
MEMORANDUM

TO: Kusel, Wilson, Round Lakes P & R District

DATE: February 29, 2016

SUBJECT: Review of lake management activities on Kusel Lake in 2015.

Three surveys were conducted on Kusel Lake in 2015. These included spring and fall meandering boat survey to determine the distribution and abundance of aquatic invasive species (AIS) and a full point-intercept survey to assess the lake's aquatic plant community.

Recent Management Activity

Invasive Eurasian watermilfoil (*Myriophyllum spicatum*) and its hybrid, a cross between Eurasian watermilfoil and native northern watermilfoil (*Myriophyllum sibiricum*), have been managed over the past decade on Kusel Lake with the use of aquatic herbicides. In 2007, over 19 acres of milfoil were treated with Navigate[®] (granular 2,4-D) at a rate of 100 lbs/acre. Since the 2007 treatment, milfoil had been maintained at relatively low levels with annual surveys and spring treatments. During the fall 2011 survey, only 1.2 acres of milfoil were mapped. However a survey conducted on October 24, 2012 found that there was an increase in the abundance of milfoil beds. A total of 6.35 acres of sparsely distributed hybrid watermilfoil were found. But then a survey conducted on October 11, 2013 found sparsely growing beds covering only 0.35 acres. It was noted at the time of the survey that the water was more turbid than usual and that the native plant community did not appear to be as robust as normal for Kusel Lake. Plant growth was sparse in many of the areas where native and invasive species were commonly found in abundance.

A treatment took place on June 4, 2014 but only in the northeast channel where 0.5 acres of milfoil were targeted with 100 lbs of Navigate[®] applied at a rate of 4.0 ppm (56.8 lbs/acre-foot). On October 30, 2014, an invasive species mapping survey of Kusel Lake found that hybrid milfoil had returned to the main lake, with 6.5 acres being mapped (**Figure 1**). A majority of this milfoil was found in the west half of the lake growing in depths greater than 12 feet. Growth of hybrid watermilfoil had not been seen in these locations for many years. Because of the extent and depth of hybrid watermilfoil found at the time of the survey, a whole-lake low-dose 2,4-D treatment was proposed for the spring of 2015. Permission to conduct this large of a treatment was denied by the Wisconsin DNR until data on the composition of the native aquatic plant community could be collected. As an alternative, permission was given to treat the three densest areas with liquid 2,4-D and endothall, each applied at 1.0 ppm. These areas are shown in **Figure 1**. This treatment took place on May 29, 2015.

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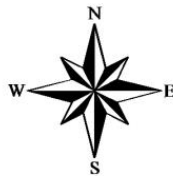
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Figure 1. Distribution of hybrid watermilfoil (*Myriophyllum spicatum* x *M. sibiricum*) on October 30, 2014 on Kusel Lake, Waushara County, Wisconsin.



Kusel Lake EWM 10/30/14

-  Moderately dense EWM
-  Scattered EWM



0 0.125 0.25 0.5
Kilometers

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Curly-leaf pondweed, another aquatic invasive species, was first identified in Kusel Lake over 10 years ago. Since this time, curly-leaf pondweed has not expanded significantly and has yet to reach nuisance levels in the lake. In recent years, spring surveys of Kusel Lake have been conducted as a means to monitor curly-leaf pondweed growth.

In addition, volunteer water quality monitoring took place on Kusel Lake in the spring and fall of 2015. Samples were submitted to and analyzed by the Water & Environmental Analysis Lab at UW-Stevens Point. These data have been compiled, interpreted and presented in relation to previous water quality data from Kusel Lake.

Aquatic Invasive Species Mapping Surveys

AIS mapping surveys were conducted on June 2 and September 1, 2015. The goals of these surveys were to locate and map curly-leaf pondweed (*Potamogeton crispus*) and hybrid watermilfoil. Curly-leaf pondweed is a cold-water species which dies back during the summer months. As a result, spring is the best time to survey for this species. Milfoil, on the other hand, can continue to grow throughout the season, reaching peak biomass in September and October, making fall the ideal time to survey this plant.

The surveys were performed using surface observations, sonar and rake tows to verify locations of AIS. The locations of the beds were drawn on a lake map for reference. GPS waypoints were recorded and used to delineate the edges of each bed. Depths were also recorded for each location to be used to estimate treatment needs. Beds were mapped and their sizes determined using ArcMap software.

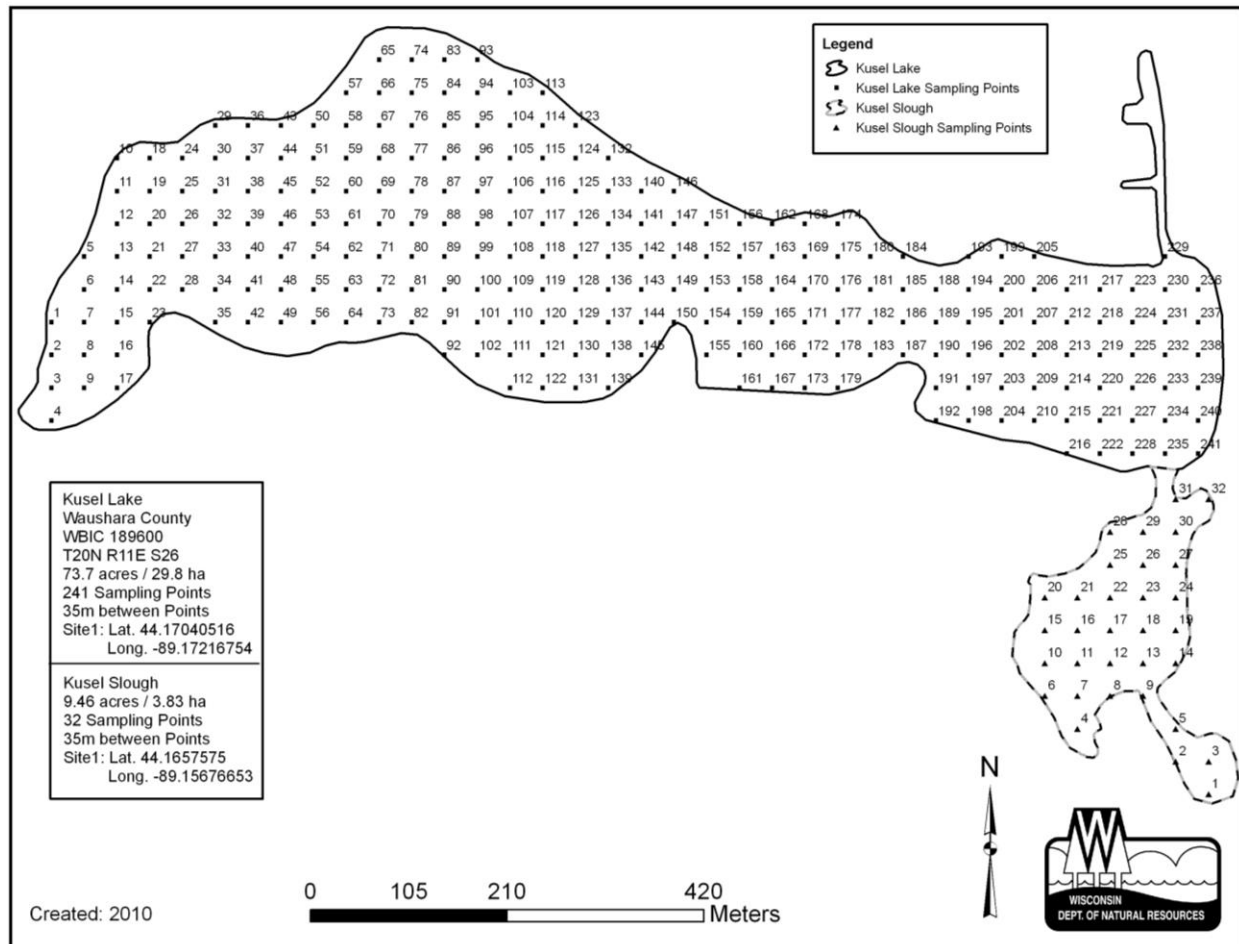
Submergent Aquatic Plant Survey

On September 1, 2015, a point-intercept survey of the entire plant community of Kusel Lake was conducted. The Wisconsin DNR developed the survey map shown in **Figure 2**. This map includes 241 sample points in the main lake and 32 points in the shallow bay or 'slough' located along the southeast shore. At the time of the survey though, water levels were low and did not allow for navigation into the slough. At each of grid points plotted in the lake, aquatic plant samples were collected from a boat with a single rake tow. The rake used consisted of two short-toothed garden rake heads welded together and attached to a rope. All plant samples collected were identified to *genus* and *species* whenever possible, and the information was recorded. An abundance rating was also given for each species. In addition to the plant data, water depths were recorded for each location. Data collected was used to determine species composition, percent frequency and relative abundance. Chi-square statistical analysis was used to determine if significant change took place between the 2015 and 2006 when the last point-intercept survey of this type took place.

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Figure 2. Point-intercept aquatic plant survey map for Kusel Lake, Waushara County, Wisconsin.



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Survey Results

During the June 2, 2015 survey, curly-leaf pondweed was identified in six locations in the eastern half of Kusel Lake (**Figure 3**) totaling approximately 0.9 acre. These areas are consistent with the distribution of curly-leaf pondweed over the past decade.

A fair amount of hybrid watermilfoil was found during the September 1, 2015 survey ranging in density from highly scattered to scattered (**Figure 4**). In total, 9.2 acres were found again growing primarily in the western half of the lake (**Table 1**). The density of hybrid watermilfoil appeared to have declined as a result of the treatment, however the distribution (acreage) overall increased.

Table 1. Size and average depth of hybrid watermilfoil beds identified on September 1, 2015 in Kusel Lake, Waushara County, WI.

Site	Acres	Average Depth (ft)
A	8.1	14
B	0.2	7
C	0.1	9
D	0.8	3

Total 9.2

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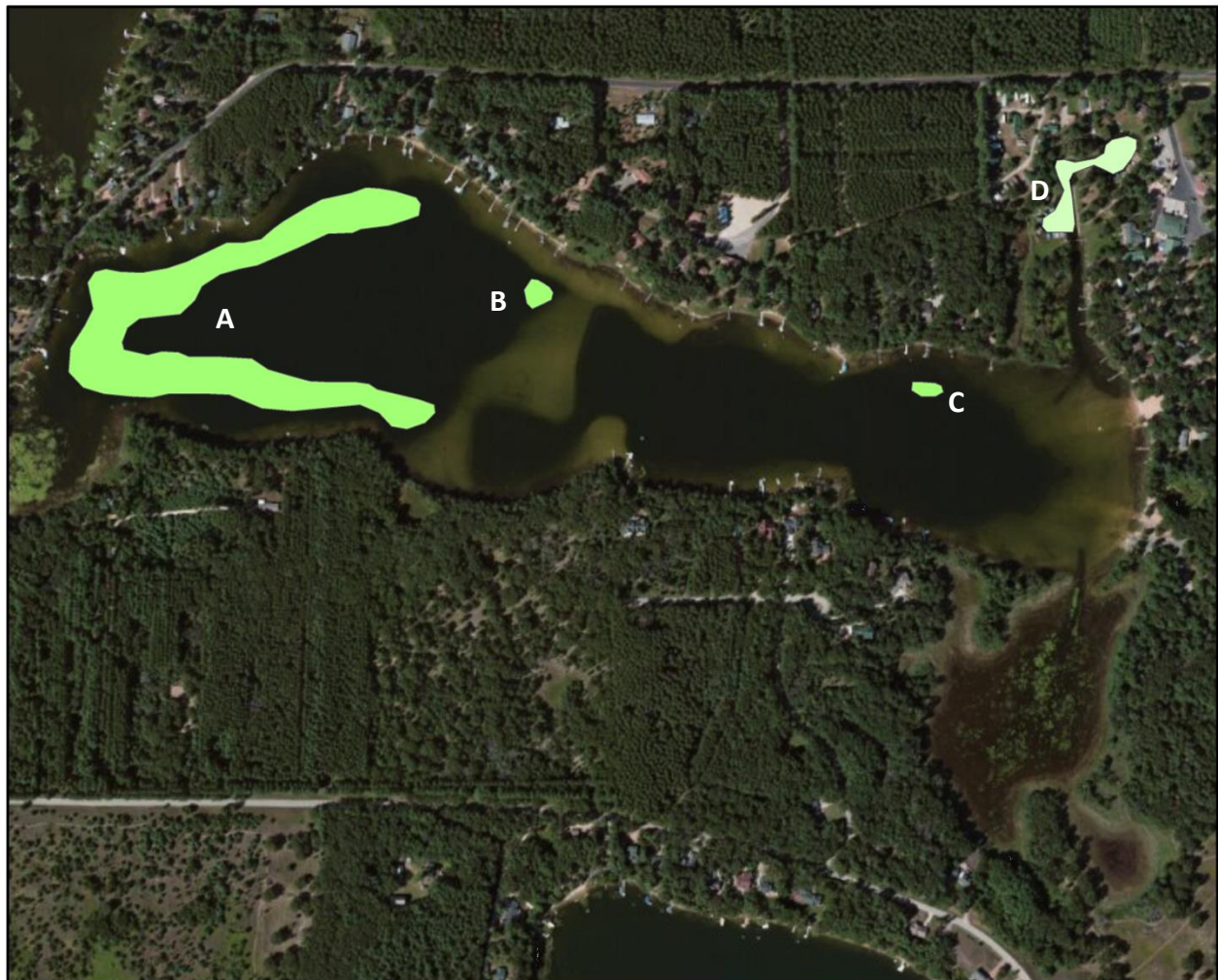
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Figure 3. Distribution of curly-leaf pondweed (*Potamogeton crispus*) on June 2, 2015 on Kusel Lake, Waushara County, Wisconsin.



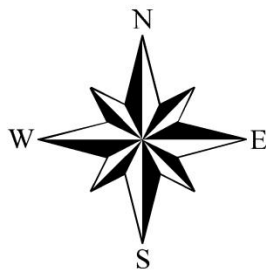
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Figure 4. Distribution of hybrid watermilfoil (*Myriophyllum spicatum* x *M. sibiricum*) on September 1, 2015 on Kusel Lake, Waushara County, Wisconsin.



Hybrid Watermilfoil

- Highly Scattered HWM
- Scattered HWM



0 0.15 0.3 0.6 Kilometers



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A total of 125 locations had vegetation during the point-intercept survey. In 2006, during a similar survey, vegetation was found at 117 sites. Vegetation was found growing down to 18.7 feet in 2015 and 17.5 feet in 2006. A total of 14 aquatic plant species were found during the 2015 survey (**Table 2, Figure 5**). In 2006, 17 species were identified. The state-wide average is 13 species. Kusel Lake lies near the border of the Northern Central Hardwood Forests and Southeastern Wisconsin Till Plain regions of Wisconsin (**Figure 6**). The average number of species found in lakes in these regions is 14 species (Nichols, 1999).

Table 2. Results of the submergent aquatic plant surveys conducted on Kusel Lake in August 2006 and September 2015.

Common Name	Scientific Name	Aug. 2006	Sept. 2015	Significant Change	Increase (I) or Decrease (D)
		Percent Frequency	Percent Frequency		
Eurasian watermilfoil	<i>Myriophyllum spicatum</i>	27.22	4.95	***	D
Muskgrasses	<i>Chara spp.</i>	30.56	62.09	***	I
Nitella	<i>Nitella spp.</i>	--	7.69	***	I
Filamentous algae	--	--	7.14	***	I
Wild celery	<i>Vallisneria americana</i>	16.67	6.04	**	D
Creeping spikerush	<i>Eleocharis palustris</i>	--	4.40	**	I
Southern naiad	<i>Najas guadalupensis</i>	--	3.85	**	I
Slender naiad	<i>Najas flexilis</i>	21.67	3.30	***	D
Coontail	<i>Ceratophyllum demersum</i>	1.67	2.20		
White water lily	<i>Nymphaea odorata</i>	5.00	2.20		
Illinois pondweed	<i>Potamogeton illinoensis</i>	2.22	0.55		
Floating-leaf pondweed	<i>Potamogeton natans</i>	1.11	0.55		
Spatterdock	<i>Nuphar variegata</i>	1.11	visual		
Watershield	<i>Brasenia schreberi</i>	1.11	visual		
Variable pondweed	<i>Potamogeton gramineus</i>	16.11	--	***	D
Flat-stem pondweed	<i>Potamogeton zosteriformis</i>	9.44	--	***	D
Water star-grass	<i>Heteranthera dubia</i>	4.44	--	**	D
Common waterweed	<i>Elodea canadensis</i>	2.22	--	*	D
Sago pondweed	<i>Stuckenia pectinata</i>	1.67	--		
Northern watermilfoil	<i>Myriophyllum sibiricum</i>	0.56	--		
Small pondweed	<i>Potamogeton pusillus</i>	0.56	--		

* significant change ($\alpha = 0.05$), ** more significant change ($\alpha = 0.01$), *** most significant change ($\alpha = 0.001$)

Number of Species (N)	17	14
Diversity Index (D)	0.86	0.58
Avg. Coefficient of Conservatism (C)	5.6	6.0
Floristic Quality Index (FQI)	22.3	20.8

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Figure 5. Submergent aquatic plant community composition on August 6, 2015 in Kusel Lake, Waushara County, Wisconsin.

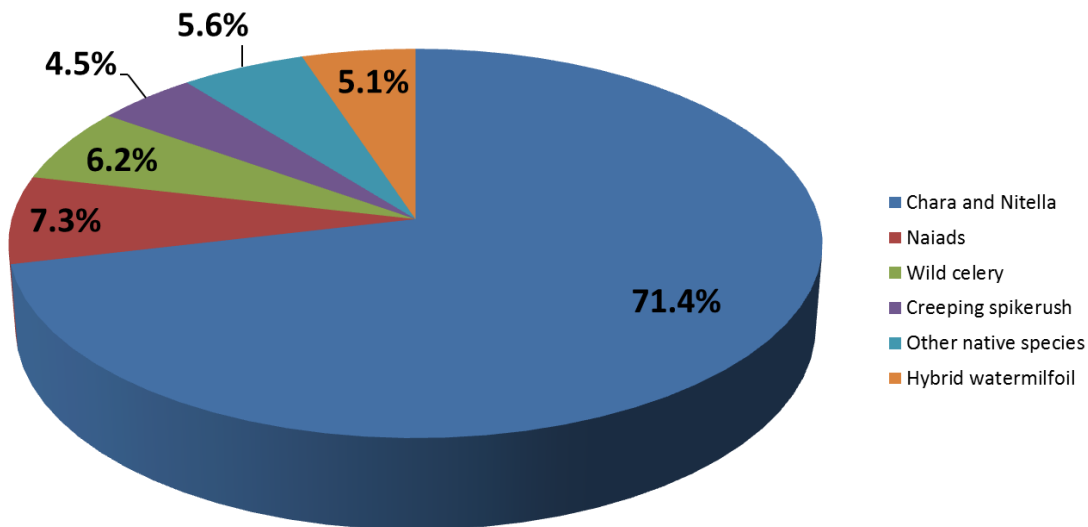


Figure 6. Ecoregions of Wisconsin (after Omernick and Gallant, 1988)



The most abundant plant species encountered in Kusel Lake during the 2015 survey was muskgrass (*Chara* spp.), a type of complex algae. It was found at approximately 62% of the sites within the littoral zone of the lake. Muskgrass was also the most abundant species in 2006. **Figure 7** shows the distribution of this species throughout Kusel Lake in 2015.

In **Table 2** the asterisks indicate where statistically significant changes between 2006 and 2015 exist. The more asterisks represented for each plant species, the larger the significant change. This change is also indicated as an increase or a decrease in change from 2006 to 2015. In the case of

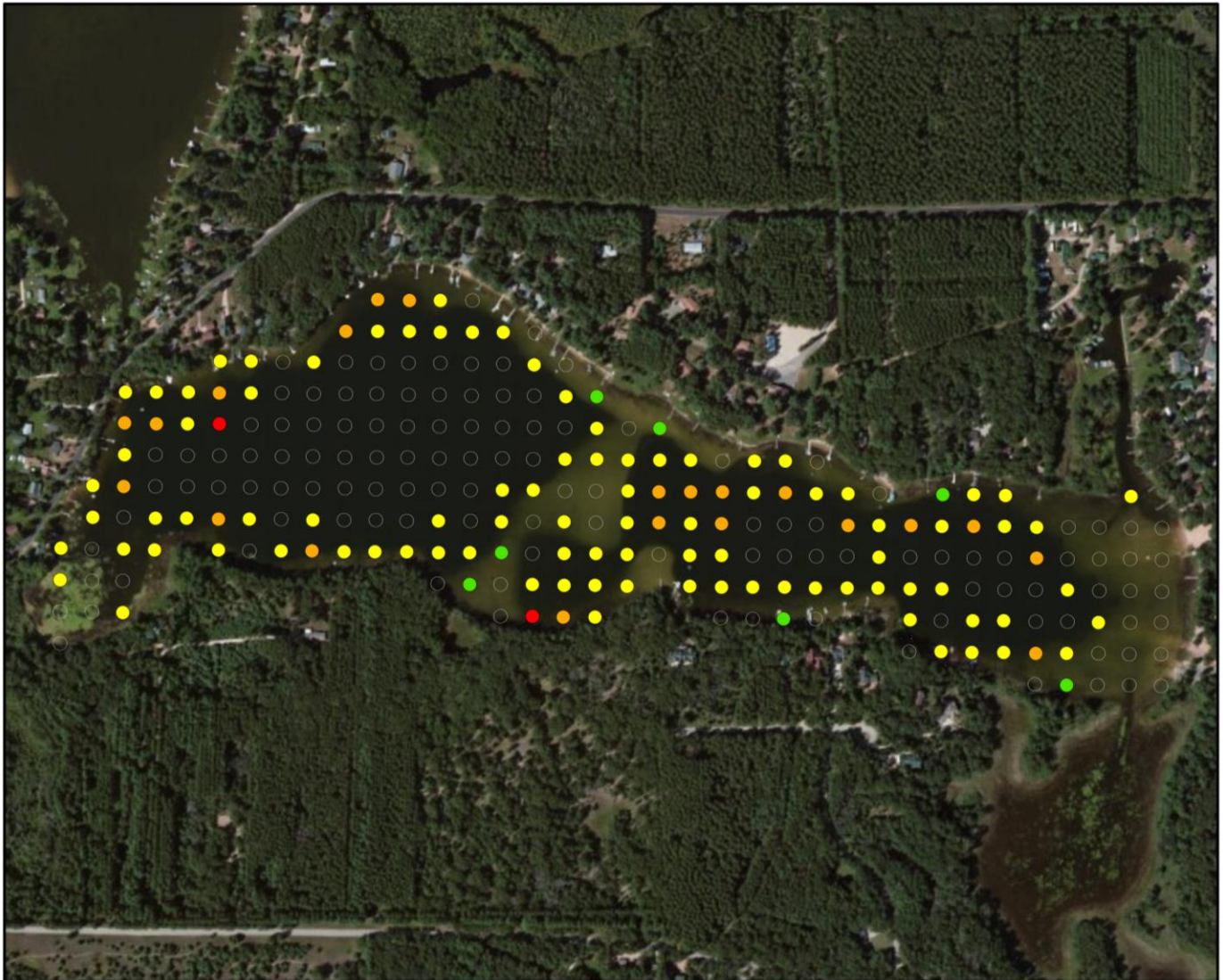
Kusel Lake, seven species had significant declines in the past nine years and five species experienced a significant increase. It is difficult to draw conclusions regarding changes in the aquatic plant community based on data sets collected nine years apart. Many environmental factors can affect plant growth from year to year. Since 2006 small-scale treatments have taken place on a semi-annual basis. However, the amount of herbicide used in these surveys would not be expected to negatively impact native species.

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Figure 4. Distribution of muskgrass (*Chara* spp.), on September 1, 2015 on Kusel Lake, Waushara County, WI.



Muskgrass (*Chara* spp.)

- sample site
- visual
- scattered
- moderate
- dense



0 0.15 0.3 0.6 Kilometers

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Changes in the native plant community were first noted in 2013 during the fall mapping survey. At the time, it was noted that water quality and the distribution of native aquatic plant species were low.

Simpson Diversity Index

The plant data collected from Kusel Lake was used to calculate the Simpson Diversity Index (**Table 1**). In order to estimate the diversity of the aquatic plant community, this index takes in account both the number of species identified (richness) and the distribution or relative abundance of each species. As these parameters increase, so does the overall diversity. With the Simpson Diversity Index (D), 1 represents infinite diversity and 0, no diversity. That is, the bigger the value of D, the higher the diversity. The value of D calculated for Kusel Lake was 0.58 in 2015 and 0.86 in 2006. Although State-wide or regional averages for D are not available, data from lakes surveyed throughout the State have yielded values between 0.70 and 0.90. This suggests the diversity of Kusel Lake's aquatic plant community is currently relatively low and has declined over the past decade.

Assessment of Floristic Quality

Plant survey data were also used to assess the "floristic quality" of Kusel Lake. The method used assigns a value to each *native* plant species called a Coefficient of Conservatism (C). It does not take in account the presence of exotic species or filamentous algae. Coefficient values range from 0 - 10 and reflect a particular species' likelihood of occurring in a relatively undisturbed landscape. Species with low coefficient values, such as sago pondweed (*Stuckenia pectinata*) (C = 3), are likely to be found in a variety of habitat types and can tolerate high levels of human disturbance. On the other hand, species with higher coefficient values, such as southern naiad (*Najas guadalupensis*) (C = 8), are much more likely to be restricted to high quality, natural areas. By averaging the coefficient values available for the submergent and emergent species found in Kusel Lake, a value of 6.0 was calculated in 2015 and 5.6 in 2006 (**Table 2**). The average value for lakes in Wisconsin is 6.0 while the average for lakes in the Northern Central Hardwood Forests and Southeastern Till Plain regions of Wisconsin is 5.6.

By utilizing the Coefficients of Conservatism for the plant species found in Kusel Lake, further assessment of floristic quality can be made. By multiplying the average coefficient values by the square root of the number of plant species found, a Floristic Quality Index (FQI) of 20.8 was calculated for Kusel Lake in 2015 and 22.3 in 2006. In general, higher FQI values reflect higher lake quality. The average for lakes in the Northern Central Hardwood Forests and Southeastern Till Plain region is 20.9. Both Coefficient of Conservatism and the Floristic Quality Index values suggest the quality of Kusel Lake, specifically in terms of the plant community, is currently average having dropped since 2006.

Aquatic plants serve an important purpose in the aquatic environment. They play an instrumental role in maintaining ecological balance in ponds, lakes, wetlands, rivers, and streams. Native aquatic plants have many values. They serve as buffers against nutrient

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loading and toxic chemicals, act as filters that capture runoff-borne sediments, stabilize lakebed sediments, protect shorelines from erosion, and provide critical fish and wildlife habitat. Therefore, it is essential that the native aquatic plant community within Kusel Lake be protected.

The raw data for the 2015 submergent aquatic plant survey can be found in **Appendix A**.

Water Quality Analysis

Water quality data available for Kusel Lake from 2010 to 2015 have been collected and compiled (**Table 2**).

Table 2. Water quality data collected from May 2010 to November 2015 on Kusel Lake, Waushara County, Wisconsin.

DATE	pH (SU)	Conductivity (mmhos/cm)	Alkalinity (mg/L)	Total Hardness (mg/L)	Chlorophyll (ug/L)	Total Phosphorus (mg/L)	Ammonia (mg/L)	Nitrates & Nitrites (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Secchi (ft)
5/3/2010	8.46	193	112	119	--	0.015	0.01	<0.02	0.46	16
2/22/2011	--	--	--	--	--	0.197	0.30	0.08	--	--
5/4/2011	8.34	196	124	116	--	0.013	0.21	0.05	0.80	13
6/9/2011	--	--	--	118.5	6	0.019	--	--	--	8.75
6/13/2011	8.09	227	110	--	1.1	0.012	0.076	0.026	0.57	15.1
6/30/2011	--	--	--	--	5	0.016	--	--	--	11.25
7/18/2011	--	--	--	--	5	0.014	--	--	--	10.75
7/20/2011	8.39	222	110	--	1.9	0.012	0.073	ND	0.58	10.3
8/8/2011	--	--	--	--	1	0.014	--	--	--	--
10/31/2011	7.94	221	120	--	--	0.019	0.16	2.2	0.88	8.75
11/14/2011	8.03	189	124	--	--	0.017	0.15	0.05	0.82	10
4/30/2012	--	208	--	--	--	0.022	0.08	0.07	0.60	13
11/13/2012	--	230	--	--	--	0.012	0.11	0.03	0.70	13
5/25/2014	8.50	201	112	114	--	0.009	0.05	<0.02	0.46	6
11/15/2014	8.29	220	140	125	--	0.010	0.05	0.05	0.64	--
5/2/2015	--	202	--	--	--	<0.006	0.10	<0.02	0.51	--
11/1/2015	--	198	--	--	--	0.018	0.07	<0.02	0.59	--

pH

pH is a measure of a lake's acidity or basicity. Many factors influence pH including geology, productivity, pollution, etc. Values of pH between seven and nine are not uncommon for lakes in Wisconsin. Values for Kusel Lake over the past six years have ranged between 7.94 and 8.50, indicating that the lake is basic or has hard water.

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Conductivity

Conductivity is the measure of the inorganic compounds in a body of water as determined by how well an electrical current is carried through a water sample. Conductivity is dependent upon the concentration of inorganic compounds suspended in the water column. High conductivity values may indicate contamination from septic systems, fertilizers, animal wastes or road salts. As a result, conductivity can be used to determine if human activities are influencing water quality. The recommended value for conductivity in lake samples is below 300 $\mu\text{mhos/cm}$. Conductivity in Kusel Lake from 2010 to 2015 ranged from 189 – 230 $\mu\text{mhos/cm}$.

Alkalinity

Alkalinity is a measure of the amount of carbonates, bicarbonates and hydroxide present in water. Alkalinity is predominantly determined by soil and bedrock characteristics. Lakes and ponds fed by groundwater from limestone aquifers tend to have high alkalinity. High alkalinity can also be a result of high algae and aquatic plant production. Levels above 25 mg/L indicate a hard water system able to withstand acid rain conditions. Low alkalinity (< 25 mg/L) waters are susceptible to acid rain. Alkalinity levels were high for Kusel Lake, ranging from 110 – 140 from 2010 to 2015.

Nitrogen

Excess nitrogen can also be a threat to overall water quality. Nitrogen is an important nutrient for plants and algae. It can enter lakes from groundwater, surface runoff (livestock manure and agricultural fertilizers) and precipitation. In addition, decomposing organic matter releases nitrogen.

Nitrogen can exist in a number of forms in aquatic systems. Samples collected between 2010 and 2015 from Kusel Lake were tested for ammonia, nitrates and nitrites, and total Kjeldahl nitrogen. Nitrates and nitrites (along with ammonia) are inorganic forms of nitrogen which can be readily used by plants and algae. Kjeldahl nitrogen is the sum of organic and ammonia forms of nitrogen. Water naturally contains less than 1.0 ppm of nitrogen. If the inorganic forms of nitrogen exceed 0.3 mg/L, there is sufficient nitrogen to support summer algae blooms and negatively affect water quality. Inorganic nitrogen levels in Kusel Lake have been below 0.3 mg/L for over a decade.

Phosphorus

Phosphorus is one of the most important water quality indicators. Phosphorus levels can determine the amount of algae growth in a lake. Phosphorus can come from external sources within the watershed (fertilizers, livestock, septic systems) or to a lesser extent, from groundwater. Phosphorus can also come from within the lake through a process called internal loading. Internal loading occurs when plants and chemical reactions release phosphorus from the lake sediments into the water column.

The average phosphorus concentration for natural lakes in Wisconsin is 0.025 mg/L or 25 ppb. Values above 0.05 mg/L are indicative of poor water quality. The concentration in February 2011 was 0.197 mg/L which is very high, but from May 2011 through

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November 2015, the concentrations were much lower and within desirable ranges (0.009 - 0.022 mg/L). In general, these data indicate good water quality within Kusel Lake.

Secchi Transparency

Water clarity is often used as a quick and easy test for a lake's overall water quality, especially in relation to the amount of algae present. There is an inverse relationship between Secchi depth and the amount of suspended matter, including algae, in the water column. The less suspended matter, the deeper the Secchi disc is visible. Secchi depths greater than six feet are generally indicative of good water quality. From 2010 into 2014, Secchi depths have been greater than six feet in depth. As with the previous water quality parameters, the water clarity data as a whole indicate good water quality in Kusel Lake.

Conclusions and Recommendations

A relatively small amount of curly-leaf pondweed was found in Kusel Lake in 2015. Levels continue to pose little risk to the lake. What is concerning is the amount of hybrid watermilfoil found during the fall 2015 survey. It is unclear what caused this expansion over the past two years particularly at the depths it was found (>12 feet). Perhaps the apparent decline in the native plant community identified during the previous survey allowed the hybrid watermilfoil to expand into areas previously dominated by native species.

Management Options

Traditionally, chemical treatments have been the tool of choice for managing milfoil in Kusel Lake. In the spring of 2016, a chemical treatment should again be utilized. There are two options to consider. The first is to treat the existing milfoil with Navigate[®] (granular 2,4-D). This has been the most widely used approach on Kusel Lake and has traditionally provided long-term control of this species with minimal impact to the native plant community. This approach would utilize Navigate[®] applied at the labeled rates of 2.0 to 4.0 ppm (28.4 to 56.8 lbs/acre-foot). Because Bed A is significantly deeper, the higher application rate is not warranted. On the remaining beds, the maximum labeled rate is recommended to optimize the herbicide's effectiveness. **Table 3** shows a breakdown of costs for this treatment approach.

Chemical treatments can provide seasonal relief from AIS, but may not provide long-term control. Often AIS beds are found in the same locations from year to year. These treatments serve to prevent or slow the further spread of AIS throughout the lake or movement to other lakes. While this approach rarely leads to eradication, these treatments can serve as a means to prevent wide-spread expansion of these species.

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Table 3. Treatment costs for Kusel Lake in 2016 using Navigate[®] (granular 2,4-D) applied at 2.0 – 4.0 ppm.

Navigate [®] at 2.0 - 4.0 ppm								
Site	Acreage	Depth (ft)	Acre-ft	ppm	rate	product	unit cost	cost
A	8.1	14	113.4	2.0	28.4	3221	\$4.12	\$13,269
B	0.2	7	1.4	4.0	56.8	80	\$4.12	\$328
C	0.1	9	0.9	4.0	56.8	51	\$4.12	\$211
D	0.8	3	2.4	4.0	56.8	136	\$4.12	\$562
Total	9.2		118.1			3,488		\$14,369
Setup	\$435							
Labor	\$200							
Navigate	\$14,369							
Total	\$15,004							

The second option is to conduct a whole-lake treatment to manage the hybrid watermilfoil in Kusel Lake. This approach would utilize DMA4[®] (liquid 2,4-D) applied to the milfoil beds. Knowing the herbicide would dissipate throughout the lake, the total amount of product to be used is determined by the final target concentration of the entire lake. For this treatment, the target concentration would be 0.4 ppm 2,4-D. It would be ideal to wait until the lake stratifies. When this happens, the lake essentially forms two distinct layers separated by a temperature gradient called a thermocline. As a result, if the treatment is timed properly, the herbicide can be applied to just the upper layer of the lake (epilimnion). Often thermoclines form at depths of 15 to 20 feet in lakes like Kusel Lake. A cost estimate for this approach is found in **Table 4**. This actual treatment cost will depend upon the depth at which the thermocline becomes established. In order to know when a thermocline has become established, it is important to regularly monitor temperature profiles in the lake starting after ice out. It is recommended a volunteer on the lake be found to assist with this monitoring. If the District does not own a temperature probe, it may be wise to purchase one. It may also be possible to borrow one from the Wisconsin DNR or Waushara County. Cason & Associates staff can also be hired to conduct this monitoring. Also, it is likely this approach will have a greater impact to the native plant community. This is of particular concern given the decline in the plant community identified in 2013. As with any aquatic herbicide application, maintaining the health of the aquatic plant community should be a priority.

Table 4. Treatment costs for Kusel Lake in 2016 using DMA4[®] (liquid 2,4-D) applied at 0.4 ppm (after stratification).

Site	ac	av depth	ac-ft	ppm	rate	product	unit cost	cost
A	75	7.6	570	0.4	0.284	162	\$28.00	\$4,533
	75					162		\$4,533

Setup	\$450
Labor	\$1,000
Material	\$4,533
Total	\$5,983

Post-Treatment Management - Manual removal

Once the treatment has taken affect, it would be advisable to remove any surviving hybrid watermilfoil plants manually. This can effectively eliminate newly found individual plants or small isolated beds. There are a variety of techniques for manual removal, however, the most appropriate approaches for the current situation are hand-pulling or diver-assisted suction harvesting (DASH). Hand-pulling is much easier to perform in shallow water while DASH operations are used in deeper water. The DASH method employs a pump with a large hose mounted on a boat. The diver pulls the plants from the lake bed by hand and feeds them into the hose. The plant matter is pumped onto the boat where it is screened out. Currently there are only a couple of companies in Wisconsin that offer DASH. To find out more about this option, the District should contact the local DNR office. When manually removing milfoil, it is important to remove the entire plant (including fragments) and roots in order to keep it from spreading. This can be a great way to keep new infestations from becoming established.

If manual removal is utilized, it is important that lake residents and users properly identify the different types of watermilfoil. Unfortunately, identification of hybrid milfoil can be challenging since it shares characteristics of both the native northern watermilfoil and Eurasian watermilfoil. Often DNA analysis is needed to confirm whether a plant is a hybrid or not. It would be wise to start by monitoring previous treatment locations to remove any surviving hybrid watermilfoil. It is important to remove the entire plant (including fragments and roots) in order to keep it from spreading. This can be a great way to keep new infestations from becoming established.

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Post-Treatment Management – Point-intercept plant survey

Following the recommended treatment a post-treatment point-intercept aquatic plant survey should be conducted. This survey should be conducted in the same manner as the summer 2015 point-intercept survey. By comparing data collected before and after treatment, certain comparisons can be made and conclusions drawn as to the impact the proposed treatment had to the native and invasive plant species. Again, this will be a condition of the Wisconsin DNR permit. Like in 2015, it is unlikely the Wisconsin DNR will be able to conduct this survey. The cost for Cason and Associates to perform this survey will be \$2,730. As with this report, results of a 2016 point-intercept survey will be included in the year-end report prepared in the winter of 2016/2017.

Monitoring Recommendation

It is recommended that the District continue sponsoring annual surveys in the spring and fall to monitor for aquatic invasive species and stay proactive in the management of hybrid watermilfoil in Kusel Lake. Locating and treating new hybrid watermilfoil locations early in the season is the best way to stay on top of any new growth and reduce the chance of milfoil establishing in other areas of the lake. It can also reduce the chance of it spreading to other lakes. The cost for each survey will be \$750; the results of which will be included in the annual report.

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Appendix A

**Point-intercept aquatic plant survey data from September 1, 2015 on Kusel Lake,
Waushara County, Wisconsin.**

[illegible]

[illegible]