State of Wisconsin
DEPARTMENT OF NATURAL RESOURCES
2984 Shawano Avenue
Green Bay, WI 54313

Scott Walker, Governor
Cathy Stepp, Secretary

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To whom it may concern:

This past field season West Alaska Lake in Kewaunee County was part of the DNR Directed Lakes Monitoring Program. Through this program, West Alaska Lake had multiple sampling techniques completed to help determine overall lake health. The largest of these sampling techniques was the aquatic plant index survey. This survey was conducted on August 26, 2016. This report details the plant survey and how the results can be interpreted. It also includes the water chemistry and aquatic invasive species survey results.

Plant Index Survey

Importance of Aquatic Plants

Aquatic plants form the foundation of healthy lake ecosystems. They not only protect water quality, but also produce life-giving oxygen. Aquatic plants are a lake's own filtering system, helping to clarify the water by absorbing nutrients like phosphorus and nitrogen that could stimulate algal blooms. Plant beds stabilize soft lake bottoms and prevent shoreline erosion by reducing the effect of waves and currents. Healthy native aquatic plant communities help prevent the establishment of invasive non-native plants such as Eurasian water milfoil and curly-leaf pondweed. Native aquatic plants also provide important reproductive, food, and cover habitat for fish, invertebrates, and wildlife. By leaving or restoring a natural buffer area of emergent vegetation along the shoreline, property owners can reduce erosion, help maintain water quality, and provide habitat and travel corridors for wildlife.

Point-Intercept Sampling Method

Based on area and depth specific to West Alaska Lake, we mapped a 126-point sampling grid over the entire lake surface. Using a GPS, we navigated by boat to each of the pre-determined grid points. At each point we used a two-sided rake to sample approximately 1 foot along the bottom. After pulling the plants to the surface, the overall rake as well as individual species on the rake were assigned a fullness rating of 1, 2 or 3 to estimate density of plant growth (figure 1). We also recorded visual sightings of species within six feet of the sample point, as well as any additional species seen in the lake during a general boat survey. For more detailed information on the point-intercept sampling method and how data were collected please visit: http://www.uwsp.edu/cnr-ap/UWEXLakes/Documents/ecology/Aquatic%20Plants/PI-Protocol-2010.pdf

Species frequencies of occurrence reflect the percentage of times a species was found out of the total number of points sampled. Littoral frequency of occurrence (given in Table 1) indicates how often a species was found considering only areas of the lake that are capable of supporting plant growth (known as the "littoral area or zone"). The maximum depth of plant growth is the deepest depth at which plants were found in the lake. Species richness is a count of the total number of different plant species found in a lake. The Floristic Quality Index (FQI) is a metric that evaluates the closeness of the flora in a lake to that of an undisturbed condition. The higher a FQI value, the closer that plant community is to an undisturbed ecosystem. Statewide and ecoregion averages are calculated from a subset of approximately 250 lakes across Wisconsin.

Table 1: Species Present

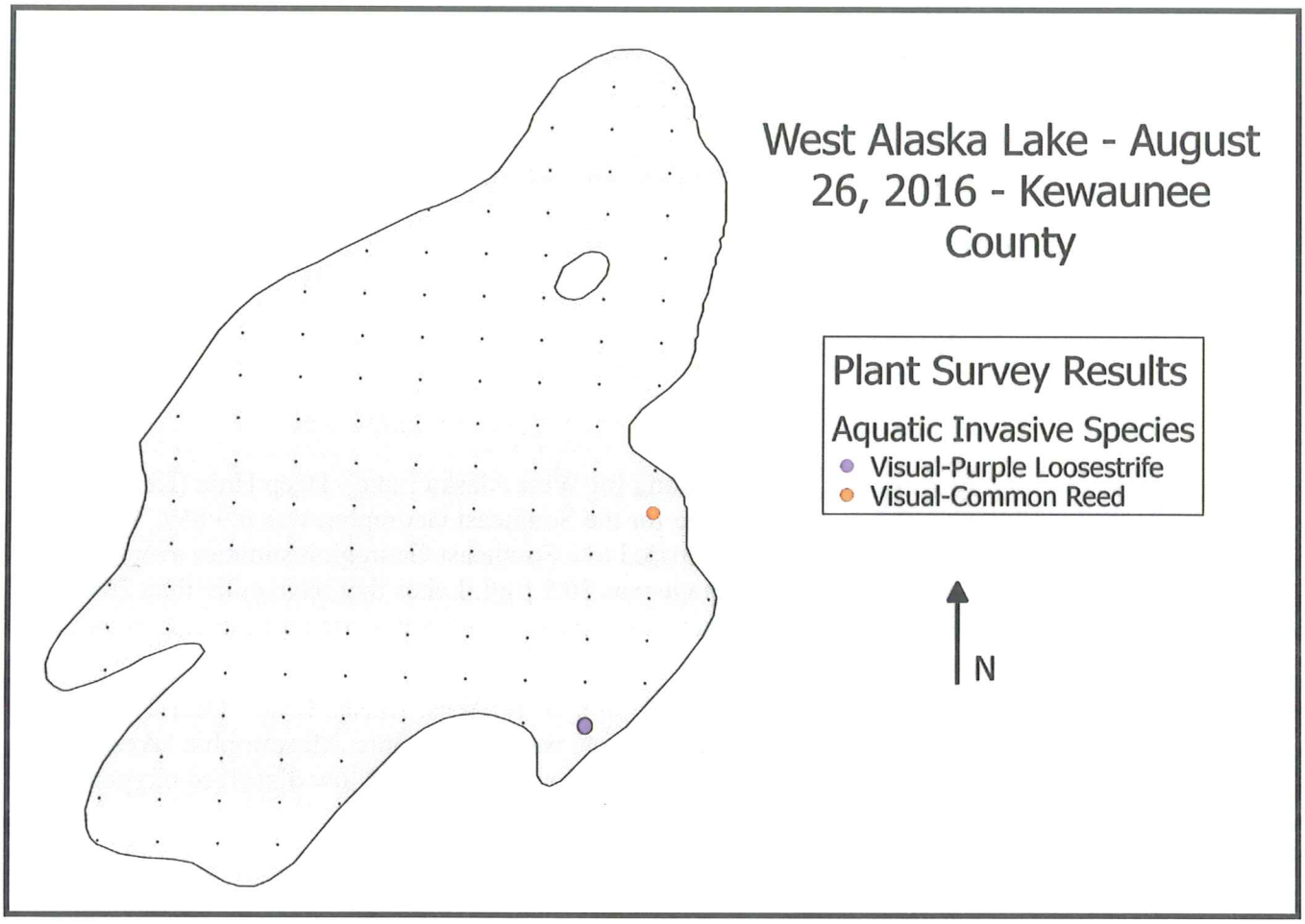
% Frequency of Occurrence (Littoral): This estimation of frequency of occurrence is calculated by taking the total number of times a species is detected in a lake divided by the total number of points in a lake at which the growth of plants is possible.

Common Name	Scientific Name	Growth Form (Floating, free floating, submerged, emergent)	% Frequency of Occurrence
Muskgrasses	*Chara spp.*	Submerged	69.12
Nitella	*Nitella spp.*	Submerged	22.06
White water lily	*Nymphaea odorata*	Floating	14.71
Northern Water-milfoil	*Myriophyllum sibricum*	Submerged	7.35
Coontail	*Ceratophyllum demersum*	Submerged	5.88
Sago Pondweed	*Stuckenia pectinate*	Submerged	2.94
Water Stargrass	*Heteranthera dubia*	Submerged	1.47
Fries Pondweed	Potamogeton friesii	Submerged	1.47
Aquatic Moss	*Fontinalis antipyretica*	Submerged	1.47
Spatterdock	*Nuphar variegata*	Floating	Visual
Purple Loosestrife *	*Lythrum salicaria*	Terrestrial	Visual
Common Reed *	*Phragmites australis*	Emergent	Visual
Softstem Bullrush	*Schoenoplectus tabernaemontani*	Emergent	Visual

* = species non-native and potentially invasive in WI

Table 2: Overall Survey Summary

	WEST ALASKA LAKE	STATEWIDE AVERAGE	SWTP ECOREGION AVERAGE
Littoral Frequency of Occurrence (%)	89.7%	73.3%	79.0%
Maximum Depth of Plant Growth (ft)	16.5	15.3	15.4
Species Richness	12	16.8	15
Floristic Quality Index (FQI)	16.3	24.1	20



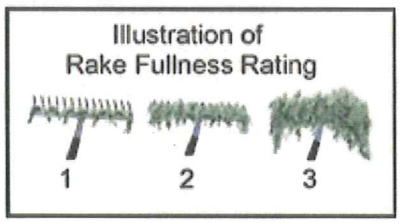


Figure 1: AIS distribution map with rake fullness ratings. Neither plant species were actually collected on a GPS point. Visuals are made when a plant species is within 6 feet of the rake location without being collected on the rake.

Plant survey Results

As you can see from the overall plant index survey summary, West Alaska Lake has a relatively high frequency of occurrence in the littoral zone when compared to other lakes throughout the state and ecoregion. This can partly be contributed to the lakes bathymetry. With the majority of the West Alaska Lake's plant community being two plants (Chara sp. and Nitella sp.); the species richness is less than the statewide and ecoregion averages. This is likely caused by sediment type, water quality, and the lake's bathymetry. Sometimes, a lake's biological conditions are perfect for one or two main plant species to dominate the ecosystem not allowing other plant species to flourish. Other lakes in this area display very similar characteristics.

Water Chemistry

The following information is taken from the West Alaska Lake webpage provided by the DNR.
http://dnr.wi.gov/lakes/LakePages/LakeDetail.aspx?wbic=94300

West Alaska Lake - Deep Hole was sampled **3** different days during the 2016 season. Parameters sampled included:

- water clarity (SD)
- temperature
- dissolved oxygen (D.O.)
- total phosphorus (TP)
- chlorophyll (CHL)

The average summer (July-Aug) secchi disk reading for West Alaska Lake - Deep Hole (Kewaunee County, WBIC: 94300) was 17 feet. The average for the Southeast Georegion was 6.9 feet. The average summer Chlorophyll was 2.3 µg/l (compared to a Southeast Georegion summer average of 23.5 µg/l). The summer Total Phosphorus average was 20.2 µg/l. Lakes that have more than 20 µg/l and impoundments that have more than 30 µg/l of total phosphorus may experience noticeable algae blooms.

The overall Trophic State Index (TSI- based on chlorophyll) for West Alaska Lake - Deep Hole was 41. The TSI suggests that West Alaska Lake - Deep Hole was mesotrophic. Mesotrophic lakes are characterized by moderately clear water, but have an increasing chance of low dissolved oxygen in deep water during the summer.

Lake Water Quality 2016 Annual Report

West Alaska Lake
Kewaunee County
Waterbody Number: 94300

Lake Type: SEEPAGE
DNR Region: NE
GEO Region:SE

Site Name	Storet #
West Alaska Lake - Deep Hole	313170

Date	SD (ft)	SD (m)	Hit Bottom	CHL	TP	TSI (SD)	TSI (CHL)	TSI (TP)	Lake Level	Clarity	Color	Perception
07/26/2016	20.5	6.2	N	1.44	16.4	34	38	50				
08/15/2016	13.5	4.1	N	3.19	23.9	40	44	53				
09/09/2016	10	3	N	4.17	19.6	44	46	51				

07/26/2016		
Depth METERS	Temp. DEGREES C	D.O. MG/L
1	26.8	7.6
2	26.6	7.6
3	25	8.2
4	20.5	7.4
5	15	2.7
6	10.7	.8
6.5	9.4	.4

08/15/2016		
Depth METERS	Temp. DEGREES C	D.O. MG/L
1	26.77	8.03
2	26.56	7.56
3	25.87	6.38
4	22.13	8.25
5	16.87	3.43
6	11.6	1.39
7	9.19	.89
8	7.73	.47
9	7.17	.34
10	6.78	.27
11	6.63	.23

09/09/2016		
Depth METERS	Temp. DEGREES C	D.O. MG/L
1	23.9	8.3
2	23.8	8
3	23.6	7.8
4	22.3	3.3
5	18.1	.2
6	13.2	.2
7	9.4	.1
8	8.2	.1
9	7.4	.1
10	7	.1
11	6.9	.1

SD = Secchi depth measured in feet converted to meters; Chl = Chlorophyll a in micrograms per liter(ug/l); TP = Total phosphorus in ug/l, surface sample only; TSI(SD), TSI(CHL), TSI(TP) = Trophic state index based on SD, CHL, TP respectively; Depth measured in feet.

Aquatic Invasive (AIS) Species Survey

AIS found while monitoring consist of Narrow-leaf Cattail (Typha angustifolia), Phragmites (Phragmites australis subsp. australis), and Purple Loosestrife (Lythrum salicaria). Milfoil observed and collected near the boat launch for genetic analysis was determined to be pure native northern watermilfoil (M. sibiricum). Curly leaf pondweed (Potamogeton crispus) has been previously verified but was not observed during the August 2016 survey (likely due to the late summer survey timing and/or very sparse population). The non-native Phragmites populations were located near the public boat launch, as well as an isolated pioneering patch near a riparian residence on the southwestern shore (figure 3).

To learn more about aquatic invasive species and become more familiar with each specific species please visit the WDNR aquatic invasive species webpage: http://dnr.wi.gov/topic/Invasives/

Figure 3: Green dot represents non-native Phragmites population.

This report summarizes the 2016 monitoring results. To add to this data set, I am planning to collect water chemistry samples in West Alaska Lake again in the summer of 2017. This monitoring effort will be a repeat of what was collected in 2016 as part of the Directed Lakes Program.

If you have any questions regarding the survey results from West Alaska Lake, please feel free to contact me at 920-662-5489 or at mary.gansberg@wisconsin.gov.

Sincerely,

Mary Gansberg

Mary Gansberg
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Wisconsin Department of Natural Resources