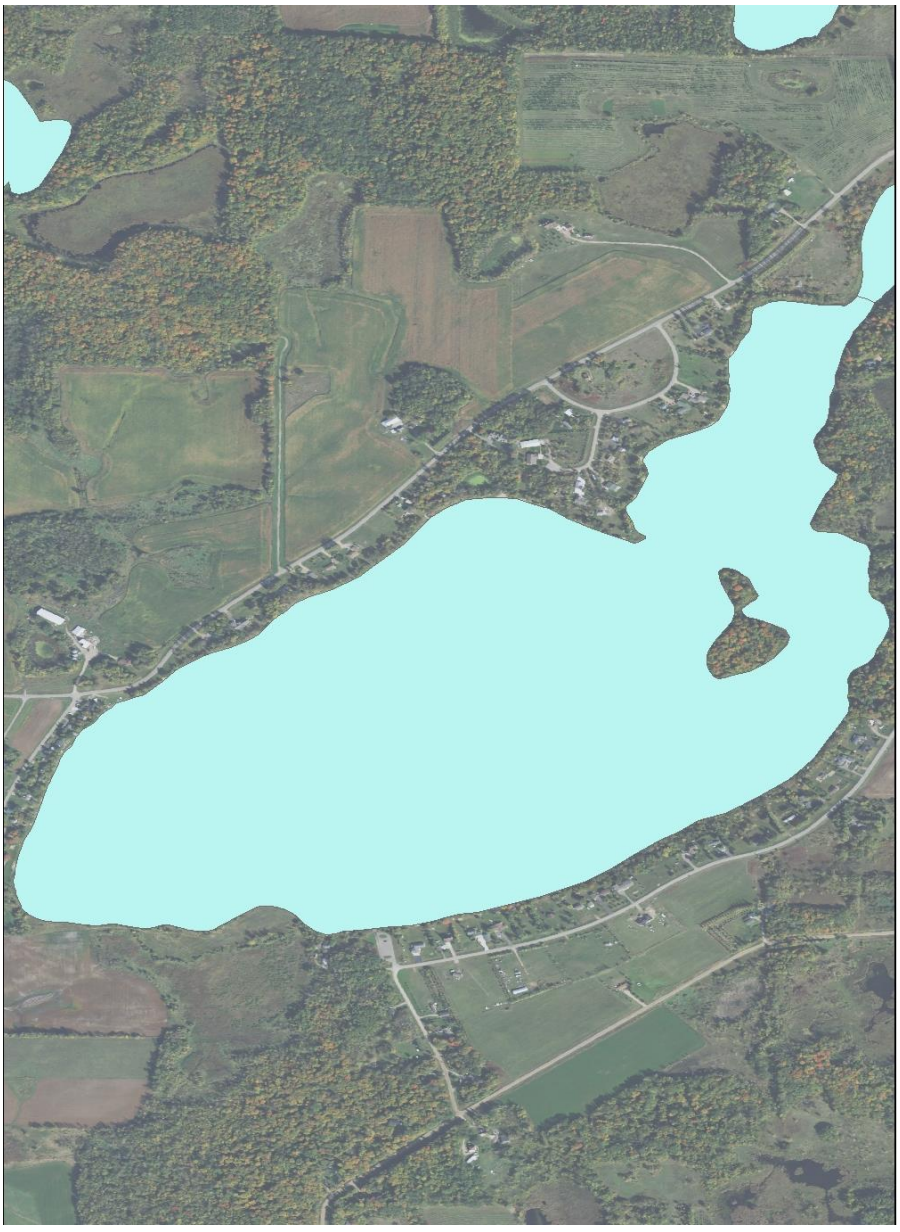
Pelican River Watershed District

Aquatic Vegetation Survey Report

Pearl Lake
Becker County

August 8 & 9, 2018



Introduction

Pearl Lake is a 281 acres lake located along the western edge of the Pelican River Watershed District boundary. It reaches a depth of 54 feet with a littoral area (<15feet) accounting for 60% (168 acres) of its surface area. The drainage area of Pearl Lake includes several other small lakes and wetlands including Little Pearl, Dart, Bijou, and Holstad Lakes. Other than the lakes within its drainage area, Pearl is poorly connected to any downstream lake or other lakes within the watershed.

Water quality exhibits large year-to-year fluctuations with a 10 year average of 28 ppb phosphorus and clarity of 9.5 feet. A diagnostic study for Pearl Lake was completed in 2012 which determined that the primary source of in-lake phosphorus was from internal loading from nutrient rich sediments. The lake stratifies strongly between 4-6 meters and develops anoxia in the lower layer, further increasing release of phosphorus from lake bottom sediments in to the lower water layer.

The purpose of the vegetation survey of Munson 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, interns Alissa Chalberg and Eli Disse, conducted a survey of aquatic vegetation on August 8 and 9, 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 Munson Lake at 50-meter intervals for a total of 145 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.

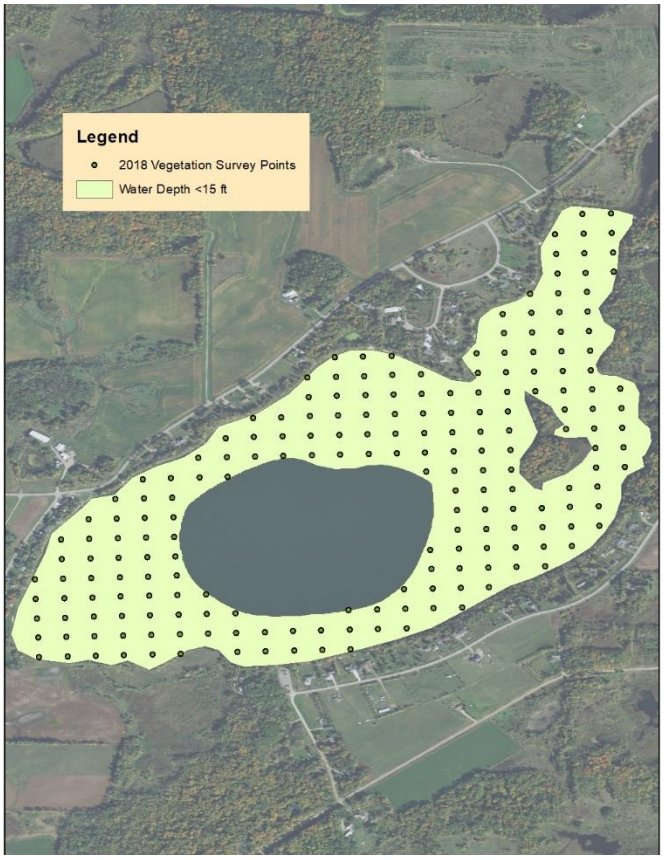


Figure 1. Vegetation point intercept survey point on Munson Lake

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: Description of plant abundance scale (0-3)

Figure 2: Double headed garden rake attached to rope

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

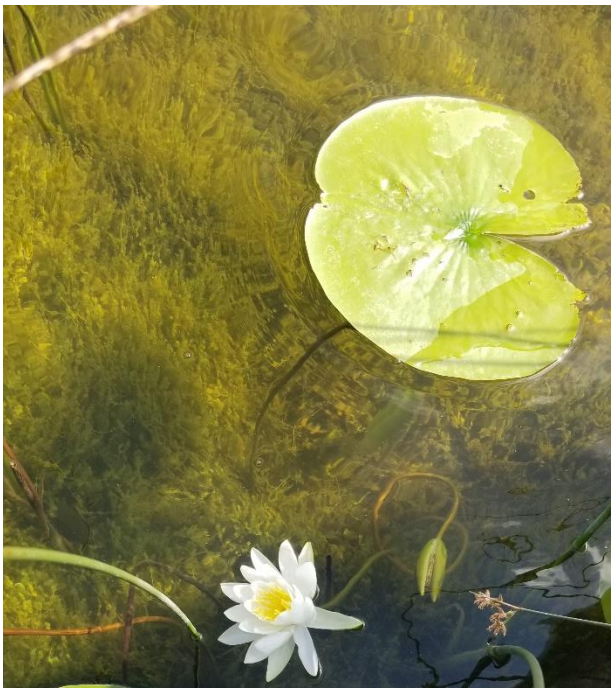


Figure 4: Sample site with sporadic White waterlily, an abundance indicator of 1

Results

A total of 14 native aquatic plant species were recorded on Pearl Lake, including 1 emergent, 1 floating leafed, 1 free floating, and 11 anchored (Table 1). The most common occurring plants (>10% occurrence) included Coontail, Flatstem pondweed Bushy pondweed, Northern Watermilfoil, Sago Pondweed, Large leaf pondweed, Illinois pondweed, and Canada waterweed. Invasive Curly-leaf pondweed was observed in Pearl Lake

Coontail *(Ceratophyllum demersum)* roots loosely to sediments and is typically found on lakes with low pH and soft water and was observed at 62% of the survey sites. Coontail has a tolerance for low light conditions and will grow several meters deep. Because of its tolerance for low light conditions and cool water, it will overwinter as an evergreen plant, continuing photosynthesis at a reduced rate under the ice. This gives it an advantage in spring when it resumes vigorous growth. The stiff whorls of the leaves off prime habitat for a host of critters, particularly during winter when other plants are reduced to roots and rhizomes. Coontail also provides food for waterfowl, which feed on both its foliage and fruit. The bushy stems harbor many invertebrates and provide important shelter and foraging opportunities for fish.

Flatstem pondweed *(Potamogeton zosteriformis)* grows in a variety of water depths from shallow to several meters deep and was observed at 61% of the site surveyed. It has freely-branched stems that emerge from a straight rhizome. The stems are strongly flattened and have an angled appearance. Flatstem pondweed dies back in the fall and overwinters by rhizomes and winter buds. This plant is an important food source for a variety of waterfowl. The plant may also be grazed by deer, muskrat, and beaver. It also provides a food source and cover for fish and invertebrates.

Bushy pondweed (Slender naiad) *(Najas flexilis)* has fine branched stems that emerge from a slight rootstalk. It will grow at a wide range of depths up to several meters deep. Bushy pondweed was observed at 50% of the survey site on Pearl Lake. This plant is a true annual, meaning it dies back completely each fall and relies on it seed to regrow in the spring. During the growing season, it often spreads by stem fragments. Bushy pondweed is extremely important to waterfowl. Stems, leaves, and seeds are all consumed by a wide variety of ducks. It is also important to marsh birds as well as muskrats and provides food and shelter for fish.

Northern watermilfoil *(Myriophyllum sibiricum)* It is a submerged plant that is characterized with five to 11 pairs of thread-like leaflets on each leaf. It was found at 39% of the sites. 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.

Sago Pondweed *(Stuckenia pectinate)* grows in a wide variety of sediment and water conditions and was observed at 18% of the survey sites . 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.

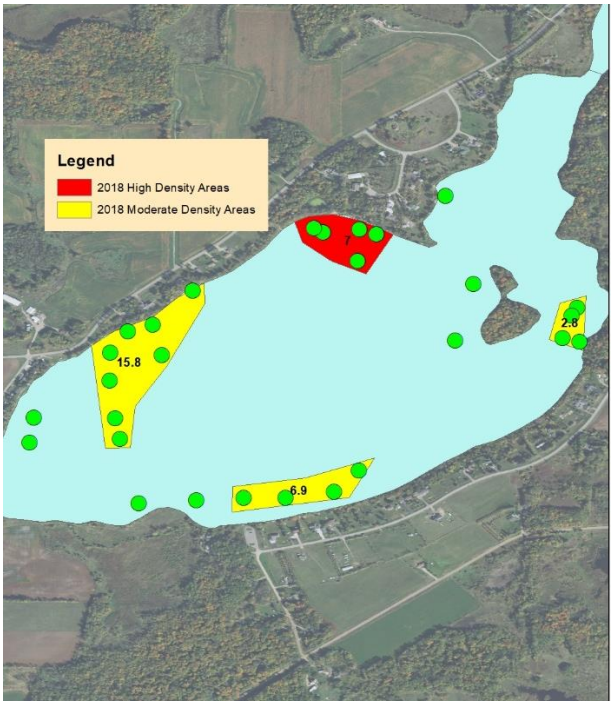
Large leaf pondweed *(Potamogeton amplifolius)* has robust stems and submerged leaves that are one of the largest in this region (1-3 inches wide and up to 5 inches long). It is most frequently found in soft sediment one to several meters (3-15 feet) and may grow reaching the water surface with a floating leaf and fruiting stalk (see image on left). Large leaf pondweed is sensitive to turbidity water and suffers when top-cut by motor boats. This plant sometimes survives the winter as a evergreen. Because if it broad leaves, it offers excellent shade, shelter and foraging opportunities for fish while it abundant of nutlets provides valuable waterfowl food.

Illinois pondweed *(Potamogeton illioensis)* has stout stems that emerge from thick rhizomes and was observed at 28% 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.

Canada (Common) waterweed *(Elodea canadensis)* is a loosely anchored plant common in fine sediments enriched with organic matter and was observed at 62% of the survey sites on Pearl Lake. This plant has slender stem with leaves in whorls of three. The branching stem often for a tangle mat that may become a nuisance. It can overwinter an evergreen with reduced photosynthesis beneath is cover. The plants spreads primarily by fragmentation as seeds are rarely produced. The branching stem offer valuable cover for and grazing opportunities for fish. I very dense stands, however, fish movement can be obstructed. Muskrats and waterfowl graze on the plant while invertebrates find it valuable habitat.

Curly-leaf Pondweed *(Potamogeton crispus)* is a common invasive submerged aquatic plant that can form dense, nuisance beds. This plant gets a "jump start" on most native plants by germinating in the fall and producing winter foliage. When the ice retreats in the spring, it quickly produces spring foliage and out competes most native plants. The plant dies back in mid-July that can create a sudden loss of habitat, release nutrients into the water, trigger nuisance algal blooms, and create turbid water. Curly-leaf pondweed reproduces primarily with vegetative buds called turions

that look like small, brown pine cones on shortened branches along the stem. This reproductive bodies can be produces in great numbers where studies have shown as many as 1,600 in just a square meter plot. For this reason, it is important that for managing the plant population, that any control efforts are done before the plant produces any turions.



History of Curly-leaf pondweed in Pearl Lake

Curly leaf pond was first observed in a .20 acre area in 2010. A permit to chemically treat the plant was applied for in 2010, but was denied by the DNR. By 2011, populations were widespread and now are found in all portions of the lake. The District conducted a survey of the extent of the growth on June 21 & 22, 2018 which found the plant growing lake wide in area <15 feet four very dense areas of the invasive plant, see figure 5.

Figure 5: Map showing distribution of Curly-leaf pondweed and the areas (in acres) of growth.

Discussion

The overall results of the aquatic vegetation survey show that Pearl Lake is a macrophyte-dominated lake with a healthy and diverse plant community, good water clarity, and low nutrient levels. 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.

2018 Pearl 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.	Flat-stem pondweed	*Potamogeton zosteriformis*	126	61
	Bushy pondweed	*Najas flexilis*	102	50
	Northern watermilfoil	*Myriophyllum sibiricum*	79	39
	Sago pondweed	*Stuckenia pectinata*	36	18
	Large leaf pondweed	*Potamogeton amplifolius*	33	16
	Illinois pondweed	*Potamogeton illinoensis*	25	12
	Canada waterweed	*Elodea canadensis*	25	12
	Clasping-leaf pondweed	*Potamogeton richardsonii*	18	9
	Whitestem pondweed	*Potamogeton praelongus*	9	4
	Curly leaf pondweed	*Potamogeton crispus*	4	2
	Narrowleaf pondweed	*Potamogeton sp.*	2	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	Coontail	*Ceratophyllum demersum*	127	62
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	Yellow waterlily	*Nuphar variegata*	8	4
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*	7	3

Table 2: Aquatic Plants of Pearl Lake, Becker County, August 8 and 9, 2018

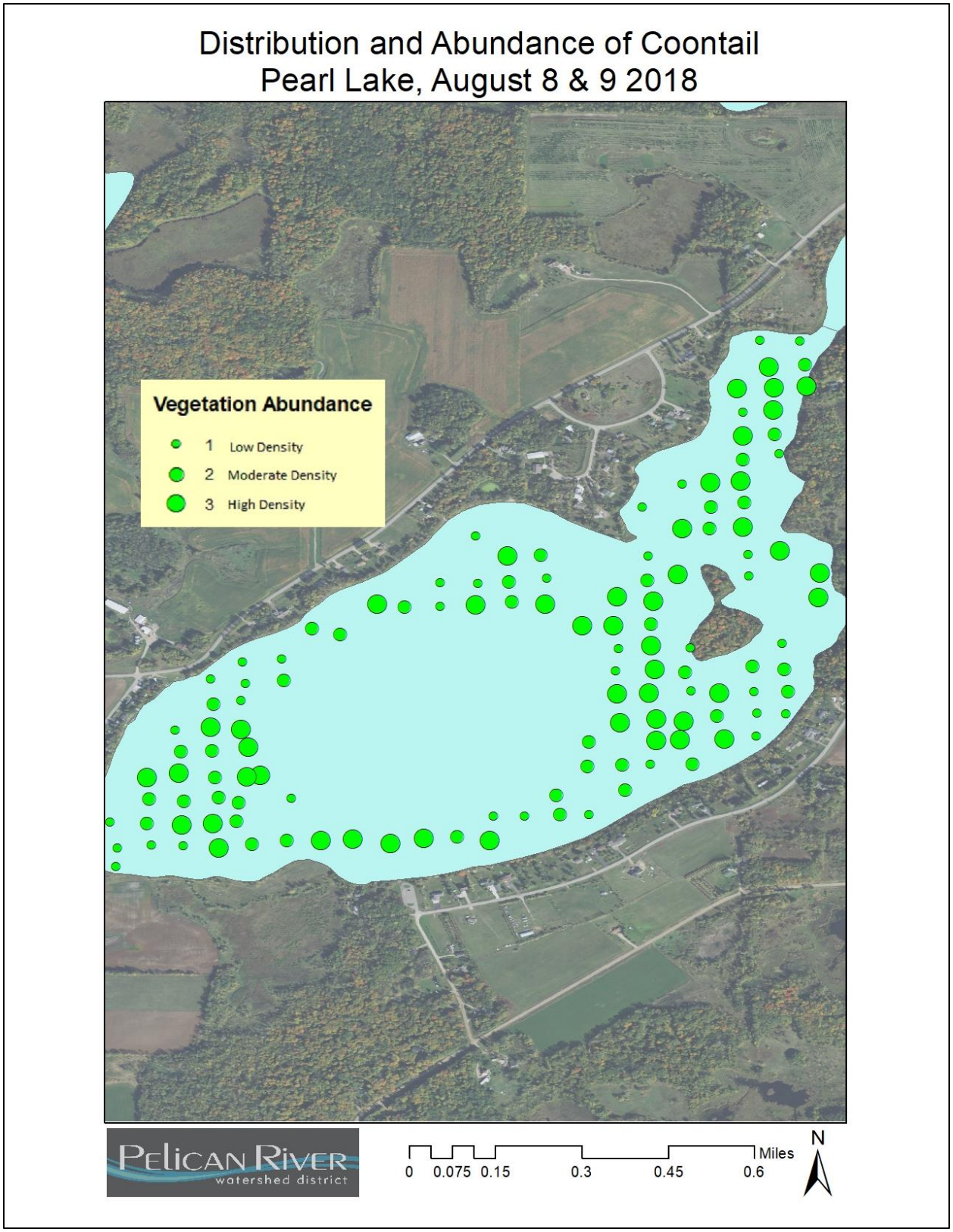


Figure 6: Distribution and abundance of Coontail in Pearl Lake, August 8 & 9, 2018

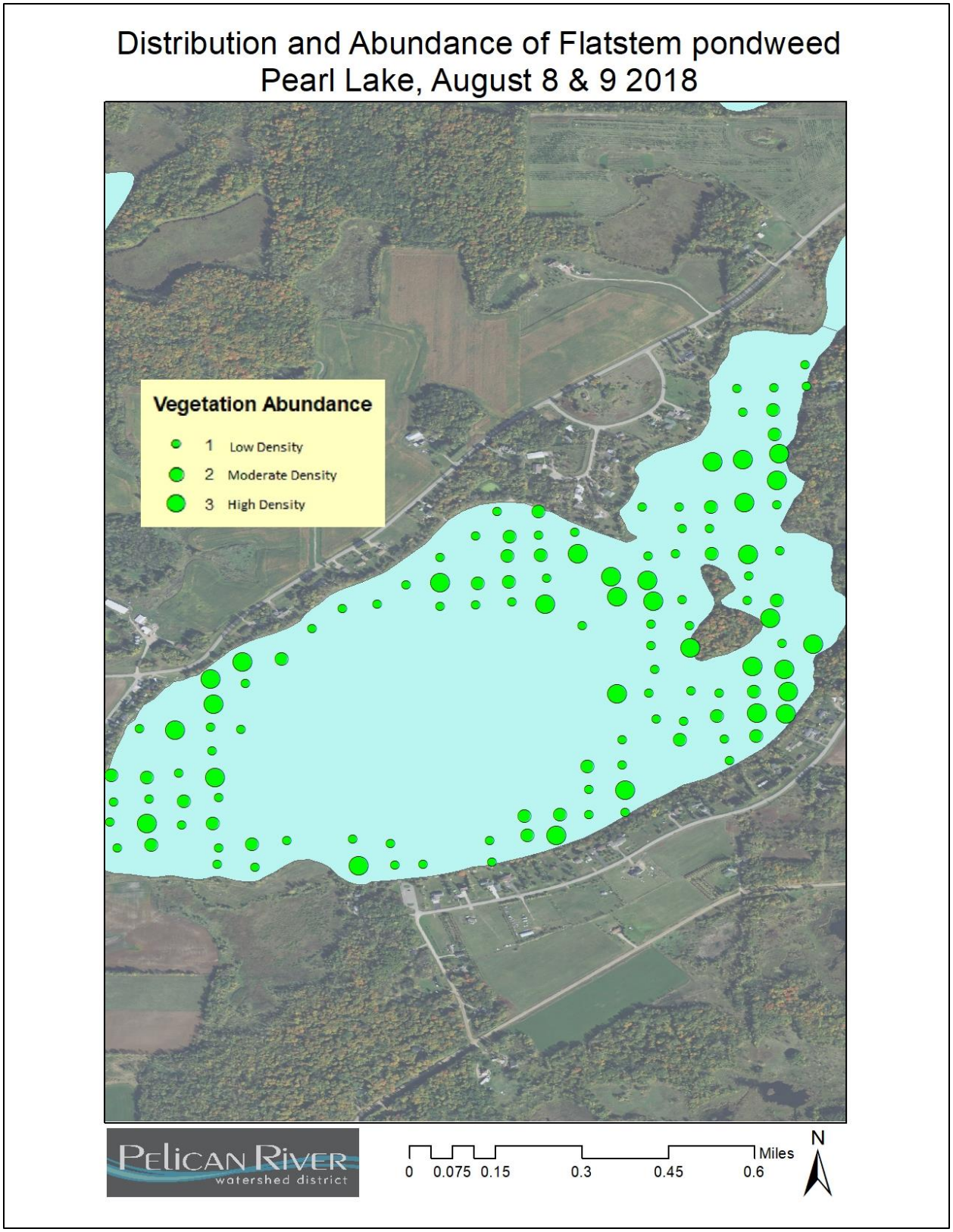


Figure 7: Distribution and abundance of Flatstem pondweed in Pearl Lake, August 8 & 9, 2018

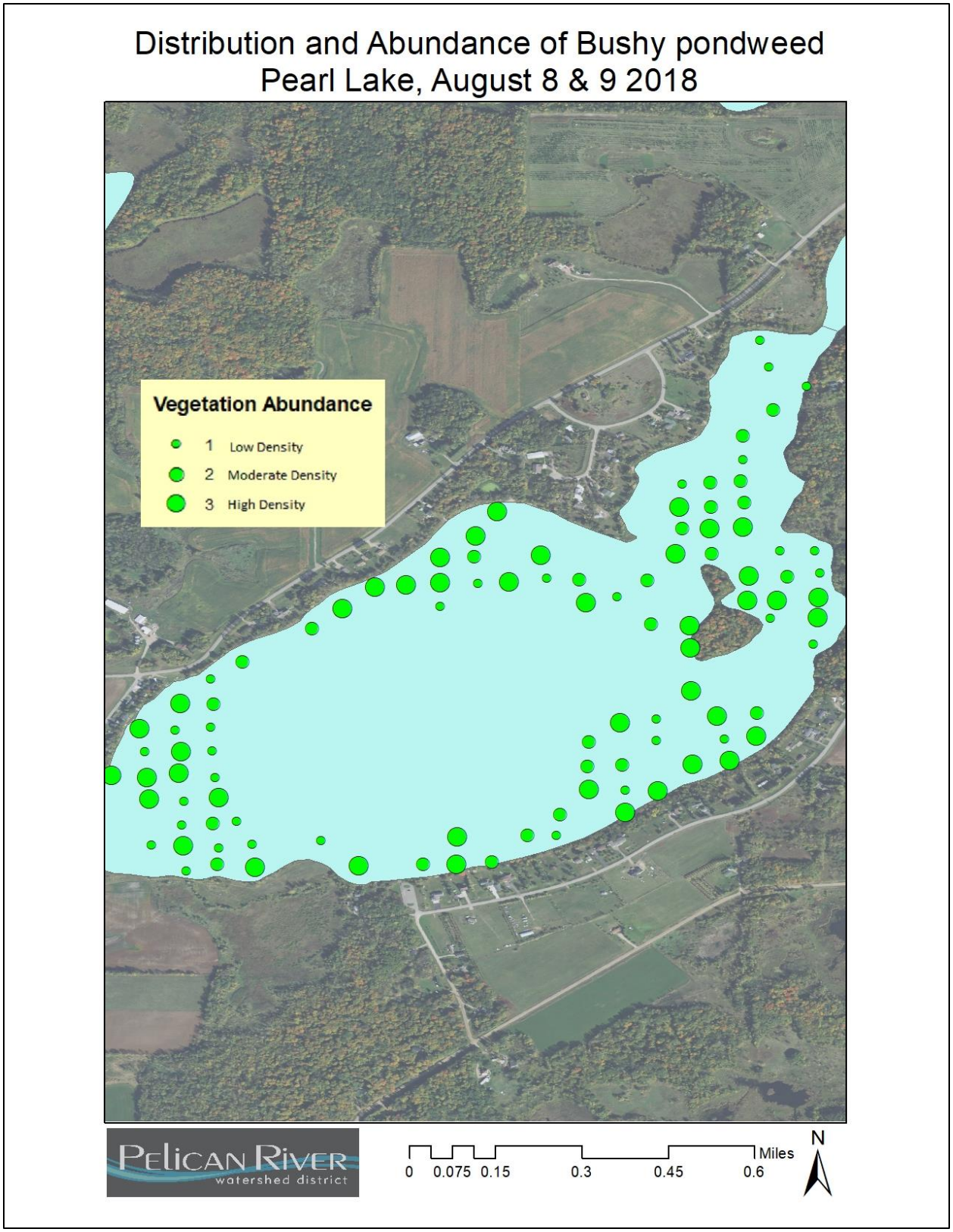


Figure 8: Distribution and abundance of Bushy pondweed in Pearl Lake, August 8 & 9, 2018

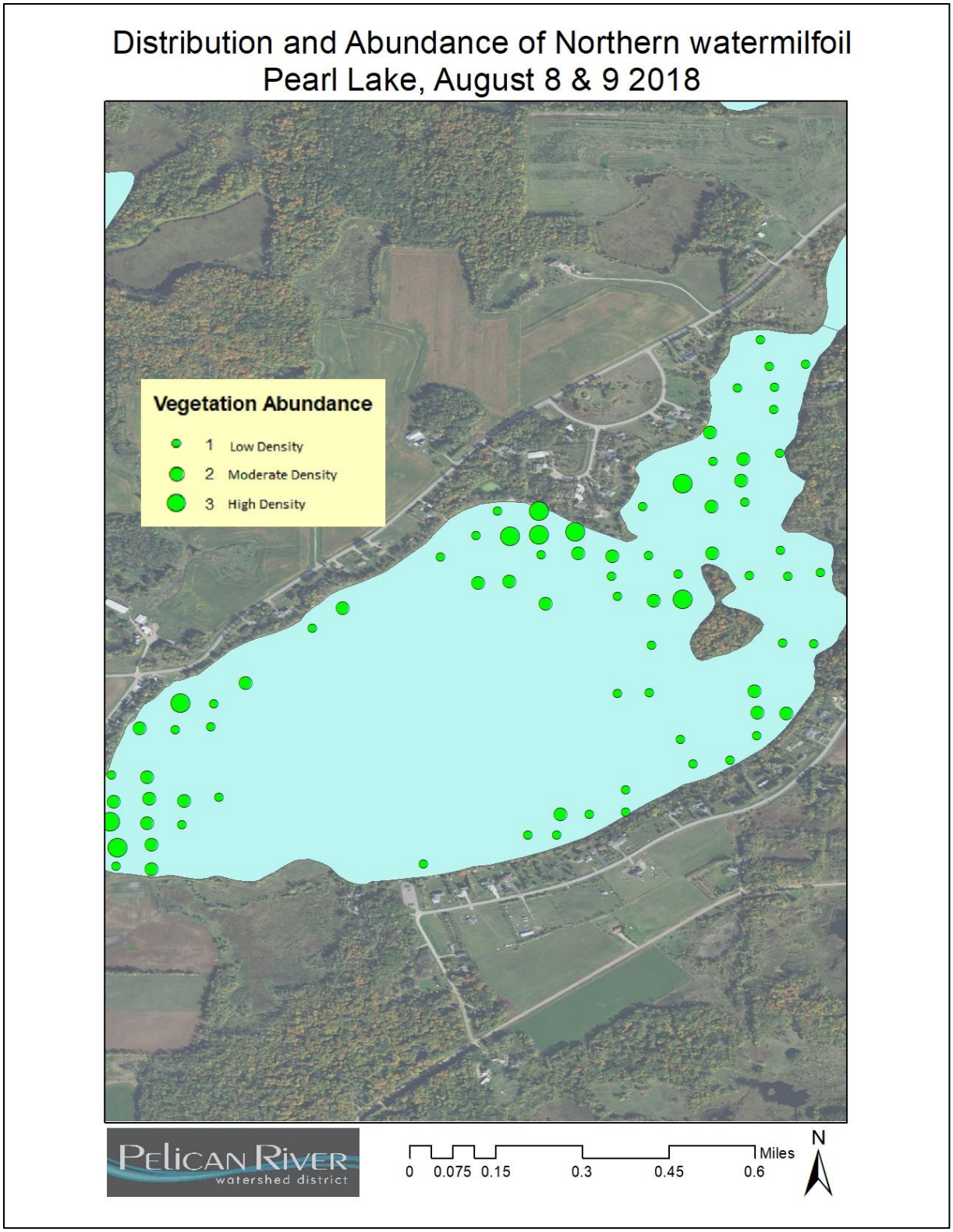


Figure 9: Distribution and abundance of Northern watermilfoil in Pearl Lake, August 8 & 9, 2018

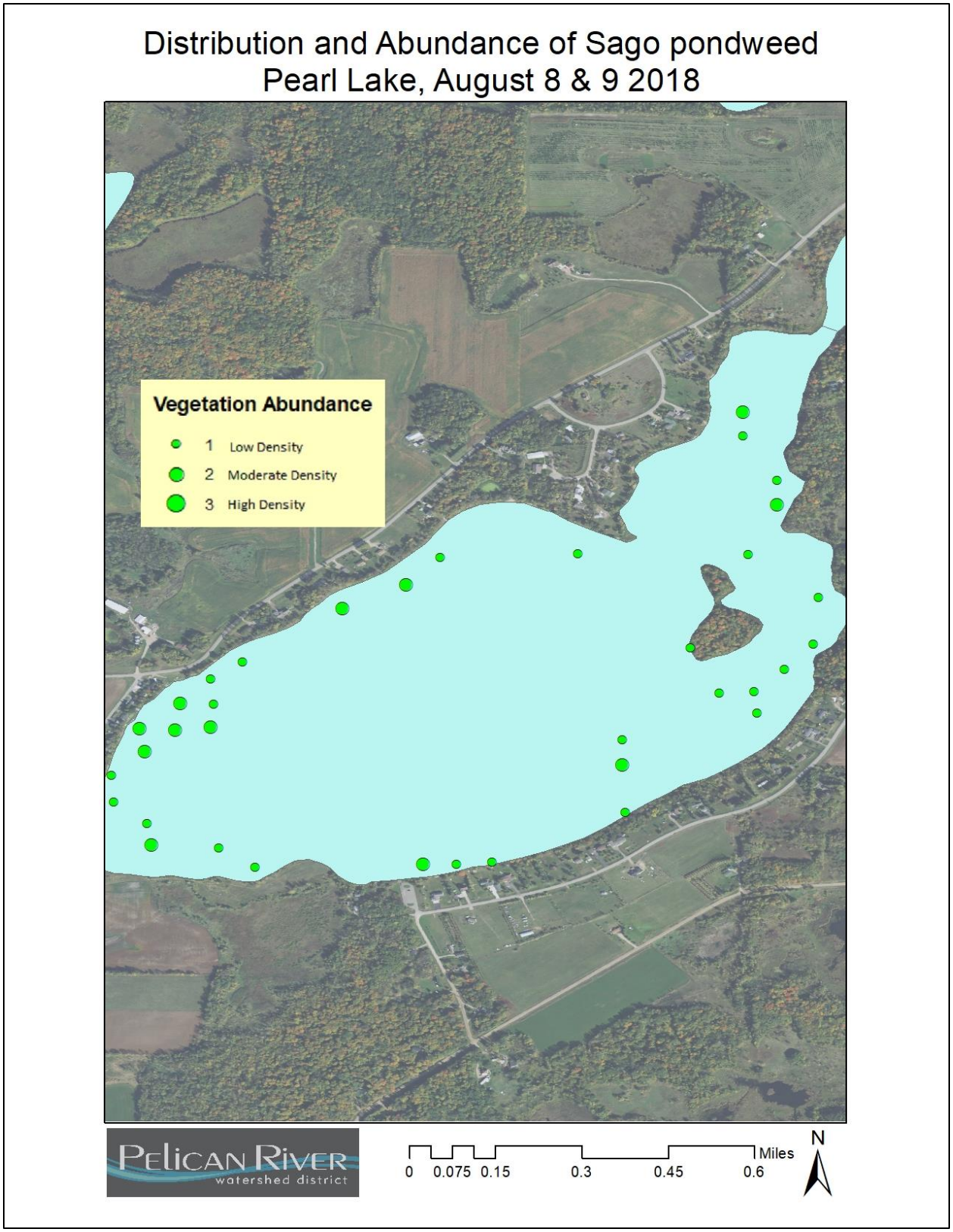


Figure 10: Distribution and abundance of Sago pondweed in Pearl Lake, August 8 & 9, 2018

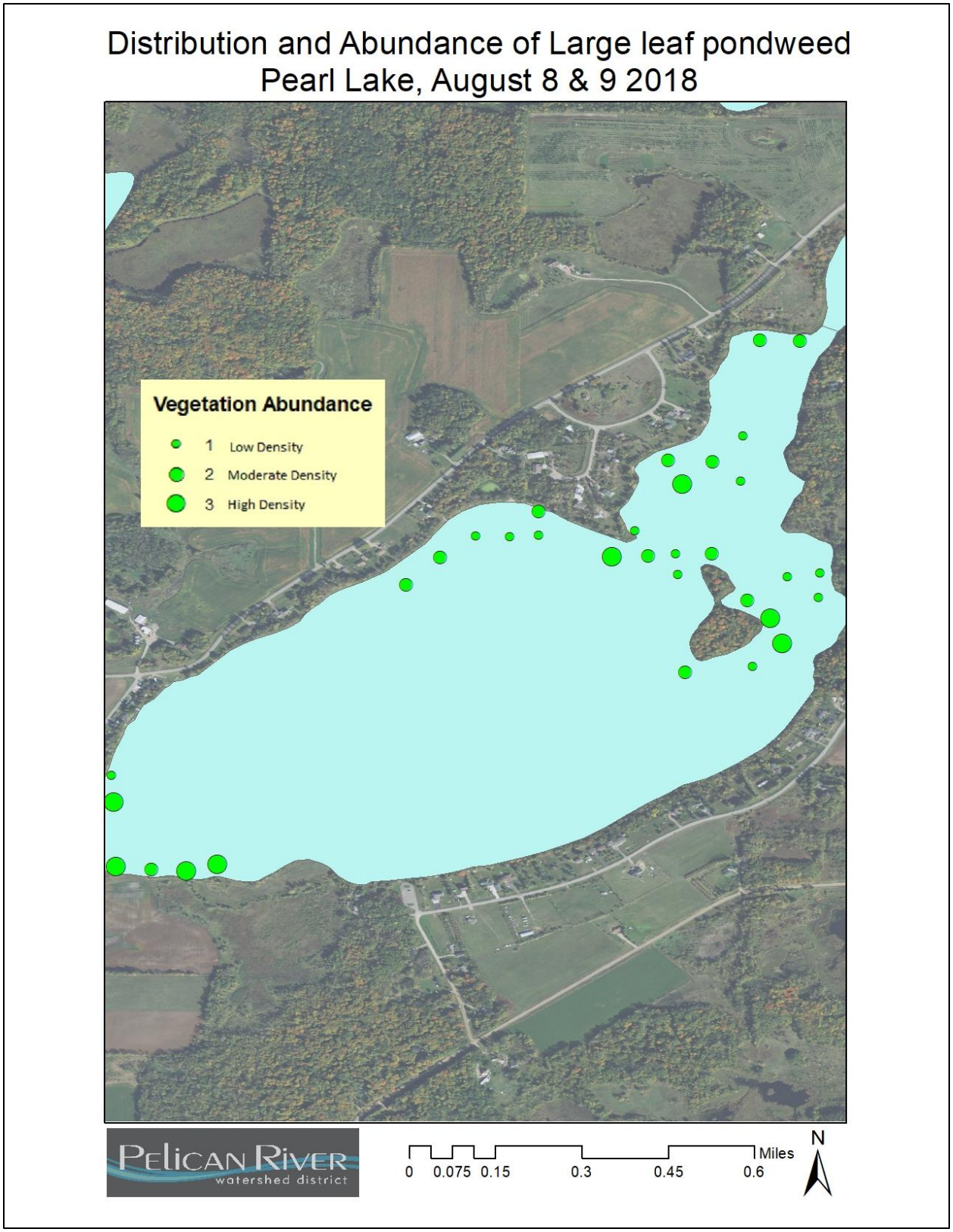


Figure 11: Distribution and abundance of Large leaf pondweed in Pearl Lake, August 8 & 9, 2018

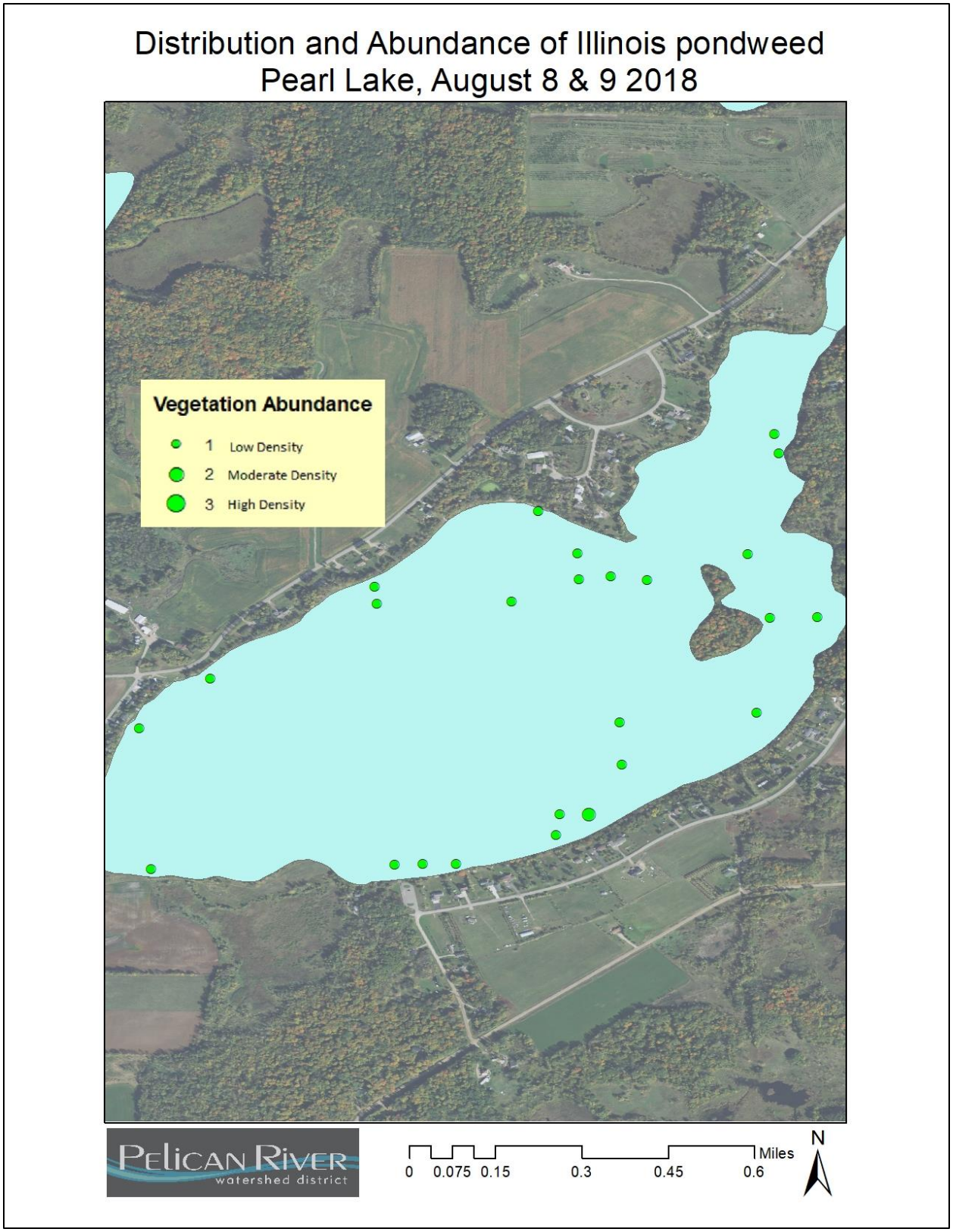


Figure 12: Distribution and abundance of Illinois pondweed in Pearl Lake, August 8 & 9, 2018

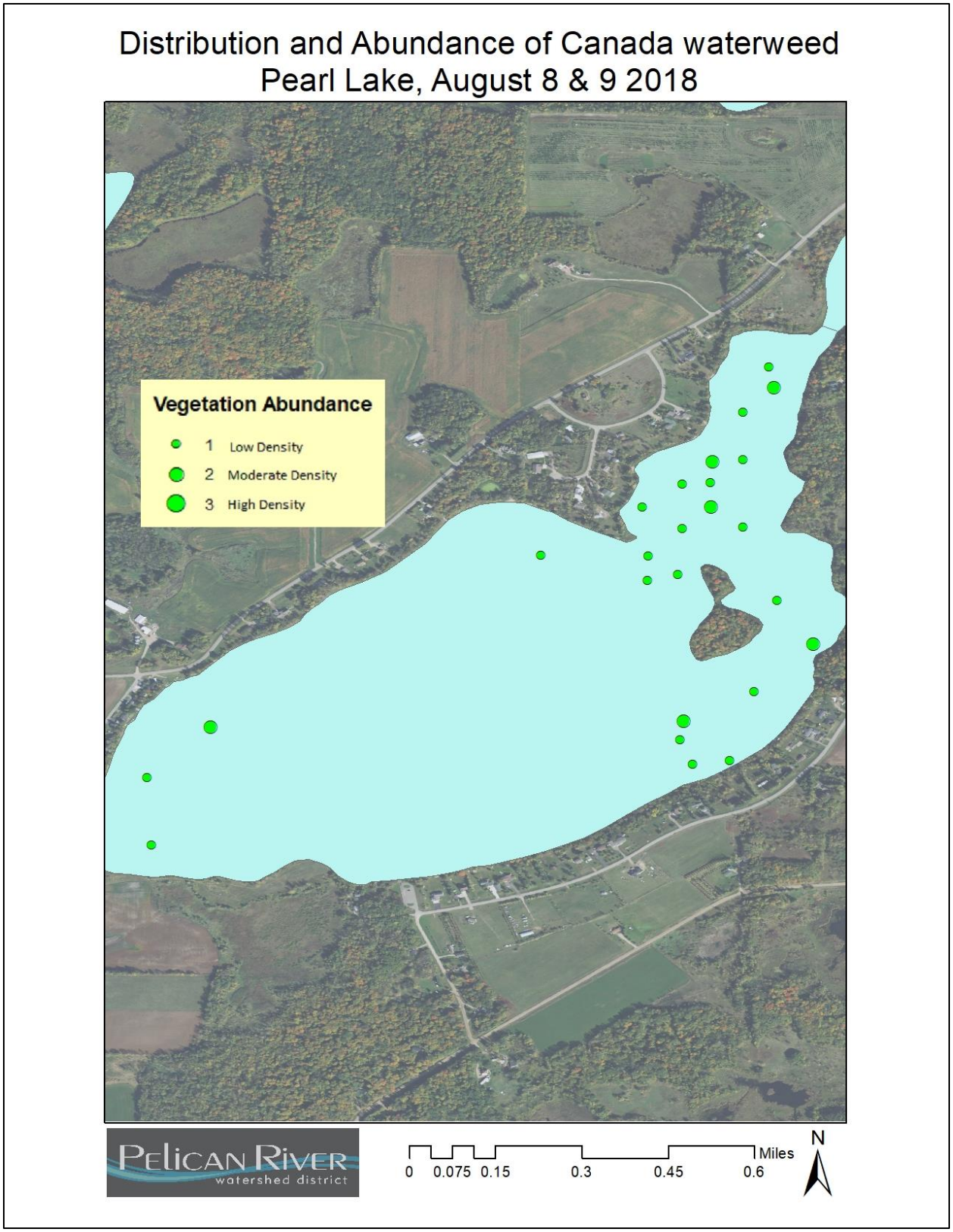


Figure 13: Distribution and abundance of Canada waterweed in Pearl Lake, August 8 & 9, 2018

Literature Cited

Borman, Susan et. al. 1997. Through the Looking Glass. A Field Guide to Aquatic Plants. Wisconsin Lakes Partnership. University of Wisconsin – Stevens Point

Madsen, J.D. 1999. Point intercept and line intercept methods for aquatic plant management. APCRP Technical Notes Collection (TN APCRP-M1-02). U.S.Army Engineer Research and Development Center, Vicksbury, MS. www.wes.army.mil/el/aqua

Skawinski, Paul M. 2018. Aquatic Plants of the Upper Midwest. A photographic field guide to our underwater forests. Third Edition