of improving the health of the lake. The aquatic plant community should be protected for the benefits that is provides to the lake and not viewed as a "weed" to be removed.

While lakes with few plants do exist, they also are limited in the number of fish, frogs, duck, turtle and wildlife in general. Lakes are classified as being algal-dominated or macrophyte (plant)-dominated. Algal-dominated lakes tend to have poorer water clarity, fewer plants, and contain fish species with poor eyesight such as carp or bullhead. Macrophyte-dominated tend to have clear to bluish water, high water clarity, healthy and diverse vegetation, and little to no noticeable algae. It is important to remember the plants and algae are in constant battle for nutrients. Maintaining a healthy plant community will help limit that amount of nutrients available for algal growth.

Plant Diversity at Survey Points		
# of Plants	**Count**	**Frequency**
8	1	1
7	2	1
6	2	1
5	3	2
4	16	10
3	48	30
2	41	26
1	25	16
0	20	13

Table 2: Plant diversity at each survey point and the frequency of the diversity at each point.

2018 Long Lake Vegetation Survey				
Plant Form	**Common Name**	**Scientific Name**	**Count**	**Frequency (%)**
SUBMERGED-ANCHORED: These plants grow primarily under the water surface. Upper leaves may float near the surface and flowers may extend above the surface. Plants are often rooted or anchored to the lake bottom.	Muskgrass	*Chara sp.*	127	80
	Sago pondweed	*Stuckenia pectinata*	30	19
	Northern watermilfoil	*Myriophyllum sibiricum*	19	12
	Illinois pondweed	*Potamogeton illinoensis*	17	11
	Canada waterweed	*Elodea canadensis*	6	4
	Flat-stem pondweed	*Potamogeton zosteriformis*	6	4
	Whitestem pondweed	*Potamogeton praelongus*	4	3
	Water celery	*Vallisneria americana*	2	1
	Arum-leaved arrowhead	*Sagittaria cuneata*	2	1
	Clasping-leaf pondweed	*Potamogeton richardsonii*	1	<1
	Slender Nitella	*Nitella flexilis*	1	<1
SUBMERGED-LOOSELY ANCHORED: These plants do not have true roots. They may attach to sediments by basal ends or float freely in the water column	Greater Bladderwort	*Uticularia vulgaris*	73	46
	Coontail	*Ceratophyllum demersum*	6	4
FLOATING LEAF: These plant are rooted in the lake bottom and have leaves that float on the water surface. Many have colorful flowers that extend above the water	White waterlily	*Nympaea odorata*	18	12
	Yellow waterlily	*Nuphar variegata*	8	5
	Floating-leaf Pondweed	*Potomogeton natans*	1	<1
FREE-FLOATING: These plants float in the water and drift with the currents.	Water moss	*Not identified to species*	1	<1
EMERGENT: These plants extend well above the water surface and are usually found in shallow water, near shore.	Hardstem bulrush	*Scirpus acutus*	24	15
	Bur-reed	*Sparganium sp.*	13	8
	Cattail	*Typha sp.*	5	1

Table 3: Aquatic Plants of Long Lake, Becker County, August 2 and 3, 2018

Figure 5: Distribution and abundance of Muskgrass in Long Lake, August 2 & 3, 2018

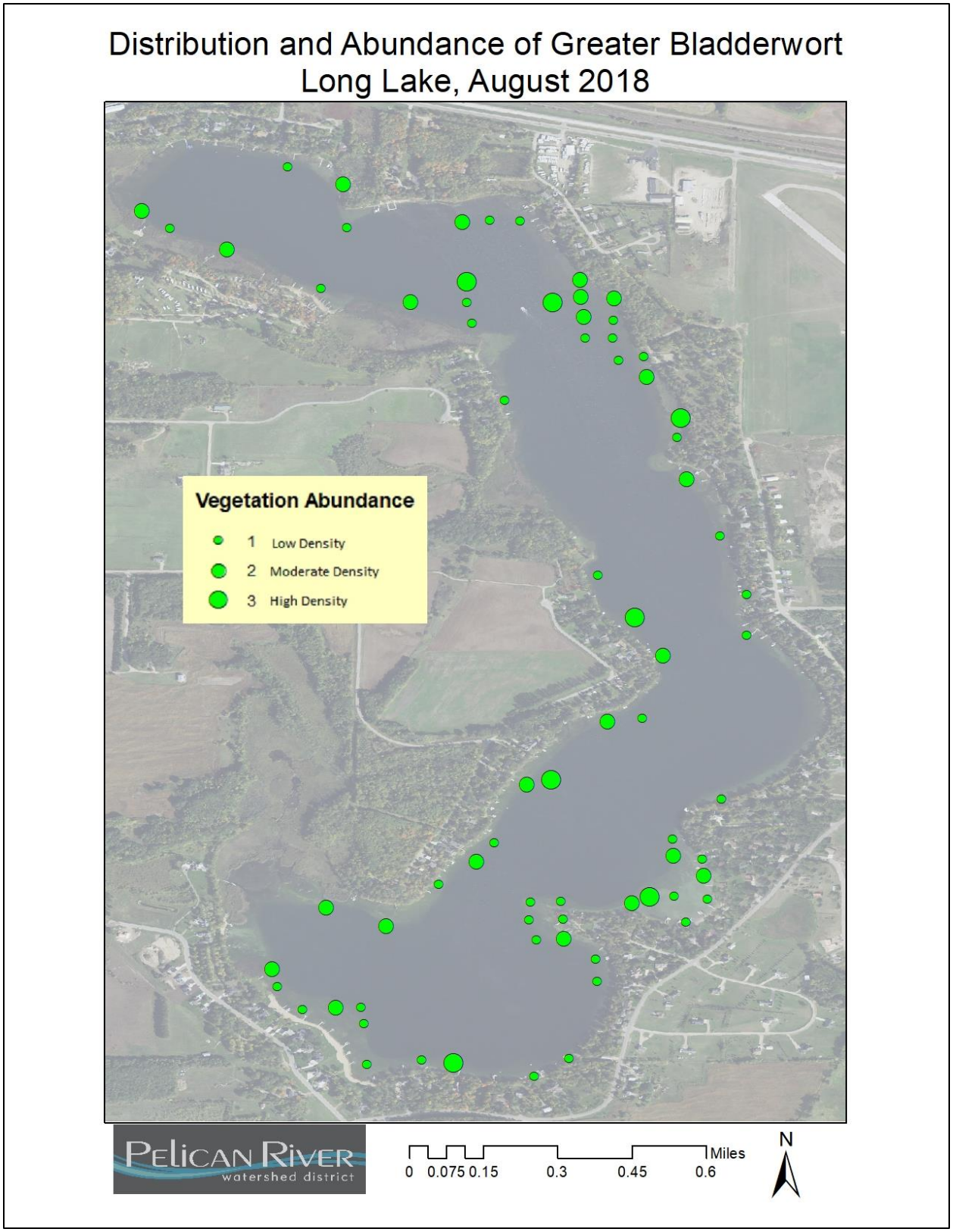


Figure 6: Distribution and abundance of Greater bladderwort in Long Lake, August 2 & 3, 2018

Figure 7: Distribution and abundance of Sago pondweed in Long Lake, August 2 & 3, 2018

Figure 8: Distribution and abundance of Hardstem bulrush in Long Lake, August 2 & 3, 2018

Figure 9: Distribution and abundance of Northern watermilfoil in Long Lake, August 2 & 3, 2018

Figure 10: Distribution and abundance of Illinois pondweed in Long Lake, August 2 & 3, 2018

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