Blackhawk Lake, Iowa County, Wisconsin
Aquatic Invasive Species Education, Prevention, and Planning Report and Aquatic Plant Management Plan
2014 - 2018

Final Report
for Wisconsin Department of Natural Resources
AIS Education, Prevention, and Planning Grant AEPP-410-14

Cobb-Highland Recreation Commission
Blackhawk Lake Recreation Area
and
DFS Conservation Consulting

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Table of Contents

Tables

Figures

Summary and Recommendations

Blackhawk Lake in Iowa County, Wisconsin, is a 220-acre impoundment with a maximum depth of 45 feet. The lake is surrounded by public lands with a mostly wooded shoreline. The Cobb-Highland Recreation Commission oversees a 600-acre recreation area associated with the lake, including a beach, campgrounds, concessions, public boat landing and other amenities.

The popularity of Blackhawk Lake as a recreation destination is due in part to its natural scenic beauty, good water quality (usually exceptionally clear in spring), easy boating navigation except in shallow areas, and excellent fisheries (2006 Blackhawk L user survey).

Blackhawk Lake water quality is generally excellent in the spring (May-June), with Secchi disk clarity averaging 16.2 feet in years of normal precipitation without severe storm events. The summer Secchi is generally lower in July and August (7.6 feet average) as the aquatic plants decay and release nutrients for the growth of algae. With the greater frequency of severe rainfall events in recent years, the lake has had more sediment and nutrient loading than normal. Blue-green algae blooms have resulted in exposure of users to potential toxins in some years.

Three small colonies of *Myriophyllum spicatum* (EWM) were found in spring 2006. They were manually harvested by a scuba diver. An Early Detection, Rapid Response grant was obtained from WI DNR to prepare an Aquatic Plant Management (APM) Plan to address the invasion. By summer 2006 and spring 2007, the EWM had spread around the lake. In May 2007, 2,4-D granular herbicide (Navigate) was applied on larger colonies of EWM, and an experimental manual harvest was done. This helped to reduce the EWM in the areas of highest density. However, it was still found in scattered locations post-treatment.

No EWM was found in 2008 when the water was turbid from heavy spring rains and associated runoff. In 2009, EWM was found near the locations of the pioneer infestations. Colonies were manually harvested as feasible by snorkeling. In June 2010, abundant EWM was found in 5 acres on the sand ridge spawning area. 2,4-D granular applied at near maximum rates effectively controlled the EWM infestation. Only a few plants were found in 2011.

EWM has not be found in the last 7 years (since 2011); therefore, it is considered to have been eradicated from Blackhawk Lake. Collective competition from abundant curly-leaf pondweed and lush native vegetation in spring inhibits its growth. Weather affecting water clarity also affects EWM distribution and abundance. Heavy spring rains and associated runoff resulted in sediment-related turbidity that inhibited the growth of all aquatic plants in 2008 and 2012. Educational activities, especially Clean Boats, Clean Waters watercraft inspections and education were important in preventing re-infestation of the lake.

In spring, aquatic plants and filamentous algae around the handicapped pier, concession dock, fishing pier and beach impair navigation, fishing, and swimming. Chemical treatments with Diquat and copper compounds in 2014 – 2018 have helped to reduce this nuisance.

In 2014, the Blackhawk Lake Recreation Area received an Aquatic Invasive Species (AIS) Education, Prevention, and Planning grant for monitoring; development of an APM Plan; Clean Boats, Clean Waters watercraft inspections; educational activities; and project coordination, partnerships, and reporting.

The following recommendations are made regarding protection and management of water quality and aquatic plants to protect the quality and usability of Blackhawk Lake:

- Like any other maintenance required for upkeep of the park, protection and maintenance of the lake is required to make it a desirable place to visit and an economic asset. It is recommended that funds be budgeted to:

  - Monitor water quality, aquatic plants, and blue-green algae at Blackhawk Lake to help ensure rapid action if needed to protect lake usability and users. Perform a detailed point-intercept aquatic plant survey of the entire lake once every 5 years.

  - Prevent the invasion and spread of EWM through information and education, training, Clean Boats, Clean Waters watercraft inspections, and signage.

- Be prepared to respond rapidly to any new infestation of EWM. Manual removal by rake, scuba divers, or snorkelers and/or treatment with herbicides should be used to prevent spread of the EWM if found, as detailed in the APM Plan.

- Apply for a DNR Aquatic Invasive Species Early Detection/Rapid Response grant to control EWM and prevent its spread if it is found.

- Control nuisance aquatic plants around the concession dock, fishing pier, handicapped pier, and beach that impair navigation, fishing, and swimming using manual removal or treatment with chemicals that don't harm endangered or threatened resources or native vegetation that is not a nuisance, as described in the Aquatic Plant Management (APM) Plan.

- Consider applying for a DNR Clean Boats/Clean Waters grant for watercraft inspections/education at the boat landing. The grant would pay 75% up to $4,000, with in-kind match allowed. Watercraft inspection and education is particularly important in May and June when aquatic plants are abundant.

- Pursue opportunities to educate the public and school groups about EWM, blue-green algae, and factors that affect lake quality and engage them in activities to help protect the lake. Some of these activities might include sponsoring workshops and training volunteers to identify EWM and serve as first responders in notifying of infestations and helping with EWM removal. Educating and involving the Friends of Blackhawk Lake could also provide support for this.

- Maintain shoreline vegetation. Leave beneficial emergent arrowhead, cattails, bulrush, and other plants that stabilize the shoreline, uptake nutrients, and serve as food for wildlife. Leave larger areas of the shoreline unmowed where there is little need for fishing access, with at least a 25-foot buffer of vegetation to help uptake nutrients and trap sediment.

- Limit boat traffic to deeper water so the shallower shoreline areas with native aquatic plants are left undisturbed. Continue the Slow No Wake rule.

- Work with Iowa County Land Conservation Department and the Natural Resources Conservation Service to promote the use of Best Management Practices to reduce the nutrient and sediment loading to the lake.

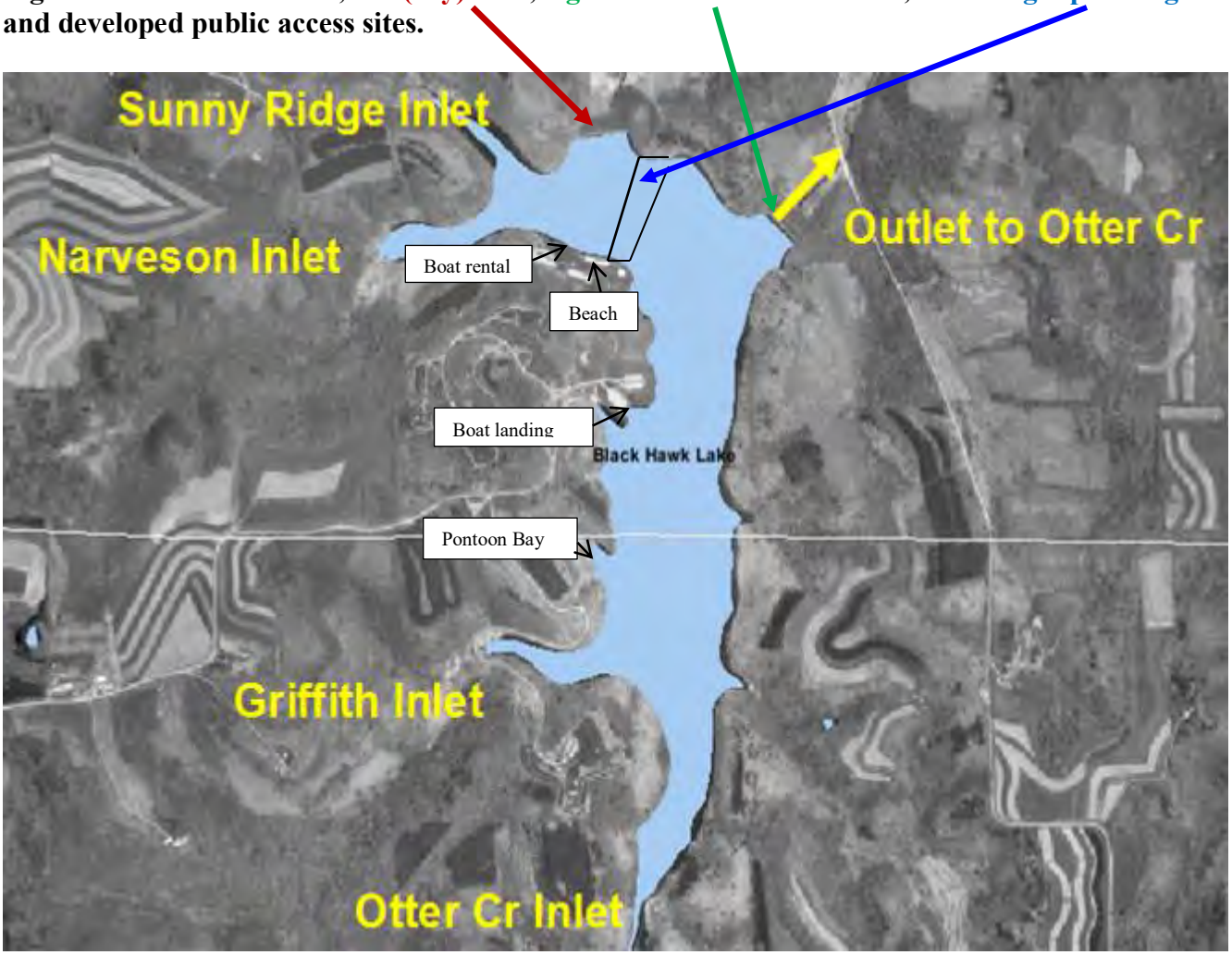
Introduction

Description of Project Area

Blackhawk Lake is a 220-acre impoundment located in Iowa County, Wisconsin (Fig. 1). Construction of the impoundment was completed in 1971. The management of Blackhawk Lake is a partnership of the Cobb-Highland Recreation Commission, Iowa County, the Iowa County Land and Water Conservation Department, and the Wisconsin Department of Natural Resources (WDNR). The dam is owned by Iowa County and is operated by Iowa County Land Conservation Department. The entire lake shoreline is publicly owned and accessible to the public.

The Cobb-Highland Recreation Commission (CHRC – a Commission of Iowa Co. government) oversees a 600-acre recreation area associated with the lake, including 500 feet of sand beach and a beach house, 150 campsites, picnic and playground areas, a public boat landing, boat rentals, concessions, ski and hiking trails, and a nature center. There are 4 major developed access sites in the park, and the entire shoreline in the park has walk-in access. The boat landing has 30 boat trailer parking spaces. There are 90 car parking spaces at the access sites, and 35 pontoon mooring sites on the lake shoreline in the park. The Recreation Area serves >100,000 visitors per year.

Fig. 1. Blackhawk L inlets, left (dry) dam, right dam outlet to Otter Ck, sand ridge spawning area and developed public access sites.



The physical characteristics of Blackhawk Lake are summarized in Table 1. The popularity of Blackhawk Lake as a recreation destination is due to its natural scenic beauty, very good water quality (usually exceptionally clear in spring, with Secchi disk transparency of 20 – 30 feet), easy boating navigation except in shallow areas with abundant aquatic plants (2006 Blackhawk L user survey) and outstanding, balanced fishery (personal communication, Gene Van Dyck, 2013). The entire lake is designated as Slow-No-Wake.

Table 1. Blackhawk L, Iowa Co., WI		
Physical Characteristics		
Area	220	acres
Maximum Depth	45	feet
Mean Depth	14.8	feet
Volume	3260	acre-feet
Littoral Area	80	acres/36%
Max. Depth Plants	15	feet
Flushing Rate	2.1	times/year
Residence Time	0.48	year
Watershed Area	9780	acres
Discharge	60%	bottom
	40%	surface

Public boat launch w/AIS signs

Aerial of boat landing, beach, and boat rental areas

Beach

Aquatic Invasive Species in Blackhawk Lake

Visual and rake surveys of the littoral area of Blackhawk Lake by WDNR South-Central Region aquatic invasives staff in 2004 and 2005 found invasive *Potamogeton crispus* (curly-leaf pondweed) and *Cipangopaludina chinensis (*Chinese mystery snails) but did not find any *Myriophyllum spicatum* (Eurasian watermilfoil - EWM). Blackhawk Lake was one of the last remaining lakes in south-central Wisconsin that was not infested with EWM at that time.

A point-intercept Aquatic Plant Survey (APS) was conducted in June 2006 as part of WDNR Phase I and Phase II Lake Planning grants to assess lake and watershed quality and develop a comprehensive management plan for the lake. A total of 21 species were observed in the lake. The Floristic Quality Index (FQI) was 22.7, which was above average for the region (20.9) and state (22.2).

Three small colonies of the non-native, invasive Eurasian watermilfoil (*Myriophyllum spicatum* or EWM) were observed in Blackhawk Lake during the June 2006 APS. Two of the colonies were on the NNE side near the sand ridge near the left dam and the other was near the SSW pontoon mooring bay (Fig. 2 -4).

Discovery of EWM was of great concern, because the assets that make Blackhawk Lake a desirable recreation destination can be greatly degraded by EWM. EWM threatens native aquatic plant communities and forms thick underwater beds of tangled stems and vast mats of vegetation on the water's surface. These dense beds cause loss of plant diversity, degrade water quality, and reduce desirable habitat for fish, invertebrates, and wildlife. They also hinder boating, swimming, and fishing.

Fig. 2. Blackhawk L, areas of pioneer EWM infestation, 2006.

NNE side of lake, right side of photo (to right of left dam)

SSW side of lake, Pontoon Bay

Fig. 3. Blackhawk L aquatic plant survey, June 2006

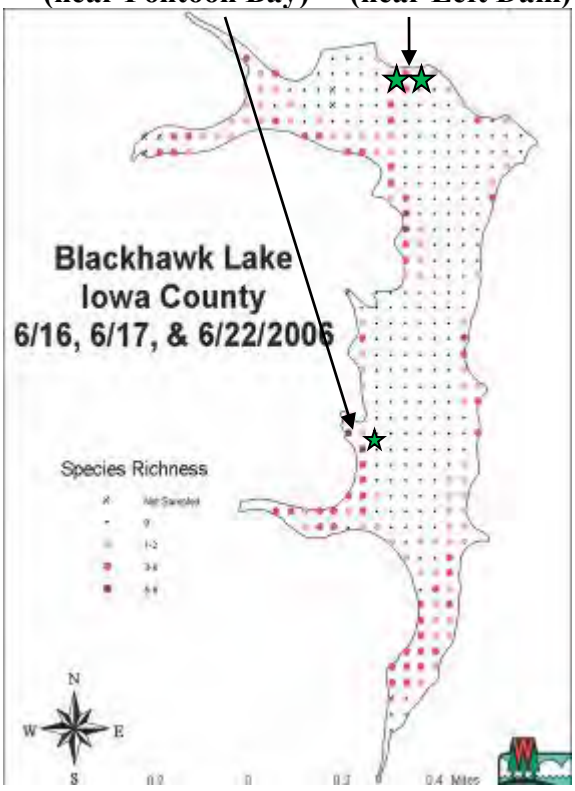
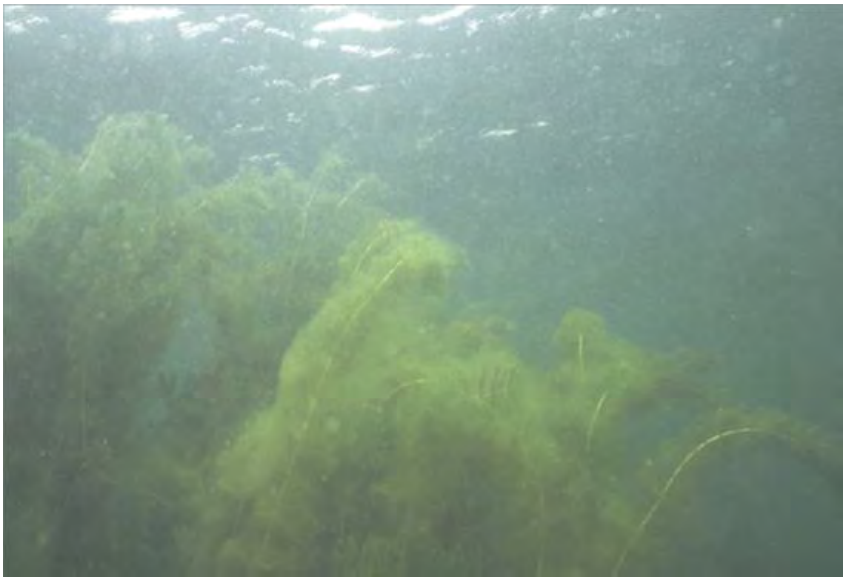


Fig. 4. EWM colony in Blackhawk L, June 2006
(photo by Underwater Habitat Investigations)



Early Detection Rapid Response (EDRR) Grant

The Cobb-Highland Recreation Commission applied for and received a Wisconsin DNR Early Detection/Rapid Response grant (AIRR-018-07) in 2006 to address the pioneer EWM infestation. The purpose of the grant was to GPS locate and map the extent of the EWM infestation, develop an Aquatic Plant Management (APM) Plan for EWM control and prevention, implement the APM plan, perform follow-up monitoring, and conduct information/education activities.

The final report for the EDRR grant (Sefton and Sefton, 2013) details the work through 2012 to control the EWM in Blackhawk Lake. A summary of the project follows.

On June 24, 2006, the two beds of EWM on the NNE side of the lake were uprooted and/or cut at the root crown below the sediment surface by a SCUBA diver from UHI. Abundant *Ceratophyllum demersum* (coontail) on the bottom made uprooting difficult. The uprooted plants were collected in nets by volunteers as they came to the surface. The wind was blowing toward the NNE shoreline, and fragments that drifted in were collected to the extent feasible. The pioneer infestation on the SSW side of the lake near the pontoon mooring bay was not addressed because of the wind direction that would bring fragments out into the lake and the lack of volunteer support.

A follow-up visual and rake survey of the shoreline performed by UHI in August 2006 noted more extensive growth of EWM (about 3 acres altogether) in various locations around the lake. UHI developed an APM Plan proposing to mechanically remove and/or chemically treat the EWM in early spring 2007 according to the plan.

By spring 2007, the EWM had spread further around the lake (Fig. 5). At the time, EWM growth was advanced compared to most other species in the clear water, including the dominant plant coontail. An early season 2,4-D application was recommended, and an Aquatic Plant Management permit received from WDNR. In May 2007, 2,4-D granular herbicide (Navigate) was applied on larger colonies of EWM, and an experimental manual harvest was done. This helped to reduce the EWM in the areas of highest density. However, it was still found in scattered locations post-treatment.

No EWM was found in 2008 when heavy spring rains and associated runoff resulted in sediment-related turbidity that inhibited the growth of all aquatic plants. In 2009, EWM was found near the locations of the pioneer infestations (Fig 6). Colonies were manually harvested as feasible by snorkeling. In June 2010, abundant EWM was found in 5 acres on the sand ridge spawning area (Fig 7). 2,4-D granular was applied at near maximum rates (Fig. 8 and Table 2) effectively controlled the EWM infestation. Only one colony of EWM was found during a point-intercept APS in 2011. No EWM was found in 2012 when heavy spring rains and associated runoff again resulted in sediment-related turbidity that inhibited the growth of all aquatic plants.

Fig 5. EWM 2007 Blackhawk L.

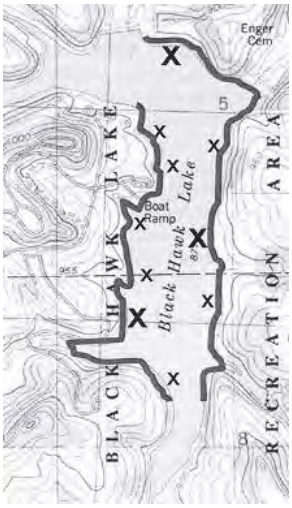


Fig 6. EWM 2009 Blackhawk L.

Fig 7. EWM 2010 Blackhawk L.

Fig. 8. Areas treated with 2,4-D, Blackhawk L, June 14 and 16, 2010

Table 2. Blackhawk Lake 2, 4-D Application Rates, June 14 & 16, 2010

EWM treatment 2010	Application rate lbs/acre 2,4-D		
Treatment area	**6/14/2010**	**6/16/2010**	**Total**
Between green & yellow lines (2.25 acres)	55	0	55
Between yellow & red lines (1.25 acres)	55	120	175
Within red line (1.25 acres)	55	140	195
Within blue line (0.25 acre)	55	88	144

The final EDRR grant report concluded that monitoring and rapid response to pioneer infestations of EWM with manual removal and herbicides effectively controlled its spread in Blackhawk L. Competition from abundant curly-leaf pondweed and lush native vegetation in the spring inhibited its growth. Weather affecting water clarity also affected EWM distribution and abundance.

The following recommendations were made regarding the future prevention and control of EWM in Blackhawk Lake:

- Like any other maintenance required for upkeep of the park, protection and maintenance of the lake is required to make it a desirable place to visit and an economic asset. This diligent monitoring of water quality, aquatic plants, and blue-green algae at Blackhawk Lake to ensure Undesirable aquatic plants, especially EWM, and blue-green algae can substantially impair lake quality and usability. Therefore, it is very important that the Recreation Area and Commission budget funds annually toward the monitoring prevention and control of EWM.

- EWM and be prepared to rapidly respond to discovery of any infestation. Manual removal by rake, scuba divers, or snorkelers and/or treatment with herbicides should be used to prevent spread of the EWM if found.

- The Commission should consider applying for a DNR Clean Boats/Clean Waters grant for watercraft inspections/education at the boat landing. The grant would pay 75% up to $4,000, with in-kind match allowed.

- The Commission should also pursue opportunities to educate the public and school groups about EWM and other factors that affect lake quality and engage them in activities to help protect the lake. Some of these activities might include sponsoring workshops and training volunteers to identify EWM and serve as first responders in notifying of infestations and helping with EWM removal. Educating and involving the Friends of Blackhawk Lake could also provide support for this.

AIS Education, Prevention, and Protection (EPP) Project

In 2014, the Blackhawk Lake Recreation Area received an Aquatic Invasive Species Education, Prevention, and Planning (AIS EPP) grant for water quality monitoring; aquatic plant surveys; development of an Aquatic Plant Management Plan; Clean Boats, Clean Waters watercraft inspections; educational activities; and project coordination, partnerships, and reporting.

Goals

The goals of the AIS EPP grant for Blackhawk Lake were to:

- Prevent further introduction and spread of Eurasian watermilfoil (EWM).
- Control any existing populations of EWM.
- Maintain a diverse native community of aquatic plants to serve as collective competition against further invasion of EWM.
- Control nuisance aquatic plant growth in high use recreational use areas (e.g. concession dock, handicapped pier, fishing pier, and beach.
- Maintain spring clarity and help prevent p mesotrophic water quality.
- Protect fish spawning areas and maintain a productive fishery.
- Maintain the natural scenic beauty, aesthetics, and recreational opportunities at Blackhawk Lake.

These goals were to be accomplished by conducting the following activities:

- Conducting aquatic plant visual, rake, and point-intercept surveys.
- Monitoring, geo-locating and mapping of any EWM found.
- Preparing an Aquatic Plant Management (APM) plan for EWM prevention and control.
- Performing follow-up monitoring to determine the effectiveness of aquatic plant management.
- Monitoring lake water quality.
- Conducting a Clean Boats, Clean Waters watercraft inspection and education program.
- Implementing educational activities.
- Documenting data collected and preparing annual progress reports.
- Preparing a final report with recommendations for future actions.

Results and Discussion

Water Quality

Blackhawk Lake was monitored biweekly from May through September for Secchi disk clarity and observations of water quality and aquatic plants. It was also sampled in May for total phosphorus and in June, July, and August for total phosphorus and chlorophyll. Annual reports summarizing this data for each year of the grant (2014-2018) are found in Appendices 1-5.

The average spring (May-June) and summer (July-August) Secchi disk clarity and total phosphorus and the average summer chlorophyll from 2006-2018 are shown in Table 3. The average summer Secchi from 1997 – 2018 is depicted in Figure 9. Average spring versus summer Secchi are graphed in Figure 10, while the average summer total phosphorus and chlorophyll are graphed in Figure 11

The average spring (May-June) total phosphorus for 2006-2018 was 25.5 ug/l. Spring total phosphorus (a nutrient which promotes algae growth) is often used as an indicator of the potential for summer algae blooms. Impoundments that have more than 30 mg/L total phosphorus may experience noticeable algae blooms. The average summer (July-August) total phosphorus from 2006-2018 is 39.1 ug/l.

Table 3. Blackhawk Lake Secchi, Total Phosphorus, and Chlorophyll, 2006-2018

Year	Ave. Spring (May-June) Secchi (ft)	Ave. Summer (July-Aug.) Secchi (ft)	Ave. Spring (May-June) Total Phosphorus (ug/l)	Ave. Summer (July-Aug.) Total Total Phosphorus (ug/l)	Ave. Summer (July-August) Chlorophyll (ug/l)
2006	20.2	10.00	26.0	58.7	21.8
2007	19.7	7.29	12.0	38.0	28.9
2008	5.1	13.56	60.0	17.5	4.6
2009	20.6	8.75	14.0	36.0	30.1
2010	19.8	9.00	17.0	26.0	21.2
2011	24.2	3.67	40.0	32.0	20.6
2012	7.7	3.67	21.0	41.0	24.1
2013	11.7	6.33	35.1	46.8	41.5
2014	14.7	7.33	13.35	33.7	27.6
2015	17.9	12.38	25.8	30.8	20.5
2016	19.9	5.83	16.1	27.6	27.1
2017	13.0	4.88	19.8	74.9	60.3
2018	11.9	5.38	31.3	44.9	96.4
Average	15.9	7.54	25.5	39.1	32.7

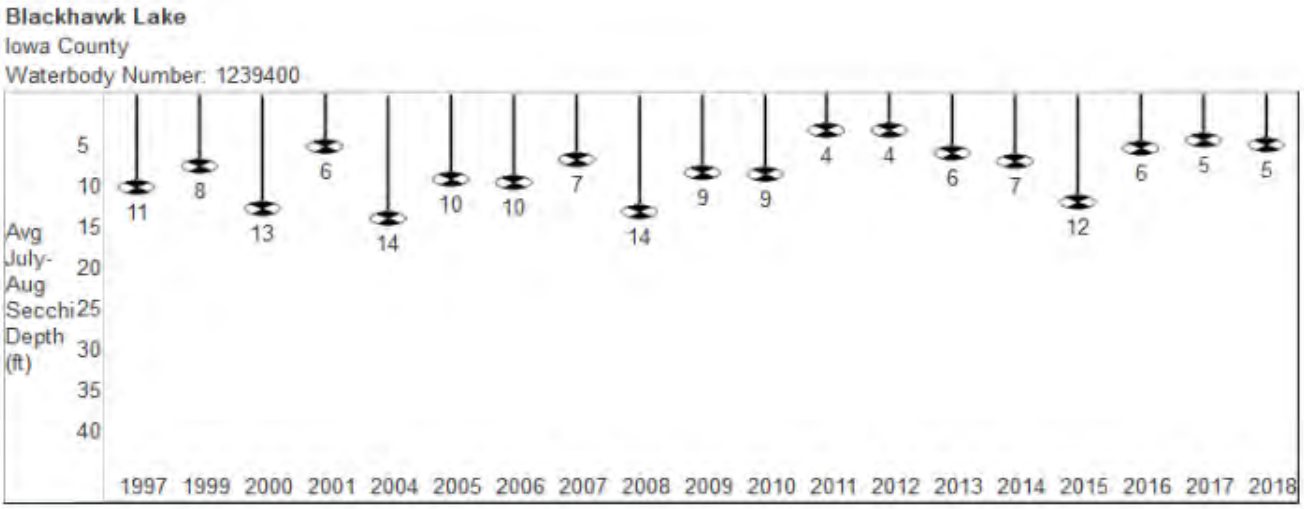
The average summer (July-August) chlorophyll (indicating the concentration of algae suspended in the water) from 2006 – 2018 was 32.7 ug/L as compared to a Southwest Wisconsin Georegion average of 43.7 ug/L.

The average spring (May-June) Secchi for 2006–2018 was 15.9 feet. In years when there were heavy spring rains and associated runoff (2008 and 2012), the spring Secchi clarity was much lower (averaging 6.4 feet) due to sediment-related turbidity. Until mid-summer, the water at Blackhawk Lake is usually clearer than would be expected based on the phosphorus and chlorophyll (Table 3). Two major factors may be contributing to this:

1) zooplankton grazing on the algae and 2) abundant aquatic plant growth and filamentous algae out-competing the planktonic algae for the nutrients.

When aquatic plants and filamentous algae die off beginning in mid-summer, nutrients are released to promote planktonic algae growth. The summer (July-August), average Secchi clarity from 2006-2018 was 7.54 feet. The average summer Secchi disk clarity at Blackhawk Lake is usually 2-3 feet deeper than the average for the Southwest Wisconsin Georegion.

Fig 9. Blackhawk Lake Average Summer Secchi, 1997-2018



Past secchi averages in feet (July and August only).

Year	Secchi Mean	Secchi Min	Secchi Max	Secchi Count
1997	10.63	6.75	14.5	2
1999	8	8	8	1
2000	13.2	2	19	5
2001	5.5	5.5	5.5	3
2004	14.3	14.3	14.3	2
2005	9.5	8.5	10.5	2
2006	10	8	13	5
2007	7.29	3	18	12
2008	13.56	12.25	15	4
2009	8.75	4	15.75	6
2010	9	4.5	17	5
2011	3.67	3	5	3
2012	3.67	3	4	3
2013	6.33	3	10	3
2014	7.33	3	14	3
2015	12.38	7	17	4
2016	5.83	3	10.5	3
2017	4.88	2.5	8	4
2018	5.38	2	8.5	4

Fig 10. Blackhawk Lake Average Spring and Summer Secchi, 2006-2018

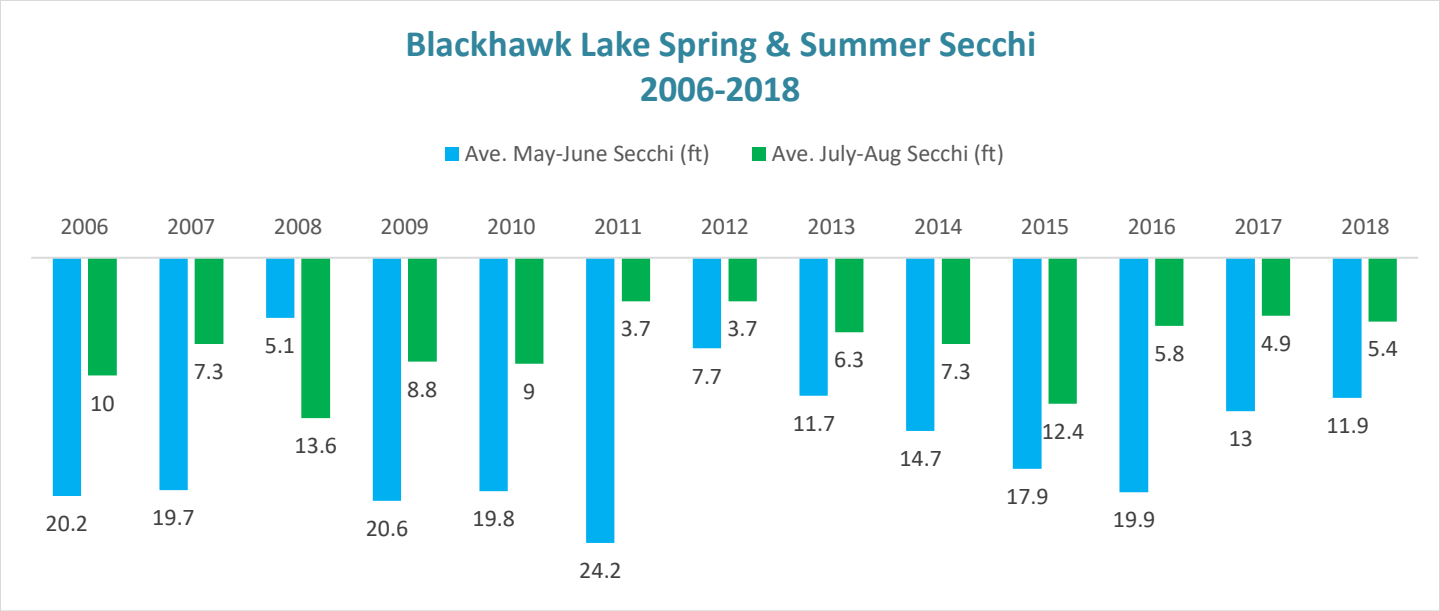
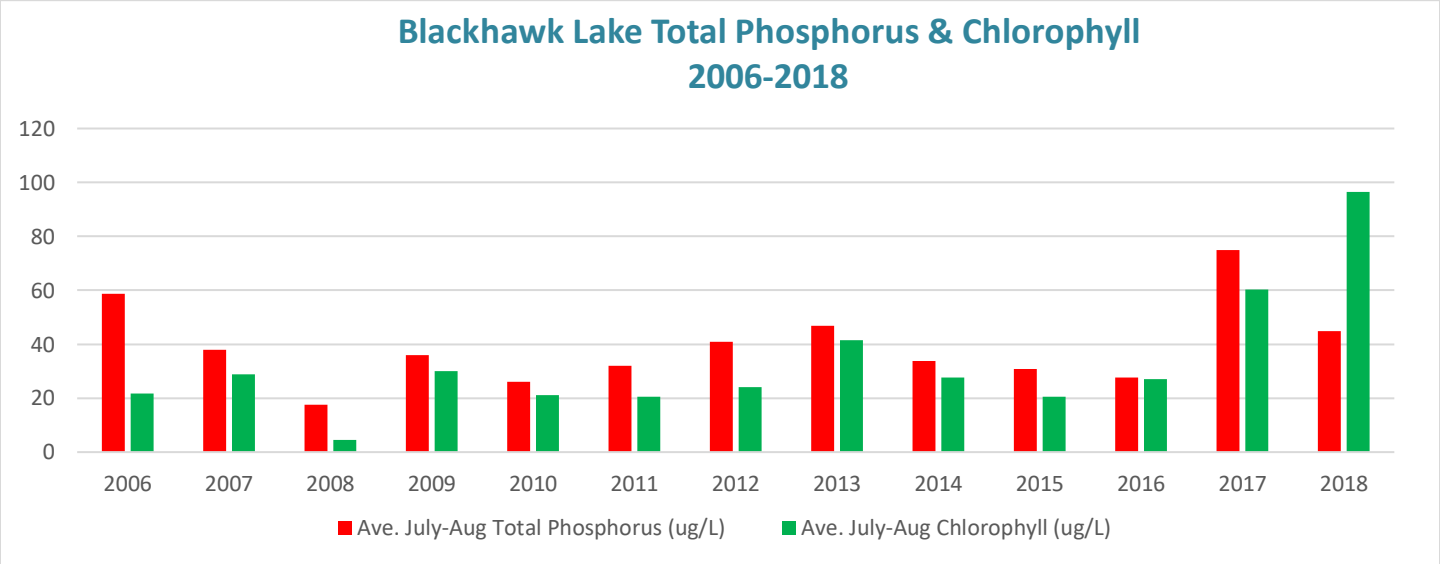


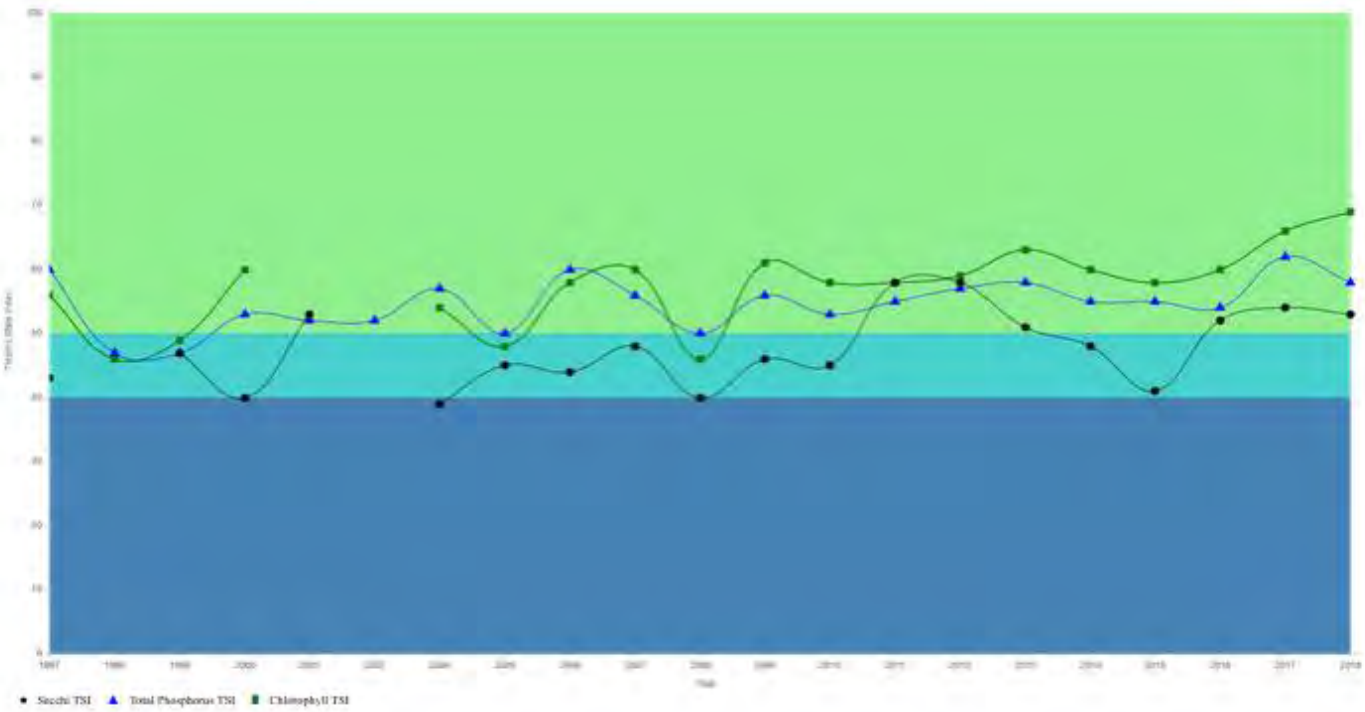
Fig 11. Blackhawk Lake Average Summer Total Phosphorus and Chlorophyll, 2006-2018



The Trophic State Index (TSI) of Blackhawk Lake from 1997 to 2018 based on summer (July-August) Secchi, total phosphorus, and chlorophyll is shown in Figure 12. In the 11 of the 12 years it was monitored between 1997 and 2010, the TSI based on Secchi disk clarity was in the 50's, indicating mesotrophic conditions. Mesotrophic lakes are becoming more nutrient rich, with decreased clarity, fewer algal species, oxygen-depleted bottom water during the summer, plant overgrowth evident, and warm water fisheries. Between 2011 and 2018, the TSI based on summer Secchi was only in the 50's 2 of the 8 years, indicating the lake is becoming more eutrophic over time.

The summer TSI based on total phosphorus and chlorophyll was between 50 and 60, except in 2017 when it was 66 and 2018 when it was 69. This indicates Blackhawk Lake is eutrophic. In eutrophic lakes blue-green algae become dominant and algal scums are possible along with extensive plant overgrowth problems. Severe blue-green algae blooms occurred in later summers of 2014 and 2018. Blue-green algae were present some other years, but did not reach severe bloom conditions.

Fig. 12. Blackhawk Lake Trophic State Index, 2006-2018



TSI	TSI Description
TSI 30-40	Deeper lakes still oligotrophic, but bottom water of some shallower lakes will become oxygen-depleted during the summer.
TSI 40-50	Water moderately clear, but increasing chance of low dissolved oxygen in deep water during the summer.
TSI 50-60	Lakes becoming eutrophic: decreased clarity, fewer algal species, oxygen-depleted bottom waters during the summer, plant overgrowth evident, warm-water fisheries (pike, perch, bass, etc.) only.
TSI 60-70	Blue-green algae become dominant and algal scums are possible, extensive plant overgrowth problems possible.
TSI 70-80	Becoming very eutrophic. Heavy algal blooms possible throughout summer, dense plant beds, but extent limited by light penetration (blue-green algae block sunlight).
TSI > 80	Algal scums, summer fishkills, few plants, rough fish dominant. Very poor water quality.

Trophic state index (TSI) is determined using a mathematical formula (Wisconsin has its own version). The TSI is a score from 0 to 110, with lakes that are less fertile having a low TSI. We base the overall TSI on the Chlorophyll TSI when we have Chlorophyll data. If we don't have chemistry data, we use TSI Secchi. We do this rather than averaging, because the TSI is used to predict biomass. This makes chlorophyll the best indicator.

Aquatic Plants

Annual Aquatic Plant Surveys

Visual and rake boat surveys were conducted for Eurasian watermilfoil and other aquatic plants annually. Photos were taken and the aquatic plants were noted. No Eurasian watermilfoil has been found in the past 7 years (since 2011). The predominant plants in the deeper water and sand ridge in spring were *Potamogen crispus* (curly-leaf pondweed), *P. puscillus* (slender pondweed), *Ceratophyllum demersum* (coontail), and filamentous algae. These plants provide collective competition against EWM, inhibiting its establishment.

Ranunculus aquatilis (white water crowfoot), *Heteranthera dubia* (water stargrass), *P. foliosus (leafy pondweed), Elodea canadensis* (common waterweed), *Stuckenia pectinata* (sago pondweed), and *Chara* (muskgrass) were common in the shallower areas in spring. A few patches of *P. zosteriformis* (flat-stem pondweed) were also found. *Heteranthera dubia* (water stargrass) becomes more abundant as the summer progresses.

2015 Point-Intercept Aquatic Plant Survey

A point-intercept aquatic plant survey (APS) was conducted on Blackhawk Lake on June 23 and June 30, 2015 by Jeanne Scherer and Katrina Punzel of the Wisconsin Department of Natural Resources and Donna Sefton of DFS Conservation Consulting using the Wisconsin Standard Aquatic Plant Survey Method as described in the DNR publication *Aquatic Plant Management in Wisconsin*.

The APS Survey data are found in Appendix 6. There were 345 waypoints on the point intercept map for Blackhawk Lake (Fig.13). Only 301 of those sites were able to be sampled with a rake, pole, or noted as no plants observed when the depth was much deeper than the maximum depth of plant growth. Those that couldn't be sampled were either too shallow, on land, had rocks, were docks or beach area, or there were temporary obstacles, such as boats or swimmers. Visual observations of nearby plants were made for many of those sites by going back near the site after the temporary obstacle has moved or observing the area around the point from the dock, beach, or land.

Voucher specimens of the aquatic plants were collected and pressed using herbarium procedures. Plants were identified to species.

Of the sites sampled, 89 contained vegetation. There were an additional 41 sites that contained vegetation, but were unable to be sampled, making the total number of sites with vegetation 130. Ten species were found at the sites that were sampled. An additional 8 species were visually observed. The maximum depth of plants was 15 feet. There were 150 sites with a depth of 15 feet or less. Based on the grid, the littoral zone is 43% of the lake surface area (Table 4).

There was an average of 2.11 species per site for sites where vegetation was found. Species richness is shown in Fig. 13. The average rake fullness was 1.95 (with 1 = few, 2 = moderate, and 3 = abundant). Rake fullness was determined for eleven different species at the sites sampled. Another 8 species were visually observed, but abundance was not determined.

No *Myriophyllum spicatum* (Eurasian water milfoil) was found. The relative frequency of plants found is depicted in Figure 14. The most common plants in order of relative frequency among the sites sampled (not including filamentous algae) were: *Potamogen crispus* (curly-leaf pondweed) at 33%, *Ceratophyllum demersum*

(coontail) at 20.2%, *Ranunculus aquatilis* (white water crowfoot) at 11.2%, *Elodea canadensis* (common waterweed) at 9%, and *Potamogeton pusillus* (slender pondweed) at 8%.

The Floristic Quality Index of Blackhawk Lake (Nichols, et al) based on the value of native plants observed was 22.6. This is compared to an average of 20.9 for lakes in southwestern Wisconsin and 22.2 for Wisconsin lakes.

Blackhawk Lake has a more diverse native aquatic plant population than many other lakes. The diversity of the native plants was highest in the littoral zone in the nearshore areas of the sand ridge, NNW side of the lake, including the concession dock, fishing pier, and south of the beach, the boat launch, and Pontoon Bay (less than 5 feet). However, the Simpson Diversity Index overall was relatively low at 0.82, with 1 being low and 0 high.

Fig. 13. Blackhawk L Aquatic Plant Survey Species Richness June 2015

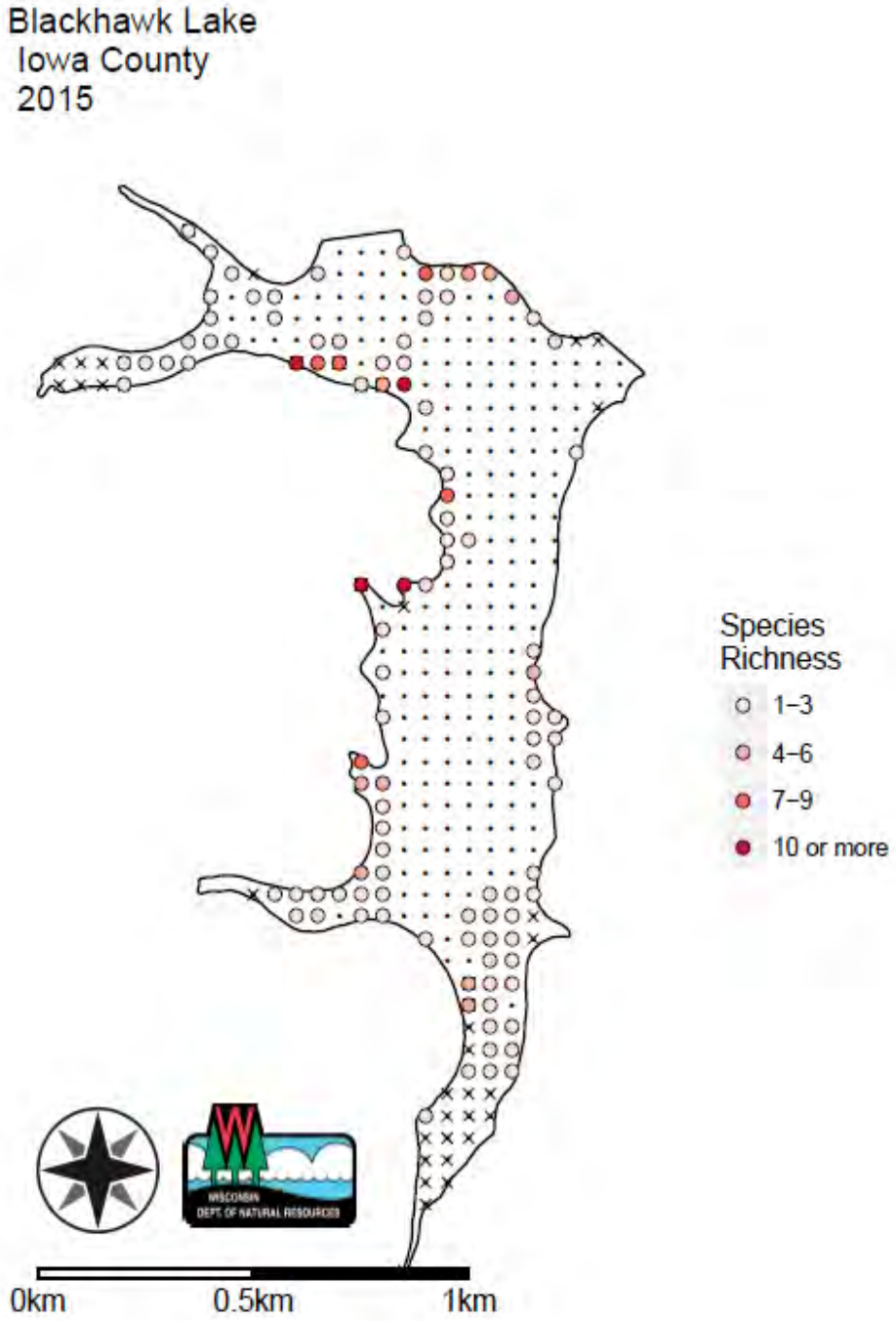
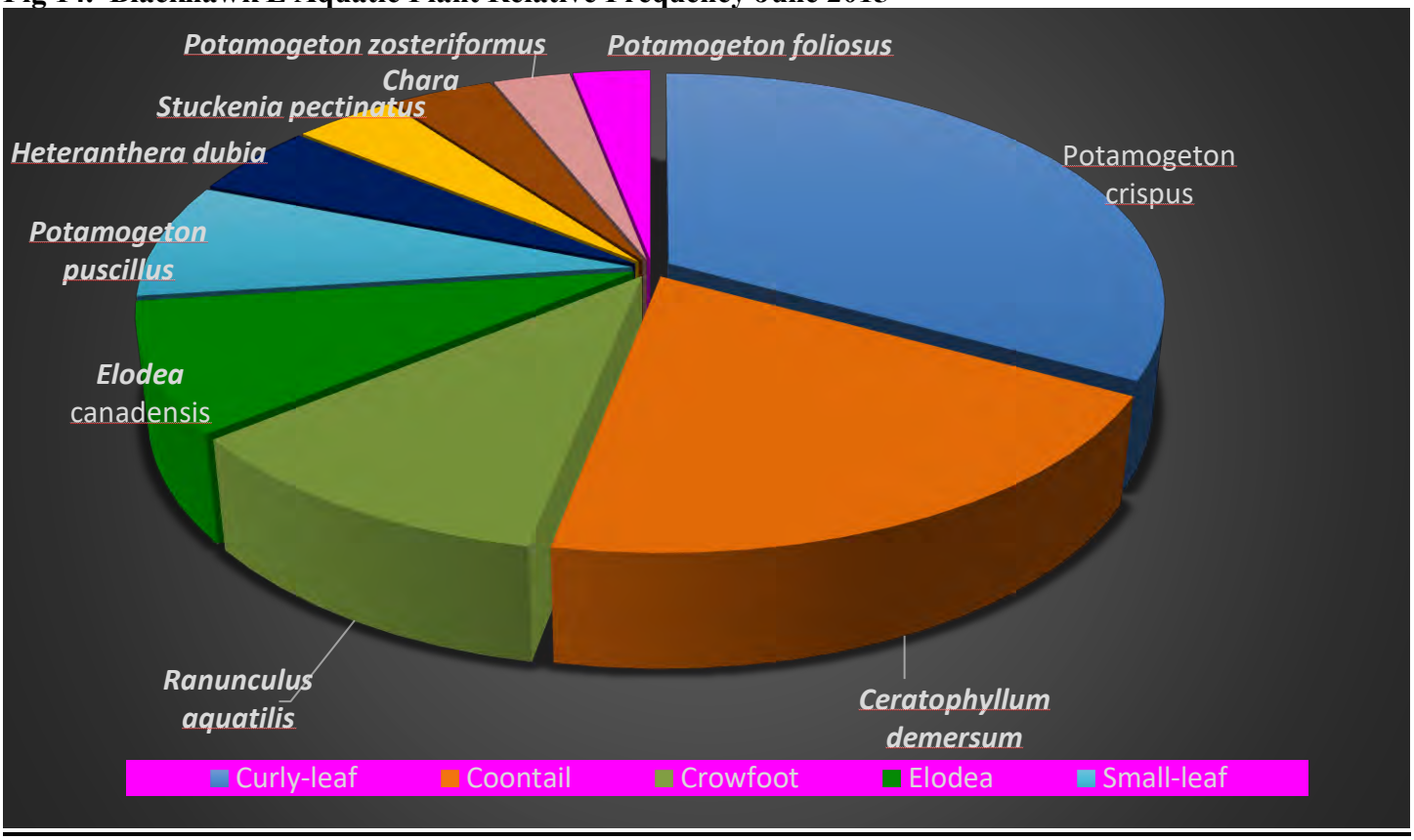


Table 4. Blackhawk Lake 2015 Aquatic Plant Survey Summary.

	RELATIVE		# SITES			FLORISTIC
	FREQUENCY	FREQ OCCUR	SAMPLED	AVE RAKE	# SITES	QUALITY
SPECIES	% NON ALGAE	VEG AREAS	W/SPECIES	FULLNESS	VISUAL	RATING
SPECIES COLLECTED AT SITES						
Potamogenton crispus	33	69.66	62	1.29	15	0
(curly-leaf pondweed)						
Ceratophyllum demersum	20.2	42.7	38	1.47	18	3
(coontail)						
Filamentous algae		29.21	26	1.35	28	0
Ranunculus aquatilis	11.2	23.6	21	1.43	9	8
(white water crowfoot)						
Elodea canadensis	9	19.1	17	1.18	8	3
(common water weed)						
Potamogen pusillus	8	16.85	15	2	6	7
(slender pondweed)						
Heteranthera dubia	5.3	11.24	10	1.2	11	6
(water stargrass)						
Stuckenia pectinata	4.3	8.99	8	1.25	4	3
(sago pondweed)						
Chara **spp.**	3.7	7.87	7	1.43	2	7
(muskgrass)						
Potamogeton zosteriformus	2.7	5.62	5	1.6	1	6
(flat-stem pondweed)						
Potamogen foliosus	2.7	5.62	5	1.4	4	6
(leafy pondweed)						
# of species sampled = 11; # with Floristic Quality Index Rating = 9						
SPECIES ONLY VISUALLY OBSERVED						
Lemna minor						4
(small duckweed)						
Potamogen nodosus						7
(long leaf pondweed)						
Sagittaria breviostra						9
(midwestern arrowhead)						
Sagittaria latifolia						3
(common arrowhead						
Schoenoplectus acutus						6
(hardstem bulrush)						
Schoenoplectus tabernaemontani						4
(soft-stem bulrush)						
Typha latifolia						1
(broadleaf cattail)						
Wolffia columbiana						5
(common watermeal)						
# of macrophyte species only visually observed = 8						
AVE FLORISTIC QUALITY RATING = 5.47						
FLORISTIC QUALITY INDEX = 22.556						

Fig 14. Blackhawk L Aquatic Plant Relative Frequency June 2015



Note: Common name for *Potamogen puscillus* ssp. *tenuissimus* is slender pondweed, not small leaf.

Point-intercept aquatic plant surveys were also conducted in 2006 and 2011. A comparison of the results with those from 2015 is found in Table 5. The relative frequency of plants found in 2006 and 2011 are shown in Figures 14 and 15.

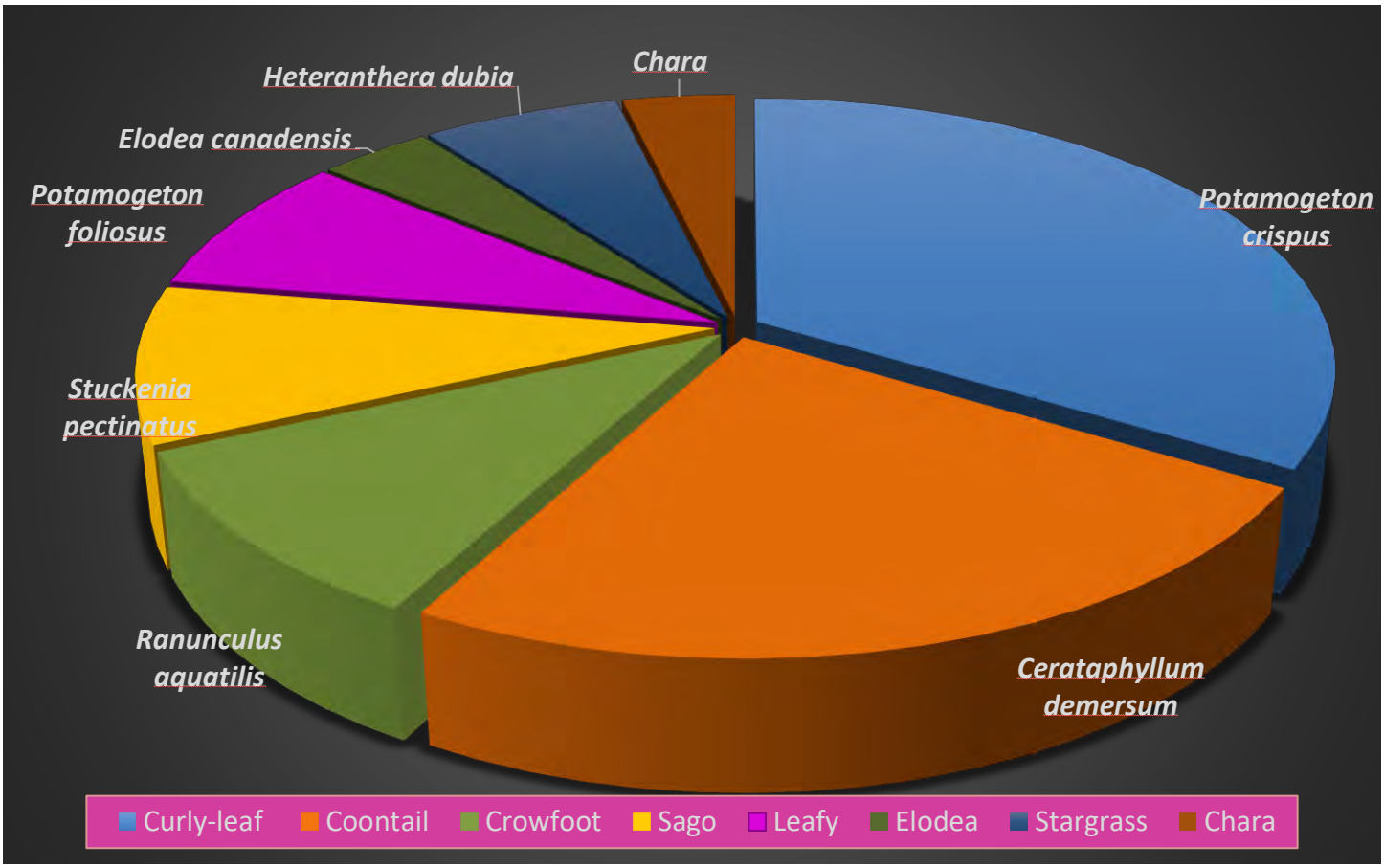
Table 5. Blackhawk Lake Aquatic Plant Surveys, 2006, 2011, and 2015.

	2006	2011	2015
# of Sampling Waypoints	345	345	345
# of Sites Sampled	228	no data	301
# of Sites with Vegetation	140	136	89/130*
Average # Species/Site	1.9	1.1	2.1
# Species sampled	14	10	10
# Species observed, including visuals	21	no visual	18
# Invasive Species	2	2	1
Littoral zone/lake surface area	41%	40%	43%

*For 2015, 41 of sites with vegetation too shallow or unable to sample, making total sites with vegetation 130.

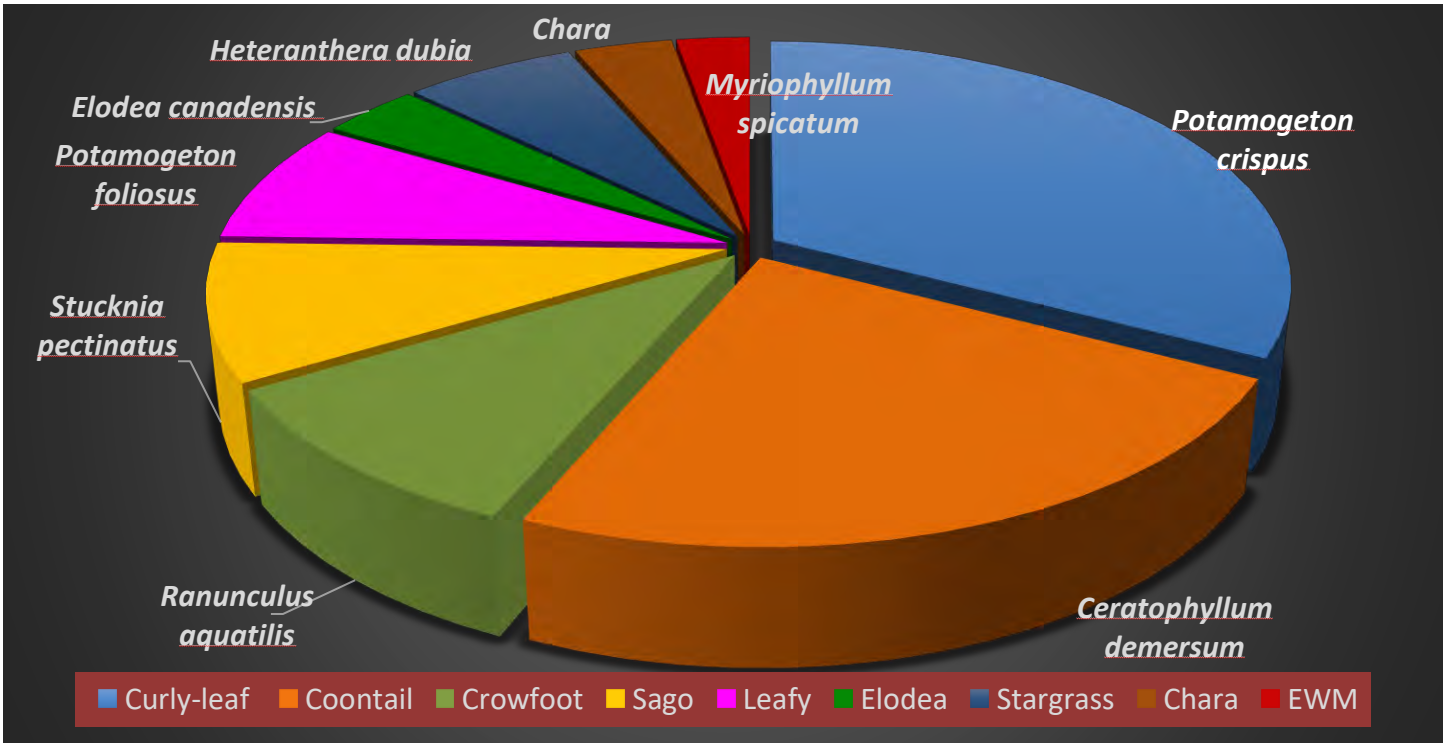
In 2006, the most common plants in order of relative frequency among the sites sampled (not including filamentous algae) were: *Ceratophyllum demersum* (coontail) at 32%, *Potamogen crispus* (curly-leaf pondweed) at 24.2%, *Elodea canadensis* (common waterweed) at 14%, and *Stuckenia pectinata* (sago pondweed) with 13.4% (Figure 15). The Floristic Quality Index of Blackhawk Lake (Nichols, et al) based on the value of native plants observed was 22.7, above average for the region (20.9) and state (22.2).

Fig. 15. Blackhawk L Aquatic Plants, Relative Frequency June 2006



In 2011, the most common plants in order of relative frequency among the sites sampled (not including filamentous algae) were: *Potamogen crispus* (curly-leaf pondweed) at 36.3%, *Ceratophyllum demersum* (coontail) at 26.2%, *Stuckenia pectinata* (sago pondweed) with 9.8%, and *Potamogen foliosus* with 8.8% (Figure 16).

Fig. 16. Blackhawk L Aquatic Plant Relative Frequency June 2011



In general, except for the absence of *Myriophyllum spicatum* (Eurasian water milfoil) and increased *Potamogeton pusillus* (slender pondweed) in 2015, there was little difference between the surveys. The dominant plants in all 3 surveys were *Potamogeton crispus* (curly-leaf pondweed) and *Ceratophyllum demersum* (coontail). Most of the remaining plants were common to all 3 surveys.

Aquatic Plant Management 2014-2018

No Eurasian watermilfoil has been found in the 7 years of surveys since 2011. During the EPP grant period, DFS Conservation Consulting made recommendations regarding aquatic plant management to maintain navigational access and manage nuisance plant growth so it does not impair swimming at the beach and fishing at the fishing and handicapped piers.

Blackhawk Lake Recreational Area applied for permits to chemically treat areas within 50 feet of the boat concession dock, the fishing pier, and the entire beach area for submergent aquatic plants from 2014-2018. The southern part of the beach that had become overridden with vegetation and unusable was reclaimed in 2015, and treatment was expanded to include the cattails along the shoreline in that area. In 2018, the treatment area was expanded to include the handicapped pier and the area between the fishing pier and the beach (Fig. 17). This was approximately 1 acre.

Treatments were to be done between mid-May and the end of June as needed when the nuisance curly leaf pondweed, slender pondweed, sago pondweed, and coontail were becoming abundant, making it difficult to get boats in and out and impairing fishing and swimming. In 2014, the permit was not obtained until mid-July and treatment couldn't be scheduled until later July. By that time, the nuisance plants were already senescing, so treatment was not done that year. Cattails at the southern end of the beach were treated in 2015 and 2016.

The herbicides were to be applied from deeper water so sediment would not be disturbed and reduce their efficacy. The applications were to be done so the herbicides would reach water 2-3 feet deep where smaller boats were docked and improve navigation, fishing and swimming. In 2015, the application was done by injection with hoses in the shallow water, which stirred up the sediment and reduced the efficacy of the treatment. Applications were done properly from 2016-2018.

Various herbicides were used from 2015-2017, but in 2018, the chemicals approved were limited because an endangered frog has been documented in the vicinity. Diquat was the approved herbicide, with the amount limited to 1 ppm in areas less than 2 feet in depth. The dosage of herbicide to use was to take into consideration that the deeper areas around the concession dock and fishing pier from which the herbicide was to be applied are 5 – 12 feet deep. A copper compound was approved for use in conjunction with the Diquat to kill filamentous algae and thus increase the efficacy of Diquat on the nuisance plants, but at a dosage that wouldn't affect *Chara*. Habitat was also approved for use on the cattails, but it was only applied in 2015 and 2016.

Clean Boats, Clean Waters 2014-2018

Abundant plants were found on motors, boats, and trailers from May - July, The Southwest Badger Resource and Development Council put a priority on Clean Lakes, Clean Waters watercraft inspections and education at the Blackhawk Lake boat landing. Blackhawk Lake Recreational Area staff and DFS Conservation Consulting also did watercraft inspections and educational activities at the lake as the opportunity arose when they were sampling. Eurasian Water Milfoil has not been found in the lake since 2011 and the inspections and educational activities are important to protecting the lake from EWM and other aquatic invasive species.

Blackhawk Lake Recreation Area staff were trained on identification of Eurasian watermilfoil. Informational brochures on Aquatic Invasive Species and Eurasian watermilfoil were available in the office. "Prevent the Spread of Invasive Species – It's the Law" signs were installed at the boat landing docks. "Please Stop and Remove All Aquatic Plants and Drain Water from Boat and Trailer" at the entrance to and exit from the landing. A portable electronic message board reminding boaters to remove all aquatic plants and drain water from their boat and trailer was set up at the landing one year during the Memorial Day and 4th of July holidays.

Education and Outreach 2014-2018

Communications with Blackhawk Lake (BHL) staff, DNR, and Health Departments

DFS Conservation Consulting kept BHL Recreation Area staff and DNR informed regarding water quality and aquatic plants following every sampling. Recommendations were made regarding herbicide treatment of aquatic vegetation that was impairing navigation, fishing, and swimming at the handicapped pier, concession dock, fishing pier, and beach. Treatments were supervised and follow-up surveys were conducted to determine the effectiveness of the treatment. The lake was also monitored for blue-green algae, and BHL staff, DNR, and the Iowa County Health Departments were notified if there was evidence of blooms of concern. Recommendations were made to post water quality advisory signs if warranted.

Blackhawk Lake staff were trained on identification of Eurasian watermilfoil and native aquatic plants and blue-green algae so they could take prompt action if either was found. Staff were actively involved in developing the Aquatic Plant Management Plan, determining the area of treatment, applying for permits, coordinating with DNR, and arranging for treatment according to the permit.

Educational Workshops for Highland Schools

Workshops on water quality and aquatic invasive species were conducted DFS Conservation Consulting for approximately 100 Highland Middle School students on 9/9/14 and for 20 High School Environmental Club on 9/16/14. Educational workshops on water quality and aquatic invasive species were also conducted for approximately 100 Highland Middle School students on 4/19/16.

Wisconsin Lakes Convention 2017

DFS Conservation Consulting gave a Power Point presentation on eradication of Eurasian water milfoil in Blackhawk Lake (What Happened to Eurasian watermilfoil in Blackhawk Lake?) at the Wisconsin Lakes Convention in Stevens Point, WI 4/7/17 (Appendix).

North American Lake Management Society International Symposium 2017

DFS Conservation Consulting gave the Power Point presentation "Successful Long Term Control of Eurasian watermilfoil in Blackhawk Lake, WI" at the North American Lake Management Society's International Symposium in Denver, Colorado on 11/8/17 (Appendix).

Blue-green Algae

Donna Sefton of DFS Conservation Consulting gave a PowerPoint presentation on Blue-Green Algae and Water Quality to 50 Middle School students and staff at Highland Schools on 11/7/18. The students learned about: 1) Blackhawk Lake water quality, aquatic plants, and algae; 2) Blue-green algae characteristics; 3) Why they are of concern; 4) How people and pets can be protected from blue-green algae toxins; and 5) What causes algae blooms and what can be done to prevent them. A copy of the presentation is found in Appendix . Copies were also sent to the Iowa and Lafayette County, WI, Health Departments, managers of parks with lakes in the area (e.g. Blackhawk Lake Recreation Area, Governor Dodge State Park, and Yellowstone Lake State Park), and Wisconsin DNR.

Aquatic Plant Management Plan

An Aquatic Plant Management (APM) Plan for Eurasian watermilfoil was prepared by Underwater Habitat Investigations in 2007. This plan was updated to be a comprehensive plan for all plants by DFS Conservation Consulting in 2018.

Goals for Aquatic Plant Management

The goals for aquatic plant management established by Blackhawk Lake Recreation Area staff with input from surveys of park/lake users and guidance from DFS Conservation Consulting were:

- Monitor aquatic plant community, particularly for aquatic invasive plants.
- Prevent the introduction of nuisance invasive species.
- Rapidly respond to any introduction of aquatic invasive species.
- Protect and expand the diverse community of native aquatic plants.
- Reduce nuisance aquatic plant growth in high use recreational areas.
- Maintain and enhance water quality.
- Educate and inform recreational users regarding aquatic plant management.

Analysis and Synthesis of Aquatic Plant Data

Point-intercept aquatic plant surveys in 2006, 2011, and 2015, along with the results of annual visual boat surveys, are described in the previous Aquatic Plants section and Appendices 1 - 6.

The Floristic Quality Index of native aquatic plant species in Blackhawk Lake exceeds that for the Southwest Wisconsin Georegion. In 2015, 10 species were identified at the sampling sites and 18 visually. *Potamogeton crispus* (curly-leaf pondweed). a non-native species ubiquitous in southern Wisconsin, and native *Ceratophyllum demersum* (coontail) *were* the dominant plants in all 3 aquatic plant surveys. Other common plants were *Potamogen puscillus* (slender pondweed), *Elodea canadensis* (common waterweed), *Ranunculus aquatilis* (white water crowfoot), *Stuckenia pectinate* (sago pondweed), *Heteranthera dubia* (water stargrass), and the macrophytic algae, *Chara*.

Eurasian watermilfoil (EWM) was first discovered in Blackhawk Lake in 2006. Rapid response with manual removal by a scuba diver and snorkeler and herbicide treatment with granular 2,4-D controlled its spread. Although water stargrass and coontail are susceptible to 2,4-D, the rates, timing, and location of the applications did not adversely affect their populations as they are primarily located in shallower water, while the treatments were done in water 5 feet or deeper. Water stargrass does not become abundant until later summer. A very high dosage of the herbicide is needed to significantly affect coontail.

No EWM has been found in Blackhawk Lake in the last 7 years (since 2011); therefore, it is considered to have been eradicated from the lake. The rapid response with manual removal and herbicides to the pioneer infestations of EWM helped control its spread. Although curly-leaf pondweed is a non-native invasive species, it is ubiquitous in southern Wisconsin and collective competition from it and other native plants also helped prevent the establishment of EWM. Weather affecting water clarity also affected EWM distribution and abundance. Heavy spring rains and associated runoff resulted in sediment-related turbidity that inhibited the growth of all aquatic plants in 2008 and 2012. Educational activities, especially Clean Boats, Clean Waters watercraft inspections and education were important in preventing re-infestation of the lake.

Curly-leaf pondweed, slender pondweed, sago pondweed, and coontail are dominant in early spring and impair navigation and fishing around the handicapped pier, concession dock, and fishing pier, as well as swimming at the beach. These plants become covered with filamentous algae. Collective competition from curly-leaf pondweed and other native plants helps prevent the establishment of EWM. Water stargrass becomes dominant in mid- to later summer and impairs navigation, fishing, swimming in high use recreation areas.

The concession dock, fishing pier, and beach have been treated with herbicides in June since 2015. The handicapped pier and area between the fishing pier and beach were added to the treatment areas in 2018. The treatments have helped reduce the impairments while maintaining lower growing native vegetation (e.g., common waterweed and Chara). Although the treatments generally improved recreational access by the 4th of July, they were not done soon enough to improve conditions for the Memorial Day weekend. When the southern 1/3 of the beach was reclaimed, cattails limited access to this area. They were treated with Habitat in 2015.

Alternatives and Recommendations for Aquatic Plant Management

Monitor

Continue to diligently monitor to help protect and maintain the water quality and usability of Blackhawk Lake and prevent the spread of invasive species as follows:

- Monitor Secchi disk clarity and make observations of water quality and aquatic plants twice per month May – September, for total phosphorus in spring and for total phosphorus and chlorophyll once per month in June, July, and August in accordance with the protocols of the DNR Citizen Lake Monitoring Network.
- Conduct boat and rake surveys for aquatic plants twice per month. These surveys are especially important in early spring (May-June) when EWM is most likely to emerge, so prompt action can be taken if it is found.
- Conduct a detailed point-intercept aquatic plant survey on the entire lake every 5 years.
- Observe if blue-green algae are present during each monitoring visit. This is especially important from mid-summer and to early fall when they are most likely to occur. Many of the aquatic plants are senescing and releasing nutrients to feed algae blooms at this time. Hot, dry, and calm conditions also foster rapid algae growth. In cooperation with the Iowa Co. Health Department, post Water Quality Advisory signs if needed to protect lake users, including pets, from potential toxins released by blue-green algae.

Prevent introduction of aquatic invasive species (AIS)

- Monitor frequently for EWM and other AIS, especially in spring, as described in Monitoring above.
- Conduct Clean Boats, Clean Waters watercraft inspections and education, especially on weekends in May and June when aquatic plants are abundant and EWM is most likely to become established.
- Implement the Maintain "Prevent the Spread of Invasive Species – It's the Law" signs at the boat landing docks and "Please Stop and Remove All Aquatic Plants and Drain Water from Boat and Trailer" at the entrance to and exit from the landing.
- Use a portable electronic message board reminding boaters to remove all aquatic plants and drain water from their boat and trailer at the landing in the spring, and especially on the Memorial Day and 4th of July holidays when there is much boating traffic and aquatic plants are abundant.
- Have informational brochures on Aquatic Invasive Species and Eurasian watermilfoil available in a prominent place at the front desk in the office.

- Sponsor workshops and train volunteers to identify EWM and serve as first responders in notifying of infestations and helping with EWM removal.

Rapidly respond to introduction of AIS

If EWM (or other undesirable aquatic invasive plant) is found:

- Map the locations and abundance of EWM using boat and rake surveys.
- Take prompt action to manually remove the plant colonies where feasible. This would include having snorkelers and/or scuba divers (volunteer or hired) manually remove and disposal of the plants. Nets, rakes, and boats would be required.
- Apply for a Chemical Aquatic Plant Management permit from DNR to treat areas where the plants are abundant. The herbicide used should be specific to EWM, using a dosage and timing that does not greatly reduce the abundance of native species.
- Apply for an Aquatic Invasive Species Early Detection, Rapid Response grant from DNR to map, control, monitor, prevent, and educate.

Protect and expand a diverse community of native species

- Only apply herbicides as needed in heavy use recreational areas as approved by DNR.
- Limit boat traffic to deeper water so the shallower shoreline areas and the sand ridge where there are native aquatic plants are left undisturbed.
- Continue and enforce the Slow No Wake rule for the lake.

Reduce nuisance aquatic plant growth in high use recreational areas

- Treat with herbicides in early spring before navigation, fishing, and swimming are severely impaired in high use recreational areas such as around the handicapped pier, concession dock, and fishing pier and at the beach. Treatment should target the primary aquatic plants that cause this impairment: curly-leaf pondweed, slender pondweed, sago pondweed, coontail, and filamentous algae.
- Although curly-leaf pondweed is an invasive species, it should only be treated around the high use recreation areas where it is a nuisance. Curly-leaf pondweed is beneficial in providing collective competition that limits the establishment of EWM in the spring and it dies off naturally by mid-summer.
- The general areas to be treated are shown in Fig. 17. These were the treatment areas in 2018. The total treatment length is estimated to be 700 ft and the treatment width 60 feet, making the calculated volume of the area to be treated approximately 0.9 acre. (The portion of this to be potentially treated for cattails is around 0.02 acres). The average depth treated is approximately 3.5 - 4 feet when the chemicals are sprayed or injected from the deeper water toward shore, making the calculated volume of 4 acre-feet. Treatment areas may vary depending on evaluation of the previous treatments and the situation each year.

Fig. 17. Recommended Areas of Herbicide Treatment for Blackhawk Lake.

- Herbicide treatments should be done by the third week in May in most years, before the plants are at nuisance levels and to allow time for the treatment to be effective before the Memorial Day weekend.
- Blackhawk Lake Recreation Area should apply to DNR for a Chemical Aquatic Plant Control permit early in the year so the areas identified as having nuisance vegetation that will impair navigation, fishing, and swimming can be treated before the plants become a nuisance in later May. The permit application should include provision for two treatments between mid-May and mid-June if needed. If cattails impair use of the southern end of the beach, they should also be treated.
- As the summer progresses, water stargrass becomes dominant and impairs navigation and fishing at the concession dock, fishing pier, and handicapped pier as well as swimming at the beach. A second treatment or manual harvesting for water stargrass should be considered in mid to later summer.
- No other areas of the lake should be treated in order to maintain and enhance native aquatic plant populations in shallower areas.
- Herbicide treatments should be done by a licensed applicator using approved herbicides per label directions and as approved by DNR. Treatments for the submersed aquatic plants and algae should be injected or sprayed as far as possible towards the shore from deeper water, taking care not to stir up the sediment as they are applied. Applying the herbicide so it reaches into the shallows will aid navigation in and out for the smaller boats that are docked in 2-3 feet of water as well as provide fishing and swimming access. The dosage of herbicides to use should take into consideration that the deeper areas around the concession dock and fishing pier are generally between 5 and 12 feet deep.

- The herbicides, dosages, and application methods must be approved by the DNR Lake Management Coordinator. It is recommended that a chemical effective on filamentous algae be included, but at a dosage that does not harm *Chara*. This will make the treatment more effective, as filamentous algar covers the nuisance plants in the spring.
- DNR has approved use of Diquat (Reward) for the submersed aquatic plants in conjunction with a copper compound to kill filamentous algae (but not harm *Chara*) to increase the efficacy of Diquat on the nuisance aquatic plants. Because an endangered frog has been documented in the vicinity, DNR has limited the amount of Diquat in areas less than 2 feet in depth to 1 ppm. Habitat (Imazapyr) has been approved for treatment of the cattails on the southern end of the beach.

Maintain and enhance water quality and fishery

The following actions should be taken to maintain the outstanding lake clarity in spring and reduce blue-green algae blooms.

- Maintain shoreline vegetation wherever possible. Leave larger areas of the shoreline vegetation (where there is little need for fishing access - e.g. between the beach and boat landing) unmowed. Only cut paths down to the fishing access areas. Leave at least a 25-foot buffer of vegetation to help uptake nutrients and trap sediment. Leave beneficial emergent arrowhead, cattails, bulrush, and other plants that stabilize the shoreline, uptake nutrients, and serve as food for wildlife (especially along the shoreline between the beach and boat landing and at the boat landing).
- Maintain and enhance habitat that supports desirable fish and wildlife populations.
- Work with the Iowa County Land Conservation Department and the Natural Resources Conservation Service to implement Best Management Practices in the watershed to reduce runoff of nutrients and sediment to the lake.

Educate and inform recreational users and staff

- Implement a Clean Boats, Clean Waters watercraft inspection and education program to teach recreational users the steps to take to prevent the spread of invasive species, e.g.:
  - Inspect boat, trailer, and equipment and remove all plants and animals before entering the water and when leaving.
  - Remove all attached plants and animals from boats, trailer, and equipment.
  - Drain all water from the boat, vehicle, and equipment.
  - Never remove plants or live fish away from a waterbody
- Hand out informational brochure, cards, and stickers on Aquatic Invasive Species and Eurasian watermilfoil at the boat landing and make them available in a prominent place at the front desk in the office.
- Maintain "Prevent the Spread of Invasive Species – It's the Law" signs at the boat landing docks and "Please Stop and Remove All Aquatic Plants and Drain Water from Boat and Trailer" at the entrance to and exit from the landing.
- Use a portable electronic message board reminding boaters to remove all aquatic plants and drain water from their boat and trailer at the landing in the spring and summer - especially the Memorial Day and 4th of July holidays when aquatic plants are abundant.
- Make presentations and conduct workshops for students and the public on aquatic invasive species, water quality, and blue-green algae.
- Train volunteers to identify EWM and serve as first responders in notifying of infestations and helping with EWM removal. Educating and involving the Friends of Blackhawk Lake could also provide support for this.

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- Wisconsin Department of Natural Resource, especially Susan Graham, Lakes Coordinator, who managed the grant, provided technical assistance, and approved permits for chemical treatment.
- Southwest Badger Resource and Development Council for making Blackhawk Lake a priority for Clean Boats, Clean Waters watercraft inspections and education.
- Teachers at Highland Schools, who made learning about water quality, invasive species, and blue-green algae a part of the curriculum.

Appendix 1
Blackhawk L AIS Education, Prevention, and Planning Grant (AEPP-410-14) Annual Report, 2014

BLACKHAWK LAKE AQUATIC INVASIVES SPECIES EDUCATION, PREVENTION & PLANNING GRANT (AEPP-410-14) REPORT 2014 REPORT
January 2015

Water Quality Monitoring

Blackhawk Lake was monitored by DFS Conservation Consulting (DFS CC) for Secchi disk transparency on 5/8, 5/18, 5/31, 6/6, 6/13, 6/24, 6/27, 7/18, 8/8, 8/22, 9/9 and 9/16/14, for phosphorus on 5/18/14 and for phosphorus and chlorophyll on 6/24, 7/18, and 8/22/14. Data was entered into DNR's Surface Water Integrated Monitoring System (SWIMS). The 2014 water quality data and report, as well as Secchi disk transparency and Trophic State Index comparisons between 1997 and 2014 are found in Appendix A.

There was a very cold winter that lingered into spring 2014. The season was about 2 weeks behind normal. Curly-leaf pondweed growth is usually abundant in May, but there was less and later growth than usual. The Secchi ranged from 10 to 20 feet in May to mid-June. The water was very clear at that time. The perception of the water quality was "Beautiful, could not be any nicer" or "Very minor aesthetic problems; excellent for swimming and boating enjoyment". Water clarity declined to 5 feet in August and remained below that for the rest of the monitoring season. As the curly-leaf pondweed senesced in later July, nutrients became readily available to promote blue-algae blooms, especially along the shoreline, from mid-July through September. It is unusual to have blue-green algae blooms in the lake, and especially for that long time period. It was recommended that Water Quality Advisory signs be posted at the beach and boat landing since blue-green algae toxins can be harmful to people and pets.

Aquatic Plant Monitoring

Visual and rake boat surveys for Eurasian Water Milfoil (EWM) were conducted on 5/8, 5/18, 5/31, 6/6, 6/13, 6/24, 7/18, 8/8, 8/22, 9/9 and 9/16/14. A point-intercept Aquatic Plant Survey was conducted on 78 sites in the northern 1/5 of the lake on 6/27 with assistance from Jeanne Sherer and Katrina Punzel of the Dept of Natural Resources. Eleven species of plants were found, with curly-leaf pondweed, slender pondweed, and coontail by far the most abundant. No EWM was found in any of the surveys. Since the point-intercept survey was not completed for the entire lake, the complete survey was postponed to 2015.

5/18/14 Water Quality and Aquatic Plants


S side-concession dock


End of concession dock

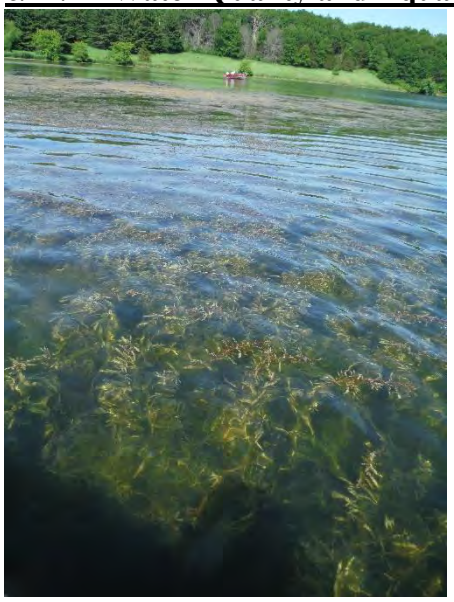

Shoreline near fishing pier


Fishing pier-concession dock


Beach


Cattails emerging-S beach

6/14/14 Water Quality and Aquatic Plants

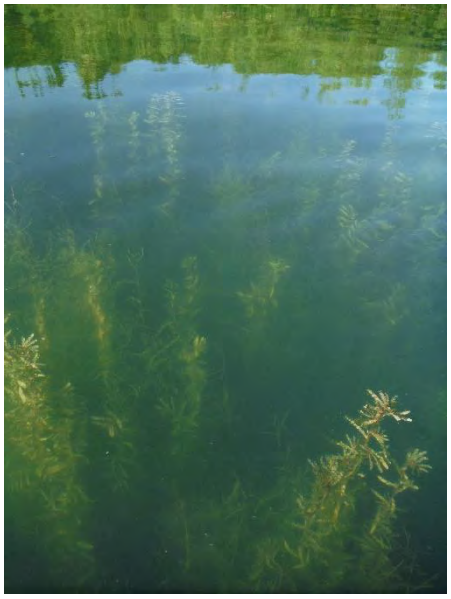

Curly leaf pondweed-sand ridge


Curly-leaf/slender pw-sand ridge


Curly-leaf pondweed-sand ridge


Pontoon Bay


Beach with cattails on left in area to be reclaimed

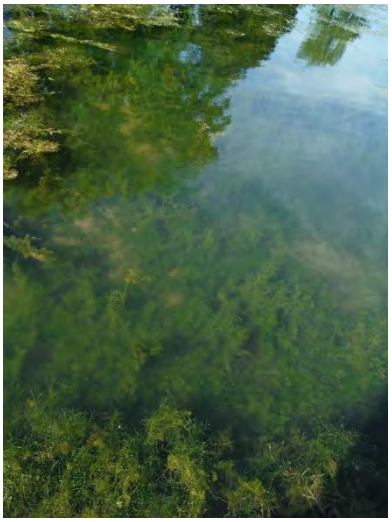


Curly-leaf in deeper water-beach

Concession dock – N side CLP

Concession dock–S side slender pw

Boat landing



Deeper water-boat landing

Shallow water-boat landing

7/18/14 Water Quality and Aquatic Plants

Pontoon Bay looking N. Filamentous algae over plants

Beach area

Slender pondweed on sand ridge. Little curly-leaf left.

Boat concession area

Slender pondweed on sand ridge

Slender/sago pondweed-boat concession

Slender pondweed-boat concession

Btwn boat concess & beach

Slender pw, stargrass fishing pier

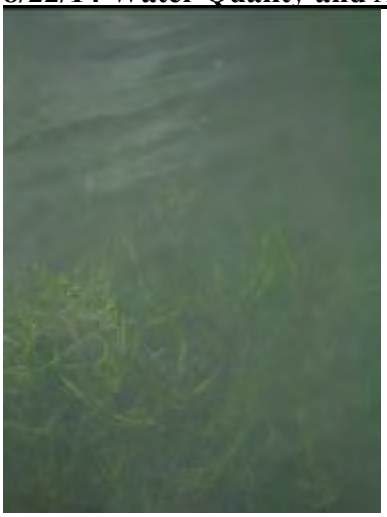
Floating-leaf pondweed *(P. natans*) near beach

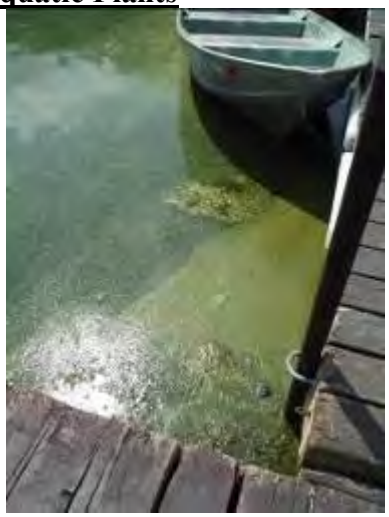

Boat landing -Elodea &filam algae


Boat landing-slender/sago pondweed


Boat landing blue-green algae bloom

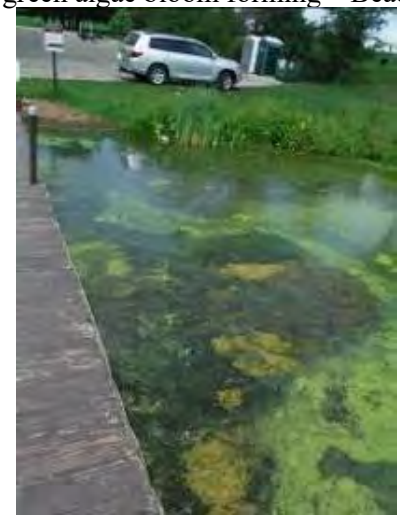
8/22/14 Water Quality and Aquatic Plants


Water stargrass, boat concession


Blue-green algae bloom forming


Beach area from a distance


Beach area blue-green algae


Boat launch plants


Boat launch blue-green algae bloom

9/16/14 Water Quality and Aquatic Plants


Blue-green algae, boat launch


Blue-green algae, boat launch


Blue-green algae, boat launch


Blue-green algae at beach


Blue-green algae, boat concession


Blue-green algae at fishing pier

Aquatic Plant Management 2014 and Recommendation for 2015

Blackhawk Lake Recreation Area applied for a permit to chemically treat the areas around the beach, concession dock and fishing pier in July 2014. By the time they received the permit and could arrange for treatment, the plants were no longer a severe nuisance and beneficial native plants, such as water stargrass and *Potagamogeton natans* (floating leaf pondweed) were present, so no treatment was done.

The following recommendations are made regarding aquatic plant management in 2015. The Blackhawk Lake Recreational Area should apply for a permit to chemically treat within 50 feet of the concession dock and the fishing pier to maintain navigational and fishing access in these areas and the entire beach area to maintain swimming access. The treatment should be done between mid-May and mid-June as needed before nuisance curly leaf pondweed, slender pondweed, sago pondweed, and coontail become abundant and impair recreational use. Treatment should not be done after 7/15, as the nuisance species are senescing and beneficial plants such as water stargrass and floating-leaf pondweed are present at that time.

If the Blackhawk Lake Recreation Area wants to reclaim the beach area lost over time, they will need to obtain permits from DNR Water Regulations and Zoning and/or the Lakes Coordinator. The plants in this area during spring and early summer are primarily curly-leaf pondweed, sago pondweed, and coontail, the same ones that that impair navigation and fishing around the concession boat dock and fishing pier and swimming around the beach. Cattails in this area will also likely need to be treated to provide access to the shoreline.

Clean Boats, Clean Waters

Blackhawk Lake Recreation Area and DFS Conservation Consulting staff attended Clean Boats, Clean Waters training at the DNR Service Center in Dodgeville on 5/19/14. The Cobb-Highland Recreation Commission received a Clean Boats, Clean Waters grant to do watercraft inspections and education at Blackhawk and the Blackhawk Recreation Area staff implemented the grant in 2014. Brochures on Eurasian water milfoil and aquatic invasive species were placed in a prominent place at the front desk in the office.

Educational Workshops

Workshops on Water Quality and Aquatic Invasive Species were conducted for the Highland Middle School students on 9/9/14 and for the High School Environmental Club on 9/16/14. The teachers and students found them to be interesting and beneficial.

9/9/14 Aquatic Invasive Species and Water Quality Workshop for Highland Middle School

AIS wksp for Highland Middle Sch

AIS workshop by Laura Spears

Water Quality Monitoring workshop

Water quality workshop for Highland Middle School

Students using the water quality monitoring equipment

9/16 Aquatic Invasive Species and Water Quality Workshop for Highland High School

Highland Environmental Club canoeing basics

Highland Environmental Club canoeing basics

Getting into canoes (note blue-green algae bloom)

View from beach to fishing pier & concession dock

Students on pontoon for water quality & AIS training

Students on pontoon for water quality & AIS training

Going out to WQ sample site

Filtering chlorophyll on shore

Workshop leaders Donna Sefton & Laura Spears

Appendix A
2014 Water Quality Data

Lake Water Quality 2014 Annual Report

Blackhawk Lake
Iowa County
Waterbody Number: 1239400

Lake Type: DRAINAGE
DNR Region: SC
GEO Region:SW

Site Name	Storet #
Black Hawk Lake - Deep Hole	253124

Date	SD (ft)	SD (m)	Hit Bottom	CHL	TP	TSI (SD)	TSI (CHL)	TSI (TP)	Lake Level	Clarity	Color	Perception
05/08/2014	12	3.7				41			NORMAL	CLEAR	BLUE	2-Very minor aesthetic problems
05/18/2014	10	3			16.3	44		50	NORMAL	CLEAR	BLUE	2-Very minor aesthetic problems
05/31/2014	17	5.2				36			NORMAL	CLEAR	BLUE	1-Beautiful, could not be nicer
06/06/2014	20	6.1				34			NORMAL	CLEAR	BLUE	1-Beautiful, could not be nicer
06/13/2014	17	5.2				36			NORMAL	CLEAR	BLUE	1-Beautiful, could not be nicer
06/24/2014	14	4.3		4.77	10.4	39	47	46	NORMAL	CLEAR	BLUE	2-Very minor aesthetic problems
06/27/2014	13	4				40			NORMAL		BLUE	2-Very minor aesthetic problems
07/18/2014	14	4.3		10.1	20.2	39	52	51	NORMAL	MURKY	GREEN	4-Would not swim but boating OK (algae)
08/08/2014	5	1.5				54			NORMAL	MURKY	GREEN	5-Enjoyment substantially impaired (algae)
08/22/2014	3	0.9		45	47.1	61	64	58	NORMAL	MURKY	GREEN	5-Enjoyment substantially impaired (algae)
09/09/2014	4	1.2				57			NORMAL	MURKY	GREEN	4-Would not swim but boating OK (algae)
09/16/2014	3	0.9				61			HIGH	MURKY	GREEN	5-Enjoyment substantially impaired (algae)

Date	Collector Comments
05/08/2014	Partly cloudy- calm. Concession dock area: water clear with some filamentous algae + curly-leaf pondweed- lots of panfish. Boat launch area murky (brown) with no plants near shore. Pontoon bay: some floating filamentous algae- water buttercup just coming up. Boat/rake survey found no Eurasian watermilfoil.
05/18/2014	Partly cloudy- wind from W @ 8 mph. 70's. Curly leaf pondweed primary plant- but not as much growth as there usually is this time of year. Boat/rake survey found no Eurasian water milfoil.
05/31/2014	Clear- slight breeze- mostly curly-leaf pondweed. Sago pondweed- water stargrass- water buttercup just emerging. Not much coontail on bottom on sand ridge. Boat/rake survey found no Eurasian water milfoil.
06/06/2014	Partly cloudy- breeze from SW @ 7 mph- 80's. Lots of curly-leaf pondweed- some sago pondweed- little coontail. Water stargrass and water buttercup coming up. Boat/rake survey found no Eurasian water milfoil.
06/13/2014	Clear- calm. Lots of curly-leaf pondweed and narrow leaf pondweed. Some elodea- coontail- and sago pondweed in shallow areas. Boat/rake survey found no Eurasian water milfoil.
06/24/2014	Partly cloudy- slight breeze. Boat/rake survey found no Eurasian water milfoil. Shallows by boat landing has coontail- sago pondweed- elodea- water stargrass- curly-leaf pondweed- water buttercup- narrow leaved pondweed- filamentous algae + duckweed.
06/27/2014	Partly cloudy. Breezy. Point-intercept aquatic plant survey completed on northern part of lake. No Eurasian water milfoil found.
07/18/2014	Partly cloudy- slight breeze- 80's. Little curly-leaf pondweed. Mostly sago pondweed on sand ridge. No Eurasian water milfoil observed with boat/rake survey. Blue-green algae "paint slick" bloom at boat landing and concession and fishing docks- but not at beach. Recommended post water quality advisory signs.
08/08/2014	Partly cloudy- 80's- slight breeze. Sago pondweed dying off- water stargrass becoming more abundant near shore + by docks. Potamogen natans between beach and concession dock. Looks like pea soup near shore. Obvious blue-green algae bloom (probably Microcystis) throughout lake. Recommended post water quality advisory signs.
08/22/2014	Partly cloudy- 80's- humid. Obvious blue-green algae bloom. Recommended post water quality advisory signs. Aquatic plants decaying. Boat/rake survey found no Eurasian water milfoil.
09/09/2014	Partly cloudy- calm- water green- but not an obvious blue-green algae bloom.
09/16/2014	Calm- 65. Water green. Blue-green algae "paint slick" at landing and boat concession area. Boat/rake survey found no Eurasian water milfoil. Recommended post water quality advisory signs.

Date	Data Collectors	Project
05/08/2014	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake
05/18/2014	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake
05/31/2014	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake
06/06/2014	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake
06/13/2014	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake
06/24/2014	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake
06/27/2014	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake
07/18/2014	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake
08/08/2014	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake
08/22/2014	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake
09/09/2014	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake
09/16/2014	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake

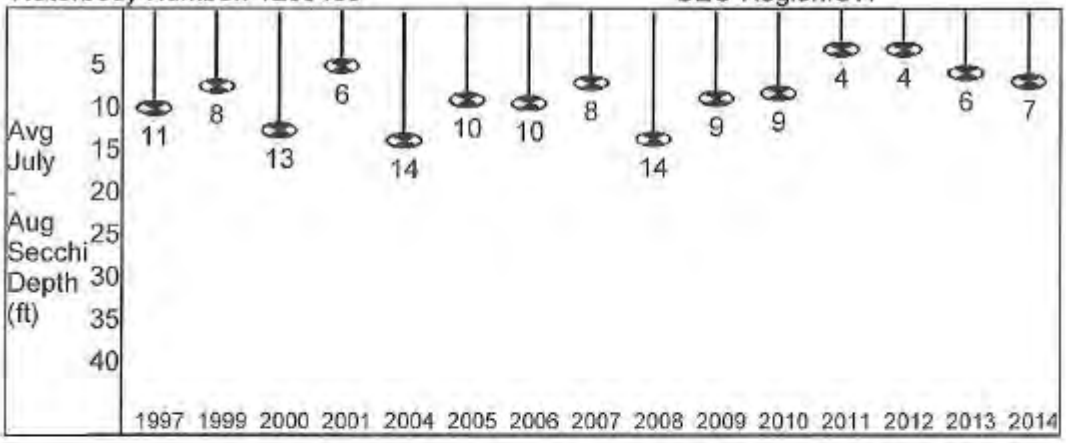
SD = Secchi depth measured in feet converted to meters; Chl = Chlorophyll a in micrograms per liter(ug/l); TP = Total phosphorus in ug/l, surface sample only; TSI (SD), TSI(CHL), TSI(TP) = Trophic state index based on SD, CHL, TP respectively; Depth measured in feet.

Wisconsin Department of Natural Resources **Wisconsin Lakes Partnership**

Report Generated: 12/23/2014

Blackhawk Lake
Iowa County
Waterbody Number: 1239400

Lake Type: DRAINAGE
DNR Region: SC
GEO Region:SW

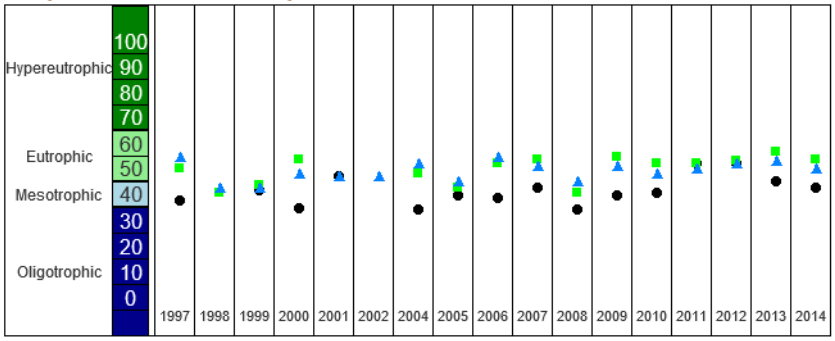


Past secchi averages in feet (July and August only).

Year	Secchi Mean	Secchi Min	Secchi Max	Secchi Count
1997	10.63	6.75	14.5	2
1999	8	8	8	1
2000	13.2	2	19	5
2001	5.5	5.5	5.5	3
2004	14.3	14.3	14.3	2
2005	9.5	8.5	10.5	2
2006	10	8	13	5
2007	7.6	4	18	6
2008	14.13	13.25	15	2
2009	9.42	4.5	15.75	3
2010	8.83	4.5	17	3
2011	3.67	3	5	3
2012	3.67	3	4	3
2013	6.33	3	10	3
2014	7.33	3	14	3

Report Generated: 12/23/2014

Trophic State Index Graph



Monitoring Station: Black Hawk Lake - Deep Hole, Iowa County
Past Summer (July-August) Trophic State Index (TSI) averages.

● = Secchi ■ = Chlorophyll ▲ = Total Phosphorus

TSI(Chl) = TSI(TP) = TSI(Sec)	It is likely that algae dominate light attenuation.
TSI(Chl) > TSI(Sec)	Large particulates, such as Aphanizomenon flakes dominate
TSI(TP) = TSI(Sec) > TSI(Chl)	Non-algal particulate or color dominate light attenuation
TSI(Sec) = TSI(Chl) >= TSI(TP)	The algae biomass in your lake is limited by phosphorus
TSI(TP) > TSI(Chl) = TSI(Sec)	Zooplankton grazing, nitrogen, or some factor other than phosphorus is limiting algae biomass

Black Hawk Lake - Deep Hole 2014 Results

Black Hawk Lake - Deep Hole was sampled **12** different days during the 2014 season. Parameters sampled included:

- water clarity
- total phosphorus
- chlorophyll

The average summer (July-Aug) secchi disk reading for Black Hawk Lake - Deep Hole (Iowa County, WBIC: 1239400) was 7.33 feet. The average for the Southwest Georegion was 3.8 feet. Typically the summer (July-Aug) water was reported as **MURKY** and **GREEN**. This suggests that the secchi depth may be mostly impacted by algae. Algal blooms are generally considered to decrease the aesthetic appeal of a lake because people prefer clearer water to swim in and look at. Algae are always present in a balanced lake ecosystem. They are the photosynthetic basis of the food web. Algae are eaten by zooplankton, which are in turn eaten by fish. You will know algae are causing reduced Secchi depth if the water generally appears green when you assess the color against the white background of the secchi disc.

Chemistry data was collected on Black Hawk Lake - Deep Hole. The average summer Chlorophyll was 27.6 µg/l (compared to a Southwest Georegion summer average of 62 µg/l). The summer Total Phosphorus average was 33.7 µg/l. Lakes that have more than 20 µg/l and impoundments that have more than 30 µg/l of total phosphorus may experience noticable algae blooms.

The overall Trophic State Index (based on chlorophyll) for Black Hawk Lake - Deep Hole was 60. The TSI suggests that Black Hawk Lake - Deep Hole was **eutrophic**. This TSI usually suggests decreased clarity, fewer algal species, oxygen-depleted bottom waters during the summer, plant overgrowth evident, warm-water fisheries (pike, perch, bass, etc.) only.

101 S. Webster Street . PO Box 7921 . Madison, Wisconsin 53707-7921 . 608.266.2621

Appendix 2
Blackhawk L AIS Education, Prevention, and Planning Grant (AEPP-410-14) Annual Report, 2015

BLACKHAWK LAKE AQUATIC INVASIVE SPECIES EDUCATION, PREVENTION & PLANNING GRANT (AEPP-410-14) 2015 REPORT
January 2016

Water Quality Monitoring

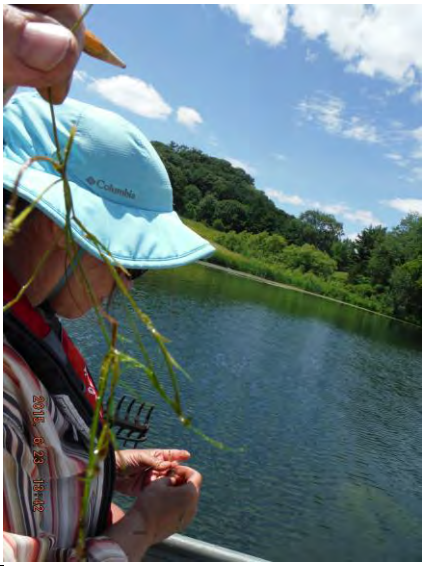
Blackhawk Lake was monitored by DFS Conservation Consulting for Secchi disk transparency on 9 dates in 2015 (5/1, 5/19, 6/6, 6/23, 6/30, 7/15, 7/27, 8/12, 8/26/15), for phosphorus on 5/19/15 and for phosphorus and chlorophyll on 6/23, 7/27, and 8/26/15. Data was entered into DNR's Surface Water Integrated Monitoring System (SWIMS). The 2015 water quality data and report, as well as Secchi disk transparency and Trophic State Index comparisons from 1997 – 2015 are found in Appendix A.

The water clarity of Blackhawk Lake was very good from May–July 2015, with Secchi disk transparency ranging from 13 feet on May 1 during spring turnover to high of 23.5 feet on May 19, and between 15 and 20 feet during June and July. Aquatic plants began to senesce in August, making nutrients became readily available to fuel blue-algae blooms. By 8/12, the Secchi was reduced to 10 feet with some blue-green algae present. On 8/26, the clarity had been reduced to 7 feet, with a developing blue green algae bloom

Aquatic Plant Monitoring

Visual and rake boat surveys for Eurasian Water Milfoil (EWM) were conducted on 5/1, 5/19, 6/6, 6/23, 6/30, 7/15, 7/27, 8/12, 8/26/15. Photos were taken and notes made of the aquatic plants found. A point-intercept Aquatic Plant Survey was conducted on the entire lake on 6/23 and 6/30 with assistance from Jeanne Scherer and Katrina Punzel of the Wisconsin Dept. of Natural Resources using the Wisconsin Standard Aquatic Plant Survey Method as described in the DNR publication *Aquatic Plant Management In Wisconsin*.

Aquatic Plant Survey 6/23 & 6/30/15



There were 345 waypoints on the point intercept map for Blackhawk Lake (see Appendix B). Only 301 of those sites were able to be sampled with a rake, pole, or noted as no plants observed when the depth was much deeper than the maximum depth of plant growth. Those that couldn't be sampled were either too shallow, on land, had rocks, were docks or beach area, or there were temporary obstacles, such as boats or swimmers. Visual observations of nearby plants were made for many of those sites by going back near the site after the temporary obstacle has moved or observing the area around the point from the dock, beach, or land. Voucher specimens of the aquatic plants were collected and pressed.

Of those sites sampled, 89 contained vegetation. The maximum depth of plants was 15 feet. There were 150 sites with a depth of 15 feet or less. Based on the grid, the littoral zone is around 43% of the lake surface area. There was an average of 2.11 species per site for sites where vegetation was found. The average rake fullness was 1.95 (with 1 = few, 2 = moderate, and 3 = abundant). Rake fullness was determined for eleven different species at the sites sampled. Another 8 species were visually observed, but abundance was not determined.

No *Myriophyllum spicatum* (Eurasian water milfoil) was found. The most common plants in order of relative frequency among the sites sampled (not including filamentous algae) were: *Potamogen crispus* (curly-leaf pondweed) at 33%, *Ceratophyllum demersum* (coontail) at 20.2%, *Ranunculus aquatilis* (white water crowfoot) at 11.2%, *Elodea canadensis* (common waterweed) at 9%, and *Potamogeton pusillus* (slender pondweed) at 8%.

The Floristic Quality Index of Blackhawk Lake (Nichols, et al) based on the value of native plants observed was 22.6. This is compared to an average of 20.9 for lakes in southwestern Wisconsin and 22.2 for Wisconsin lakes. Blackhawk Lake has a more diverse native aquatic plant population than many other lakes.

The diversity of the native plants was highest in the littoral zone in the nearshore areas of the sand ridge, NNW side of the lake, including the concession dock, fishing pier, and south of the beach, the boat launch, and Pontoon Bay (where water was 5 feet deep or less). However, the Simpson Diversity Index was relatively low at 0.82, with 1 being low and 0 high.

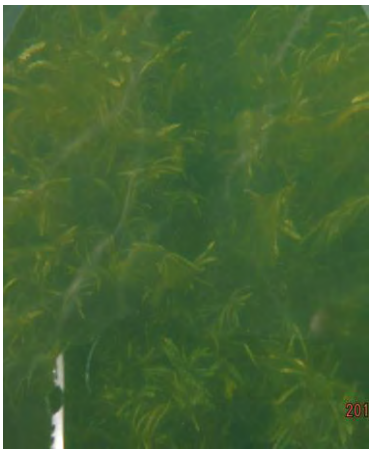
5/1/15 Water Quality and Aquatic Plants

From concession dock to handicapped pier

Fishing pier to concession dock

Curly-leaf pw concession

Spawning beds btwn concession & fishing piers



Curly-leaf pondweed

White water crowfoot

Curly-leaf & white water crowfoot

Water color-NE bay

5/19/15 Water Quality and Aquatic Plants

Curly-leaf pondweed

Cattails-S end of beach

Curly-leaf pondweed

White water crowfoot

Concession dock, N side

Concession dock, S side


Fishing pier N side


Fishing pier N side


Fishing pier S side

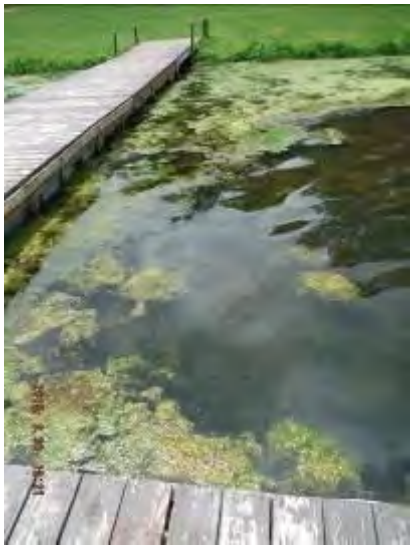
6/23/15 & 6/30/15 Water Quality and Aquatic Plants


Concession dock


Fishing pier


Beach to fishing pier


Fishing pier – S side


Fishing pier – N side


Fishing pier-slender pondweed


Fishing pier-floating leaf pondweed


Fishing pier- arrowhead

7/15/15 Water Quality and Aquatic Plants


Concession dock-slender pondweed/fil. algae

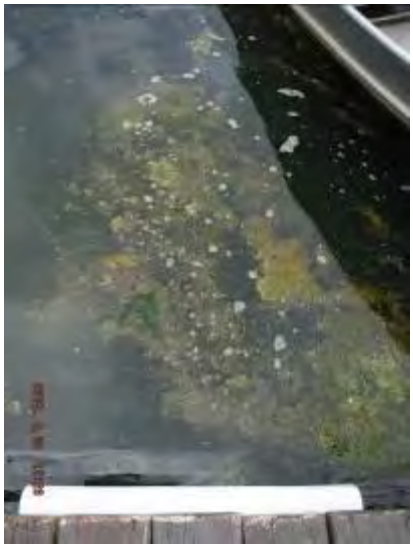

Fishing pier-slender pondweed


Fishing pier-floating-leaf pw


Concession dock to fishing pier


Beach


Cattails S end beach


Concession dock – N side

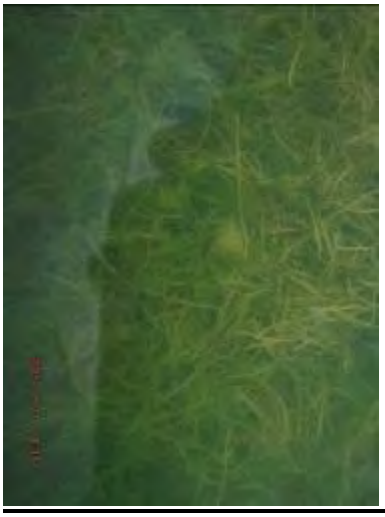

Concession dock – S side

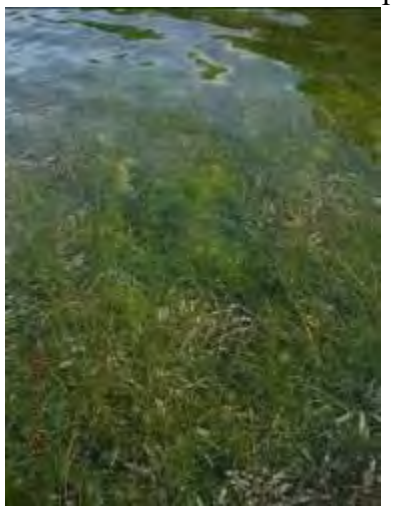
7/27/15 Water Quality and Aquatic Plants


Concession dock


Concession dock deeper


Concession dock S side


Water stargrass-concess dock


Chara, water stargrass, others


Floating-leaf pondweed/arrowhead btwn fishing pier & concession dock

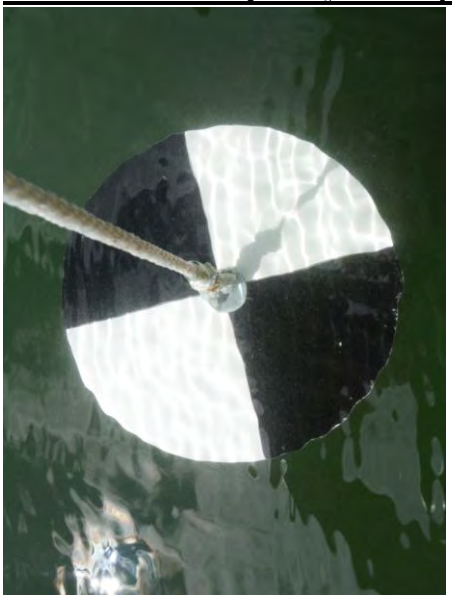
Fishing pier

Beach looking N

S end of beach-treated cattails

S end of beach-treated cattails

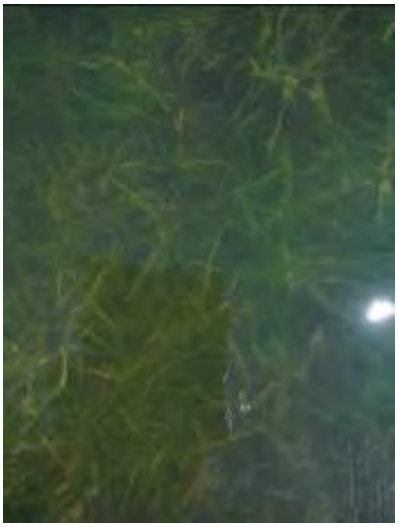
8/26/2015 Water Quality and Aquatic Plants



Water clarity

Concession dock

Concession dock S side



Fishing pier-water stargrass

Fishing pier-arrowhead, floating-leaf pondweed

Fishing pier

Fishing pier S to beach

Beach –cattails senescing where treated

Boat landing S side-
AIS sign & arrowhead

Boat landing-S side vegetation

Boat landing-N side emergents

Aquatic Plant Management

Based on the 2014 data, the following recommendations were made regarding aquatic plant management in 2015. To maintain navigational access and manage nuisance plant growth so it does not impair navigation, fishing, and swimming, the Blackhawk Lake Recreation Area should apply for a permit to chemically treat within 50 feet of the fishing pier and the boat concession dock, and the entire beach area. The treatment should be done between mid-May and mid-June as needed before the nuisance curly leaf pondweed, slender pondweed, sago pondweed, and coontail become abundant. Treatment should not be done after July 15 since beneficial native plants such as water stargrass, Elodea, Chara, and floating leaf pondweed are present at that time.

Blackhawk Lake Recreation Area received a permit to chemically treat the areas around the boat concession dock, fishing pier, and beach in 2015 (Appendix C). The permit from DNR recommended that diquat-based products be used for the submersed plants to improve navigation and fishing access, and glyphosate be used on the cattails in the reclaimed beach area. Susan Graham, DNR Lakes Management Coordinator, noted in a message to the applicator, Stantec Consulting Services, that it was important not to stir up the bottom sediments in the area of treatment, as that would decrease the effectiveness of the chemical. They should approach the treatment areas from the deeper water, injecting or spraying toward the shoreline.

The treatment was performed on 6/23/15 by Stantec Consulting Services. Rather than spraying as recommended, Stantec dragged the sprayer hoses from the back of the boat in the shallow areas, stirring up the bottom sediment.

Before the treatment, curly leaf pondweed, stringy slender and sago pondweed, and coontail were a nuisance, wrapping around boat props and significantly reducing navigation. Nine days after treatment (during the aquatic plant survey on 6/30/15), the cattails were beginning to die off in the area treated to the south of the beach. The plants around the boat concession dock and the fishing pier didn't seem to be greatly affected yet by the treatment. Those around the fishing pier were especially green and healthy. (The herbicide can take 14 or more days to show maximum effect).

On 7/15/15, there was still a large amount of vegetation around the fishing pier, but less at the boat concession dock in the deeper water. It didn't cause significant impairment of navigation in deeper reaches of the boat dock the rest of the season. There was still a lot of healthy native vegetation (especially water stargrass) around the fishing pier until late summer, when it died off naturally.

Recommendations for aquatic plant management in 2016 are similar to 2015. Areas within 50 feet of the fishing pier and the boat concession dock and the entire beach should be chemically treated as needed to improve the navigability and swimming and fishing access. Depending on the plant growth, the first treatment should be done in mid- May to early June. Another treatment may be needed between mid-June and mid-July. Treatments should be timed to be effective by the Memorial Day weekend and the July 4 week. Treatments should be done by spraying or injecting the chemicals from the deeper water into the shallows. Chemicals to be used will be determined by the DNR Lakes Management Coordinator.

Clean Boats, Clean Waters

Clean Lakes, Clean Waters watercraft inspections and education were done by Southwest Badger Resource and Development Council, Blackhawk Lake Recreation Area staff, and DFS Conservation Consulting. Brochures on Eurasian water milfoil and aquatic invasive species were available in a prominent place at the front desk in the office.

Appendix A
2015 Water Quality Data

Lake Water Quality 2015 Annual Report

Blackhawk Lake
Iowa County
Waterbody Number: 1239400

Lake Type: DRAINAGE
DNR Region: SC
GEO Region:SW

Site Name	Storet #
Black Hawk Lake - Deep Hole	253124

Date	SD (ft)	SD (m)	Hit Bottom	CHL	TP	TSI (SD)	TSI (CHL)	TSI (TP)	Lake Level	Clarity	Color	Perception
05/01/2015	13	4	NO		25.2	40		53	NORMAL	MURKY	GREEN	2-Very minor aesthetic problems
05/19/2015	23.5	7.2	NO			32			NORMAL	CLEAR	BLUE	1-Beautiful, could not be nicer
06/06/2015	18	5.5	NO			35			NORMAL	CLEAR	BLUE	1-Beautiful, could not be nicer
06/23/2015	20	6.1	NO	2.53	26.4	34	42	54	NORMAL	CLEAR	BLUE	1-Beautiful, could not be nicer
06/30/2015	15	4.6	NO			38			NORMAL	CLEAR	BLUE	1-Beautiful, could not be nicer
07/15/2015	15.5	4.7	NO			38			NORMAL	CLEAR	BLUE	2-Very minor aesthetic problems
07/27/2015	17	5.2	NO	5.32	26.5	36	47	54	NORMAL	MURKY	GREEN	2-Very minor aesthetic problems
08/12/2015	10	3	NO			44			NORMAL	MURKY	GREEN	3-Enjoyment somewhat impaired (algae)
08/26/2015	7	2.1	NO	35.6	35	49	62	56	NORMAL	MURKY	GREEN	3-Enjoyment somewhat impaired (algae)

Date	Collector Comments
05/01/2015	Overcast- slight breeze- Some particles in water and milky color in major inlets. No Eurasian watermilfoil (EWM). Lush native plant growth (e.g. water buttercup- elodea- small pondweed- coontail) covering bottom in shallow areas. Curly-leaf pondweed interspersed with other plants in shallow water and emerging near the surface in deeper water.
05/19/2015	No Eurasian watermilfoil. Curly-leaf pondweed in deeper water. Lush native plant growth covering bottom in shallower water (e.g.- water buttercup- water stargrass- small pondweed- elodea- sago pondweed).
06/06/2015	Clear- slight breeze- ~80. No EWM. Mostly curly-leaf pondweed + sago in deeper areas. Lush growth of native plants such as water buttercup. water stargrass- small leaved pondweed- coontail and elodea in shallows.
06/23/2015	

	Clear- slight breeze- ~80. Aquatic Plant Survey with Jeanne Shearer and Katrina Punze found no EWM- native vegetation in shallows. Beach and boat concession areas being chemically treated with 2-4- D.
06/30/2015	Partly cloudy- slight breeze. Aquatic plant survey with Jeanne Scherer and Katrina Punzel found no EWM- with native plant growth in shallows. Tiny green algae in water.
07/15/2015	No EWM. Sago/small leaved pondweed on sand ridge beginning to senesce- not mats like usually are. Chara and other lush plant growth just S. of beach. Some very small green algae in water- but not aesthetic problem.
07/27/2015	Slight breeze- 87- humid. No EWM. Sago pondweed + other plants in deeper water senescing. Still abundant variety of plants such as water stargrass- Chara- Elodea- coontail- flatstem pondweed in nearshore areas (~2 - 6")-
08/12/2015	Calm to slight breeze- ~80. No EWM. A little blue green algae. Lot of water stargrass in shallows (2' - 4"). Most of other plants dying off. Some build-up of decaying filamentous algae + scum in shallows.
08/26/2015	No EWM. Aquatic plants senescing. Blue green algae blooming developing.

Date	Data Collectors	Project
05/01/2015	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake
05/19/2015	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake
06/06/2015	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake
06/23/2015	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake
06/30/2015	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake
07/15/2015	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake
07/27/2015	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake
08/12/2015	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake
08/26/2015	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake

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.

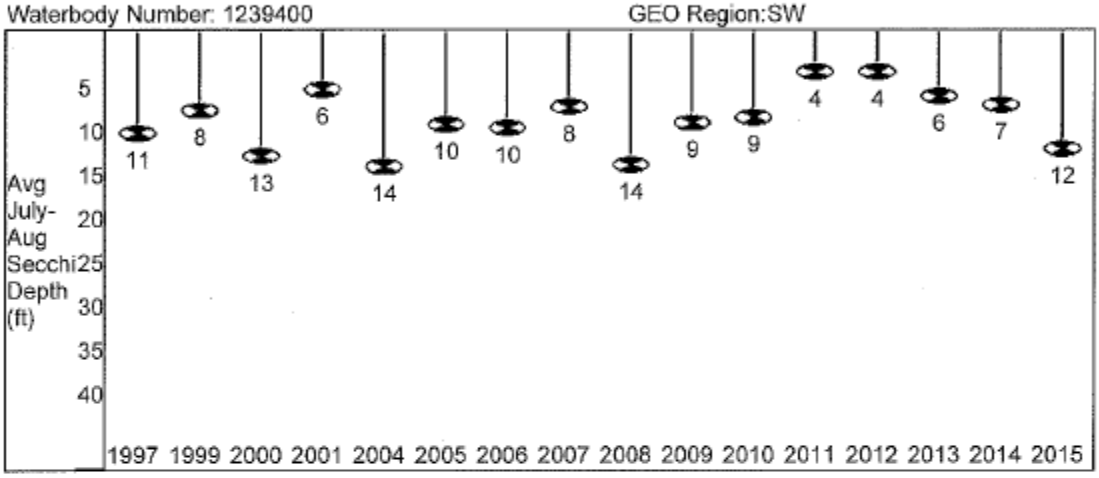
Wisconsin Department of Natural Resources **Wisconsin Lakes Partnership**

Report Generated: 12/07/2015

Wisconsin Department of Natural Resources

Blackhawk Lake
Iowa County
Waterbody Number: 1239400

Lake Type: DRAINAGE
DNR Region: SC
GEO Region:SW

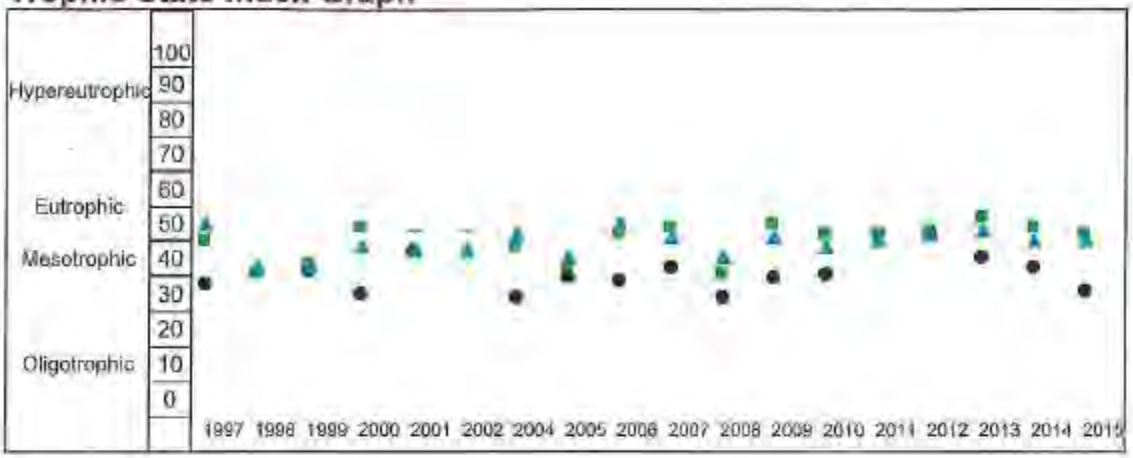


Past secchi averages in feet (July and August only).

Year	Secchi Mean	Secchi Min	Secchi Max	Secchi Count
1997	10.63	6.75	14.5	2
1999	8	8	8	1
2000	13.2	2	19	5
2001	5.5	5.5	5.5	3
2004	14.3	14.3	14.3	2
2005	9.5	8.5	10.5	2
2006	10	8	13	5
2007	7.6	4	18	6
2008	14.13	13.25	15	2
2009	9.42	4.5	15.75	3
2010	8.83	4.5	17	3
2011	3.67	3	5	3
2012	3.67	3	4	3
2013	6.33	3	10	3
2014	7.33	3	14	3
2015	12.38	7	17	4

Report Generated: 12/07/2015

Trophic State Index Graph



Monitoring Station: Black Hawk Lake - Deep Hole, Iowa County
Past Summer (July-August) Trophic State Index (TSI) averages.

● = Secchi ■ = Chlorophyll ▲ = Total Phosphorus

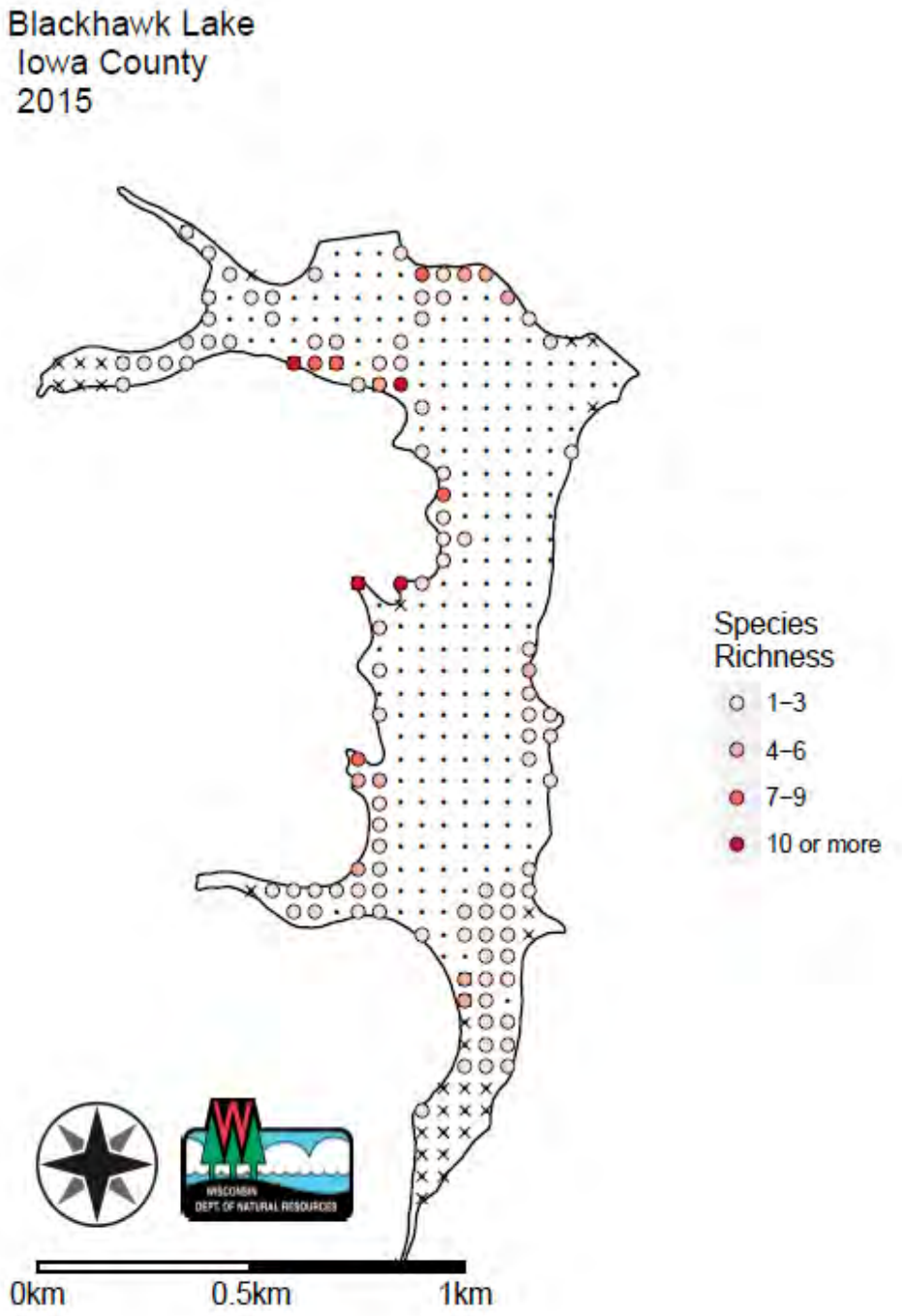
TSI(Chl) = TSI(TP) = TSI (Sec)	It is likely that algae dominate light attenuation.
TSI(Chl) > TSI(Sec)	Large particulates, such as Aphanizomenon flakes dominate
TSI(TP) = TSI(Sec) > TSI (Chl)	Non-algal particulate or color dominate light attenuation
TSI(Sec) = TSI(Chl) >= TSI (TP)	The algae biomass in your lake is limited by phosphorus
TSI(TP) > TSI(Chl) = TSI (Sec)	Zooplankton grazing, nitrogen, or some factor other than phosphorus is limiting algae biomass

TSI	TSI Description
TSI < 30	Classical oligotrophy: clear water, many algal species, oxygen throughout the year in bottom water, cold water, oxygen-sensitive fish species in deep lakes. Excellent water quality.
TSI 30-40	Deeper lakes still oligotrophic, but bottom water of some shallower lakes will become oxygen-depleted during the summer.
TSI 40-50	Water moderately clear, but increasing chance of low dissolved oxygen in deep water during the summer.
TSI 50-60	Lakes becoming eutrophic: decreased clarity, fewer algal species, oxygen-depleted bottom waters during the summer, plant overgrowth evident, warm-water fisheries (pike, perch, bass, etc.) only.
TSI 60-70	Blue-green algae become dominant and algal scums are possible, extensive plant overgrowth problems possible.
TSI 70-80	Becoming very eutrophic. Heavy algal blooms possible throughout summer, dense plant beds, but extent limited by light penetration (blue-green algae block sunlight).
TSI > 80	Algal scums, summer fishkills, few plants, rough fish dominant. Very poor water quality.

Trophic state index (TSI) is determined using a mathematical formula (Wisconsin has its own version). The TSI is a score from 0 to 110, with lakes that are less fertile having a low TSI. We base the overall TSI on the Chlorophyll TSI when we have Chlorophyll data. If we don't have chemistry data, we use TSI Secchi. We do this rather than averaging, because the TSI is used to predict biomass. This makes chlorophyll the best indicator. Visit Bob Carlson's website, dipin.kent.edu/tsi.htm, for more info.

Appendix B
Aquatic Plant Point-Intercept Survey
June, 2015

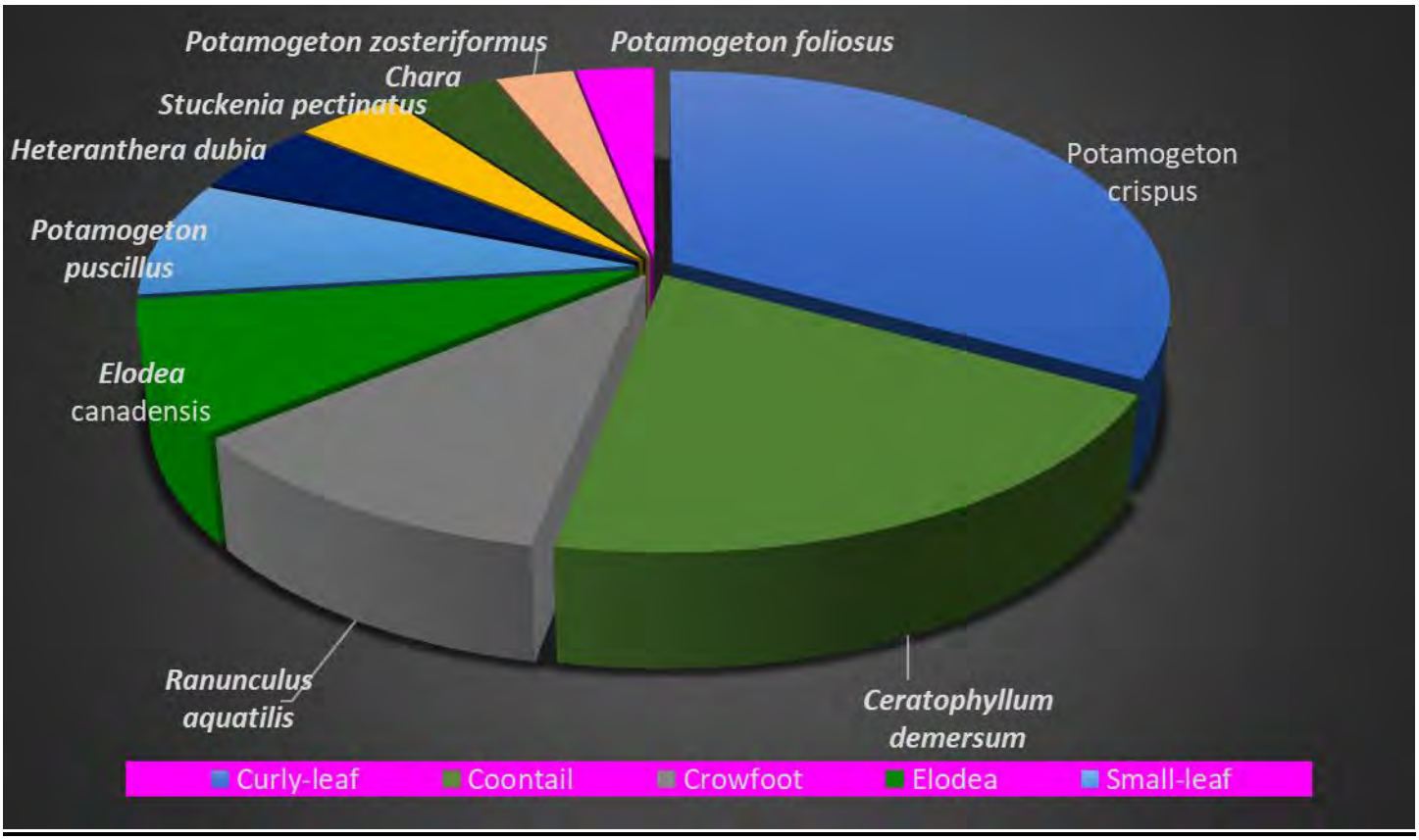
Blackhawk L Aquatic Plant Survey Species Richness June 2015



Blackhawk Lake 2015 Aquatic Plant Survey Summary

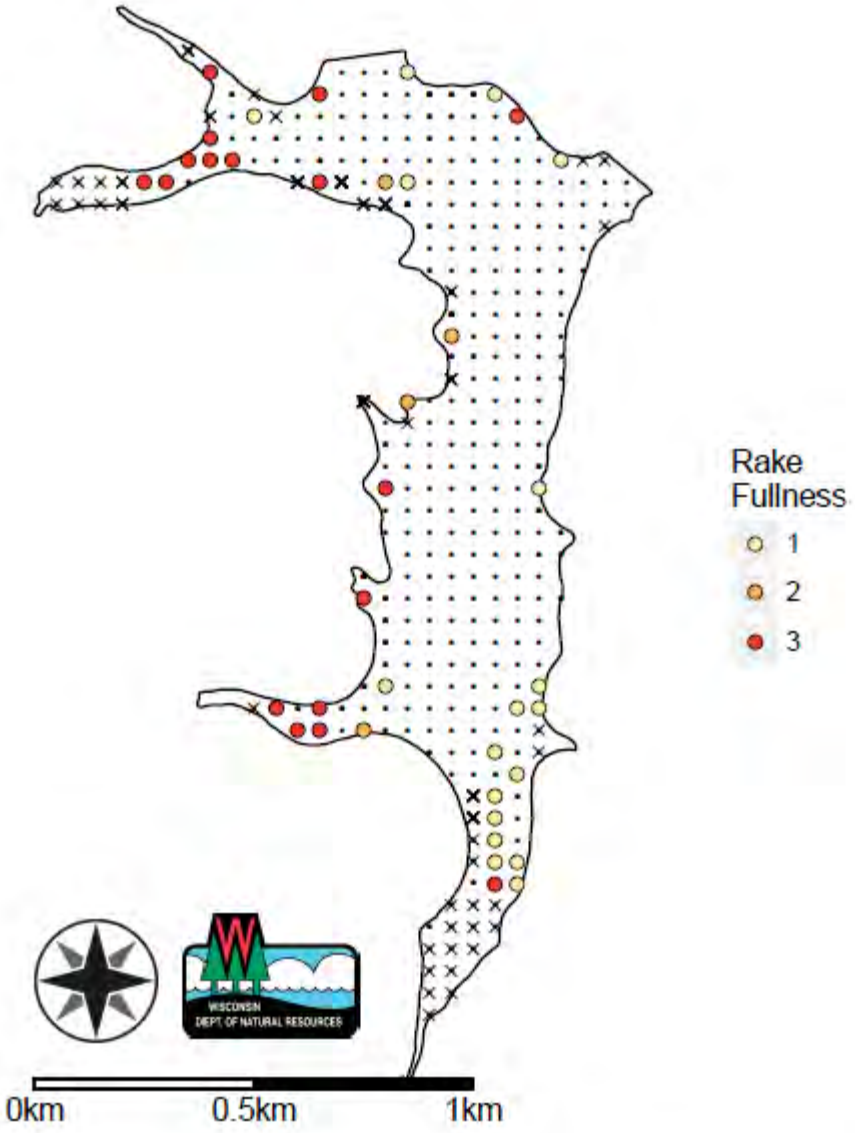
	RELATIVE		# SITES			FLORISTIC
	FREQUENCY	FREQ OCCUR	SAMPLED	AVE RAKE	# SITES	QUALITY
SPECIES	% NON ALGAE	VEG AREAS	W/SPECIES	FULLNESS	VISUAL	RATING
SPECIES COLLECTED AT SITES						
Potamogenton crispus	33	69.66	62	1.29	15	0
(curly-leaf pondweed)						
Ceratophyllum demersum	20.2	42.7	38	1.47	18	3
(coontail)						
Filamentous algae		29.21	26	1.35	28	0
Ranunculus aquatilis	11.2	23.6	21	1.43	9	8
(white water crowfoot)						
Elodea canadensis	9	19.1	17	1.18	8	3
(common water weed)						
Potamogen pusillus	8	16.85	15	2	6	7
(slender pondweed)						
Heteranthera dubia	5.3	11.24	10	1.2	11	6
(water stargrass)						
Stuckenia pectinata	4.3	8.99	8	1.25	4	3
(sago pondweed)						
Chara **spp.**	3.7	7.87	7	1.43	2	7
(muskgrass)						
Potamogeton zosteriformus	2.7	5.62	5	1.6	1	6
(flat-stem pondweed)						
Potamogen foliosus	2.7	5.62	5	1.4	4	6
(leafy pondweed)						
# of species sampled = 11; # with Floristic Quality Index Rating = 9						
SPECIES ONLY VISUALLY OBSERVED						
Lemna minor						4
(small duckweed)						
Potamogen nodosus						7
(long leaf pondweed)						
Sagittaria breviostra						9
(midwestern arrowhead)						
Sagittaria latifolia						3
(common arrowhead						
Schoenoplectus acutus						6
(hardstem bulrush)						
Schoenoplectus tabernaemontani						4
(soft-stem bulrush)						
Typha latifolia						1
(broadleaf cattail)						
Wolffia columbiana						5
(common watermeal)						
# of macrophyte species only visually observed = 8						
AVE FLORISTIC QUALITY RATING = 5.47						
FLORISTIC QUALITY INDEX = 22.556						

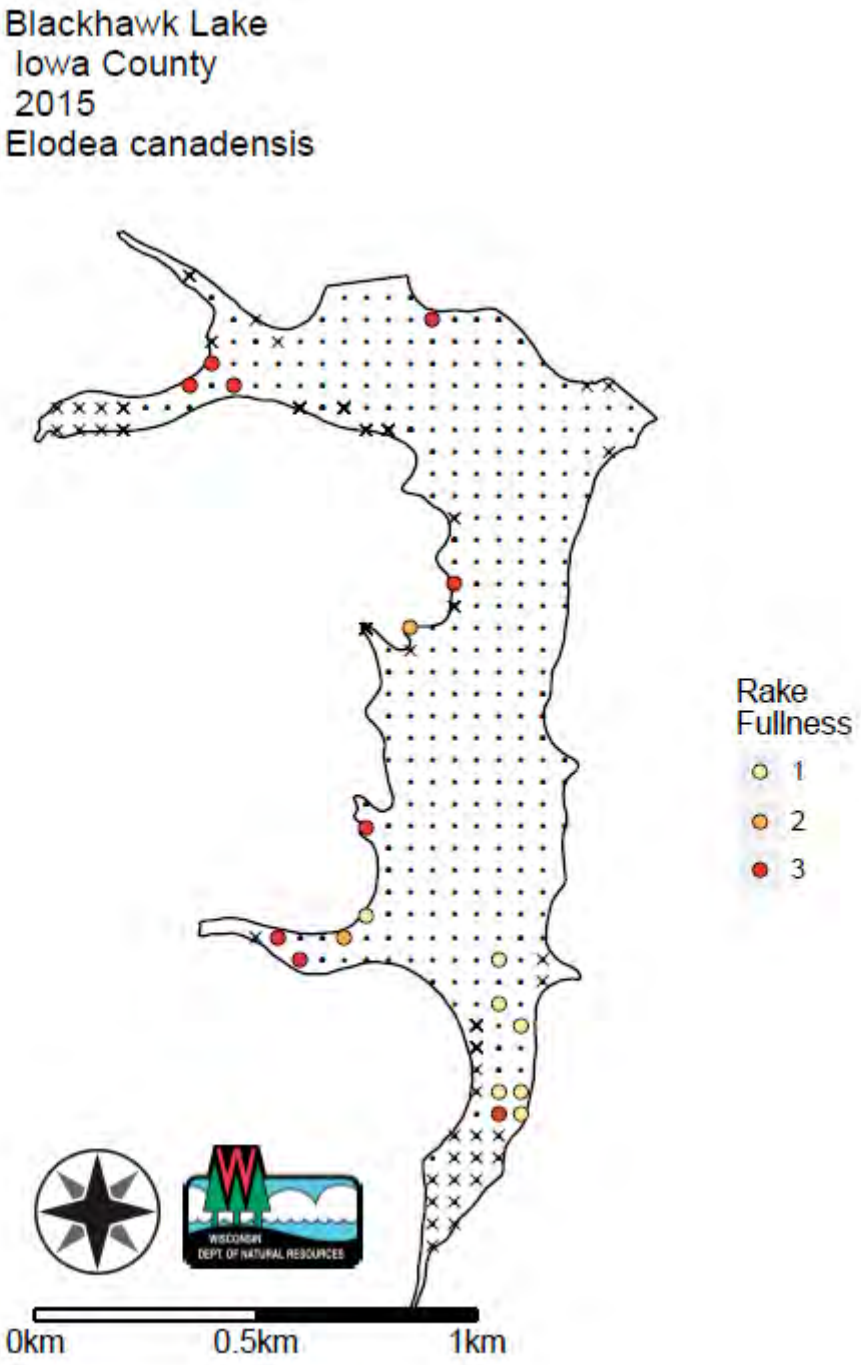
Blackhawk L Aquatic Plant Relative Frequency June 2015



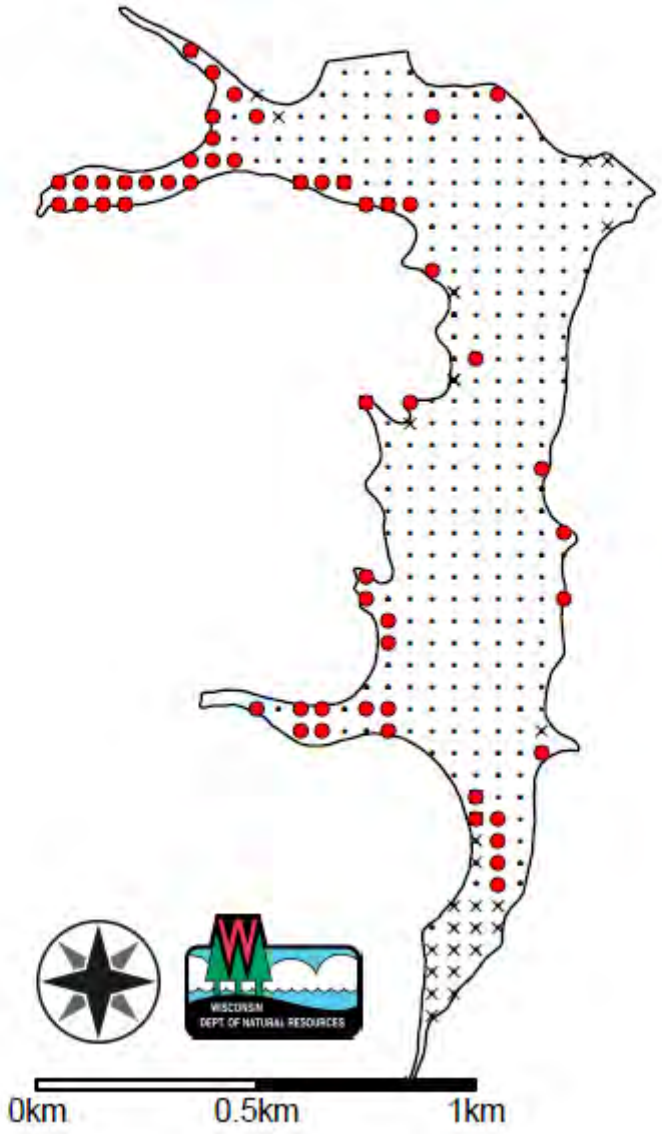
Note: Common name for *Potamogen puscillus* ssp. *tenuissimus* is slender pondweed**.**

Blackhawk Lake
Iowa County
2015
Ceratophyllum demersum

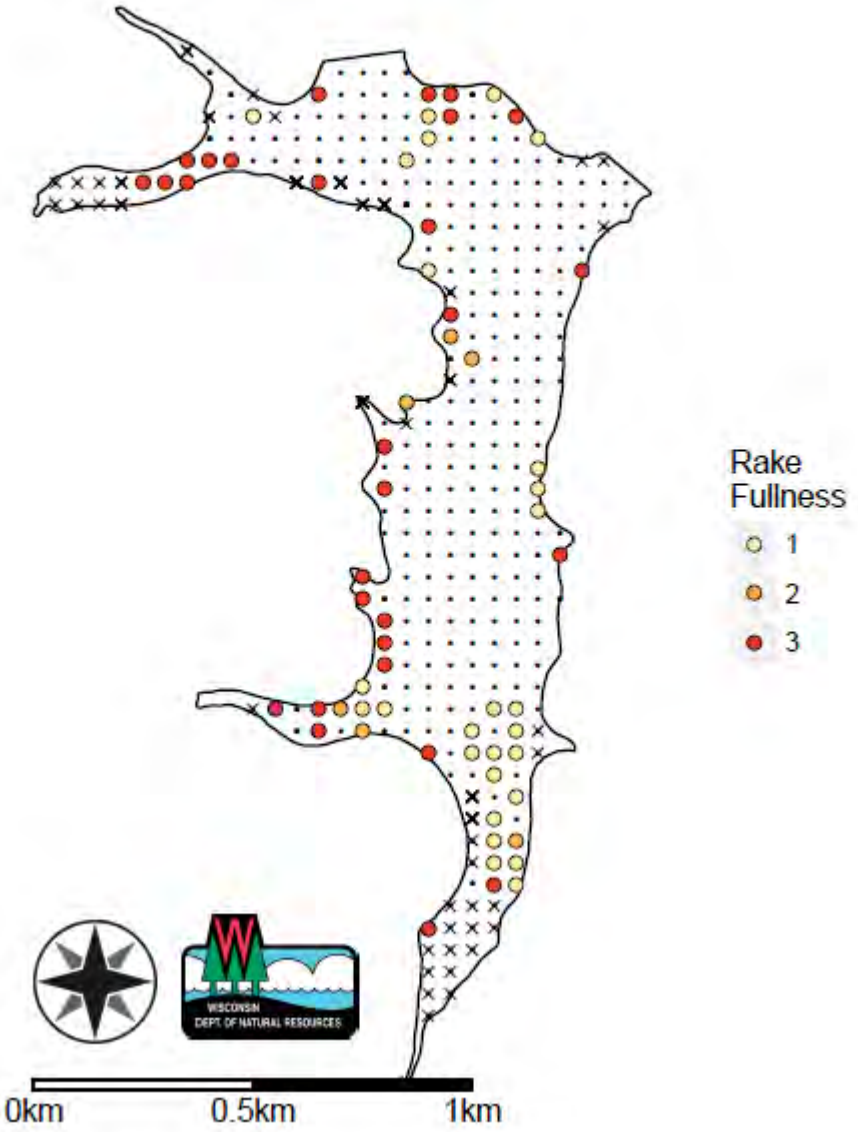



Blackhawk Lake
Iowa County
2015
Elodea canadensis
Rake
Fullness
1
2
3
WISCONSIN
DEPT. OF NATURAL RESOURCES
0km
0.5km
1km

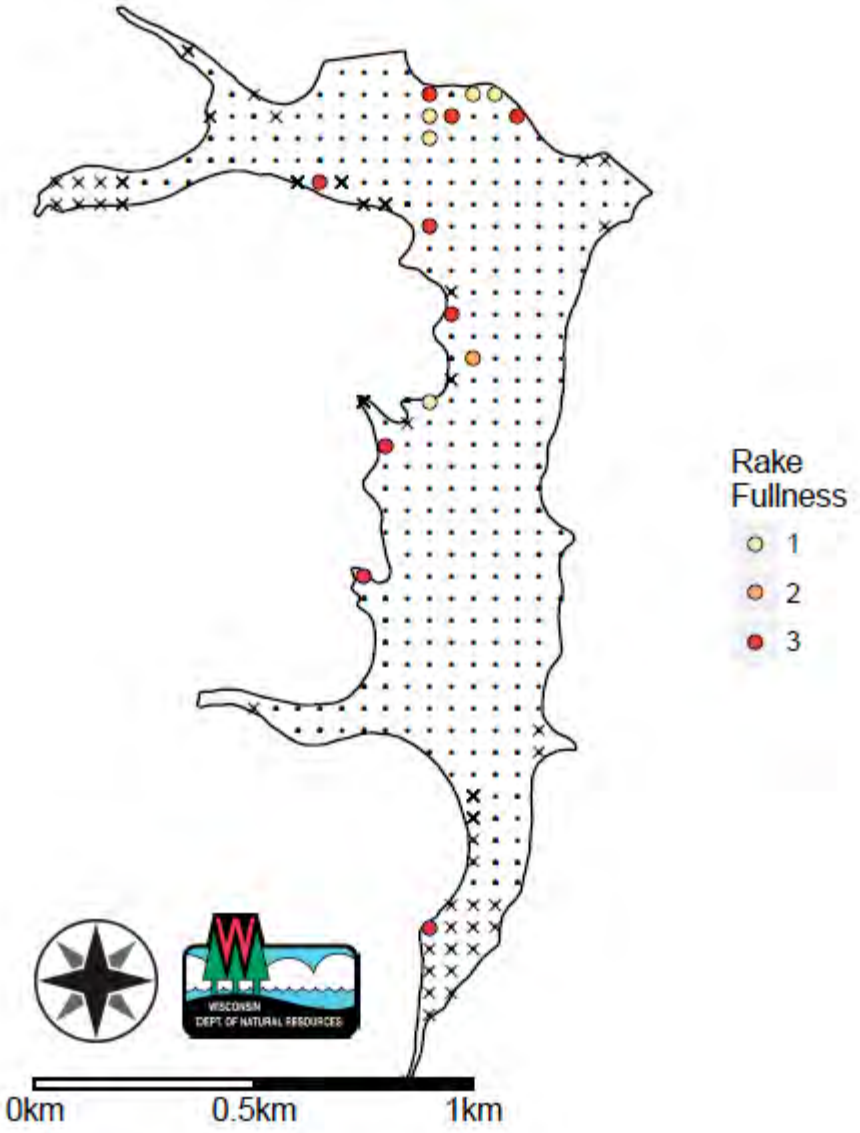
Blackhawk Lake
Iowa County
2015
Filamentous algae



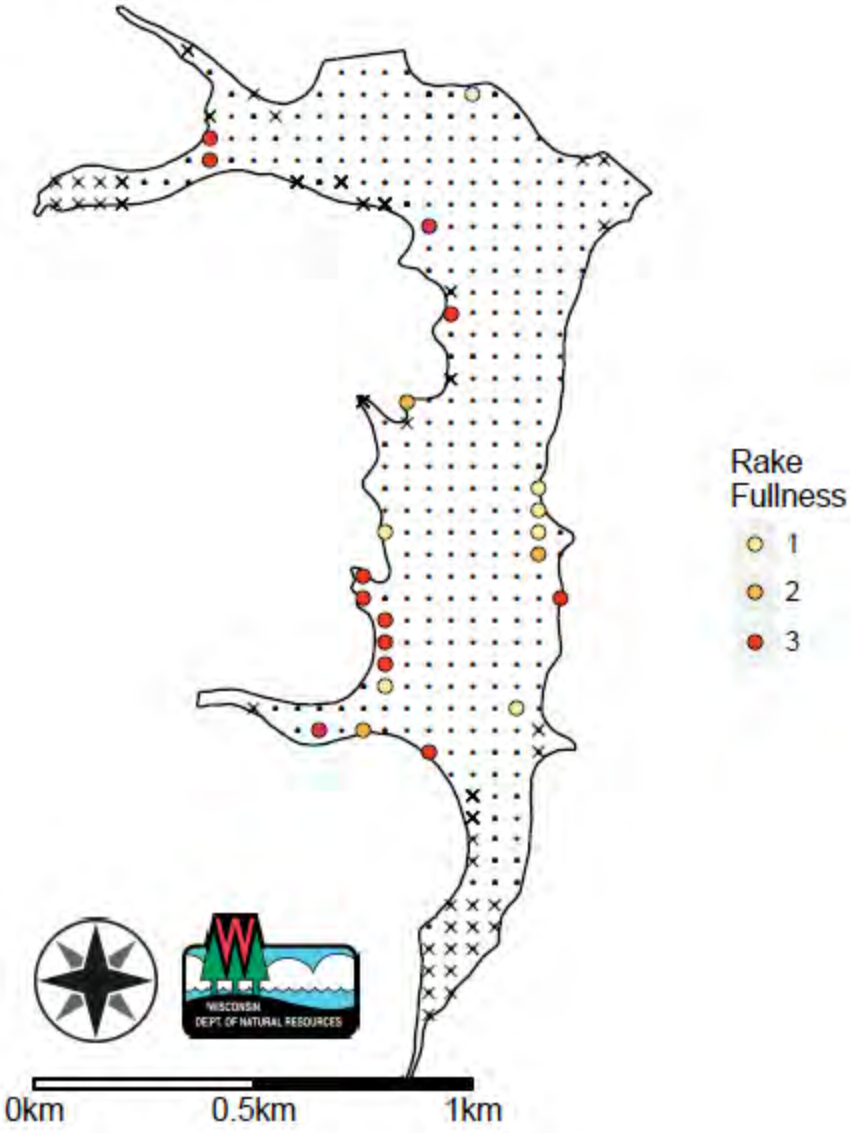
Blackhawk Lake
Iowa County
2015
Potamogeton crispus

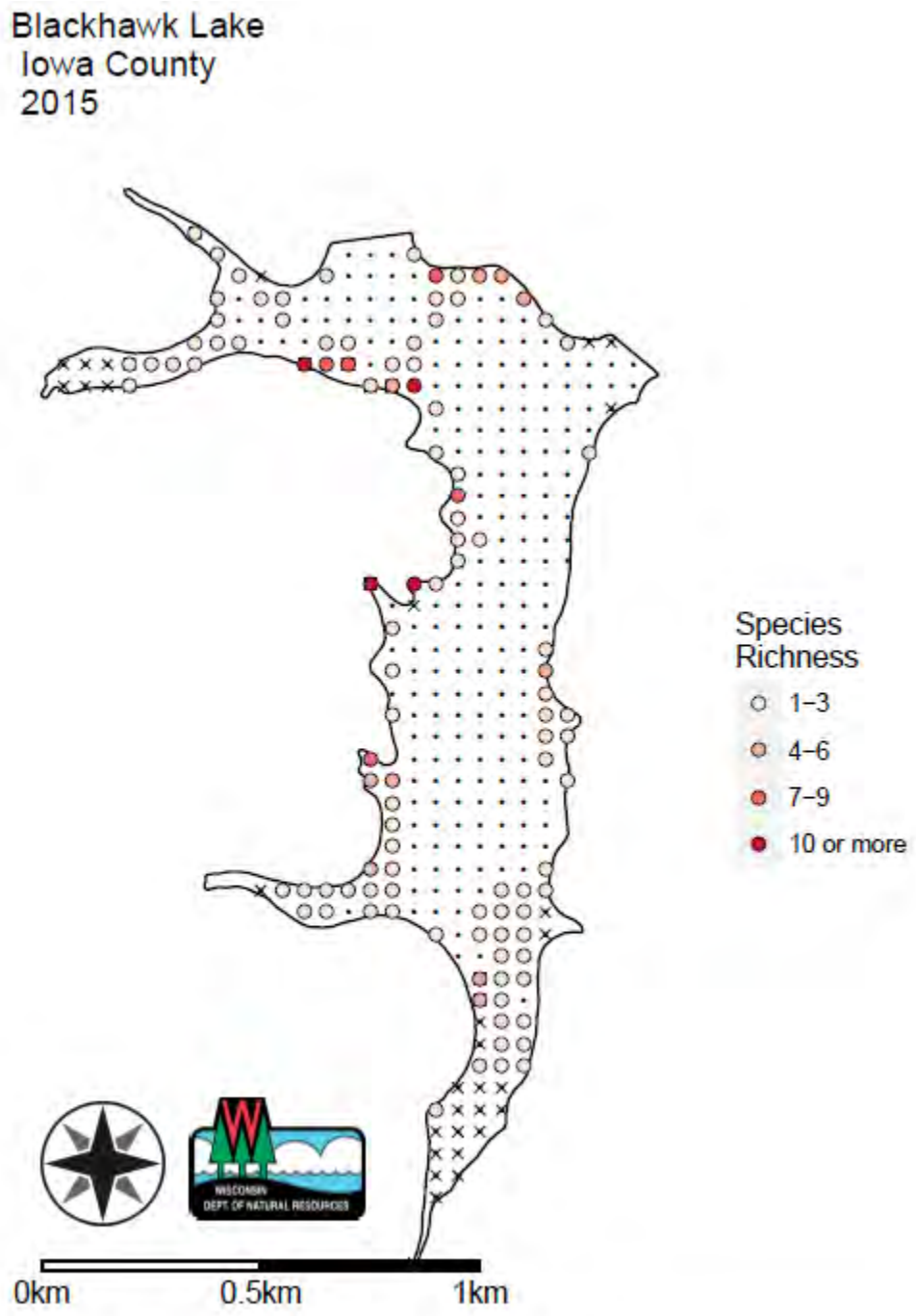


Blackhawk Lake
Iowa County
2015
Potamogeton pusillus

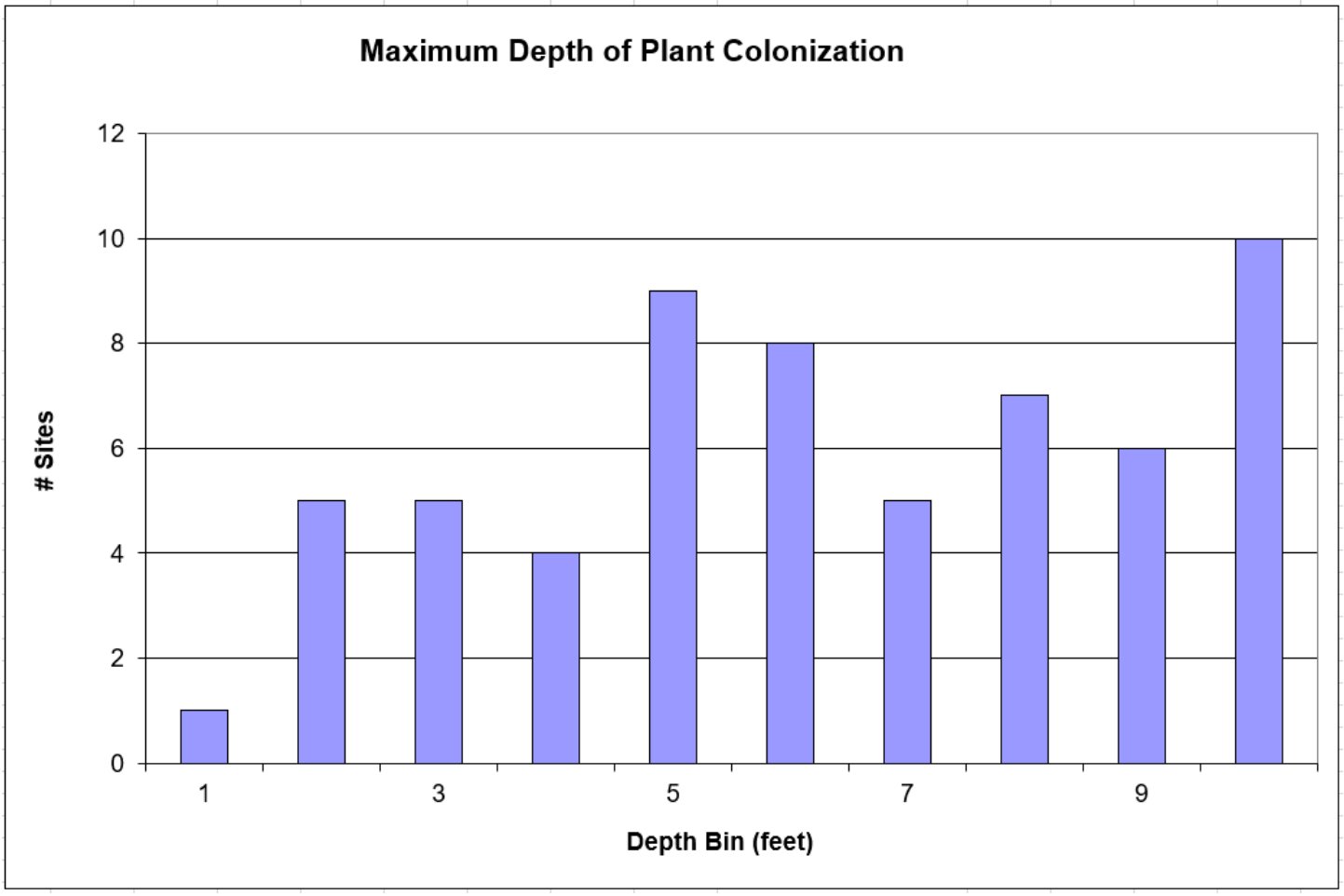


Blackhawk Lake
Iowa County
2015
Ranunculus aquatilis




Blackhawk Lake
Iowa County
2015
Species
Richness
1–3
4–6
7–9
10 or more
WISCONSIN
DEPT. OF NATURAL RESOURCES
0km
0.5km
1km

Blackhawk Lake Aquatic Plant Survey 2015



Appendix C
Aquatic Plant Management Permit, 2015

State of Wisconsin
DEPARTMENT OF NATURAL RESOURCES
3911 Fish Hatchery Road
Fitchburg WI 53711-5397

Scott Walker, Governor
Cathy Stepp, Secretary
Telephone 608-266-2621
Toll Free 1-888-936-7463
TTY Access via relay - 711

June 12, 2015

Cobb-Highland Recreation Commission
2025 County Rd BH
Highland, WI 53543

PERMIT# SC-2015-25-901

Subject: Aquatic Plant Management Permit for Blackhawk Lake, Iowa County

Dear Applicant:

Enclosed is your permit for chemical control of dense aquatic plants in .18 acres of Blackhawk Lake, Iowa County, Wisconsin. Your permit application has been reviewed and meets the minimum requirements by law and a permit is being issued. Issuance of the permit is not an endorsement or approval for the action authorized.

Permit Conditions:
Treatments are limited in area to protect native plants and shoreline habitat for animals that have been documented in the area. Treatment areas are intended to allow shorefishing for anglers, and reduce difficulties with navigation from the pier. Cattail control is allowed to help reclaim the beach area.

The following herbicides are not permitted for use in this pond: Clipper, fluridone products, and Hydrothol 191. Any herbicide selected must be applied at no higher than the label rate. A permit amendment must be issued by the department if any herbicide or applicator not already listed on the application form will be added.

The herbicide applicator must follow the disinfection protocol following the signature to reduce the possible spread of fish diseases.

Pesticide treatment area signs must identify the areas that are treated with chemicals, and remain posted for the duration of any use restrictions according to the chemicals used.

Supervision of this treatment is required. Please notify me via email at susan.graham@wisconsin.gov. I will be available to supervise any day from 6/23 to 6/26. If you would like to schedule a treatment date after this time period, please call or email to schedule a time.

The permit holder must submit form 3200-111 (available online), "Aquatic Plant Management Herbicide Treatment Record", for each treatment as follows:

1. **Immediately, if any unusual circumstances occur during the treatment.**
2. **Within 30 days, if treatment occurred.**
3. **By October 1 of this year, if no treatment occurred.**

Thank-you for complying with Chapter NR 107, Wisconsin Administrative Code concerning aquatic plant management.

Sincerely, Susan Graham

Susan Graham
Lake Management Coordinator
608-275-3329

c-copy. Gene Van Dyck, DNR Fisheries Manager
Donna Sefton, DFS Conservation Consulting
Mark Kordus, Stantec Consulting Services, Inc.

DISINFECTION PROTOCOL:

All equipment used for the project including but not limited to tracked vehicles, barges, boats, silt or turbidity curtain, hoses, sheet pile and pumps shall be de-contaminated for invasive species and viruses prior to use and after use. **Specific disinfection measures are required on all waters infected with Viral Hemorrhagic Septicemia (VHS) and must be taken prior to moving to another waterbody. The most current disinfection protocols along with a VHS-affected waters list can be found at the following website http://dnr.wi.gov/topic/fishing/vhs/vhs_prevent.html**

The following steps should be taken *every time* you move your equipment to avoid transporting invasive viruses and species. To the extent practicable, equipment and gear used on infested waters should not be used on other non-infested waters.

1. Inspect and remove aquatic plants, animals, and mud from your equipment.
2. Drain all water from your equipment, including but not limited to tracked vehicles, barges, boats, silt or turbidity curtain, hoses, sheet pile and pumps
3. Dispose of aquatic plants, animals in the trash. Never release or transfer aquatic plants, animals or water from one waterbody to another.
4. Wash your equipment with hot (>104° F) and/or high pressure water OR allow your equipment to dry thoroughly for 5 days OR follow a current disinfection protocol at the following website **http://dnr.wi.gov/topic/fishing/documents/vhs/disinfection_protocols.pdf**

State of Wisconsin DNR
DNR Department of Natural Resources
Water Permit Central Intake – attn. APM
PO Box 7185
Madison, WI 53707-7185

Chemical Aquatic Plant Control Application and Permit
Wisconsin Pollutant Discharge Elimination System (WPDES)
Pesticide Pollutant Permit Application

Form 3200-004 (R 03/13)

DNR Use Only	
ID Number: SC-2015-25-901	Permit Expiration Date: 10/1/2015
Waterbody #: 1239400	Fee Received: 20.00

Notice: Use of this form is required by the Department for any application filed pursuant to s. 281.17(2), Wis. Stats., and Chapters NR 107, 200 and 205, Wis. Adm. Code. This permit application is required to request coverage for pollutant discharge into waters of the state. Personally identifiable information on this form may be provided to requesters to the extent required by Wisconsin's Open Records Law [ss. 19.31-19.39, Wis. Stats.].

Section I – Applicant Information – Name of Permit Applicant. Also indicate names and addresses of all individuals, associations, communities or town sanitary districts sponsoring treatment. Attach additional sheets if necessary.

Home Address

Name: Cobb-Highland Recreation Commission
Street Address: 2025 County Rd BH
City: Highland | State: WI | ZIP Code: 53543

Lake Address

Name: Blackhawk Lake Recreation Area
Street Address:
City: | State: | ZIP Code:

Phone Number (include area code)
Primary: 623-2707 Secondary: 674-5573

Email Address: bhlake@mhtc.net

Section II – Aquatic Plant Control Location

Waterbody to be Treated (waterbody where treatment area is located): Blackhawk Lake

Lake Surface Area: 220 acres

Estimated Surface Area that is 10 Feet or Less in Depth: acres

County: Iowa | Section: 6 | Township: 7 N | Range: 2 ☒ E ☐ W

Latitude: 43.025654 | Longitude: -90.288626

Is the waterbody a private pond? ☐ Yes ☒ No

Does the waterbody have public access? ☒ Yes ☐ No

Adjacent Riparian Property Owner Names (attach sheets if necessary)

1.
2.
3.
4.
5.
6.
7.

Name of Lake Property Owners' Association Representative or Lake District Representative (if none, please indicate)

Name of Applicator or Firm: Stantec Consulting Services Inc.

Street or Route: 209 Commerce Pkwy, Po Box 128

City: Cottage Grove | State: WI | ZIP Code: 53527

County: Dane | Phone Number (include area code): 715-781-9976

Email Address: Mark.Kordus@stantec.com

Applicator Certification Number for Category 5 Aquatic Pesticide Application: 077803 James Schaal OK

Business Location License Number (if applicable): 93-8019357-014719 OK

Restricted Use Pesticide License Number (if applicable):

Area(s) Proposed for Control: (Note details in permit cover letter for final permitted sizes of treatment areas.)

	Treatment Length		Treatment Width			Estimated Acreage	Average Depth	
A.	400	ft. X	20	ft. ÷ 43,560 ft.² =		.18	3	ft.
B.		ft. X		ft. ÷ 43,560 ft.² =				ft.
C.		ft. X		ft. ÷ 43,560 ft.² =				ft.
D.		ft. X		ft. ÷ 43,560 ft.² =				ft.
E.		ft. X		ft. ÷ 43,560 ft.² =				ft.

Total Estimated Acres

Total from lines A - E:

Total from Attached Sheets:

Grand Total:

If the estimated acreage is greater than 10 acres, or is greater than 10 percent of the estimated area 10 feet or less in depth in Section II, complete and attach Form 3200-004A, Large-Scale Treatment Worksheet. Private pond treatments are exempted from this requirement.

Is this area within or adjacent to a sensitive area designated by the Department of Natural Resources?

☐ Yes ☒ No

DNR Use:
NHI Review? ☒ Yes ☐ No Describe:
No concerns.

MAY 13 2015

WT/3 - WV/3 - OGL/3

Section III – Fees

1. s. NR 107.11(1), Wis. Adm. Code, lists the conditions under which the permit fee is limited to the $20 minimum charge.
2. s. NR 107.11(4), Wis. Adm. Code, lists the uses that are exempt from permit requirements.
3. s. NR 107.04(2), Wis. Adm. Code, provides for a refund of acreage fees if the permit is denied or if no treatment occurs.
4. Fee calculations:

Basic Permit Fee (non-refundable) ..... $ 20.00

If proposed treatment is over 0.25 acre, calculate acreage fee:
(round up to nearest whole acre, to maximum of 50 acres.)

_____ acres X $25 per acre = $ _____

If proposed treatment is ≤ 0.25 acre, acreage fee is $0.

Enter Acreage Fee (from above) ..... _____

Total Fee Enclosed ..... $ 20.00

☑ **Site Map:** Attach a sketch or a printed map of lake indicating area and dimensions of each individual area where plant control is desired and flow of surface water outside treatment area. Also show location of property owners riparian to and adjacent to the treatment area. Attach a separate list of owners and corresponding treatment dimensions coded to the lake map, if necessary.

Section IV – Reasons for Aquatic Plant Control

Is this permit being requested in accordance with an approved Aquatic Plant Management Plan? ☒ Yes ☐ No

Treatment Type: ☒ Lake ☐ Pond ☐ Wetland ☐ Marina ☐ Other

Goal of Aquatic Plant Control:

- ☒ Reduce nuisance algae accumulation
- ☐ Maintain navigational channel for common use
- ☐ Maintain private access for boating
- ☐ Maintain private access for fishing
- ☒ Improve swimming
- ☐ Control of purple loosestrife
- ☐ Control of invasive exotics
- ☐ Other: _____

Nuisance Caused By:

- ☐ Algae
- ☒ Emergent water plants (majority of leaves and stems growing above water surface, e.g. cattails, bulrushes)
- ☐ Floating water plants (majority of leaves floating on water surface, e.g., waterlilies, duckweed)
- ☒ Submerged water plants (leaves and stems below water surface, flowering parts may be exposed, e.g., milfoil, coontail)
- ☐ Other: _____

List Target Plants

Note: Different plants require different chemicals for effective treatment. Do not purchase chemical before identifying plants.

Section V – Chemical Control

Alternatives to Chemical Control:	Feasible?	If No, Why Not?
1. Mechanical harvesting	☐ Yes ☒ No	No Labor Force
2. Hand pulling	☐ Yes ☒ No	
3. Hand raking	☐ Yes ☒ No	
4. Hand cutting	☐ Yes ☒ No	
5. Sediment screens/covers	☐ Yes ☒ No	
6. Dredging	☒ Yes ☐ No	
7. Lake drawdown	☐ Yes ☒ No	
8. Nutrient controls in watershed	☐ Yes ☒ No	
9. Other: _____	☐ Yes ☒ No	

Note: If proposed treatment involves multiple properties, consider feasibility of EACH alternative for EACH property owner.

If you checked yes to any of the alternatives listed above, please explain your decision to use chemical controls:

Section V – Chemical Control (continued)

Trade Name of Proposed Chemical(s)

Reward, Aquastrike, or other Wisconsin-registered diquat product.
Captain or other chelated copper product
Habitat

Method of Application: _____

Will surface water outflow and/or overflow be controlled to prevent chemical loss? ☒ Yes ☐ No

Have the proposed chemicals been permitted in a prior year on the proposed site? ☐ All ☐ Some ☒ None

What were the results of the treatment?

Note: Chemical fact sheets for aquatic pesticides used in Wisconsin are available from the Department of Natural Resources upon request.

Section VI – Applicant Responsibilities and Certification

1. The applicant has prepared a detailed map which shows the length, width and average depth of each area proposed for the control of rooted vegetation and the surface area in acres or square feet for each proposed algae treatment.
2. The applicant understands that the Department of Natural Resources may require supervision of any aquatic plant management project involving chemicals. Under s. NR 107.07, Wis. Adm. Code, supervision may include inspection of the proposed treatment area, chemicals and application equipment before, during or after treatment. The applicant is required to notify the regional office 4 working days in advance of each anticipated treatment with the date, time, location and size of treatment unless the Department waives this requirement. Do you request the Department to waive the advance notification requirement? ☒ Yes ☐ No
3. The applicant agrees to comply with all terms or conditions of this permit, if issued, as well as all provisions of Chapter NR 107, Wis. Adm. Code. The required application fee is attached.
4. The applicant has provided a copy of the current application to any affected property owners' association, inland lake district and, in the case of chemical applications for rooted aquatic plants, to all owners of property riparian or adjacent to the treatment area. The applicant has also provided a copy of the current chemical fact sheet for the chemicals proposed for use to any affected property owner's association or inland lake district.

☒ Check if you are signing as Agent for Applicant.

I hereby certify that the above information is true and correct and that copies of this application have been provided to the appropriate parties named in Section II and that the conditions of the permit and pesticide use will be adhered to.

Dan Wehrle — Signature of Applicant

5/9/2018 — Date Signed

All portions of this permit, map and accompanying cover letter must be in possession of the chemical applicator at time of treatment. During treatment all provisions of Chapter NR 107, specifically ss. NR 107.07 and NR 107.08, Wis. Adm. Code, must be complied with, as well as the specific conditions contained in the permit cover letter.

Section VII – WPDES Permit Request

Is WPDES coverage being requested? Refer to http://dnr.wi.gov/topic/wastewater/aquaticpesticides.html for more information.

☐ No: ☐ Already have WPDES coverage until Sept. 2016
☐ WPDES coverage not needed

☑ Yes – complete section VII with signature

Select which permit you are requesting:
☒ WI-0064556-1 Aquatic Plants, Algae & Bacteria
☐ WI-0064564-1 Aquatic Animals
☐ WI-0064581-1 Mosquitoes & other Flying Insects

Indicate WPDES permittee responsible for the pollutant discharge: ☐ Applicator ☒ Sponsor

Do you expect the pest control activity will result in a detectable pollutant discharge to waters of the state beyond the treatment area boundary or a pollutant residual in waters of the state after the treatment project is completed? ☐ Yes ☐ No

If yes, identify the pollutant(s): _____

Are you planning to incorporate integrated pest management principles, as specified in the WPDES permit, into your pest control activity to minimize any pollutant residual or pollutant discharge beyond the treatment area? ☐ Yes ☐ No

Type of WPDES coverage being requested: ☐ One Treatment Site ☐ Statewide Coverage

For informational purposes, select areas of WI for most of your aquatic treatments: ☐ NW ☐ NE ☐ SW ☐ SE

Is WPDES coverage being requested for more than 1 year?
☑ Yes ☐ No If yes, the permittee will remain in "active" WPDES status until a Notice of Termination is submitted.

I hereby certify that I am the authorized representative (as specified in Ch. NR 205.07(1)(g), Wis. Adm. Code) of the pest treatment activity which is the subject of this permit application. I certify that the information contained in this form and attachments is, to the best of my knowledge, true, accurate and complete.

Dan Welsh — Signature of Authorized Representative
Dan Welsh — Printed Name
5/11/2015 — Date Signed

Section VIII – Permit to Carry Out Chemical Treatment (Leave Blank – DNR Use Only)

The foregoing application is approved. Permission is hereby granted to the applicant to chemically treat the waters described in the application during the season of 20 15

Application fee received? ☒ Yes ☐ No

Advance notification of treatment required? ☒ Yes ☐ No

Complete 6/12/15 SM

State of Wisconsin
Department of Natural Resources
For the Secretary

By Susan Graham
Regional Director or Designee

6/12/15 — Date Signed
6/12/15 via email — Date Mailed

Please Note:

If you believe that you have a right to challenge this decision, you should know that Wisconsin statutes and administrative rules establish time periods within which requests to review Department decisions must be filed.

For judicial review of a decision pursuant to ss. 227.52 and 227.53, Wis. Stats., you have 30 days after the decision is mailed or otherwise served by the Department, to file your petition with the appropriate circuit court and serve the petition on the Department. Such a petition for judicial review shall name the Department of Natural Resources as the respondent.

This notice is provided pursuant to s. 227.48(2), Wis. Stats.

To request a contested case hearing pursuant to s. 227.42, Wis. Stats., you have 30 days after the decision is mailed, or otherwise served by the Department, to serve a petition for hearing on the Secretary of the Department of Natural Resources. The filing of a request for a contested case hearing is not a prerequisite for judicial review and does not extend the 30-day period for filing a petition for judicial review.


Area of Cattail Removal
Chemical Weed Control Area
Chemical Weed Control Area

Appendix 3
Blackhawk L AIS Education, Prevention, and Planning Grant (AEPP-410-14) Annual Report, 2016

BLACKHAWK LAKE AQUATIC INVASIVE SPECIES EDUCATION, PREVENTION & PLANNING GRANT (AEPP-410-14) 2016 REPORT
January 2017

Water Quality Monitoring 2016

Blackhawk Lake was monitored by DFS Conservation Consulting for Secchi disk transparency on 8 dates in 2016 (4/19, 5/8, 5/20, 6/3, 6/24, 7/19, 8/2, 8/14, and 9/11/16), for phosphorus on 5/8/16, and for phosphorus and chlorophyll on 6/24, 7/18, and 8/14/16. Data was entered into DNR's Surface Water Integrated Monitoring System (SWIMS). The 2016 water quality data and report, as well as Secchi disk transparency and Trophic State Index (TSI) comparisons from 1997 – 2016 are found in Appendix A.

The water clarity of Blackhawk Lake was 5.5 – 6.5 feet during spring turnover in April and early May, 2016, when it was rainy and windy. From May 20 through June 24, the clarity was excellent, ranging from 20 feet to 29.5 feet. Perception of water quality was "Excellent, could not be any better." By July 19, the Secchi was reduced to 10.5 feet. In August and September, the Secchi ranged from 2.5 – 4 feet, when there was a rainy and windy period. The average summer (July – August) Secchi was 5.83 feet, less than half of what it was in 2015 (12.38 feet). It was still more than the average for the Southwest Georegion in 2016 (4.1 feet). Small green algae were visible in the water as aquatic plants decayed and released nutrients to feed algal growth as summer progressed. There was no evidence of potentially toxic blue-green algae such as *Aphanizomenon, Anabaena*, or *Microcystis* that could be recognized in the field.

The average summer chlorophyll (indicating the amount of algae suspended in the water) was 27.1 ug/L as compared to a Southwest Georegion average of 43.7 ug/L. The summer total phosphorus (a nutrient to feed algae growth) was 27.6 ug/L. Impoundments that have more than 30 ug/L total phosphorus may experience noticeable algae blooms.

The average Trophic State Index (based on chlorophyll, indicating the amount of algae suspended in the water) during July and August was 60, indicating the lake was eutrophic. The TSI based on Secchi was slightly eutrophic in April – early May, mesotrophic from mid-May – July, and eutrophic in August and September. This pattern was the same for chlorophyll. Based on total phosphorus, the TSI was slightly eutrophic throughout the year.

Until mid-summer, the water at Blackhawk Lake is usually clearer than would be expected based on the phosphorus and chlorophyll. Two major factors may be contributing to this: 1) zooplankton grazing on the algae and 2) abundant aquatic plant growth and filamentous algae out-competing the planktonic algae for the nutrients. When the plants and filamentous algae die off beginning in mid-summer, the nutrients are released to promote planktonic algae growth.

Aquatic Plant Monitoring 2016

Visual and rake boat surveys for *Myriophyllum spicatum* (Eurasian Watermilfoil or EWM) were conducted on 4/19, 5/8, 5/20, 6/3, 6/24, 7/19, 8/2, 8/14, and 9/11/16. Photos were taken and the aquatic plants were noted. No Eurasian watermilfoil was found. The predominant plants in the deeper water and sand ridge were *Potamogen crispus* (curly-leaf pondweed, mostly decayed by mid-July), *P. puscillus* (slender pondweed), *Ceratophyllum demersum* (coontail), and filamentous algae. *Stuckenia pectinata* (sago pondweed), *Ranunculus aquatilis* (white water crowfoot), *Heteranthera dubia* (water stargrass), *P. foliosus (leafy pondweed), Elodea canadensis* (common waterweed), coontail, *Chara* (muskgrass), and *P. zosteriformis* (flat-stem pondweed) were common in the shallower areas.

The visual survey done on 5/20/16 found aquatic plant growth in shallower areas of Pontoon Bay and around the concession dock, fishing pier, and beach more abundant than in previous years at that time. Much of the curly-leaf pondweed had senesced by mid-July and many of the remaining plants (except for water stargrass) had senesced by the end of August.

4/19/16 Water Quality and Aquatic Plants

Coontail

Elodea

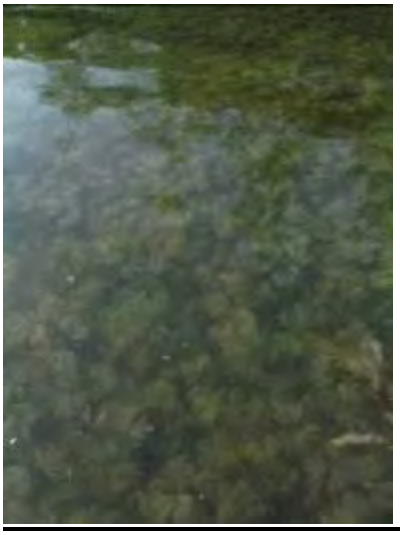
Chara

Elodea, curly-leaf, water crowfoot near concession dock

Leafy pondweed,concession dock

Water stargrass near concession dock

5/8/16 Water Quality and Aquatic Plants

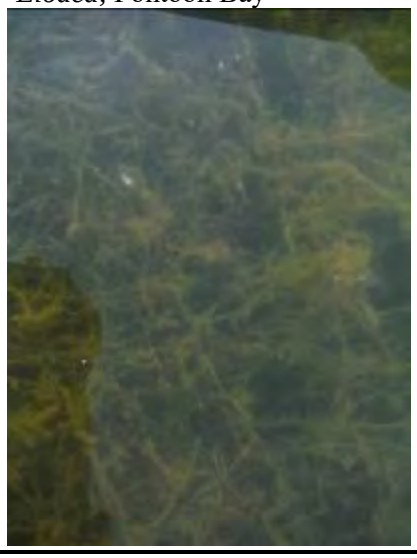


Water crowfoot, Pontoon Bay

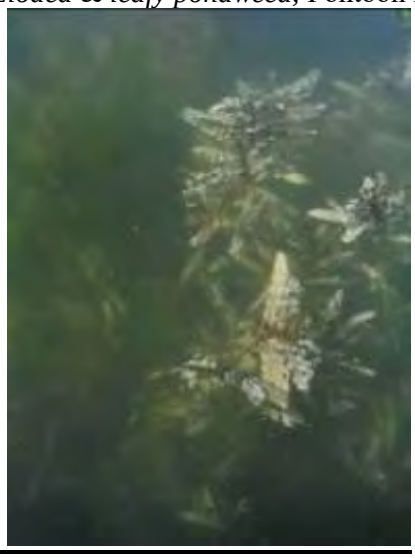
Elodea, Pontoon Bay

Elodea & leafy pondweed, Pontoon Bay

Leafy pondweed, Pontoon Bay



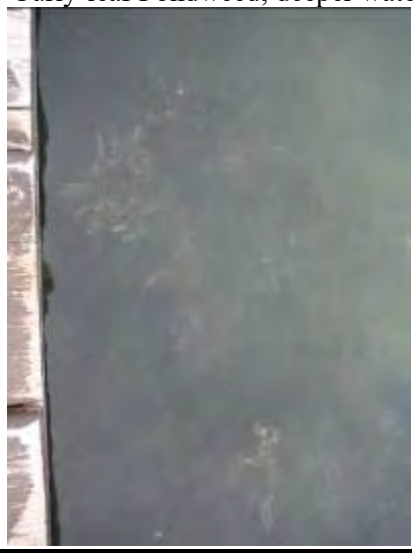
Water stargrass, Pontoon Bay



Curly-leaf Pondweed, deeper water

Water crowfoot, fishing pier N side

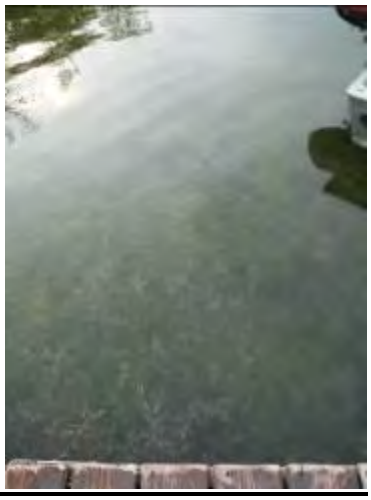
Water crowfoot, fishing pier S side



Curly-leaf pondweed fishing pier deep

Concession dock

Water crowfoot concession



Water crowfoot & CLP concession

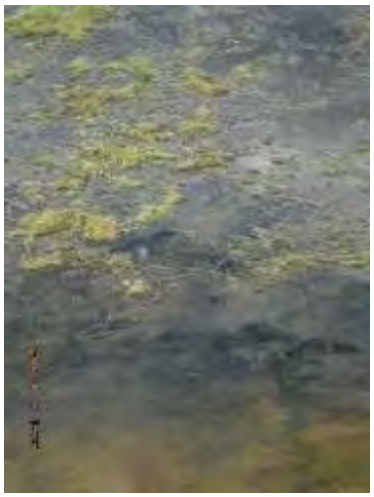
Chara

Leafy pondweed

Water stargrass

6/3/16 Water Quality and Aquatic Plants

S. half of beach



Close-up of plants in beach area

Beach area

N. side of beach (toward fish pier)

Plant growth off fishing pier

N side of concession dock

S side of concession dock

Boats moored right side dock

N. side of concession dock

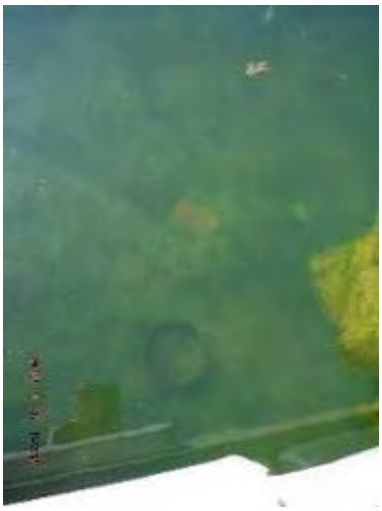
Deeper end of concession dock

Water stargrass near dock

6/24/16 Water Quality and Aquatic Plants

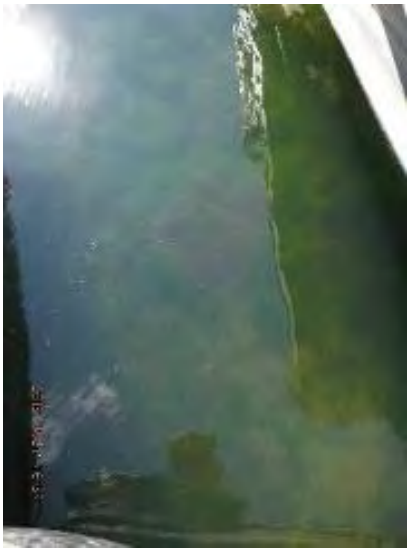

Boat concession area


Concession dock out from shore


Near end of concession dock


S side of concession dock


N side of concession dock


N side of concession dock


Fishing pier N side


Fishing pier S. side


End of fishing pier

Beach looking south

S side of beach where previously a lot of vegetation

Sand ridge filamentous algae

Plants sand ridge & NNE shallows

P. puscillus (slender pw),sand ridge

Slender pondweed sand ridge

Sago & slender pondweed

Plants sand ridge & NNE shallows

8/14/16 Water Quality and Aquatic Plants

Secchi clarity = 4’

Plants S side concession dock

Clarity end of concession dock

Fishing pier

Duckweed near shore fishing pier

Beach, looking S from fishing pier

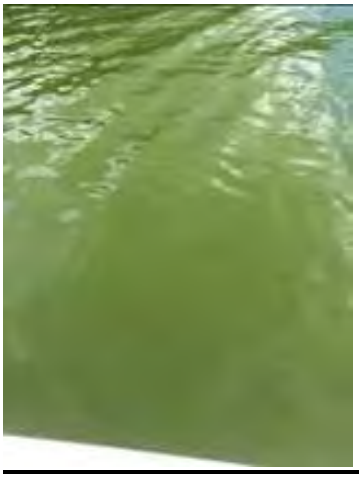
Beach, southern 1/3

Coontail & duckweed on beach

Duckweed on beach

Boat launch

8/21/16 Water Quality and Aquatic Plants



Deep hole, right dam

Great Blue Heron, E shore

Left dam

Pontoon Bay

Deep end of fishing pier

Water stargrass & floating-leaf pondweed fishing pier

Beach looking N

Beach looking north

Concession dock

Aquatic Plant Management in 2016

No Eurasian Water Milfoil was found in 2016. A visual survey done on 5/20/16 found more abundant aquatic plant growth (especially in shallower areas of Pontoon Bay and around the concession dock, fishing pier, and beach) than in previous years. The Blackhawk Lake Recreation Area applied for a permit for chemical treatment. The permit was issued on 5/23/16 (Appendix B). The areas around the concession dock, fishing pier, and beach (mostly deeper water) were chemically treated by Wisconsin Lake and Pond Resource on 5/24/16 from the deeper water towards shore so as not to stir up the sediment in the shallow water. The chemicals approved for the treatment were Aquastrike, Diquat, or Captain.

There was still abundant plant growth in the shallower areas on 6/3/16. The southern 1/3 of the beach (the area reclaimed) was virtually unusable. The treatment stressed the curly-leaf pondweed and slender pondweed toward the ends of the concession dock and fishing pier, but it had little effect on plants in the shallower areas where boats need to navigate and where people fish. The white water crowfoot, coontail, and *Elodea* are relatively low growing, but can be a nuisance in the shallow water where the smaller boats are docked. Water stargrass and *Potamogeton foliosus* (leafy pondweed) were coming up around the docks. They can be a nuisance and wrap around the props later in the season.

Another treatment was recommended, this time making sure the herbicide reached areas closer to shore. The treatment was done by Wisconsin Lake and Pond Resource on 6/9/16.

Plants were substantially reduced around the boat concession dock, end of the fishing pier, and beach by 6/24/16. Plants were no longer a nuisance for getting boats in and out, for fishing, or for swimming. There was still a lot of plant growth and filamentous algae in the shallower areas around the fishing pier and concession dock.

A visual survey on 7/19/16 found few aquatic plants at the concession dock, the deeper area of the fishing pier, the northern 2/3 of the beach. There was abundant water stargrass, leafy pondweed, and sago pondweed on the sides of the fishing pier and in the shallows. Slender pondweed covered with filamentous algae was abundant in the deeper areas of the sand ridge and deeper areas around the shoreline. *Chara*, water stargrass, and leafy pondweed were common in the shallows of the sand ridge near the left dam.

By 8/14/16, the Secchi disk clarity was reduced to 4 feet and there was abundant decaying, smelly duckweed and other aquatic plants near shore. The south 1/3 of the beach had vegetation and green algae, but there was no evidence of potentially toxic blue-green algae (*Aphanizomenon, Microcystis, or Anabaena*). Many of the

plants in the deeper water had senesced. On 8/21/16, the Secchi disk clarity was 3 feet and the plant growth was similar to that on 8/14/16.

The Secchi was reduced to 2.5 feet on 9/11/16 and the water was brown with sediment. There had been over 4 inches of rain in the previous few days. There was little plant growth anywhere.

Recommendations for Aquatic Plant Management in 2017

The herbicides and dosages to be used for the treatments should be evaluated based on the effectiveness of the treatments in 2016. Filamentous algae should also be treated to reduce the nuisance they create and to increase the effectiveness of the chemicals on the macrophytes. Two treatments should be planned, one in mid- to later May, and another in early June (if needed). The areas to be treated and methods (e.g., spraying from deeper water as far in toward shore as possible) should be similar to those used in 2016.

Clean Boats, Clean Waters

Abundant plants were found on motors, boats, and trailers from May - July, The Southwest Badger Resource and Development Council put a priority on Clean Lakes, Clean Waters watercraft inspections and education at the Blackhawk Lake boat landing in 2016. DFS Conservation Consulting also did watercraft inspections and educational activities at the lake as the opportunity arose when they were sampling. Eurasian Water Milfoil has not been found in the lake since 2011 and the inspections and educational activities are important to protecting the lake from EWM and other aquatic invasive species.

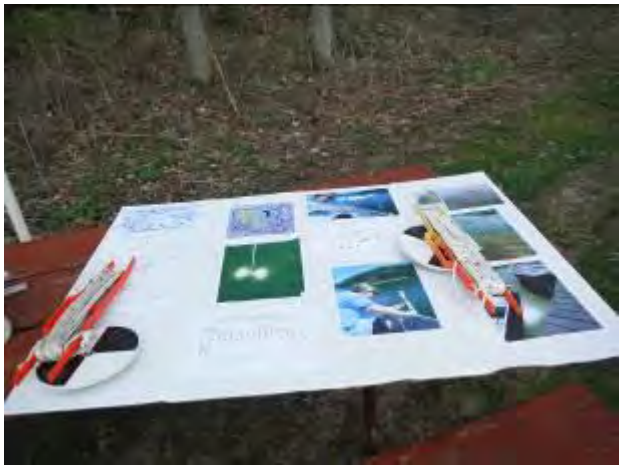
Brochures on Eurasian water milfoil and aquatic invasive species were available in a prominent place at the front desk in the office.

Education and Outreach

Educational Workshops for Highland Schools

DFS Conservation Consulting conducted educational workshops on water quality and aquatic invasive species for approximately 100 Highland Middle School students on 4/19/16. Students enjoyed the hands-on workshops and learned much as shown in the photos below.

Aquatic Invasive Species workshop & presenter

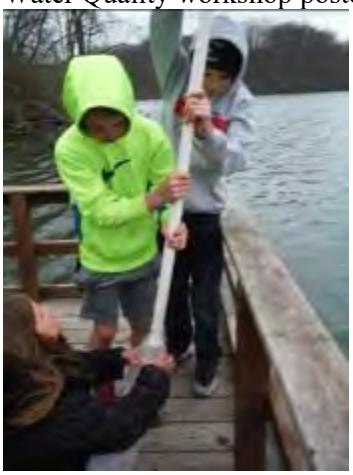


Water Quality workshop poster board

Water Quality workshop poster & Secchi disk

Secchi & integrated sampler

Using integrated sampler



Using integrated sampler

Using Secchi disk to measure water clarity

Preparing to monitor the lake & do aquatic plant surveys

Wisconsin Lakes Convention 2017

DFS Conservation Consulting submitted an abstract for a presentation on the Blackhawk Lake Aquatic Invasive Species Education, Prevention, and Planning project at the Wisconsin Lakes Convention in April 2017 (Appendix C). The abstract was accepted for a 20-minute presentation.

Appendix A
2016 Water Quality Data

	70s- mostly clear- calm to slight breeze; abundant curly-leaf pondweed into deeper water- no EWM; water buttercup- Elodea- Chara- sago pondweed in shallows - more plant growth than usual. Lot of CLP in beach area.
06/03/2016	Lots of plants still around concession dock- beach + fishing pier following treatment. Curly-leaf pondweed dying- Ranunculus stressed- rest of aquatic plants still ok (water stargrass- elodea- P. foliosus- which is abundant in shallows).
06/23/2016	Clear- slight breeze- 85- no EWM- sago in deeper water- some algae. Chemical treatment worked around concession- fishing pier- and beach.
07/19/2016	Party cloudy- 80- slight breeze- no EWM- small green algae in water. Treatment areas around concession dock- outer edge of fishing pier- beach worked well. Some P. foliosus- water stargrass + sago pondweed in shallower areas at concession dock. P. foliosus abundant in shallower areas of fishing pier. Chara- water stargrass- and P. folisus abundant in non treated near shore areas. Mostly sago pondweed on sand ridge.
08/14/2016	Lots of decaying duckweed near shore- smelly. South 1/3 of beach has vegetation + duckweed. Lots of small (green) algae in water- no really obvious blue-green colonies (Aphanizomenon- Microcystis- Anabaena).
08/21/2016	70's- partly sunny- breezy. Water green with small green algae visible- but no obvious blue-green colonies (Aphanizomenon- Microcystic- Anabaena). Most of aquatic plants senesced. South 1/3 of beach still some plants + muck. Duckweed near shore.
09/11/2016	70s. slight breeze- 4+ in. rain in last few days. Water brown from sediment- few aquatic plants or algae.

Date	Data Collectors	Project
04/19/2016	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake
05/01/2016	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake
05/20/2016	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake
06/03/2016	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake
06/23/2016	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake
07/19/2016	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake
08/14/2016	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake
08/21/2016	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake
09/11/2016	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake

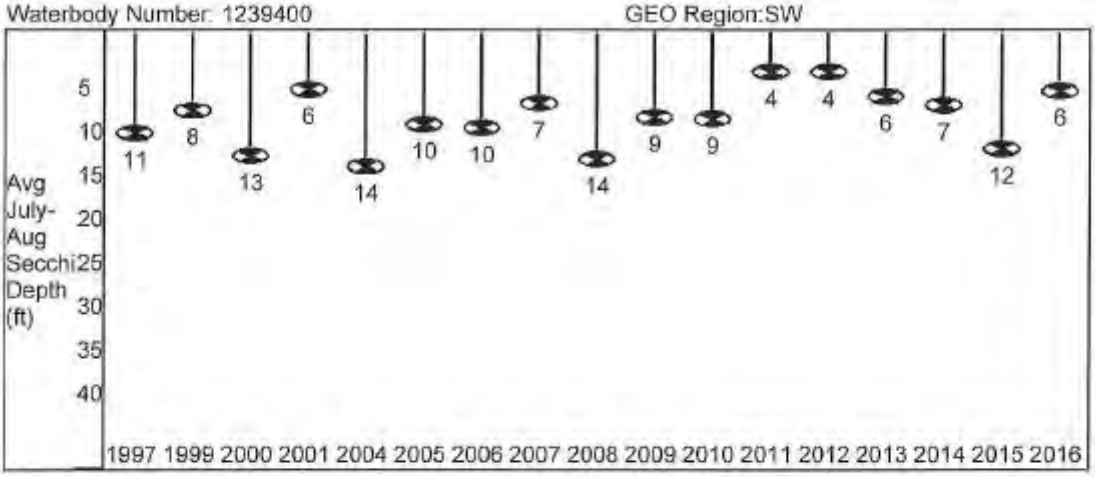
SD = Secchi depth measured in feet converted to meters; Chl = Chlorophyll a in micrograms per liter(ug/l); TP = Total phosphorus in ug/l, surface sample only; TSI(SD), TSI(CHL), TSI(TP) = Trophic state index based on SD, CHL, TP respectively; Depth measured in feet.

Wisconsin Department of Natural Resources **Wisconsin Lakes Partnership**

Report Generated: 12/13/2016

Blackhawk Lake
Iowa County
Waterbody Number: 1239400

Lake Type: DRAINAGE
DNR Region: SC
GEO Region:SW



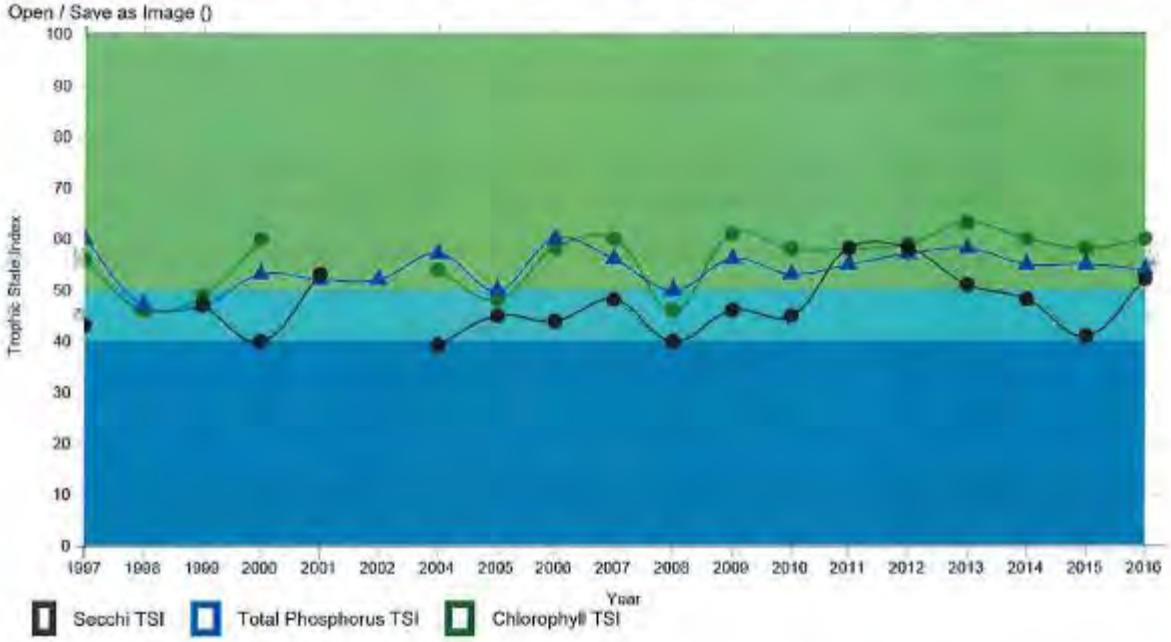
Past secchi averages in feet (July and August only).

Year	Secchi Mean	Secchi Min	Secchi Max	Secchi Count
1997	10.63	6.75	14.5	2
1999	8	8	8	1
2000	13.2	2	19	5
2001	5.5	5.5	5.5	3
2004	14.3	14.3	14.3	2
2005	9.5	8.5	10.5	2
2006	10	8	13	5
2007	7.29	3	18	12
2008	13.56	12.25	15	4
2009	8.75	4	15.75	6
2010	9	4.5	17	5
2011	3.67	3	5	3
2012	3.67	3	4	3
2013	6.33	3	10	3
2014	7.33	3	14	3
2015	12.38	7	17	4
2016	5.83	3	10.5	3

Report Generated: 12/13/2016

Trophic State Index Graph: Black Hawk Lake - Deep Hole, Iowa County

Open / Save as Image ()



Past Summer (July-August) Trophic State Index (TSI) averages.

TSI(Chl) = TSI(TP) = TSI (Sec)	It is likely that algae dominate light attenuation.
TSI(Chl) > TSI(Sec)	Large particulates, such as Aphanizomenon flakes dominate
TSI(TP) = TSI(Sec) > TSI (Chl)	Non-algal particulate or color dominate light attenuation
TSI(Sec) = TSI(Chl) >= TSI (TP)	The algae biomass in your lake is limited by phosphorus
TSI(TP) > TSI(Chl) = TSI (Sec)	Zooplankton grazing, nitrogen, or some factor other than phosphorus is limiting algae biomass

TSI	TSI Description
TSI < 30	Classical oligotrophy: clear water, many algal species, oxygen throughout the year in bottom water, cold water, oxygen-sensitive fish species in deep lakes. Excellent water quality.

Wisconsin Department of Natural Resources

Black Hawk Lake - Deep Hole 2016 Results

Black Hawk Lake - Deep Hole was sampled **10** different days during the 2016 season. Parameters sampled included:

- water clarity
- total phosphorus
- chlorophyll

The average summer (July-Aug) secchi disk reading for Black Hawk Lake - Deep Hole (Iowa County, WBIC: 1239400) was 5.83 feet. The average for the Southwest Georegion was 4.1 feet. Typically the summer (July-Aug) water was reported as **MURKY** and **GREEN**. This suggests that the secchi depth may be mostly impacted by algae. Algal blooms are generally considered to decrease the aesthetic appeal of a lake because people prefer clearer water to swim in and look at. Algae are always present in a balanced lake ecosystem. They are the photosynthetic basis of the food web. Algae are eaten by zooplankton, which are in turn eaten by fish. You will know algae are causing reduced Secchi depth if the water generally appears green when you assess the color against the white background of the secchi disc.

Chemistry data was collected on Black Hawk Lake - Deep Hole. The average summer Chlorophyll was 27.1 µg/l (compared to a Southwest Georegion summer average of 43.7 µg/l). The summer Total Phosphorus average was 27.6 µg/l. Lakes that have more than 20 µg/l and impoundments that have more than 30 µg/l of total phosphorus may experience noticable algae blooms.

The overall Trophic State Index (based on chlorophyll) for Black Hawk Lake - Deep Hole was 60. The TSI suggests that Black Hawk Lake - Deep Hole was **eutrophic**. This TSI usually suggests decreased clarity, fewer algal species, oxygen-depleted bottom waters during the summer, plant overgrowth evident, warm-water fisheries (pike, perch, bass, etc.) only.

Appendix B
2016 Aquatic Plant Management Permit

State of Wisconsin
DEPARTMENT OF NATURAL RESOURCES
3911 Fish Hatchery Road
Fitchburg WI 53711-5397

Scott Walker, Governor
Cathy Stepp, Secretary
Telephone 608-266-2621
Toll Free 1-888-936-7463
TTY Access via relay - 711

WISCONSIN DEPT. OF NATURAL RESOURCES

May 23, 2016

PERMIT# SC-2016-25-419

Cobb-Highland Recreation Commission
2025 County Rd BH
Highland, WI 53543
(permit sent via email to bhlake@mhtc.net)

Subject: Aquatic Plant Management Permit for Blackhawk Lake, Iowa County

Dear Applicant:

Enclosed is your permit for chemical control of dense aquatic plants in 1 acre of Blackhawk Lake, Iowa County, Wisconsin. Your permit application has been reviewed and meets the minimum requirements by law and a permit is being issued. Issuance of the permit is not an endorsement or approval for the action authorized.

Permit Conditions:

1. Treatments are limited in area to protect native plants and shoreline habitat for animals that have been documented in the area. Treatment areas are intended to allow shorefishing for anglers, and reduce difficulties with navigation from the pier. Cattail control is allowed to help reclaim the beach area.

2. The following herbicides are not permitted for use in this pond: Clipper, fluridone products, Hydrothol 191 and copper products. There is no evidence that an application of clipper and diquat (or clipper alone) is more effective or longer lasting than only diquat. Captain isn't needed because there is no problem with filamentous algae here.

   Diquat is approved for use at the label rate for the treatment area where the average depth is 2 feet. (1 gallon per surface acre). A permit amendment must be issued by the department if any herbicide or applicator not already listed on the application form will be added.

   Diquat is inactivated when it comes in contact with sediment, so a boat propeller stirring up the sediment in an area to be treated is counter-productive, and could be the reason the treatment didn't work very well last year. This year, the applicator should operate the boat in at least 3' of water, and spray toward shore. This will put the diquat where it's needed without stirring up the bottom.

3. The herbicide applicator must follow the disinfection protocol following the signature to reduce the possible spread of fish diseases or other invasive species.

4. Pesticide treatment area signs must identify the areas that are treated with chemicals, and remain posted for the duration of any use restrictions according to the chemicals used.

5. Supervision of this treatment is required. Please notify me via email at susan.graham@wisconsin.gov to coordinate a date and time.

6. The permit holder must submit form 3200-111 (available online), "Aquatic Plant Management Herbicide Treatment Record", for each treatment as follows:

   1. **Immediately, if any unusual circumstances occur during the treatment.**

2. **Within 30 days, if treatment occurred.**
3. **By October 1 of this year, if no treatment occurred.**

Thank-you for complying with Chapter NR 107, Wisconsin Administrative Code concerning aquatic plant management.

Sincerely,

Susan Graham

Susan Graham
Lake Management Coordinator
608-275-3329

e-copy. Gene Van Dyck, DNR Fisheries Manager
Donna Sefton, DFS Conservation Consulting
Mark Kordus, Stantec Consulting Services, Inc.

DISINFECTION PROTOCOL:

All equipment used for the project including but not limited to tracked vehicles, barges, boats, silt or turbidity curtain, hoses, sheet pile and pumps shall be de-contaminated for invasive species and viruses prior to use and after use. **Specific disinfection measures are required on all waters infected with Viral Hemorrhagic Septicemia (VHS) and must be taken prior to moving to another waterbody. The most current disinfection protocols along with a VHS-affected waters list can be found at the following website http://dnr.wi.gov/topic/fishing/vhs/vhs_prevent.html**

The following steps should be taken *every time* you move your equipment to avoid transporting invasive viruses and species. To the extent practicable, equipment and gear used on infested waters should not be used on other non-infested waters.

1. Inspect and remove aquatic plants, animals, and mud from your equipment.
2. Drain all water from your equipment, including but not limited to tracked vehicles, barges, boats, silt or turbidity curtain, hoses, sheet pile and pumps
3. Dispose of aquatic plants, animals in the trash. Never release or transfer aquatic plants, animals or water from one waterbody to another.
4. Wash your equipment with hot (>104° F) and/or high pressure water OR allow your equipment to dry thoroughly for 5 days OR follow a current disinfection protocol at the following website **http://dnr.wi.gov/topic/fishing/documents/vhs/disinfection_protocols.pdf**

Save... Print... Clear Data

State of Wisconsin DNR
DNR Department of Natural Resources
Water Permit Central Intake -- attn. APM
PO Box 7185
Madison, WI 53707-7185

Chemical Aquatic Plant Control Application and Permit
Wisconsin Pollutant Discharge Elimination System (WPDES)
Pesticide Pollutant Permit Application

Form 3200-004 (R 03/13)

Notice: Use of this form is required by the Department for any application filed pursuant to s. 281.17(2), Wis. Stats., and Chapters NR 107, 200 and 205, Wis. Adm. Code. This permit application is required to request coverage for pollutant discharge into waters of the state. Personally identifiable information on this form may be provided to requesters to the extent required by Wisconsin's Open Records Law [ss. 19.31-19.39, Wis. Stats.].

DNR Use Only	
ID Number: SC-2016-25-419	Permit Expiration Date: 10/1/16
Waterbody #:	Fee Received: 45 -

Section I – Applicant Information – Name of Permit Applicant. Also indicate names and addresses of all individuals, associations, communities or town sanitary districts sponsoring treatment. Attach additional sheets if necessary.

Home Address

Name: Cobb-Highland Recreation Commission
Street Address: 2025 County Rd BH
City: Highland | State: WI | ZIP Code: 53543

Lake Address

Name: Blackhawk Lake Recreation Area
Street Address: 2025 County Rd BH
City: Highland | State: WI | ZIP Code: 53543

Phone Number (include area code)
Primary: 608-623-2707 Secondary: 608-574-5573

Email Address: bhlake@mhtc.net

Section II – Aquatic Plant Control Location

Waterbody to be Treated (waterbody where treatment area is located): Blackhawk Lake

Lake Surface Area: 220 acres

Estimated Surface Area that is 10 Feet or Less in Depth: acres

County: Iowa | Section: 6 | Township: 7 N | Range: 2 ☒ E ☐ W

Name of Applicator or Firm: Wisconsin Lake and Pond Resource

Latitude: 43.025654 | Longitude: -90.288626

Street or Route:

Is the waterbody a private pond? ☐ Yes ☒ No

Does the waterbody have public access? ☒ Yes ☐ No

City: Eldorado | State: WI | ZIP Code:

Adjacent Riparian Property Owner Names (attach sheets if necessary)

1.
2.
3.
4.
5.
6.
7.

County: | Phone Number (include area code):

Email Address: Mark@WisconsinLPR.com

Applicator Certification Number for Category 5 Aquatic Pesticide Application: JS 7803 + MK 82178 OK

Business Location License Number (if applicable): 93-015182-012226 OK

Name of Lake Property Owners' Association Representative or Lake District Representative (if none, please indicate):

Restricted Use Pesticide License Number (if applicable):

Area(s) Proposed for Control: (Note details in permit cover letter for final permitted sizes of treatment areas.)

	Treatment Length		Treatment Width		Estimated Acreage	Average Depth
A.	400 ft.	X	20 ft.	÷ 43,560 ft.² =	.18	3 ft.
B.	____ ft.	X	____ ft.	÷ 43,560 ft.² =	____	____ ft.
C.	____ ft.	X	____ ft.	÷ 43,560 ft.² =	____	____ ft.
D.	____ ft.	X	____ ft.	÷ 43,560 ft.² =	____	____ ft.
E.	____ ft.	X	____ ft.	÷ 43,560 ft.² =	____	____ ft.

Total Estimated Acres

Total from lines A - E: ____

Total from Attached Sheets: ____

Grand Total: ____

If the estimated acreage is greater than 10 acres, or is greater than 10 percent of the estimated area 10 feet or less in depth in Section II, complete and attach Form 3200-004A, Large-Scale Treatment Worksheet. Private pond treatments are exempted from this requirement.

Is this area within or adjacent to a sensitive area designated by the Department of Natural Resources?

☐ Yes ☒ No

DNR Use:

NHI Review? ☒ Yes ☐ No Describe: No issues

Section III – Fees

1. s. NR 107.11(1), Wis. Adm. Code, lists the conditions under which the permit fee is limited to the $20 minimum charge.
2. s. NR 107.11(4), Wis. Adm. Code, lists the uses that are exempt from permit requirements.
3. s. NR 107.04(2), Wis. Adm. Code, provides for a refund of acreage fees if the permit is denied or if no treatment occurs.
4. Fee calculations:

Basic Permit Fee (non-refundable) ..... $ 20.00

If proposed treatment is over 0.25 acre, calculate acreage fee:
(round up to nearest whole acre, to maximum of 50 acres.)

1 acres X $25 per acre = $ _____

If proposed treatment is ≤ 0.25 acre, acreage fee is $0.

Enter Acreage Fee (from above) 25

Total Fee Enclosed ..... $ ~~20.00~~ 45 96

☐ **Site Map:** Attach a sketch or a printed map of lake indicating area and dimensions of each individual area where plant control is desired and flow of surface water outside treatment area. Also show location of property owners riparian to and adjacent to the treatment area. Attach a separate list of owners and corresponding treatment dimensions coded to the lake map, if necessary.

Section IV – Reasons for Aquatic Plant Control

Is this permit being requested in accordance with an approved Aquatic Plant Management Plan? ☒ Yes ☐ No

Treatment Type: ☒ Lake ☐ Pond ☐ Wetland ☐ Marina ☐ Other

Goal of Aquatic Plant Control:

- ☒ Reduce nuisance algae accumulation
- ☐ Maintain navigational channel for common use
- ☐ Maintain private access for boating
- ☐ Maintain private access for fishing
- ☒ Improve swimming
- ☐ Control of purple loosestrife
- ☐ Control of invasive exotics
- ☒ Other: improve public use - recreation (canoe/kayak entry, swimming, beach use)

Nuisance Caused By:

- ☐ Algae
- ☒ Emergent water plants (majority of leaves and stems growing above water surface, e.g. cattails, bulrushes)
- ☐ Floating water plants (majority of leaves floating on water surface, e.g., waterlilies, duckweed)
- ☒ Submerged water plants (leaves and stems below water surface, flowering parts may be exposed, e.g., milfoil, coontail)
- ☐ Other: _____

List Target Plants

Small amount of cattails
+ mixed submersed native plants

Note: Different plants require different chemicals for effective treatment. Do not purchase chemical before identifying plants.

Section V – Chemical Control

Alternatives to Chemical Control:	Feasible?	If No, Why Not?
1. Mechanical harvesting	☐ Yes ☒ No	Insufficient labor force
2. Hand pulling	☐ Yes ☒ No	
3. Hand raking	☐ Yes ☒ No	
4. Hand cutting	☐ Yes ☒ No	
5. Sediment screens/covers	☐ Yes ☒ No	
6. Dredging	☒ Yes ☐ No	
7. Lake drawdown	☐ Yes ☒ No	
8. Nutrient controls in watershed	☐ Yes ☒ No	
9. Other: _____	☐ Yes ☐ No	

Note: If proposed treatment involves multiple properties, consider feasibility of EACH alternative for EACH property owner.

If you checked yes to any of the alternatives listed above, please explain your decision to use chemical controls:

Section V – Chemical Control (continued)

Trade Name of Proposed Chemical(s)

Diquat 1 gal/acre + Habitat for cattails

Method of Application: _____

Will surface water outflow and/or overflow be controlled to prevent chemical loss? ☒ Yes ☐ No

Have the proposed chemicals been permitted in a prior year on the proposed site? ☐ All ☒ Some ☐ None

What were the results of the treatment?

Good control of emergent weeds and overgrowth

Note: Chemical fact sheets for aquatic pesticides used in Wisconsin are available from the Department of Natural Resources upon request.

Section VI – Applicant Responsibilities and Certification

1. The applicant has prepared a detailed map which shows the length, width and average depth of each area proposed for the control of rooted vegetation and the surface area in acres or square feet for each proposed algae treatment.
2. The applicant understands that the Department of Natural Resources may require supervision of any aquatic plant management project involving chemicals. Under s. NR 107.07, Wis. Adm. Code, supervision may include inspection of the proposed treatment area, chemicals and application equipment before, during or after treatment. The applicant is required to notify the regional office 4 working days in advance of each anticipated treatment with the date, time, location and size of treatment unless the Department waives this requirement. Do you request the Department to waive the advance notification requirement? ☒ Yes ☐ No
3. The applicant agrees to comply with all terms or conditions of this permit, if issued, as well as all provisions of Chapter NR 107, Wis. Adm. Code. The required application fee is attached.
4. The applicant has provided a copy of the current application to any affected property owners' association, inland lake district and, in the case of chemical applications for rooted aquatic plants, to all owners of property riparian or adjacent to the treatment area. The applicant has also provided a copy of the current chemical fact sheet for the chemicals proposed for use to any affected property owner's association or inland lake district.

☒ Check if you are signing as Agent for Applicant.

I hereby certify that the above information is true and correct and that copies of this application have been provided to the appropriate parties named in Section II and that the conditions of the permit and pesticide use will be adhered to.

Dan Welch
Signature of Applicant

3/15/2016
Date Signed

All portions of this permit, map and accompanying cover letter must be in possession of the chemical applicator at time of treatment. During treatment all provisions of Chapter NR 107, specifically ss. NR 107.07 and NR 107.08, Wis. Adm. Code, must be complied with, as well as the specific conditions contained in the permit cover letter.

Section VII – WPDES Permit Request

Is WPDES coverage being requested? Refer to http://dnr.wi.gov/topic/wastewater/aquaticpesticides.html for more information.

☒ No: ☒ Already have WPDES coverage until Sept. 2016 ☐ Yes – complete section VII with signature
☐ WPDES coverage not needed

Select which permit you are requesting: ☐ WI-0064556-1 Aquatic Plants, Algae & Bacteria
☐ WI-0064564-1 Aquatic Animals
☐ WI-0064581-1 Mosquitoes & other Flying Insects

Indicate WPDES permitee responsible for the pollutant discharge: ☐ Applicator ☒ Sponsor

Do you expect the pest control activity will result in a detectable pollutant discharge to waters of the state beyond the treatment area boundary or a pollutant residual in waters of the state after the treatment project is completed? ☐ Yes ☐ No

If yes, identify the pollutant(s): _____

Are you planning to incorporate integrated pest management principles, as specified in the WPDES permit, into your pest control activity to minimize any pollutant residual or pollutant discharge beyond the treatment area? ☐ Yes ☐ No

Type of WPDES coverage being requested: ☐ One Treatment Site ☐ Statewide Coverage

For informational purposes, select areas of WI for most of your aquatic treatments: ☐ NW ☐ NE ☐ SW ☐ SE

Is WPDES coverage being requested for more than 1 year?
☒ Yes ☐ No If yes, the permittee will remain in "active" WPDES status until a Notice of Termination is submitted.

I hereby certify that I am the authorized representative (as specified in Ch. NR 205.07(1)(g), Wis. Adm. Code) of the pest treatment activity which is the subject of this permit application. I certify that the information contained in this form and attachments is, to the best of my knowledge, true, accurate and complete.

Dan Welch — Signature of Authorized Representative
Dan Welch — Printed Name
3/15/2016 — Date Signed

Section VIII – Permit to Carry Out Chemical Treatment (Leave Blank – DNR Use Only)

The foregoing application is approved. Permission is hereby granted to the applicant to chemically treat the waters described in the application during the season of 20____.

Application fee received? ☐ Yes ☐ No	State of Wisconsin Department of Natural Resources For the Secretary
Advance notification of treatment required? ☐ Yes ☐ No	By _____ Regional Director or Designee Date Signed _____ Date Mailed _____

Please Note:

If you believe that you have a right to challenge this decision, you should know that Wisconsin statutes and administrative rules establish time periods within which requests to review Department decisions must be filed.

For judicial review of a decision pursuant to ss. 227.52 and 227.53, Wis. Stats., you have 30 days after the decision is mailed or otherwise served by the Department, to file your petition with the appropriate circuit court and serve the petition on the Department. Such a petition for judicial review shall name the Department of Natural Resources as the respondent.

This notice is provided pursuant to s. 227.48(2), Wis. Stats.

To request a contested case hearing pursuant to s. 227.42, Wis. Stats., you have 30 days after the decision is mailed, or otherwise served by the Department, to serve a petition for hearing on the Secretary of the Department of Natural Resources. The filing of a request for a contested case hearing is not a prerequisite for judicial review and does not extend the 30-day period for filing a petition for judicial review.

Surface Water Data Viewer Map

Legend

2010 Air Photos (WROC)

Treatment area is inside the white lines

.58 acreas at beach
.08 acres at boat pier
.66 acres total

Notes

0.1 0 0.04 0.1 Miles

NAD_1983_HARN_Wisconsin_TM

Appendix C
Abstract for 2017 Wisconsin Lakes Convention

Eradication of Eurasian Watermilfoil in Blackhawk Lake, Iowa County, Wisconsin

By Donna Sefton and Laura Spears, DFS Conservation Consulting, Blue Mounds, WI

Three colonies of Eurasian watermilfoil (*Myriophyllum spicatum* or EWM) were found in Blackhawk Lake, a 220-acre recreational impoundment, in 2006. By 2007, EWM had spread around the lake. An Aquatic Plant Management Plan was prepared and implemented using a DNR Early Detection/Rapid Response grant. In May 2007, 2,4-D granular was applied on small colonies and manual harvesting was done. EWM was reduced in high density areas, but still found in scattered locations post-treatment. No EWM was found in 2008 when the water was turbid with sediment. In 2009, EWM was found near the original infestations. Colonies were manually harvested. In June 2010, EWM was found in 5 acres. 2,4-D granular effectively controlled it. One colony was found in 2011 and none since. Diversity and abundance of native vegetation has increased since 2006. DNR Aquatic Invasive Species and Clean Boats, Clean Waters grants have supported biweekly aquatic plant surveys and watercraft inspection and education activities since 2012.

Donna Sefton bio

Donna Sefton has monitored water quality and conducted AIS and aquatic plant surveys on Blackhawk L. since 2004. She earned a B.S.E. in Biology and Chemistry from UW-Whitewater and M.S. in Aquatic Biology from UW-La Crosse. She was a founder of the Illinois Lake Management Society and the North American Lake Management Society. While at the Illinois EPA, she developed one of the first volunteer lake monitoring programs in the nation, which was a model for Wisconsin's CLMN. She also served as Clean Lakes and Watershed Coordinators for the U.S. EPA in Kansas City. Donna was a Citizen Lake Monitoring Network Coordinator and AIS Specialist and is currently a Drinking Water Specialist with the DNR.

Laura Spears bio

Laura Spears has been a citizen lake monitor for Blackhawk L. since 2004. She graduated from UW-Platteville in 2013 with a biology major, ecology emphasis. As an AIS Specialist with the Southwest Badger RC&D, she sampled waterbodies for AIS and conducted watercraft inspection and educational activities, including workshops for student groups. Laura was a Water Resources Management Specialist and is currently a Stormwater Specialist with DNR's Runoff Management Section.

Appendix 4
Blackhawk L AIS Education, Prevention, and Planning Grant (AEPP-410-14) Annual Report, 2017

BLACKHAWK LAKE AQUATIC INVASIVE SPECIES EDUCATION, PREVENTION & PLANNING GRANT (AEPP-410-14) 2017 REPORT
January 2018

Water Quality Monitoring 2017

Blackhawk Lake was monitored by DFS Conservation Consulting for Secchi disk transparency on 10 dates in 2017 (5/6, 5/25, 6/13, 6/27, 7/14, 7/25, 8/14, 8/23, 9/1, 9/30/17), for phosphorus on 5/25/17, and for phosphorus and chlorophyll on 6/27, 7/25, and 8/23/17. Data was entered into DNR's Surface Water Integrated Monitoring System (SWIMS). The 2017 water quality data and report, as well as Secchi disk transparency and Trophic State Index comparisons from 1997 – 2017 are found in Appendix A.

The water clarity of Blackhawk Lake was 8 feet during spring turnover in early May. By later May, the water clarity was excellent, with a Secchi of 21 feet on 5/24 and 15 feet on 6/13. The perception of the water quality at this time was "Beautiful, could not be any nicer." May-June 2017 precipitation was 5.64 inches as compared to a normal of 9.26 inches. May and June was generally windy and cool, with some periods of heavier rainfall.

The Secchi was 8 feet on 6/27 and 7/14. By 7/25, clarity was reduced to 4 feet, and it remained between 2.5 and 5 feet through September. The average summer Secchi was 4.88 ft. Only 2011 and 2012 had lower summer average clarity. The July-August 2017 precipitation was 7.97 inches, less than the normal of 9.57 inches, although over 5 inches of rain fell on 7/20 and 7/21. The average summer Secchi clarity at Blackhawk Lake equaled the average for the Southwest Wisconsin Georegion in 2018 (4.9 feet).

The spring total phosphorus was 19.8 ug/l as compared to an average of 25.5 ug/l for 2006-2016. Spring total phosphorus (a nutrient which promotes algae growth) is often used as an indicator of the potential for summer algae blooms. Impoundments that have more than 30 ug/L total phosphorus may experience noticeable algae blooms. Summer 2017 total phosphorus was 74.9 ug/l as compared to an average of 35.3 ug/l from 2006 - 2016. A very high total phosphorus of 112 ug/l on 7/25/17 was associated with a very high chlorophyll of 97.3 ug/l and a Secchi disk clarity of 4 feet.

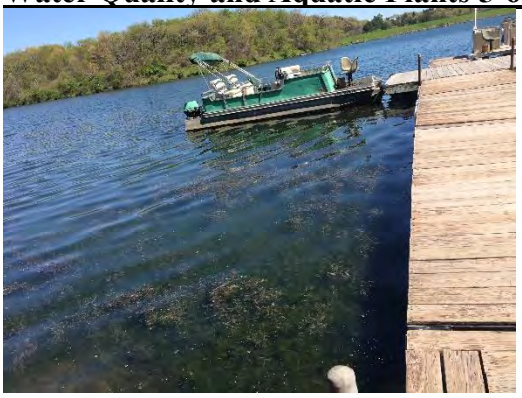
The average summer chlorophyll (indicating the concentration of algae suspended in the water) was 60.3 ug/L as compared to a Southwest Georegion average of 42.1 ug/L and an average of 24.4 for 2006-2016. Heavy spring rains washed in phosphorus, which help promote the growth of algae. Nutrients were also made readily available for algae growth as the aquatic plants died back and release the phosphorus contained in them as the summer progressed.

The summer Trophic State Index (TSI) based on chlorophyll during July and August was 66, indicating Blackhawk Lake was eutrophic. This TSI usually suggests blue-green algae can become dominant and algal scums are possible, as well as extensive aquatic plant overgrowth.

Small green algae were visible in the water as aquatic plants decayed and released nutrients to feed algal growth summer progressed. There was no evidence of potentially toxic blue-green algae colonies such as *Aphanizomenon, Anabaena, or Microcystis* in the water as there were in some previous years.

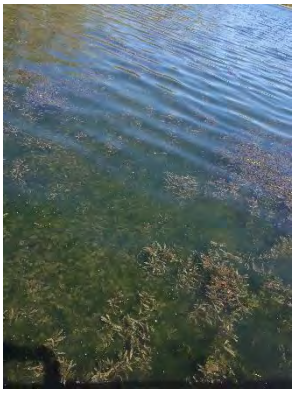
Until mid-summer, the water at Blackhawk Lake is usually clearer than would be expected based on the phosphorus and chlorophyll. Two major factors may be contributing to this: 1) zooplankton grazing on the algae and 2) abundant aquatic plant growth and filamentous algae out-competing the planktonic algae for the nutrients. When the plants and filamentous algae die off beginning in mid-summer, the nutrients are released to promote planktonic algae growth.

Water Quality and Aquatic Plants 5-6-17



Concession Dock N side

Concession Dock S side



Water buttercup

Concession Dock S side

Fishing Pier

Fishing Pier curly-leaf

Looking S. from Concession Dock

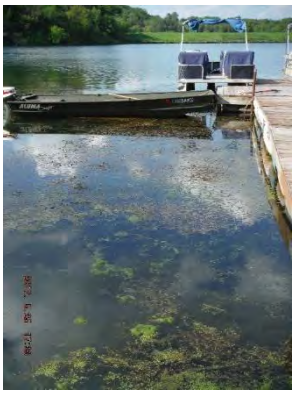
Beach

Water clarity

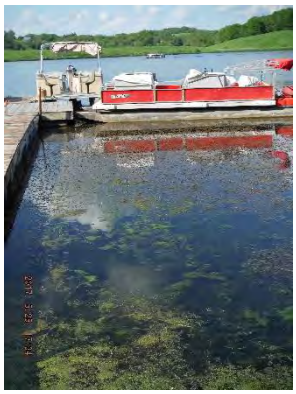
Water Quality and Aquatic Plants 5-25-17

Secchi = 21'

Concession Dock



Concession Dock N



Concession Dock S

Concession Dock

Concession Curly-leaf

Concession WaterButtercup

Concession P. puscillus

Fishing Pier

Beach looking N

Beach

Beach looking S

Boat Landing

Pontoons at Boat Landing

Sand ridge Curly-leaf Pondweed

Curly-leaf Pondweed

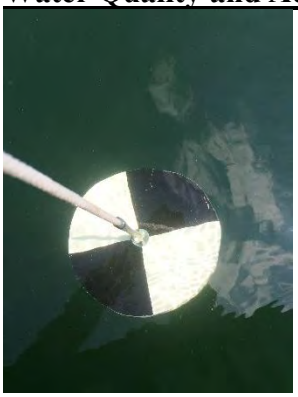
Pontoon Bay

Pontoon Bay

Pontoon Bay

Looking toward left dam

Water Quality and Aquatic Plants 6-13-17



Secchi = 15'

Concession Dock S

Concession Dock N side

Concession Dock

Fishing Pier

Fishing Pier N

Fishing Pier to Beach

Beach

Beach looking S

Beach

Beach

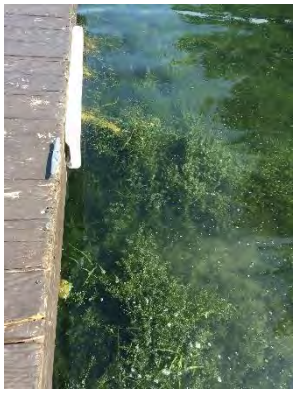
Pontoon Bay

Pontoon Bay

P. puscillus

Curly-leaf

Boat Launch



Boat Launch

Water Quality and Aquatic Plants 6-27-17

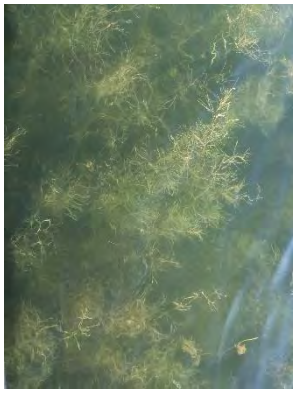
Secchi = 8'

Concession Dock

Concession Dock

Water stargrass

Concession Dock



P. puscillus (slender pw)

Looking S from Fishing Pier


N from Fishing Pier


Fishing Pier


Fishing Pier S side


Fishing Pier N side


Beach


Fishing Pier to Beach


Pontoon Bay


Pontoon Bay


Boat Landing

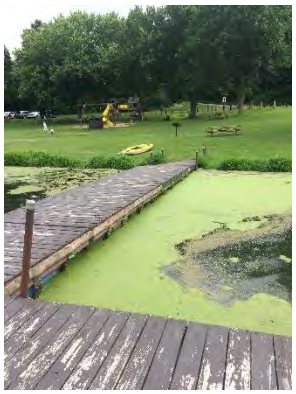

Boat Landing

<u>Water Quality and Aquatic Plants 7-14-17</u>


Concession Dock


Fishing Pier looking N


Fishing Pier S side


Fishing Pier N side

Fishing Pier

Plants near Fishing Pier

Beach looking N

Beach looking N

Beach looking S

Between Dams

Boat Landing plants

Water Quality and Aquatic Plants 7-25-17

Secchi = 4'

Concession Dock

Concession Dock

Fishing Pier

Beach looking N

Beach looking S

Boat Landing

Boating Landing Plants

Boat Landing Arrowhead

Water Quality and Aquatic Plants 8-14-17

Secchi = 2.5'

Concession Dock

Concession Dock

Concession Dock from lake

Fishing Pier

Fishing Pier N side

Beach looking N

Beach looking N

Beach from lake

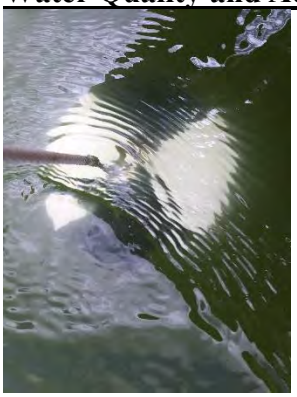
Beach looking S

Pontoon Bay

Pontoon Bay

SW side of lake

Water Quality and Aquatic Plants 8-23-17



Secchi = 5'

Concession Dock

Concession Dock N side

Fishing Pier

Fishing Pier S side

Fishing Pier N side

Beach looking N

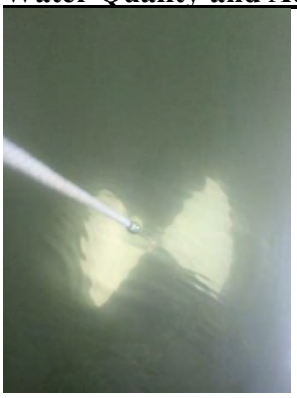
Beach looking N

Boat Landing S side

Boat Landing N

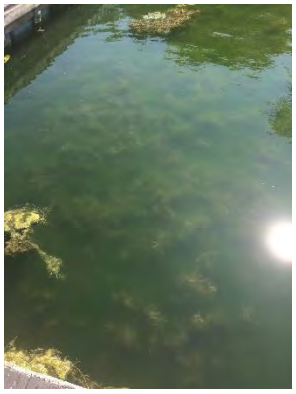
Boat Landing S

Water Quality and Aquatic Plants 9-1-17



Secchi = 3'

Concession Dock



Concession Dock

Fishing Pier

Fishing Pier

Fishing Pier looking S

Beach looking N

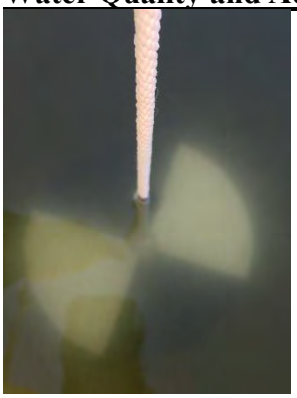
Beach looking S

Boat Landing

Boat Landing S side

Boat Landing Arrowhead

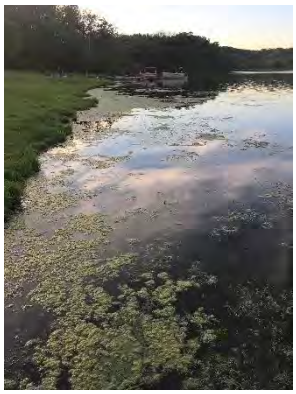
Water Quality and Aquatic Plants 9-30-17



Secchi = 2.5'

Concession Dock

Fishing Pier



Fishing Pier looking N


Beach looking N


Beach


Boat Landing Elodea


Water stargrass

<u>Aquatic Plant Monitoring and Management 2017</u>

Visual and rake boat surveys for *Myriophyllum spicatum* (Eurasian watermilfoil or EWM) and other aquatic plants were conducted on 5/6, 5/25, 6/13, 6/27, 7/14, 7/25, 8/14, 8/23, 9/1, 9/30/17.

Photos were taken and the aquatic plants were noted each sampling data (Appendix B). No Eurasian watermilfoil was found. The predominant plants in the deeper water and sand ridge in the spring were *Potamogen crispus* (curly-leaf pondweed), *P. puscillus* (slender pondweed), *Ceratophyllum demersum* (coontail), and filamentous algae. *Ranunculus aquatilis* (white water crowfoot), *Heteranthera dubia* (water stargrass), *Stuckenia pectinata* (sago pondweed), *Elodea canadensis* (common waterweed), coontail, and *Chara* (muskgrass) were common in the shallower water in spring. Most of these plants had senesced by August. Water stargrass became more abundant in the shallower water as the summer progressed.

The visual survey done on 5/6/17 found abundant aquatic plant growth, especially curly-leaf pondweed and white water crowfoot around the concession dock and fishing pier, already impairing navigation and fishing. The Secchi clarity at this time was 8 feet. By 5/25/17, curly-leaf pondweed severely impaired navigation and fishing around the concession dock and fishing pier, and swimming at the beach. Some white water crowfoot, coontail, elodea, and slender pondweed were also present around the concession dock. The lake was very clear, with a Secchi of 21 feet.

The Secchi clarity was 18 feet on 6/13. Navigation and fishing were impaired at the concession dock and fishing pier, and swimming at the beach by abundant curly-leaf pondweed and stringy slender pondweed in the deeper areas. Filamentous algae, white water crowfoot, coontail, elodea, and sago pondweed were also present in the shallower areas.

In mid-May, the Blackhawk Lake Recreation Area applied for a permit for chemical treatment around the concession dock, fishing pier, and beach. The permit was issued on 6/13/17 (Appendix B). The chemicals approved were Diquat (for the submersed aquatic plants) and Habitat (for cattails in the southern part of the reclaimed beach area if needed). Areas around the concession dock, fishing pier, and beach were treated with Diquat by Wisconsin Lake and Pond Resource. The chemicals were applied by injection through hoses in the deeper water (5-12 feet) near the sides and ends of the docks/piers and at the beach.

Sampling on 6/27 found the treatments around the concession dock, fishing pier, and beach has been effective. Curly-leaf and slender pondweed, white water crowfoot, coontail, and sago pondweed were senescing around these areas, however, water stargrass was becoming abundant and impairing navigation at the concession dock. The Secchi clarity was 8 feet.

Curly-leaf and slender pondweed, white water crowfoot, coontail, and sago pondweed had senesced around the concession dock, fishing pier, and southern 1/3 of the beach by 7/14. There was filamentous algae and duckweed in the shallows. Water stargrass had become abundant, impairing navigation, fishing, and swimming in all three areas. The Secchi clarity was 8 feet.

Sampling on 7/25 found very abundant water stargrass impairing navigation and fishing at the concession dock and fishing pier, as well as swimming at the and southern 1/3 of the beach. There were small green algae in the water, reducing the Secchi clarity to 4 feet.

By 8/14, the Secchi clarity had been reduced to 2 feet. Wind speed was approximately 12 mph. There had been much rain in the previous 2 weeks. There were small green algae in the water, but no evidence of the blue-green *Anabeana, Aphanizomenon,* or *Microcytis*. There were mats of decayed slender pondweed and filamentous algae at the fishing pier. Senescing slender pondweed covered with filamentous algae was present in Pontoon Bay.

On 8/23, the Secchi clarity was 5 feet. Water stargrass was abundant in the shallows near the fishing pier, as well as at the boat landing.

On 9/1, the water color was greenish-brown and the Secchi clarity was 3 feet. There was primarily coontail and water stargrass covered by filamentous algae in the shallows.

The water color was still greenish-brown on 9/30 and the Secchi clarity was 2.5 feet. Plants in the shallows were primarily water stargrass, elodea, and coontail. There was still some slender pondweed covered with filamentous algae in Pontoon Bay.

Recommendations for Aquatic Plant Management in 2018

The herbicides and dosages to be used for the treatments in 2018 should be evaluated based on the effectiveness of the treatments in 2017. Depending on the year, treatments should be done by mid to late May to prevent curly-leaf pondweed, slender-leaf pondweed, sago pondweed, coontail, and white water crowfoot from becoming abundant and interfering with navigation, fishing, and swimming at the handicapped pier, concession dock, fishing pier, and beach. Since the plants are generally covered with filamentous algae, the mixture should also include treatment for filamentous algae to make the chemicals more effective. A second treatment may be needed by mid-June. Since water stargrass impairs navigation, fishing, and swimming at the concession dock, fishing pier, and beach as summer progresses, a second treatment or hand-pulling for it should be considered in mid-summer.

The herbicides should be sprayed or injected using hoses as far as possible into towards the shore from deeper water, taking care not to stir up the sediment as they are applied. Spraying into the shallows will aid navigation in and out for the smaller boats that are docked in 2-3 feet of water and provide for fishing and swimming access. The dosage of herbicide to use should take into consideration that the deeper areas around the concession dock and fishing pier are 5 – 10 feet deep.

Since it takes around a month for approval of the treatment, Blackhawk Lake Recreation Area should apply for the permit by mid-March so these areas can be treated before the plants become a nuisance in mid-May. The permit application should also allow for the second treatment for water stargrass in later summer.

Clean Boats, Clean Waters

Abundant plants were found on motors, boats, and trailers, from May – July. The Southwest Badger Resource and Development Council put a priority on Clean Lakes, Clean Waters watercraft inspections and education at the Blackhawk Lake boat landing in 2017. DFS Conservation Consulting also did watercraft inspections and educational activities at the lake as the opportunity arose when they were sampling. Eurasian Water Milfoil has not been found in the lake since 2011 and the inspections and educational activities are important to protecting the lake from EWM and other aquatic invasive species.

Brochures on Eurasian water milfoil and aquatic invasive species were available in a prominent place at the front desk in the office.

Education and Outreach

Wisconsin Lakes Convention 2017:

DFS Conservation Consulting gave a Power Point presentation on eradication of Eurasian water milfoil in Blackhawk Lake (What Happened to Eurasian watermilfoil in Blackhawk Lake?) at the Wisconsin Lakes Convention in Stevens Point, WI 4/7/17 (Appendix C).

North American Lake Management Society International Symposium 2017

DFS Conservation Consulting presented the Power Point presentation "Successful Long-Term Control of Eurasian watermilfoil in Blackhawk Lake, WI" at the North American Lake Management Society's International Symposium in Denver, Colorado on 11/8/17 (Appendix D).

Appendix A
Blackhawk Lake Water Quality Data, 2017

Lake Water Quality 2017 Annual Report

Blackhawk Lake
Iowa County
Waterbody Number: 1239400

Lake Type: DRAINAGE
DNR Region: SC
GEO Region:SW

Site Name	Storet #
Black Hawk Lake - Deep Hole	253124

Date	SD (ft)	SD (m)	Hit Bottom	CHL	TP	TSI (SD)	TSI (CHL)	TSI (TP)	Lake Level	Clarity	Color	Perception
05/06/2017	8	2.4	NO			47			HIGH	MURKY	GREEN	3-Enjoyment somewhat impaired (algae)
05/25/2017	21	6.4	NO		20.6	33		52	HIGH	CLEAR	BLUE	1-Beautiful, could not be nicer
06/13/2017	15	4.6	NO			38			HIGH	CLEAR	BLUE	1-Beautiful, could not be nicer
06/27/2017	8	2.4	NO	14.2	19	47	55	51	HIGH	MURKY	GREEN	3-Enjoyment somewhat impaired (algae)
07/14/2017	8	2.4	NO			47			HIGH	MURKY	GREEN	3-Enjoyment somewhat impaired (algae)
07/25/2017	4	1.2	NO	97.3	112	57	69	65	HIGH	MURKY	GREEN	3-Enjoyment somewhat impaired (algae)
08/14/2017	2.5	0.8	NO			64			HIGH	MURKY	GREEN	4-Would not swim but boating OK (algae)
08/23/2017	5	1.5	NO	23.3	37.7	54	59	56	HIGH	MURKY	GREEN	3-Enjoyment somewhat impaired (algae)
09/01/2017	3	0.9	NO			61			HIGH	MURKY	BROWN	3-Enjoyment somewhat impaired (algae)
09/30/2017	2.5	0.8	NO			64			HIGH	MURKY	BROWN	3-Enjoyment somewhat impaired (algae)

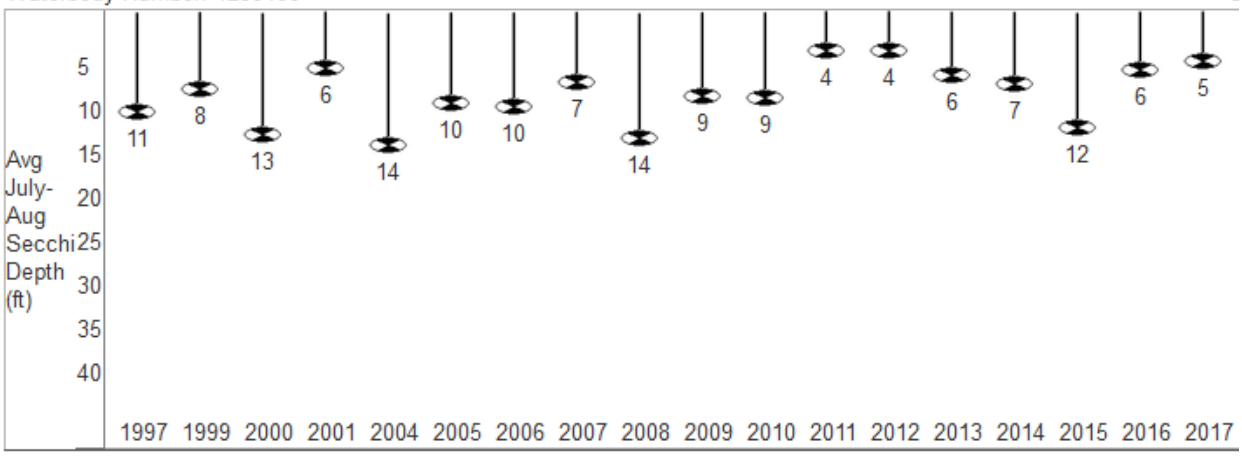
Date	Collector Comments
05/06/2017	70's- slight breeze- mostly sunny. Rain- wind- cool the previous week and much of April. No EWM- Curly-leaf pondweed moderate to abundant- some White water crowfoot- Leafy pondweed- very small green algae in water.
05/25/2017	70's- calm- partly cloudy. Rain- wind- cool weather all month. No EWM. Abundant Curly-leaf pondweed in all areas less than 10 ft- impairing swimming and navigation at concession dock and fishing pier. Some White water crowfoot- Coontail- Leafy pondweed and Elodea in shallows by concession dock.
06/13/2017	70's- calm- sunny. No EWM. Abundant aquatic plants impairing use around concession dock and fishing pier and S 1/3 of beach. Mostly stringy Slender and Sago pondweeds and Curly-leaf pondweed deeper- White water crowfoot- Coontail- Elodea- and filamentous algae shallower.
06/27/2017	70's- slight breeze- clear. No EWM- mostly Sago pondweed on sand ridge 5-10 ft- Chemical treatments right around beach- fishing pier and boat concession worked- White water crowfoot- Curly-leaf pondweed- Coontail- Leafy pondweed and Sago pondweed dying in these areas. Water stargrass is becoming abundant- impairing navigation at concession dock.
07/14/2017	70's- slight breeze. No EWM. Very small green algae in water- no evidence of blue-green algae.
07/25/2017	SW wind about 12 mph- moderate waves- partly cloudy. Lot of rain in past 2 weeks. Water color brownish-green with some tiny green algae. No EWM. Most plants have died off- except for abundant Water stargrass in shallow areas and some Sago pondweed in deeper areas.
08/14/2017	70's- calm- slight breeze- mostly sunny. Water brownish green- tiny green algae- no evidence of blue-green algae. No EWM- mostly Sago pondweed in deeper water- Water stargrass and Coontail near shore. Most other plants have died off. Water stargrass is abundant in shallow areas around concession dock and fishing pier and in S part of beach.
08/23/2017	70's- partly cloudy- blight breeze. Water brownish green. No EWM- mostly Sago pondweed in deeper water (dying)- abundant Water stargrass and some Coontail and Curly-leaf pondweed in shallows.
09/01/2017	70's- partly cloudy- slight breeze. Water color greenish brown. Mostly Sago pondweed and filamentous algae in deeper water. Abundant Water stargrass- and some Coontail and Curly-leaf pondweed in shallows.
09/30/2017	70's- slight breeze- mostly sunny. Water color greenish brown. Abundant Water stargrass in shallows- with Coontail- Chara on NE side of sandbar (across the lake from the beach). Duckweed- filamentous algae- Chinese mystery snails near shore.

Date	Data Collectors	Project
05/06/2017	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake
05/25/2017	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake
06/13/2017	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake
06/27/2017	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake
07/14/2017	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake
07/25/2017	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake
08/14/2017	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake
08/23/2017	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake
09/01/2017	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake
09/30/2017	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake

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.

Wisconsin Department of Natural Resources **Wisconsin Lakes Partnership**

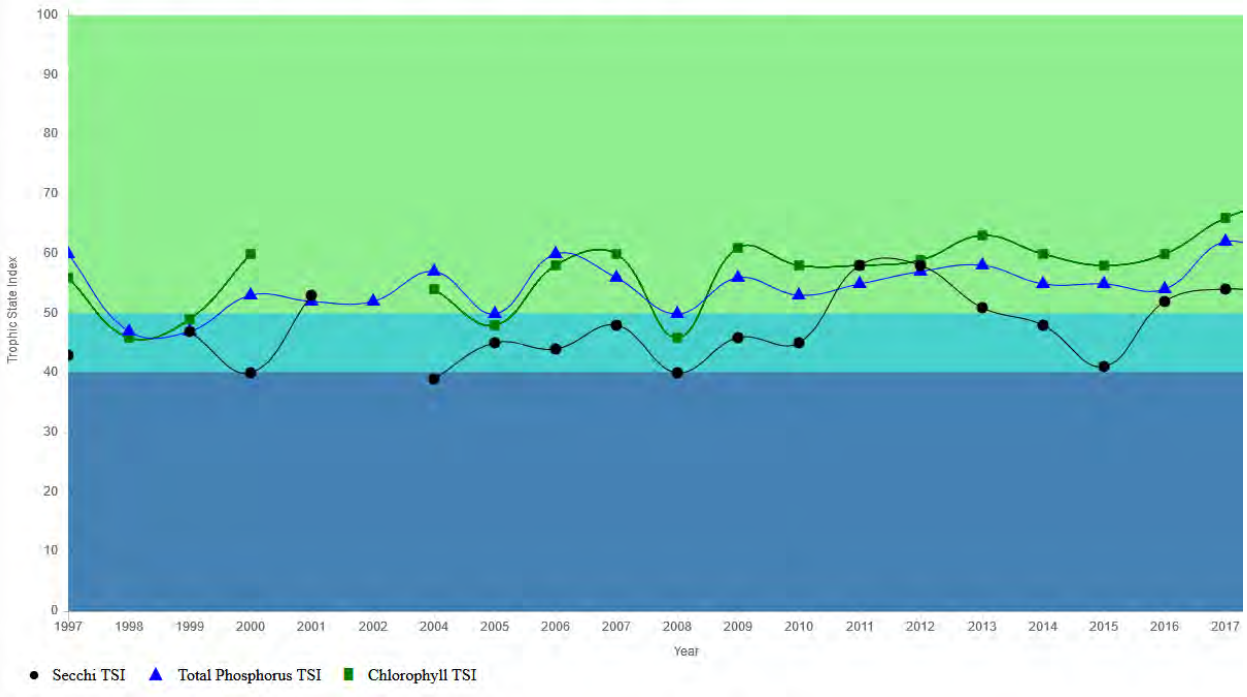
Blackhawk Lake
Iowa County
Waterbody Number: 1239400



Past secchi averages in feet (July and August only).

Year	Secchi Mean	Secchi Min	Secchi Max	Secchi Count
1997	10.63	6.75	14.5	2
1999	8	8	8	1
2000	13.2	2	19	5
2001	5.5	5.5	5.5	3
2004	14.3	14.3	14.3	2
2005	9.5	8.5	10.5	2
2006	10	8	13	5
2007	7.29	3	18	12
2008	13.56	12.25	15	4
2009	8.75	4	15.75	6
2010	9	4.5	17	5
2011	3.67	3	5	3
2012	3.67	3	4	3
2013	6.33	3	10	3
2014	7.33	3	14	3
2015	12.38	7	17	4
2016	5.83	3	10.5	3
2017	4.88	2.5	8	4

Trophic State Index Graph: Black Hawk Lake - Deep Hole - Iowa County



Past Summer (July-August) Trophic State Index (TSI) averages.

TSI(Chl) = TSI(TP) = TSI(Sec)	It is likely that algae dominate light attenuation.
TSI(Chl) > TSI(Sec)	Large particulates, such as Aphanizomenon flakes dominate
TSI(TP) = TSI(Sec) > TSI(Chl)	Non-algal particulate or color dominate light attenuation
TSI(Sec) = TSI(Chl) >= TSI(TP)	The algae biomass in your lake is limited by phosphorus
TSI(TP) > TSI(Chl) = TSI(Sec)	Zooplankton grazing, nitrogen, or some factor other than phosphorus is limiting algae biomass

TSI	TSI Description
TSI < 30	Classical oligotrophy: clear water, many algal species, oxygen throughout the year in bottom water, cold water, oxygen-sensitive fish species in deep lakes. Excellent water quality.
TSI 30-40	Deeper lakes still oligotrophic, but bottom water of some shallower lakes will become oxygen-depleted during the summer.
TSI 40-50	Water moderately clear, but increasing chance of low dissolved oxygen in deep water during the summer.
TSI 50-60	Lakes becoming eutrophic: decreased clarity, fewer algal species, oxygen-depleted bottom waters during the summer, plant overgrowth evident, warm-water fisheries (pike, perch, bass, etc.) only.
TSI 60-70	Blue-green algae become dominant and algal scums are possible, extensive plant overgrowth problems possible.
TSI 70-80	Becoming very eutrophic. Heavy algal blooms possible throughout summer, dense plant beds, but extent limited by light penetration (blue-green algae block sunlight).
TSI > 80	Algal scums, summer fishkills, few plants, rough fish dominant. Very poor water quality.

Trophic state index (TSI) is determined using a mathematical formula (Wisconsin has its own version). The TSI is a score from 0 to 110, with lakes that are less fertile having a low TSI. We base the overall TSI on the Chlorophyll TSI when we have Chlorophyll data. If we don't have chemistry data, we use TSI Secchi. We do this rather than averaging, because the TSI is used to predict biomass. This makes chlorophyll the best indicator.

Black Hawk Lake - Deep Hole 2017 Results

Black Hawk Lake - Deep Hole was sampled **11** different days during the 2017 season. Parameters sampled included:

- water clarity
- total phosphorus
- chlorophyll

The average summer (July-Aug) secchi disk reading for Black Hawk Lake - Deep Hole (Iowa County, WBIC: 1239400) was 4.88 feet. The average for the Southwest Georegion was 4.9 feet. Typically the summer (July-Aug) water was reported as **MURKY** and **GREEN**. This suggests that the secchi depth may be mostly impacted by algae. Algal blooms are generally considered to decrease the aesthetic appeal of a lake because people prefer clearer water to swim in and look at. Algae are always present in a balanced lake ecosystem. They are the photosynthetic basis of the food web. Algae are eaten by zooplankton, which are in turn eaten by fish. You will know algae are causing reduced Secchi depth if the water generally appears green when you assess the color against the white background of the secchi disc.

Chemistry data was collected on Black Hawk Lake - Deep Hole. The average summer Chlorophyll was 60.3 µg/l (compared to a Southwest Georegion summer average of 42.1 µg/l). The summer Total Phosphorus average was 74.9 µg/l. Lakes that have more than 20 µg/l and impoundments that have more than 30 µg/l of total phosphorus may experience noticable algae blooms.

The overall Trophic State Index (based on chlorophyll) for Black Hawk Lake - Deep Hole was 66. The TSI suggests that Black Hawk Lake - Deep Hole was **eutrophic**. This TSI usually suggests blue-green algae become dominant and algal scums are possible, extensive plant overgrowth problems possible.

Appendix B
Blackhawk Lake Aquatic Plant Management Permit, 2017

State of Wisconsin
DEPARTMENT OF NATURAL RESOURCES
3911 Fish Hatchery Road
Fitchburg WI 53711-5397

Scott Walker, Governor
Cathy Stepp, Secretary
Telephone 608-266-2621
Toll Free 1-888-936-7463
TTY Access via relay - 711

June 13, 2017

PERMIT# SC-2016-26-1120

Cobb-Highland Recreation Commission
2025 County Rd BH
Highland, WI 53543
(permit sent via email to managebhl@mhtc.net)

Subject: Aquatic Plant Management Permit for Blackhawk Lake, Iowa County

Dear Applicant:

Enclosed is your permit for chemical control of dense aquatic plants in 1 acre of Blackhawk Lake, Iowa County, Wisconsin. Your permit application has been reviewed and meets the minimum requirements by law and a permit is being issued. Issuance of the permit is not an endorsement or approval for the action authorized.

Permit Conditions:

1. Treatments are limited in area to protect native plants and shoreline habitat for animals that have been documented in the area. Treatment areas are intended to allow shorefishing for anglers, and reduce difficulties with navigation from the pier. Cattail control is allowed to help reclaim the beach area.

2. The following herbicides are permitted for use in this pond: diquat and Habitat.

   Diquat is approved for use at the label rate for the treatment area where the average depth is 2 feet. (1 gallon per surface acre). A permit amendment must be issued by the department if any herbicide or applicator not already listed on the application form will be added.

   Diquat is inactivated when it comes in contact with sediment, so care must be taken to avoid propeller stirring of the sediment in an area to be treated. The applicator should operate the boat in at least 3' of water, and spray toward shore. This will put the diquat where it's needed without stirring up the bottom.

   Habitat is to control the cattails which are encroaching on the beach area.

3. The herbicide applicator must follow the disinfection protocol following the signature to reduce the possible spread of fish diseases or other invasive species.

4. Pesticide treatment area signs must identify the areas that are treated with chemicals, and remain posted for the duration of any use restrictions according to the chemicals used.

5. **Supervision of this treatment by DNR staff is required.** Supervision is explained in Section NR107.07(1)(2), Wisconsin Administrative Code. The applicator must schedule supervision by calling me at 608-275-3329 at least 4 working days in advance of proposed treatment.

6. The permit holder must submit form 3200-111 (available online), "Aquatic Plant Management Herbicide Treatment Record", for each treatment as follows:

    1. **Immediately, if any unusual circumstances occur during the treatment.**
    2. **Within 30 days, if treatment occurred.**
    3. **By October 1 of this year, if no treatment occurred.**

Thank-you for complying with Chapter NR 107, Wisconsin Administrative Code concerning aquatic plant management.

Sincerely,

Susan Graham

Susan Graham
Lake Management Coordinator
608-275-3329

c-copy. Bradd Sims, DNR Fisheries Manager
Donna Sefton, DFS Conservation Consulting

DISINFECTION PROTOCOLS

Conditions related to invasive species movement. The applicant and operator agree to the following methods required under s. NR 109.05(2), Wis. Adm. Code for controlling, transporting and disposing of aquatic plants and animals, and moving water:

• Aquatic plants and animals shall be removed and water drained from all equipment as required by s. 30.07, Wis. Stats., and ss. NR 19.055 and 40.07, Wis. Adm. Code.

• Operator shall comply with the most recent Department-approved 'Boat, Gear, and Equipment Decontamination and Disinfection Protocol', Manual Code # 9183.1, available at
http://dnr.wi.gov/topic/invasives/disinfection.html

State of Wisconsin DNR
DNR Department of Natural Resources
Water Permit Central Intake – attn. APM
PO Box 7185
Madison, WI 53707-7185

Chemical Aquatic Plant Control Application and Permit
Wisconsin Pollutant Discharge Elimination System (WPDES)
Pesticide Pollutant Permit Application

Form 3200-004 (R 02/17)

Notice: Use of this form is required by the Department for any application filed pursuant to s. 281.17(2), Wis. Stats., and Chapters NR 107, 200 and 205, Wis. Adm. Code. This permit application is required to request coverage for pollutant discharge into waters of the state. Personally identifiable information on this form may be provided to requesters to the extent required by Wisconsin's Open Records Law [ss. 19.31-19.39, Wis. Stats.].

DNR Use Only	
ID Number: SG-2017-26-1120	Permit Expiration Date: 10/1/17
Waterbody #:	Fee Received: 45-

Section I – Applicant Information – Name of Permit Applicant. Also indicate names and addresses of all individuals, associations, communities or town sanitary districts sponsoring treatment. Attach additional sheets if necessary.

Home Address

Name: Cobb-Highland Recreation Commission
Street Address: 2025 County Rd BH
City: Highland | State: WI | ZIP Code: 53543
Phone Number (include area code)
Primary: (608) 623-2707 Secondary: (608) 574-5573

Waterbody Address

Name: Blackhawk Lake Recreation Area
Street Address: 2025 County Rd BH
City: Highland | State: WI | ZIP Code: 53543
Email Address: bhlake@mhtc.net manageblh@mhtc.net

Section II – Aquatic Plant Control Location

Waterbody to be Treated (waterbody where treatment area is located): Blackhawk Lake
Lake Surface Area: 220 acres
Estimated Surface Area that is 10 Feet or Less in Depth: acres

County	Section	Township	Range	
Iowa	6	07 N	2	(•) E ( ) W

Latitude: 43.0256540 Longitude: -90.2886260

- Is there more than one property owner? ( ) Yes (•) No
- Is there surface water discharge? (•) Yes ( ) No
- Does the waterbody have public access? (•) Yes ( ) No

If all are no: considered to be a private pond

Adjacent Riparian Property Owner Names (attach sheets if necessary)

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

Name of Lake Property Owners' Association Representative or Lake District Representative (if none, please indicate)

Name of Applicator or Firm: Wisconsin Lake and Pond Resource
Street or Route:
City: Eldorado | State: WI | ZIP Code:
County: | Phone Number (include area code):
Email Address: Mark@WisconsinLPR.com
Applicator Certification Number for Category 5 Aquatic Pesticide Application: JS77803 ✓ & ~~MS82178~~
Business Location License Number (if applicable): 93-015182-012226
Restricted Use Pesticide License Number (if applicable):

Area(s) Proposed for Control:

	Treatment Length		Treatment Width			Estimated Acreage		Average Depth			Calculated Volume	
1.	400	ft X	20	ft ÷ 43,560 ft²	=	0.18	ac X	3	ft	=	0.54	ac-ft
2.		ft X		ft ÷ 43,560 ft²	=		ac X		ft	=		ac-ft
3.		ft X		ft ÷ 43,560 ft²	=		ac X		ft	=		ac-ft
4.		ft X		ft ÷ 43,560 ft²	=		ac X		ft	=		ac-ft
5.		ft X		ft ÷ 43,560 ft²	=		ac X		ft	=		ac-ft
6.		ft X		ft ÷ 43,560 ft²	=		ac X		ft	=		ac-ft
7.		ft X		ft ÷ 43,560 ft²	=		ac X		ft	=		ac-ft
8.		ft X		ft ÷ 43,560 ft²	=		ac X		ft	=		ac-ft
9.		ft X		ft ÷ 43,560 ft²	=		ac X		ft	=		ac-ft
					Estimated Acreage Grand Total	~~.46~~ 0.18	ac			Calculated Volume Grand Total	~~0.54~~	ac-ft

If the estimated acreage is greater than 10 acres, or is greater than 10 percent of the estimated area 10 feet or less in depth in Section II, complete and attach Form 3200-004A, Large-Scale Treatment Worksheet. Private pond treatments are exempted from this requirement.

Is this area within or adjacent to a sensitive area designated by the Department of Natural Resources? ( ) Yes (•) No

DNR Use: NHI Review? ( ) Yes ( ) No Describe:

Section III – Fees

1. s. NR 107.11(1), Wis. Adm. Code, lists the conditions under which the permit fee is limited to the $20 minimum charge.
2. s. NR 107.11(4), Wis. Adm. Code, lists the uses that are exempt from permit requirements.
3. s. NR 107.04(2), Wis. Adm. Code, provides for a refund of acreage fees if the permit is denied or if no treatment occurs.
4. Fee calculations: If proposed treatment is over 0.25 acre, calculate acreage fee: (round up to nearest whole acre, to maximum of 50 acres.)

0 acres X $25 per acre = $ 0

If proposed treatment is ≤ 0.25 acre, acreage fee is $0.

Enter Acreage Fee (from above) ..... $ 0.00

Basic Permit Fee (non-refundable) ..... $ 20.00

Total Fee Enclosed ..... $ 0.00

Site Map: Attach a sketch or a printed map of lake indicating area and dimensions of each individual area where plant control is desired and flow of surface water outside treatment area. Also show location of property owners riparian to and adjacent to the treatment area. Attach a separate list of owners and corresponding treatment dimensions coded to the lake map, if necessary.

Section IV – Reasons for Aquatic Plant Control

Is this permit being requested in accordance with an approved Aquatic Plant Management Plan? ◉ Yes ○ No

Treatment Type: ◉ Lake ○ Pond ○ Wetland ○ Marina ○ Other

Goal of Aquatic Plant Control:

1. ☐ Maintain navigational channel
2. ☐ Maintain boat landing and carry in access
3. ☐ Improve fish habitat
4. ☐ Maintain swimming area
5. ☐ Control of invasive exotics
6. ☐ Other: _____

Nuisance Caused By:

- ☐ Algae
- ☒ Emergent water plants (majority of leaves and stems growing above water surface, e.g. cattails, bulrushes)
- ☐ Floating water plants (majority of leaves floating on water surface, e.g., waterlilies, duckweed)
- ☒ Submerged water plants (leaves and stems below water surface, flowering parts may be exposed, e.g., milfoil, coontail)
- ☐ Other: _____

List Target Plants

Note: Different plants require different chemicals for effective treatment. Do not purchase chemical before identifying plants.

very small amount of re-invading cattails and mixed submersed native plants

Section V – Chemical Control

Alternatives to Chemical Control:	Feasible?	If No, Why Not?
1. Mechanical harvesting	○ Yes ◉ No	Insufficient labor force
2. Manual removal	○ Yes ◉ No	
3. Sediment screens/covers	○ Yes ◉ No	
4. Dredging	◉ Yes ○ No	
5. Lake drawdown	○ Yes ◉ No	
6. Nutrient controls in watershed	○ Yes ◉ No	
7. Other: _____	○ Yes ○ No	

Note: If proposed treatment involves multiple properties, consider feasibility of EACH alternative for EACH property owner.

If you checked yes to any of the alternatives listed above, please explain your decision to use chemical controls:

Section V – Chemical Control (continued)

Full Trade Name of Proposed Chemical(s)
Diquat and Habitat and/or recommendations from WLPR and WDNR

Method of Application: _____

Will surface water outflow and/or overflow be controlled to prevent chemical loss? ◉ Yes ○ No

Have the proposed chemicals been permitted in a prior year on the proposed site? ○ All ◉ Some ○ None

What were the results of the treatment?
Fair control of emergent weeds and overgrowth

For private ponds and wetlands please ignore next question

Is treatment area greater than 5% of surface area? ○ Yes ◉ No

If yes, calculate whole lake concentration (in ppm). Refer to DNR Lake pages dnr.wi.gov/Lakes to answer the following:

Does the lake stratify? ○ Yes ○ No If yes, calculate whole lake concentration using volume above thermocline. If no, calculate whole lake concentration using total lake volume.

Whole Lake Concentration: _____ ppm

Note: Chemical fact sheets for aquatic pesticides used in Wisconsin are available from the Department of Natural Resources at the following link: dnr.wi.gov/Lakes/plants/factsheets/.

Section VI – Applicant Responsibilities and Certification

1. The applicant has prepared a detailed map which shows the length, width and average depth of each area proposed for the control of rooted vegetation and the surface area in acres or square feet for each proposed algae treatment.
2. The applicant understands that the Department of Natural Resources may require supervision of any aquatic plant management project involving chemicals. Under s. NR 107.07, Wis. Adm. Code, supervision may include inspection of the proposed treatment area, chemicals and application equipment before, during or after treatment. The applicant is required to notify the regional office 4 working days in advance of each anticipated treatment with the date, time, location and size of treatment unless the Department waives this requirement. Do you request the Department to waive the advance notification requirement? ◉ Yes ○ No
3. The applicant agrees to comply with all terms or conditions of this permit, if issued, as well as all provisions of Chapter NR 107, Wis. Adm. Code. The required application fee is attached.
4. The applicant has provided a copy of the current application to any affected property owners' association, inland lake district and, in the case of chemical applications for rooted aquatic plants, to all owners of property riparian or adjacent to the treatment area. The applicant has also provided a copy of the current chemical fact sheet for the chemicals proposed for use to any affected property owner's association or inland lake district.
5. Conditions related to invasive species movement. The applicant and operator agree to the following methods required under s. NR 109.05(2), Wis. Adm. Code for controlling, transporting and disposing of aquatic plants and animals, and moving water:
   - Aquatic plants and animals shall be removed and water drained from all equipment as required by s. 30.07, Wis. Stats., and ss. NR 19.055 and 40.07, Wis. Adm. Code.
   - Operator shall comply with the most recent Department-approved 'Boat, Gear, and Equipment Decontamination and Disinfection Protocol', Manual Code # 9183.1, available at http://dnr.wi.gov/topic/invasives/disinfection.html

☒ Check if you are signing as Agent for Applicant.

I hereby certify that the above information is true and correct and that copies of this application have been provided to the appropriate parties named in Section II and that the conditions of the permit and pesticide use will be adhered to.

Dan Walsh
Signature of Applicant

5/17/2017
Date Signed

All portions of this permit, map and accompanying cover letter must be in possession of the chemical applicator at time of treatment. During treatment all provisions of Chapter NR 107, specifically ss. NR 107.07 and NR 107.08, Wis. Adm. Code, must be complied with, as well as the specific conditions contained in the permit cover letter.

Section VII – WPDES Permit Request

Is WPDES coverage being requested? Refer to http://dnr.wi.gov/topic/wastewater/aquaticpesticides.html for more information.

(◉) No: (◉) Already have WPDES coverage. ( ) Yes – complete section VII with signature
( ) WPDES coverage not needed

Select which permit you are requesting:
☐ WI-0064556-1 Aquatic Plants, Algae & Bacteria
☐ WI-0064564-1 Aquatic Animals
☐ WI-0064581-1 Mosquitoes & other Flying Insects

Indicate WPDES permittee responsible for the pollutant discharge: ( ) Applicator (◉) Sponsor

Do you expect the pest control activity will result in a detectable pollutant discharge to waters of the state beyond the treatment area boundary or a pollutant residual in waters of the state after the treatment project is completed? ( ) Yes (◉) No

If yes, identify the pollutant(s): _____

Are you planning to incorporate integrated pest management principles, as specified in the WPDES permit, into your pest control activity to minimize any pollutant residual or pollutant discharge beyond the treatment area? (◉) Yes ( ) No

Type of WPDES coverage being requested: (◉) One Treatment Site ( ) Statewide Coverage

For informational purposes, select areas of WI for most of your aquatic treatments: ☐ NW ☐ NE ☒ SW ☐ SE

Is WPDES coverage being requested for more than 1 year?
(◉) Yes ( ) No If yes, the permittee will remain in "active" WPDES status until a Notice of Termination is submitted.

I hereby certify that I am the authorized representative (as specified in Ch. NR 205.07(1)(g), Wis. Adm. Code) of the pest treatment activity which is the subject of this permit application. I certify that the information contained in this form and attachments is, to the best of my knowledge, true, accurate and complete.

Dan Welsh — Signature of Authorized Representative
Daniel Welsh — Printed Name
5/17/2017 — Date Signed

Section VIII – Permit to Carry Out Chemical Treatment (Leave Blank – DNR Use Only)

The foregoing application is approved. Permission is hereby granted to the applicant to chemically treat the waters described in the application during the season of 2017.

Application fee received? ☒ Yes ( ) No

Advance notification of treatment required? ☒ Yes ( ) No

State of Wisconsin
Department of Natural Resources
For the Secretary

By Susan Graham
Regional Director or Designee

6/13/17 — Date Signed
6/13/17 — Date Mailed

Please Note:

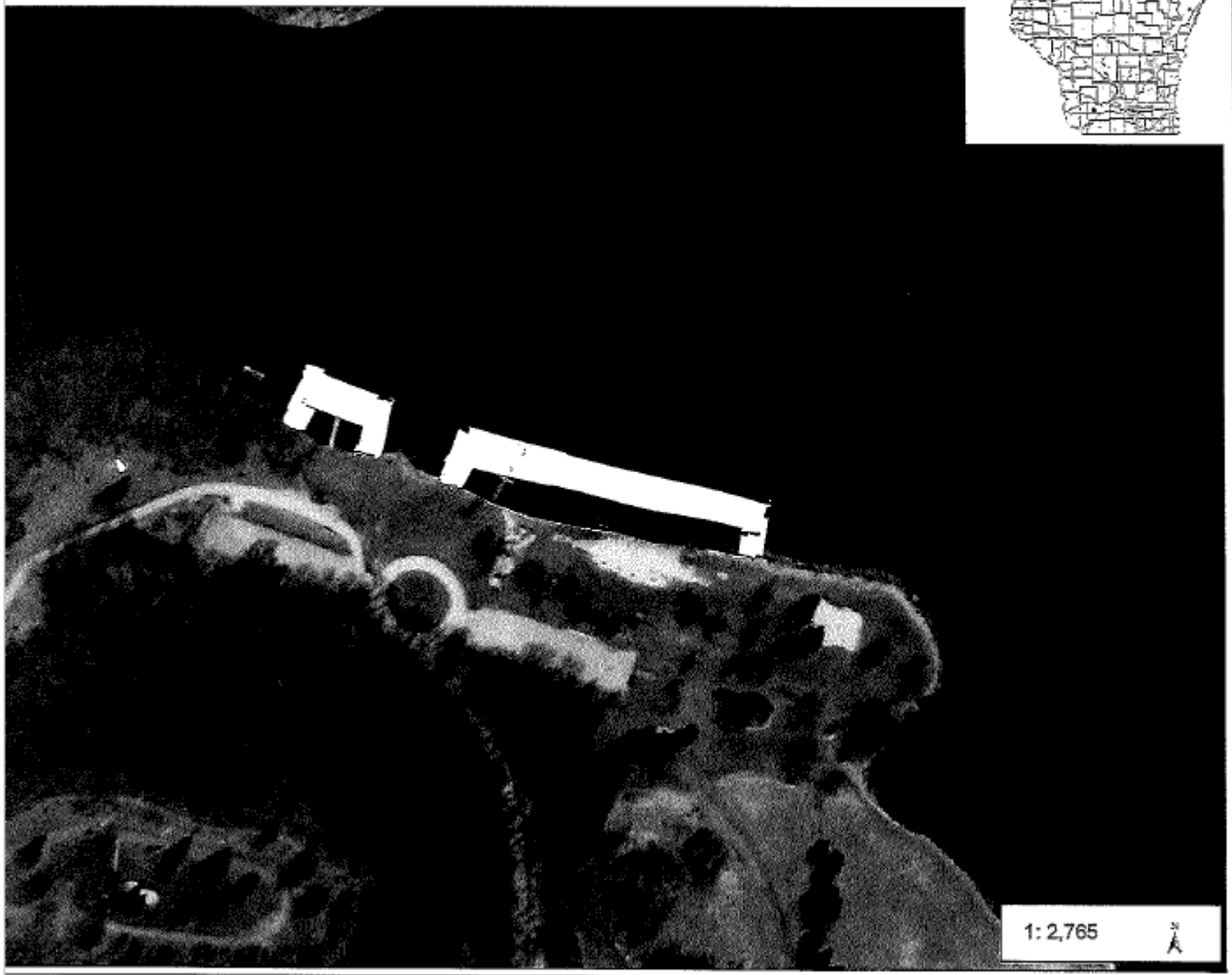
If you believe that you have a right to challenge this decision, you should know that Wisconsin statutes and administrative rules establish time periods within which requests to review Department decisions must be filed.

For judicial review of a decision pursuant to ss. 227.52 and 227.53, Wis. Stats., you have 30 days after the decision is mailed or otherwise served by the Department, to file your petition with the appropriate circuit court and serve the petition on the Department. Such a petition for judicial review shall name the Department of Natural Resources as the respondent.

This notice is provided pursuant to s. 227.48(2), Wis. Stats.

To request a contested case hearing pursuant to s. 227.42, Wis. Stats., you have 30 days after the decision is mailed, or otherwise served by the Department, to serve a petition for hearing on the Secretary of the Department of Natural Resources. The filing of a request for a contested case hearing is not a prerequisite for judicial review and does not extend the 30-day period for filing a petition for judicial review.

Surface Water Data Viewer Map



Legend

2010 Air Photos (WROC)

Treatment area is inside the white lines

.58 acreas at beach
.08 acres at boat pier
.66 acres total

Notes

0.1 0 0.04 0.1 Miles

NAD_1983_HARN_Wisconsin_TM
© Latitude Geographics Group Ltd.

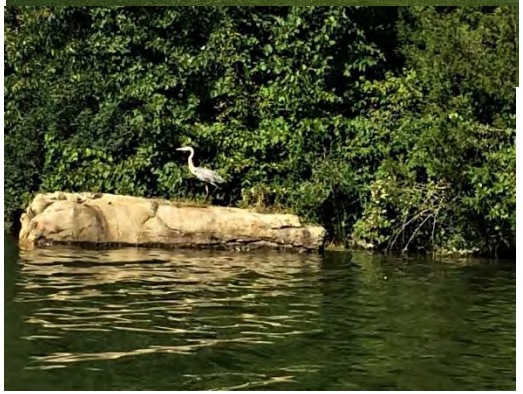
Appendix C
"What Happened to Eurasian watermilfoil in Blackhawk Lake?"
Wisconsin Lakes Convention, April 2017

What Happened to Eurasian Watermilfoil in Blackhawk L, WI?

Donna Sefton and Laura Spears
DFS Conservation Consulting
Blue Mounds, WI

Blackhawk Lake, Iowa Co., WI

- Constructed 1971
- Publicly owned shoreline
- 660 acre recr area with campground, beach, concession, landing
- High quality for SW WI 20’ ft Secchi spring
- Excellent fishery



Blackhawk L Physical Characteristics

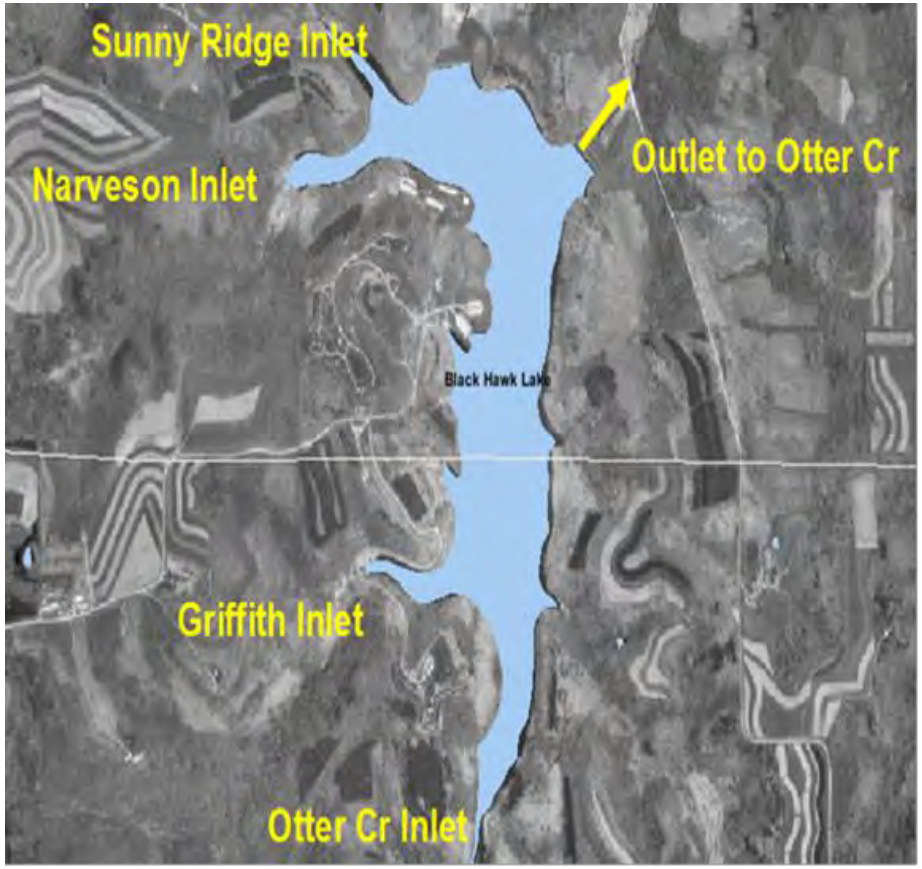
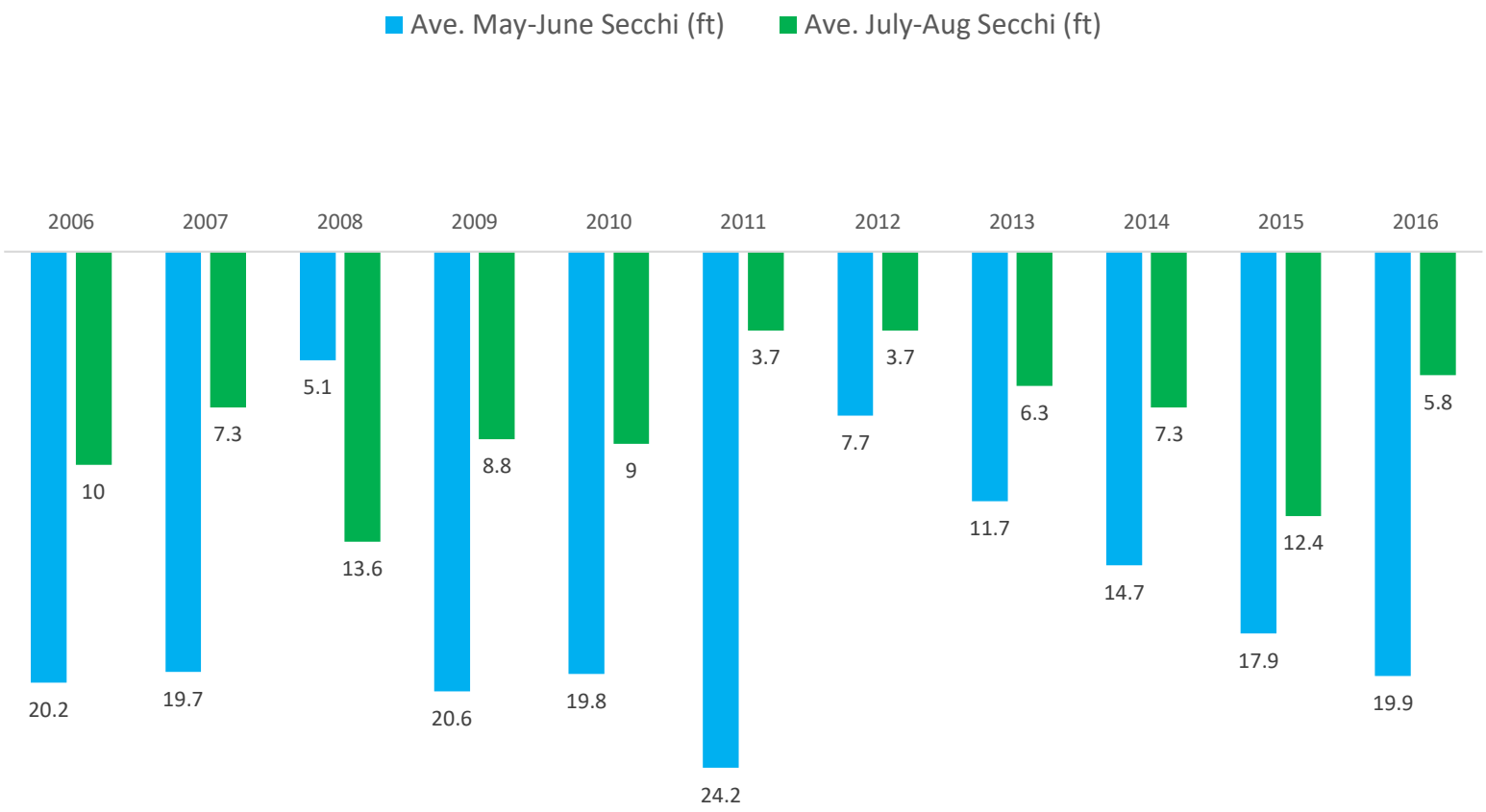
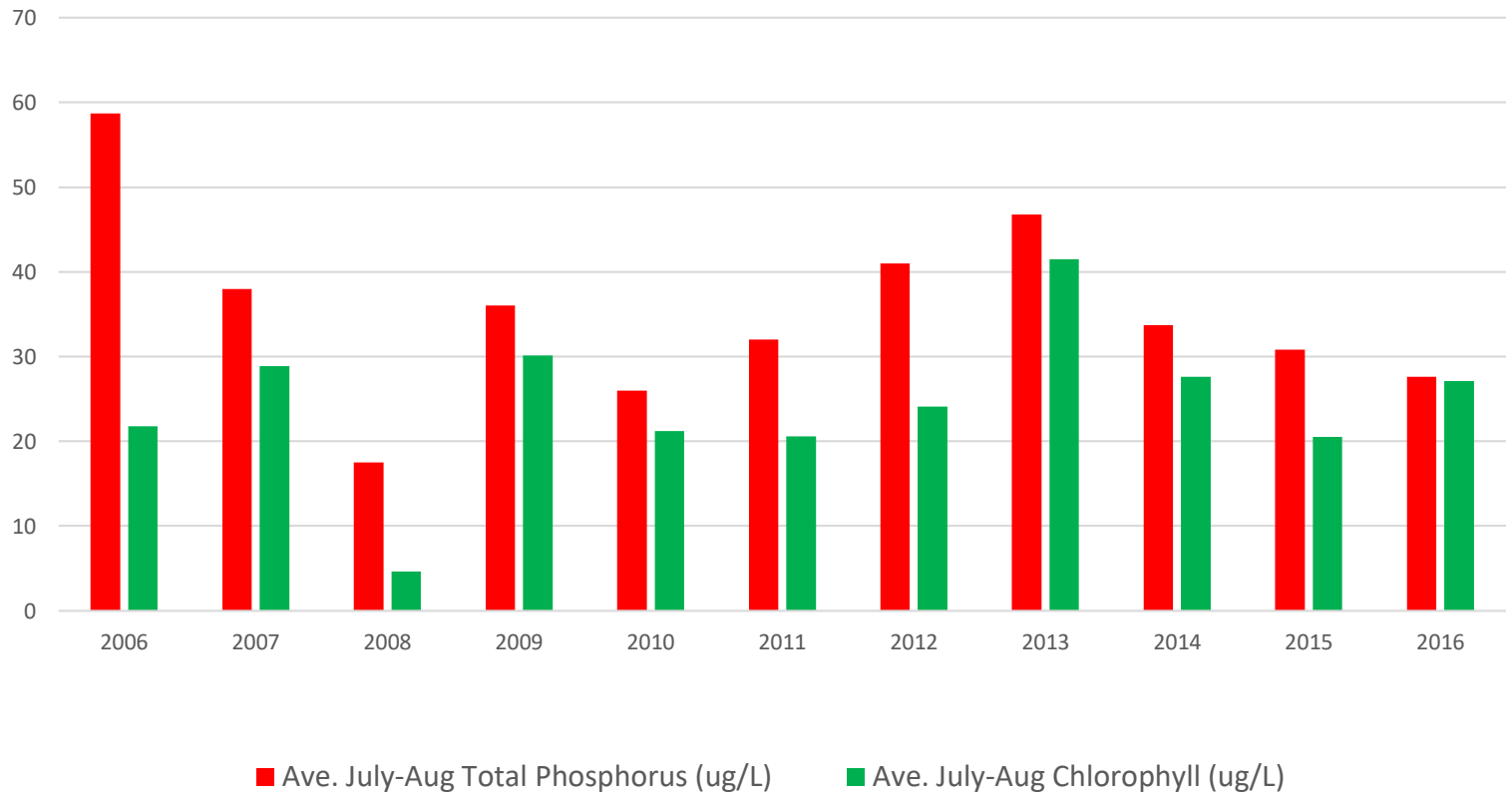


Table 1. Blackhawk L, Iowa Co., WI		
Physical Characteristics		
Area	220	acres
Maximum Depth	45	feet
Mean Depth	14.8	feet
Volume	3260	acre-feet
Littoral Area	80	acres/36%
Max. Depth Plants	15	feet
Flushing Rate	2.1	times/year
Residence Time	0.48	year
Watershed Area	9780	acres
Discharge	60%	bottom
	40%	surface

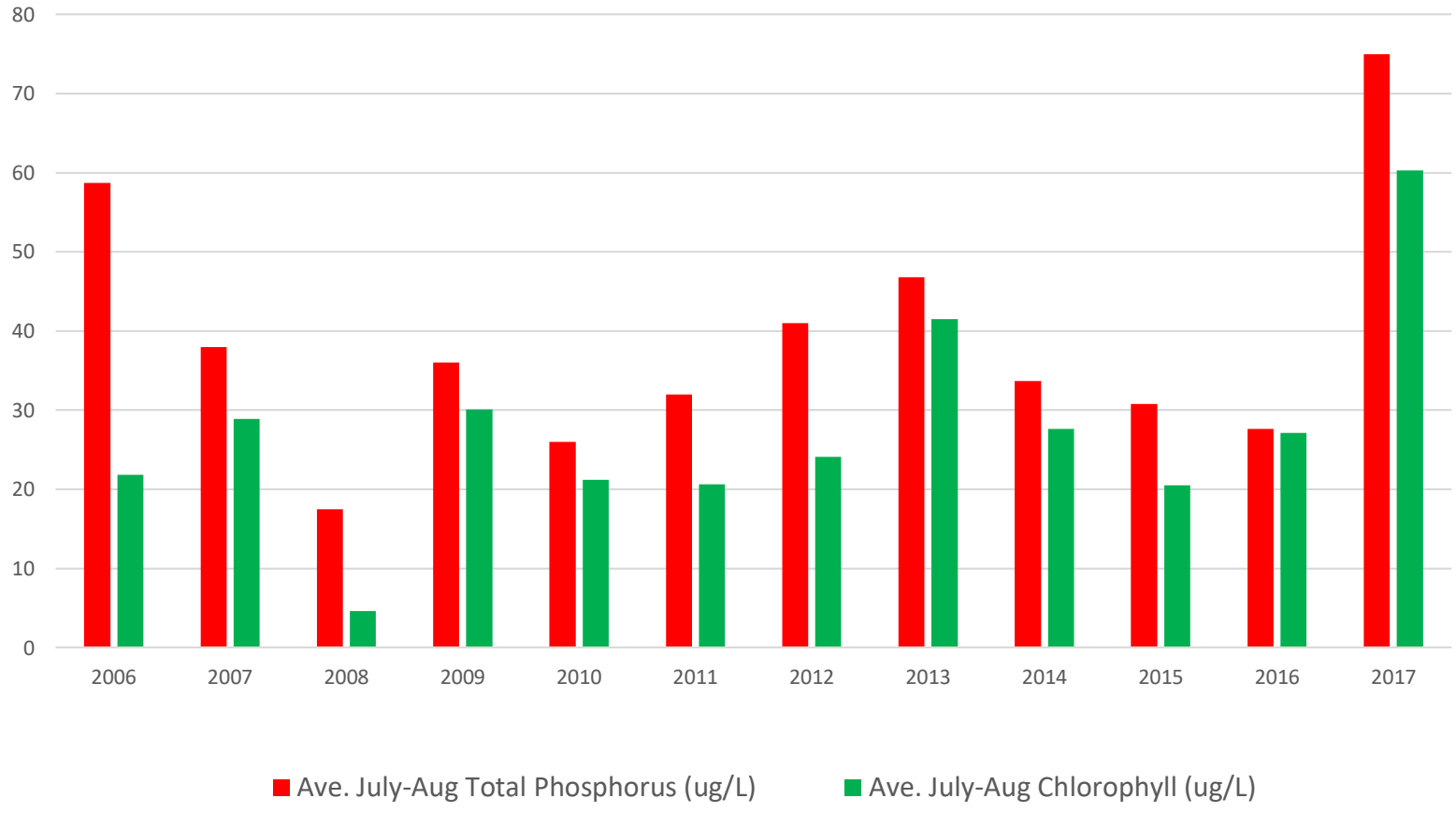
Blackhawk Lake Spring & Summer Secchi 2006-2016



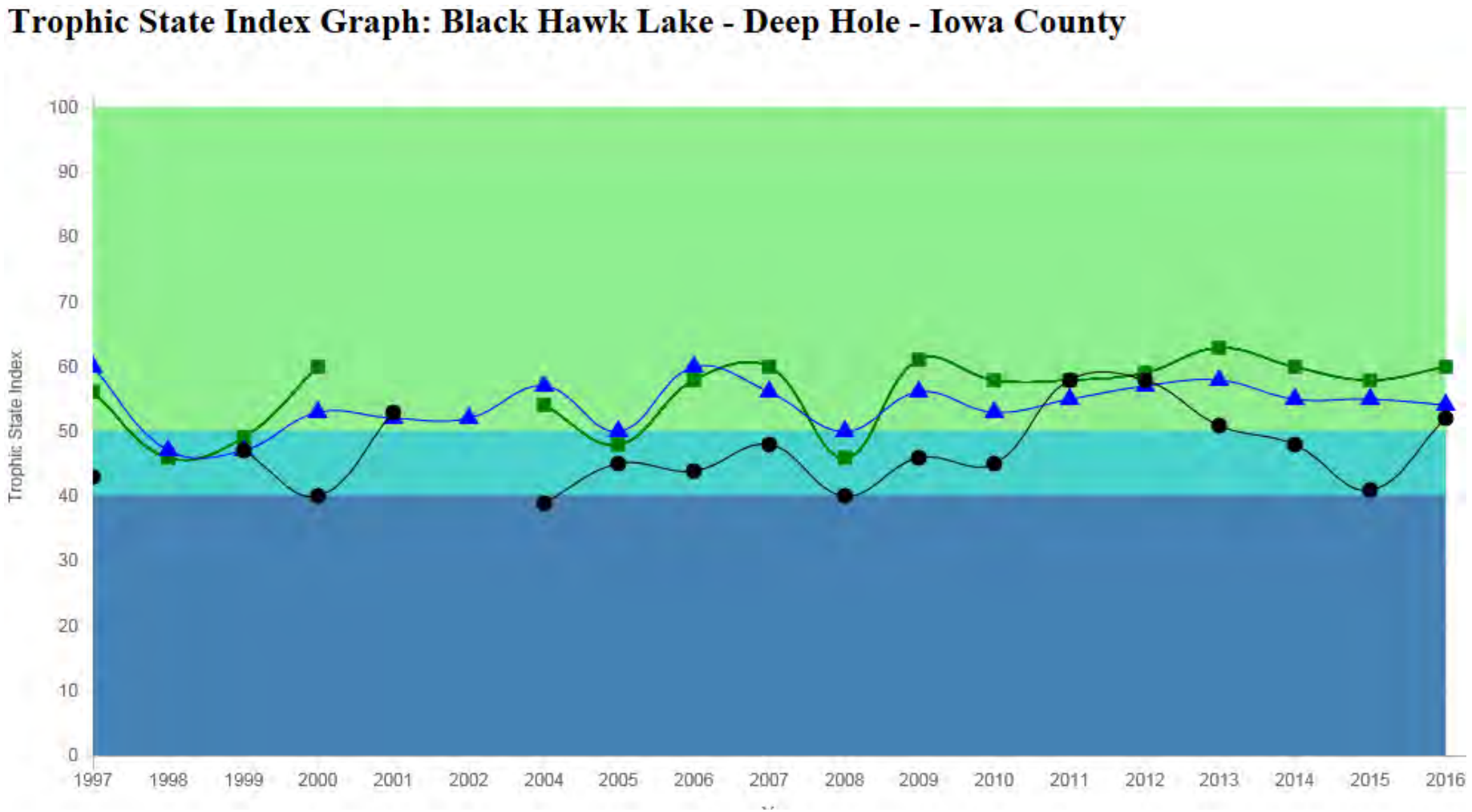
Blackhawk Lake Total Phosphorus & Chlorophyll 2006-2016



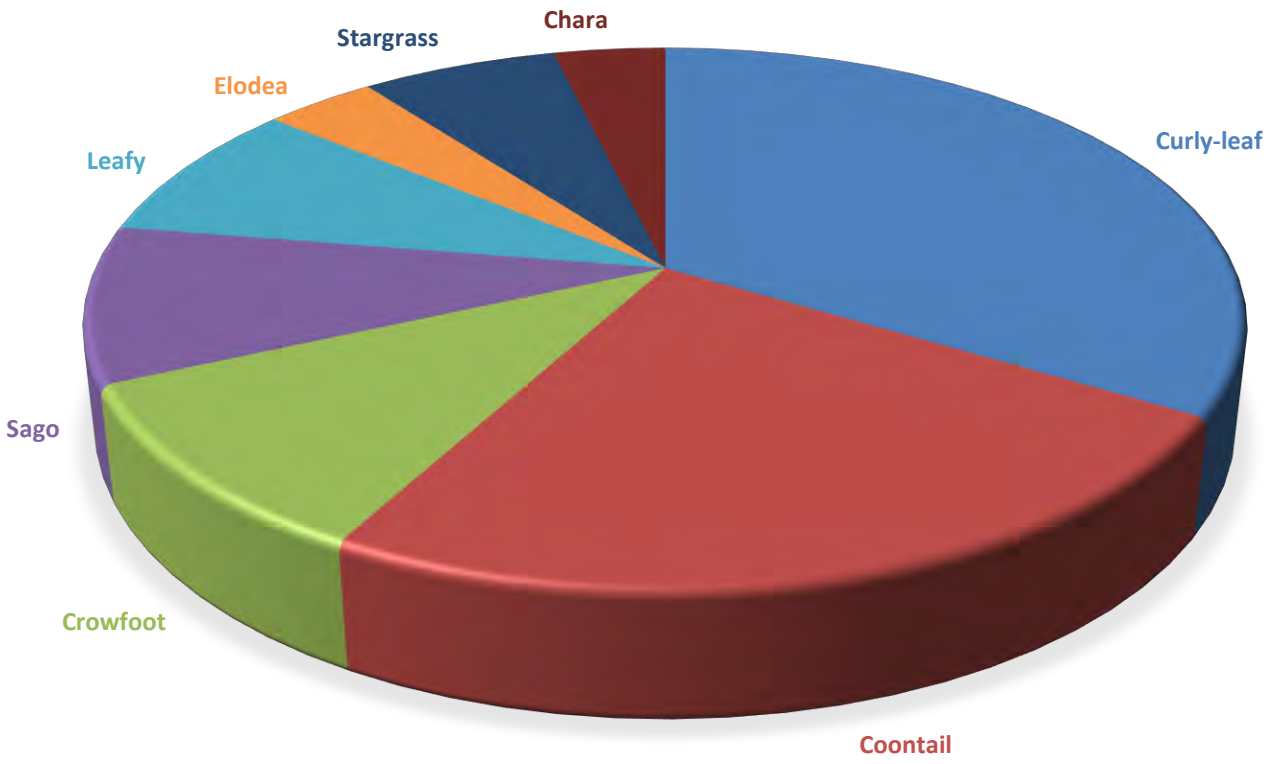
Blackhawk Lake Total Phosphorus & Chlorophyll 2006-2017



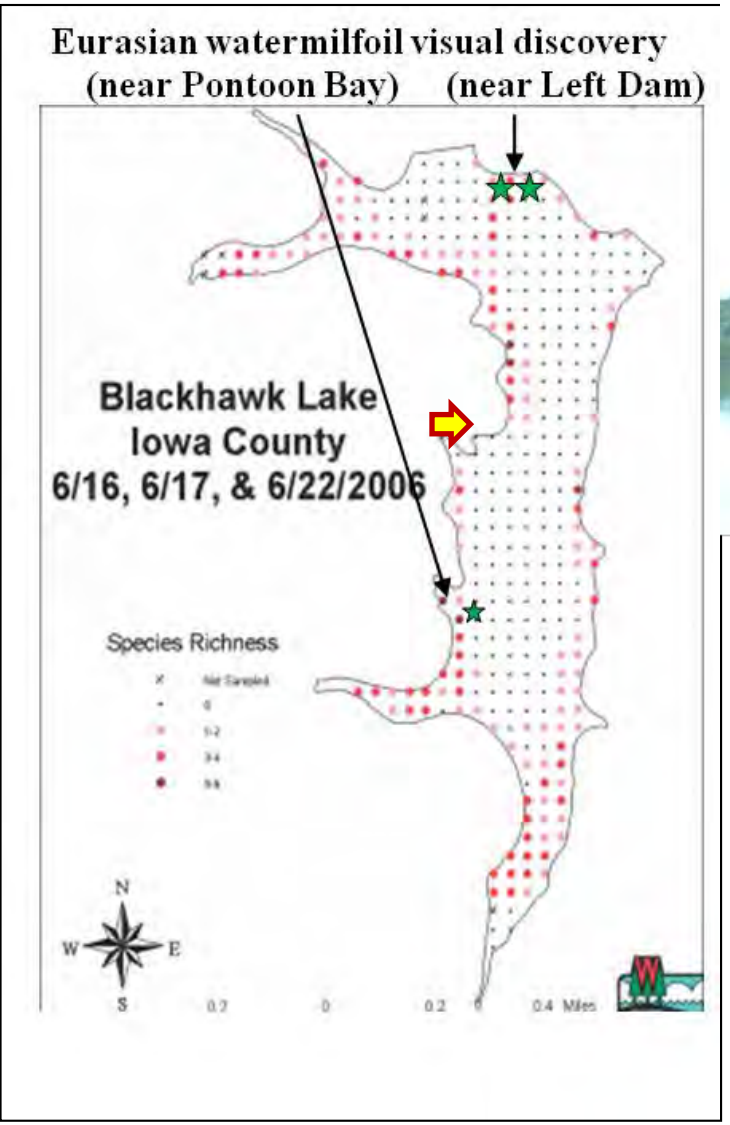
Blackhawk L TSI 1997 - 2016



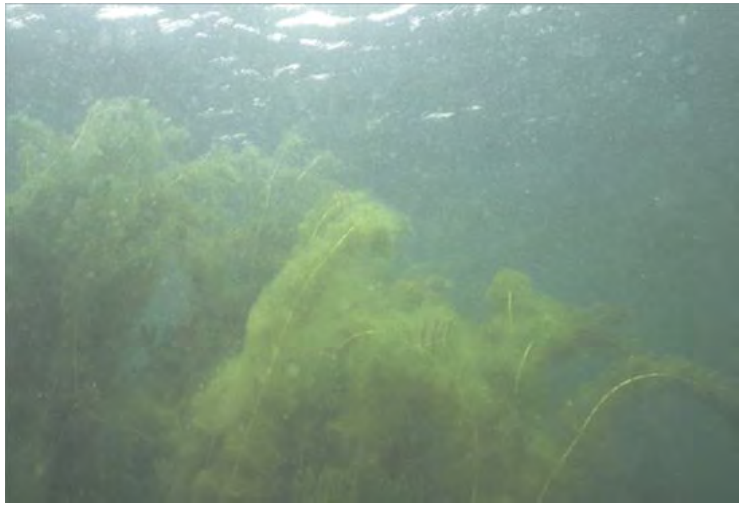
Blackhawk L Aquatic Plant Relative Frequency June 2006



Blackhawk L 2006 APS found EWM



Early Detection/Rapid Response 2006



- Pioneer colonies on NNE side uprooted or root crowned by scuba diver June 2006
- Collected in nets, disposed on land
- August 2006: scattered colonies in many areas
- EDRR grant:
  - Geolocate, map, monitor EWM
  - Survey aquatic plants, monitor WQ
  - Prepare/implement APM Plan
  - Information/education
- Prevent further invasion/spread
- Control in manner that maintains native plants, water quality & fish habitat & spawning areas

2007 Distribution and Treatment

- Larger colonies
- New colonies along E & W shorelines
- Spot treatment w/ 2,4-D granular
- Manual removal
- Less post-treatment, new locations

Areas treated

EWM post treatment

2008/2009 EWM Distribution & Manual Removal

- **2008**
  - **Heavy spring rains, water turbid, no EWM, few other plants**
- **2009**
  - **Near pioneer infestations & S of boat concession & landing**
  - **Manually removed in original infestation locations by snorkeler**
  - **Difficult where interspersed with other plants**

2009 Manual Removal

2010 EWM Distribution & Treatment

- Spring water clarity 20’
- EWM abundant on 5 acres of sand ridge near left dam, 5-10’ water

  - Treated w/2,4-D granular
- Colonies in pontoon bay & elsewhere interspersed with other plants

  - Not treated

EWM on Sand Ridge, June, 2010

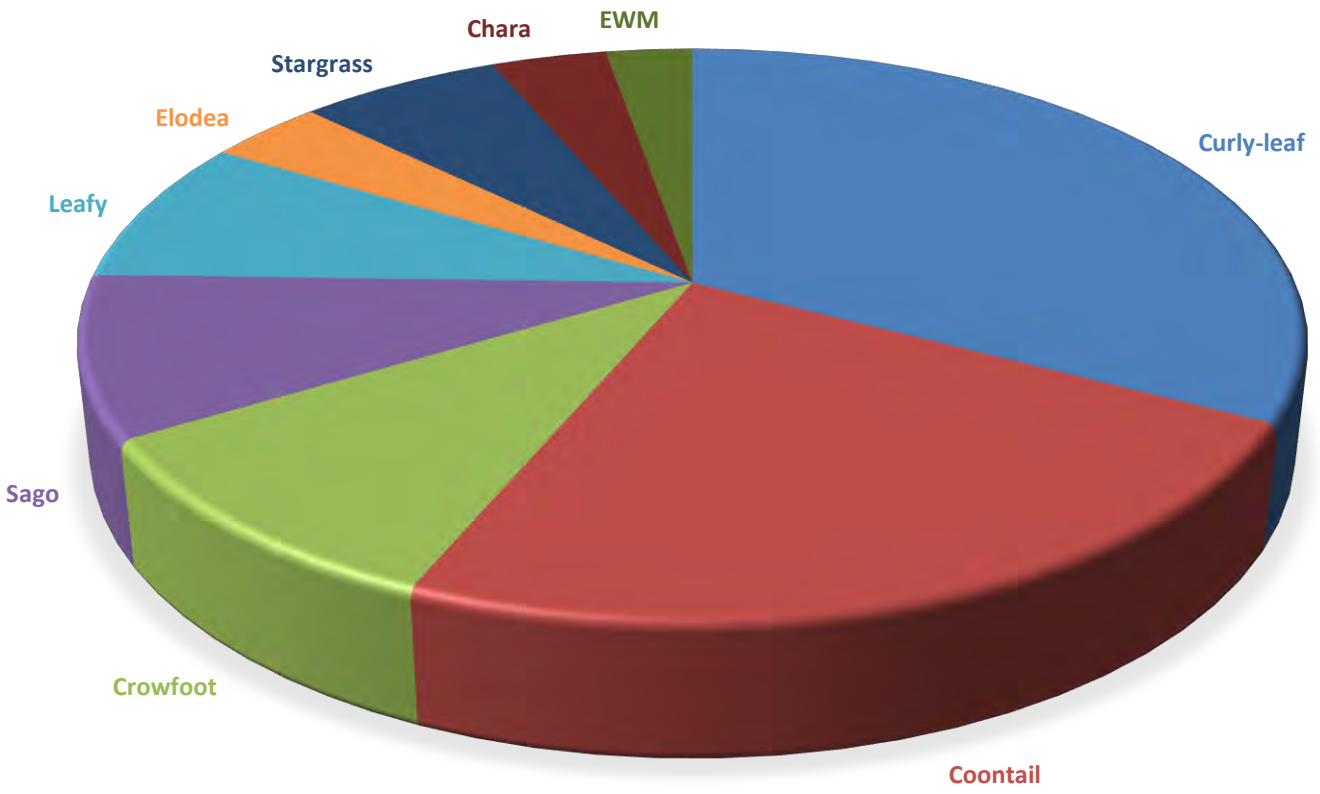
EWM Treatment w/2,4-D, June 2010

EWM treatment 2010	Application rate lbs/acre 2,4-D		
Treatment area	**6/14/2010**	**6/16/2010**	**Total**
Between green & yellow lines (2.25 acres)	55	0	55
Between yellow & red lines (1.25 acres)	55	120	175
Within red line (1.25 acres)	55	140	195
Within blue line (0.25 acre)	55	88	144

Blackhawk L Aquatic Plants 2010 - 2011

- No EWM remainder of 2010
- One colony EWM 2011
- 2011 APS > diversity than 2006
  - White water crowfoot
  - Water stargrass
  - Small-leaf pondweed

Blackhawk L Aquatic Plant Relative Frequency June 2011

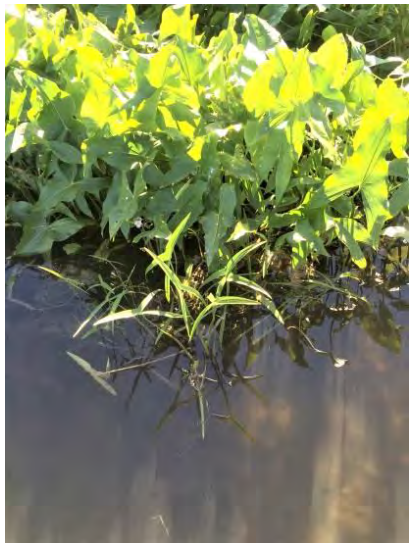


AIS Education/Prevention/Planning Grant

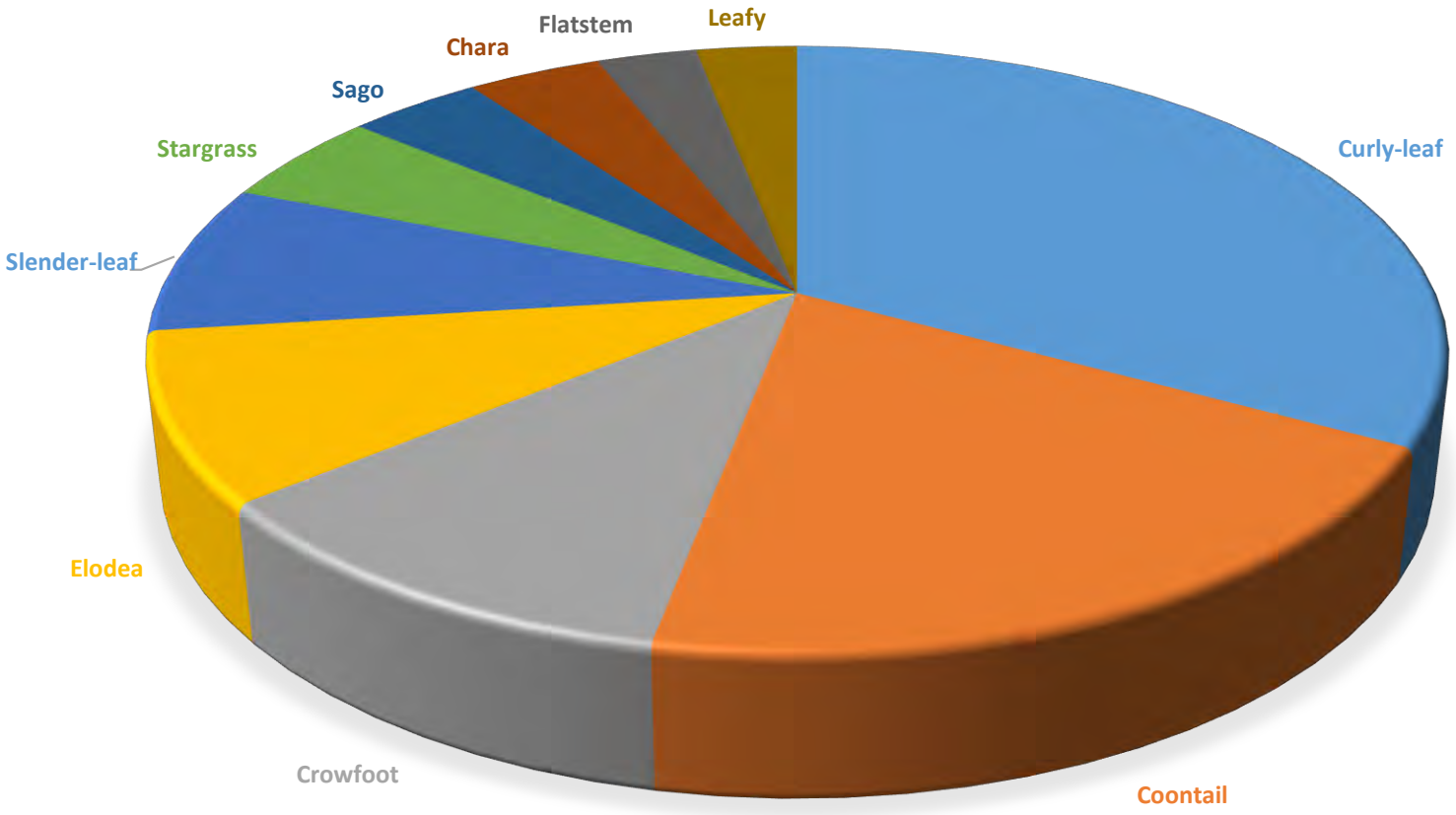
- **Monitoring, geo-locating, mapping EWM**
- **WQ monitoring**
- **Aquatic Plant Survey**
- **APM plan update**
- **Training staff & volunteers on AIS & WQ monitoring**
- **Clean Boats, Clean Waters**
- **Information/Education**

EWM 2012 - 2016

- No EWM
- Curly-leaf pondweed deeper water in spring
- More diverse native vegetation in littoral areas than 2006 & 2011



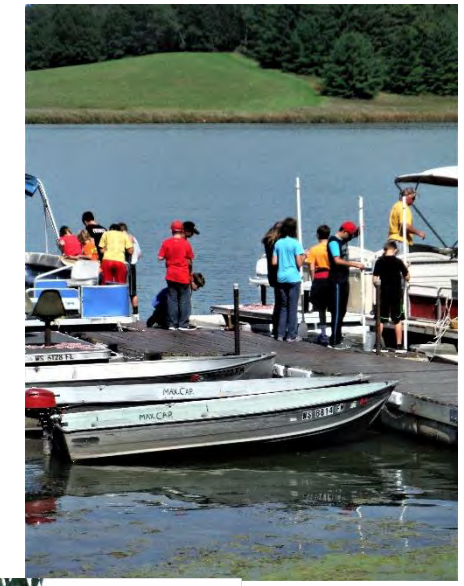
Blackhawk L Aquatic Plant Relative Frequency June 2015



Clean Boats, Clean Waters

- Signs
- Info/educational materials at office/nature center
- Electronic message board at landing
- Watercraft inspections & education
- - Staff with DNR grant
- - SW Badger RC&D
- Informational kiosk at landing (proposed)

WQ & AIS Educational Workshops for Highland Schools



Blackhawk L Draft APM Plan

- **Manual harvesting best for EWM during clear water phase & where small distinct colonies**
- **Herbicide more effective & practical for larger areas &/or when not as clear. Since water stargrass & coontail susceptible to 2,4-D, may need to use different herbicide for EWM control**
- **In spring/early summer, navigation, fishing, swimming impaired in areas of boat concession, fishing pier & beach**
  - **Mostly curly-leaf, small-leaved & leafy pondweed, white water crowfoot, coontail, filamentous algae**
  - **2 treatments as needed between 3rd week May & 3rd week June**

Blackhawk L EWM Control Summary

- Key to control is monitoring & rapid response
- Manual harvesting best during clear water phase & plants distinct colonies
- 2,4-D granular effective on larger areas
- Collective competition from curly-leaf pondweed & other plants in spring inhibits EWM
- Weather that affects water clarity influences EWM distribution & abundance

Why No EWM since 2011?

- Early detection/rapid response
- Collective competition of more diverse aquatic plant population (curly leaf pondweed too)
- 2010 2,4-D treatment on sand ridge
- Manual harvesting where feasible
- Weather
- Biweekly visual/rake surveys
- Clean Boats, Clean Waters
- Educational activities
- Other?

Blackhawk L EWM Control Summary

- Key to control is monitoring & rapid response
- Manual harvesting best during clear water phase & plants distinct colonies
- 2,4-D granular effective on larger areas
- Collective competition from curly-leaf pondweed & other plants in spring inhibits EWM
- Weather that affects water clarity influences EWM distribution & abundance

Questions?

Appendix D
"Successful Long-term Control of Eurasian watermilfoil in Blackhawk Lake, WI"
North American Lake Management Society International Symposium, April 2017

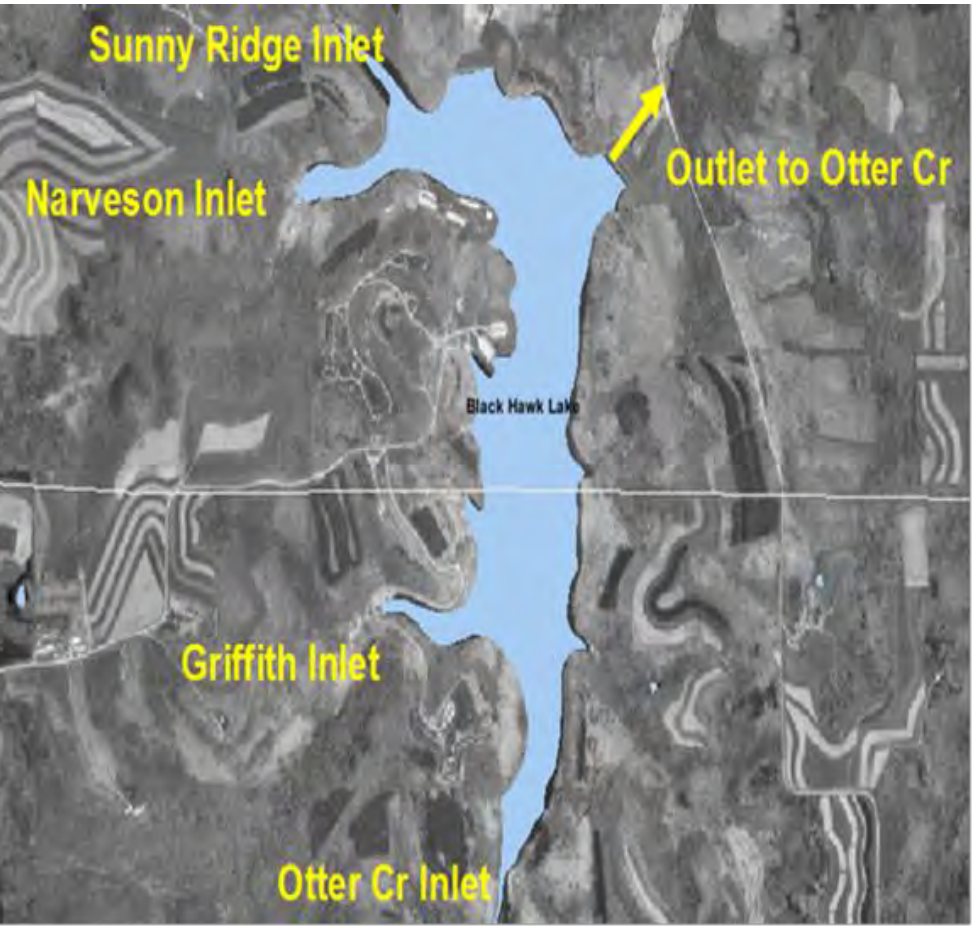
Successful Long Term Control of *Myriophyllum spicatum* (Eurasian watermilfoil) in Blackhawk L, WI

Donna Sefton and Laura Spears
DFS Conservation Consulting
Blue Mounds, WI

Blackhawk Lake, Iowa Co., WI

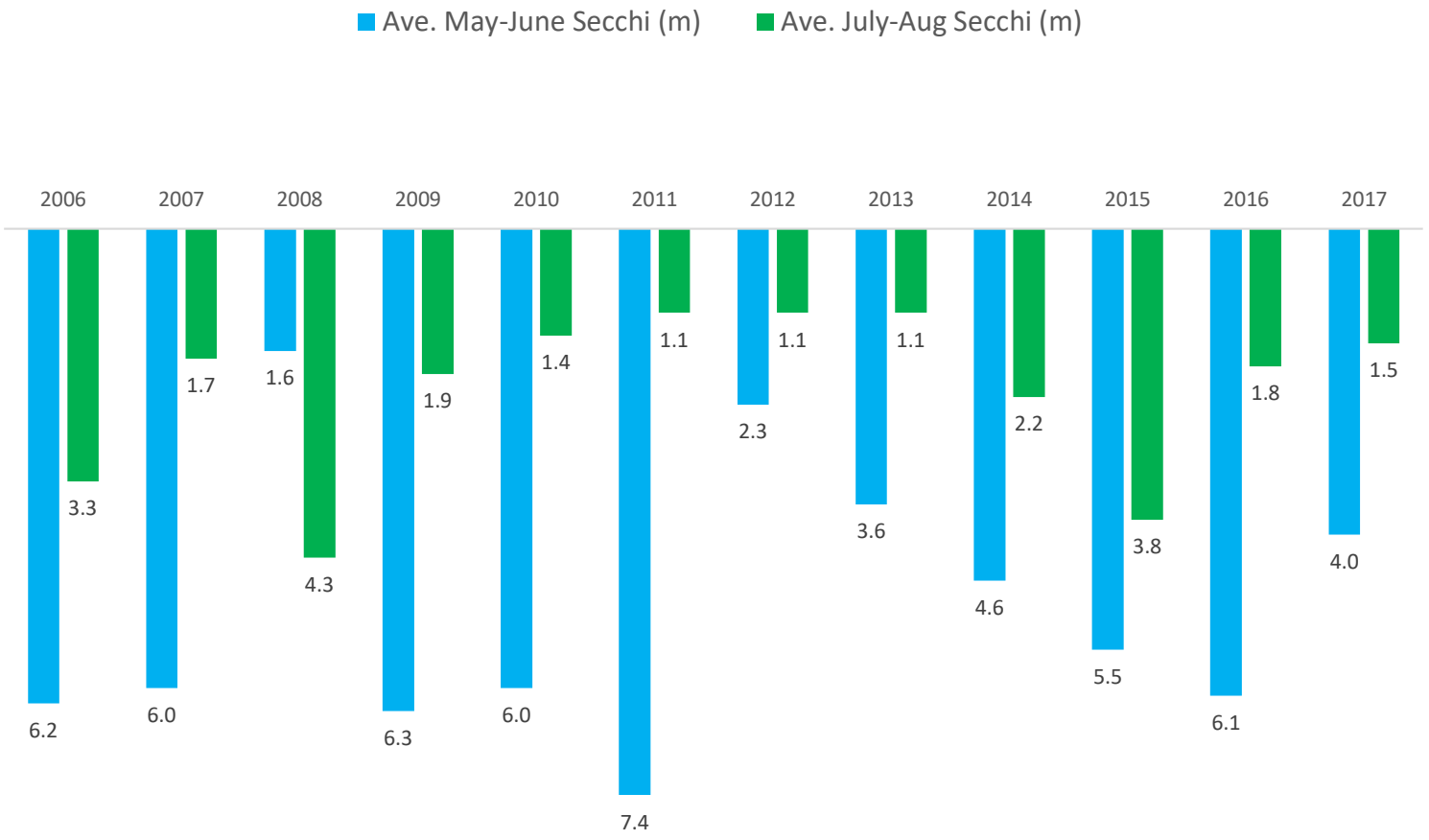
- Constructed 1971
- Publicly owned shoreline
- 267 ha recr. area with campgrounds, beach, concessions, landing
- High quality for SW WI Spring Secchi 5 -7 m
- Excellent fishery
- Wildlife area

Blackhawk L Physical Characteristics

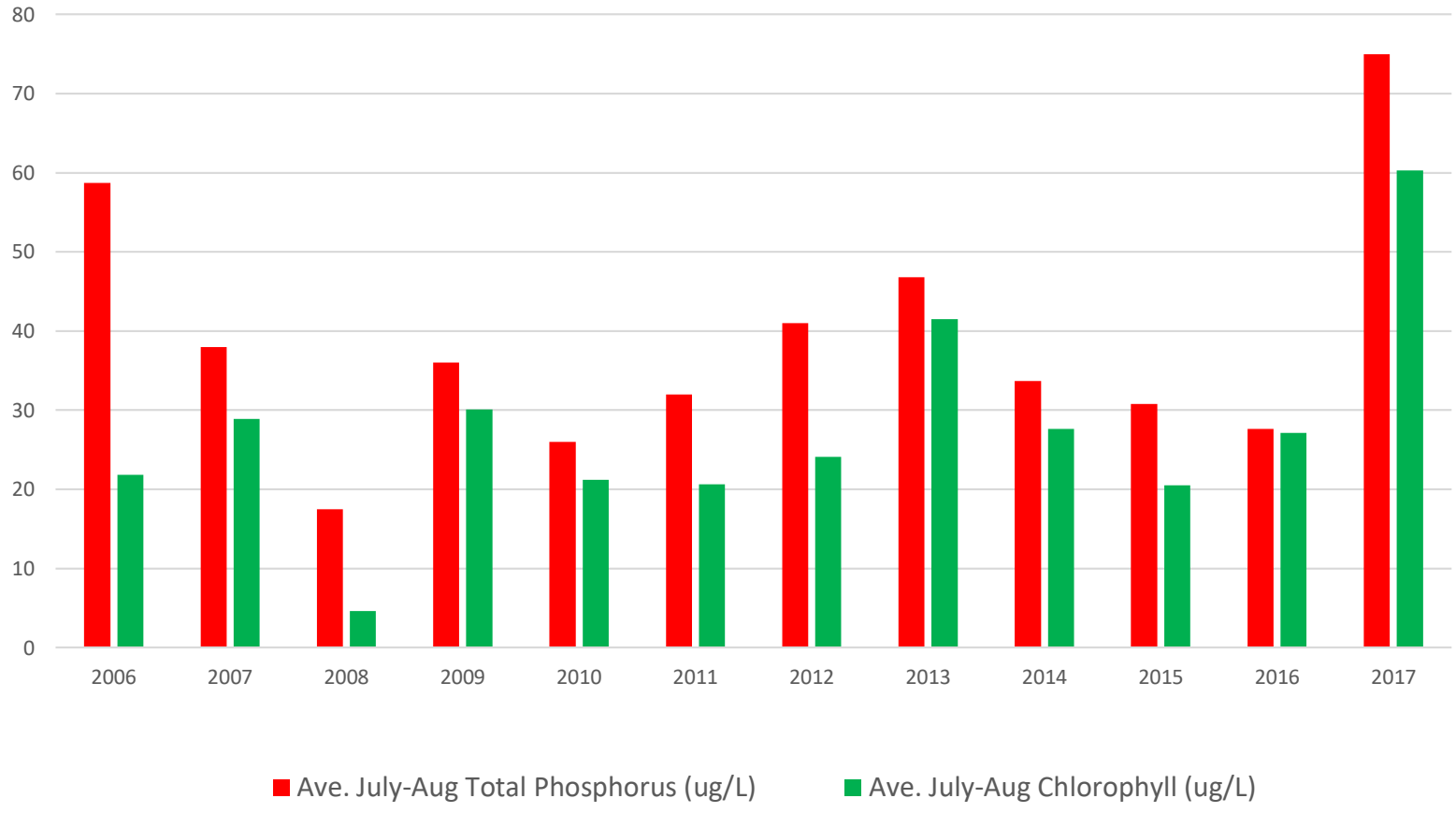


Lake Surface Area	89	hectares
Maximum Depth	13.7	meters
Mean Depth	4.5	meters
Volume	4,021,151	cubic meters
Watershed Area	3958	hectares
Littoral Area	32.4	hectares
	36	%
Max. Depth Plants	4.6	meters
Flushing Rate	2.1	times/year
Residence Time	0.48	year
Discharge	60%	hypolimnetic

Blackhawk Lake Spring & Summer Secchi 2006-2017

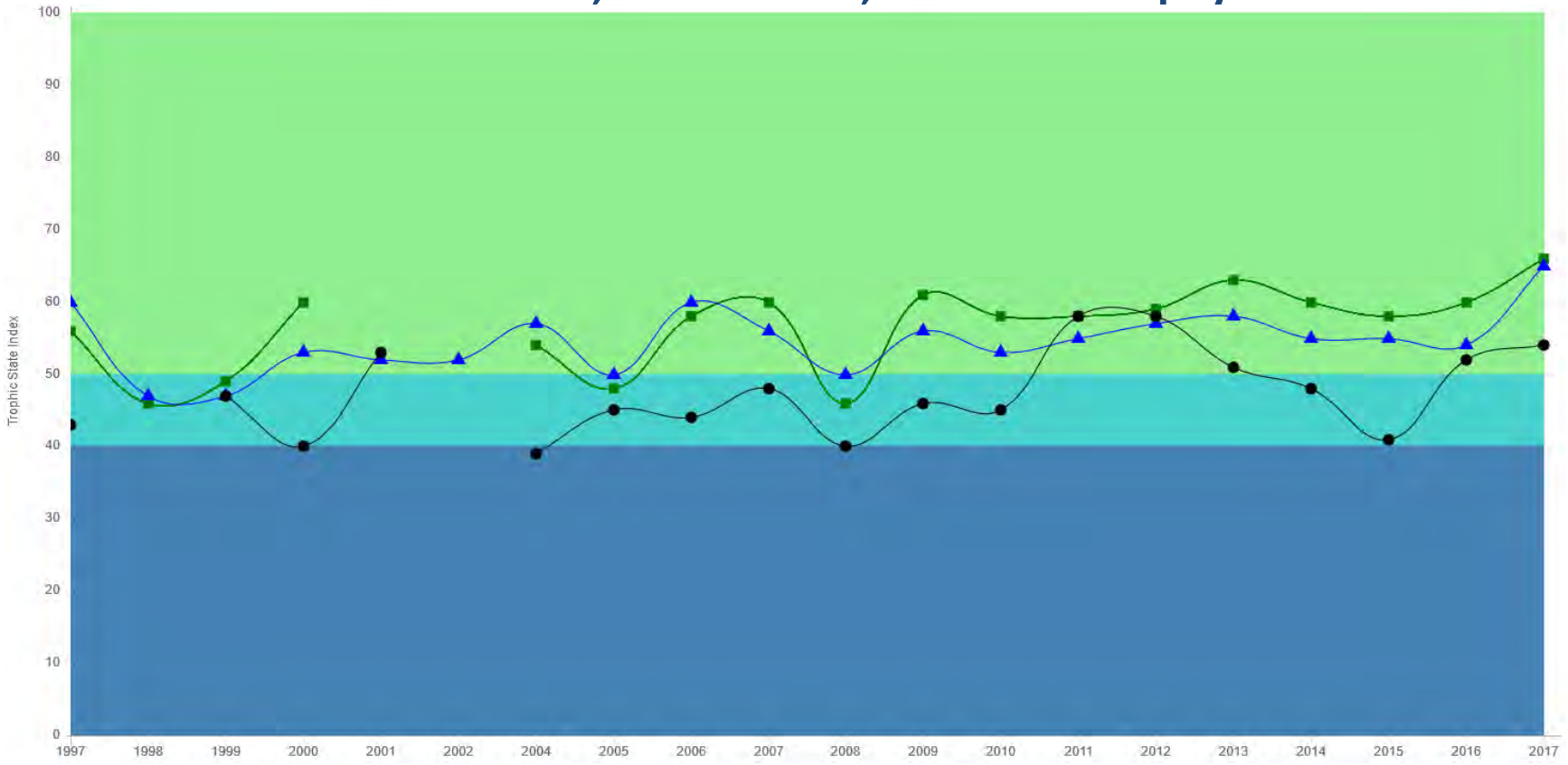


Blackhawk Lake Total Phosphorus & Chlorophyll 2006-2017

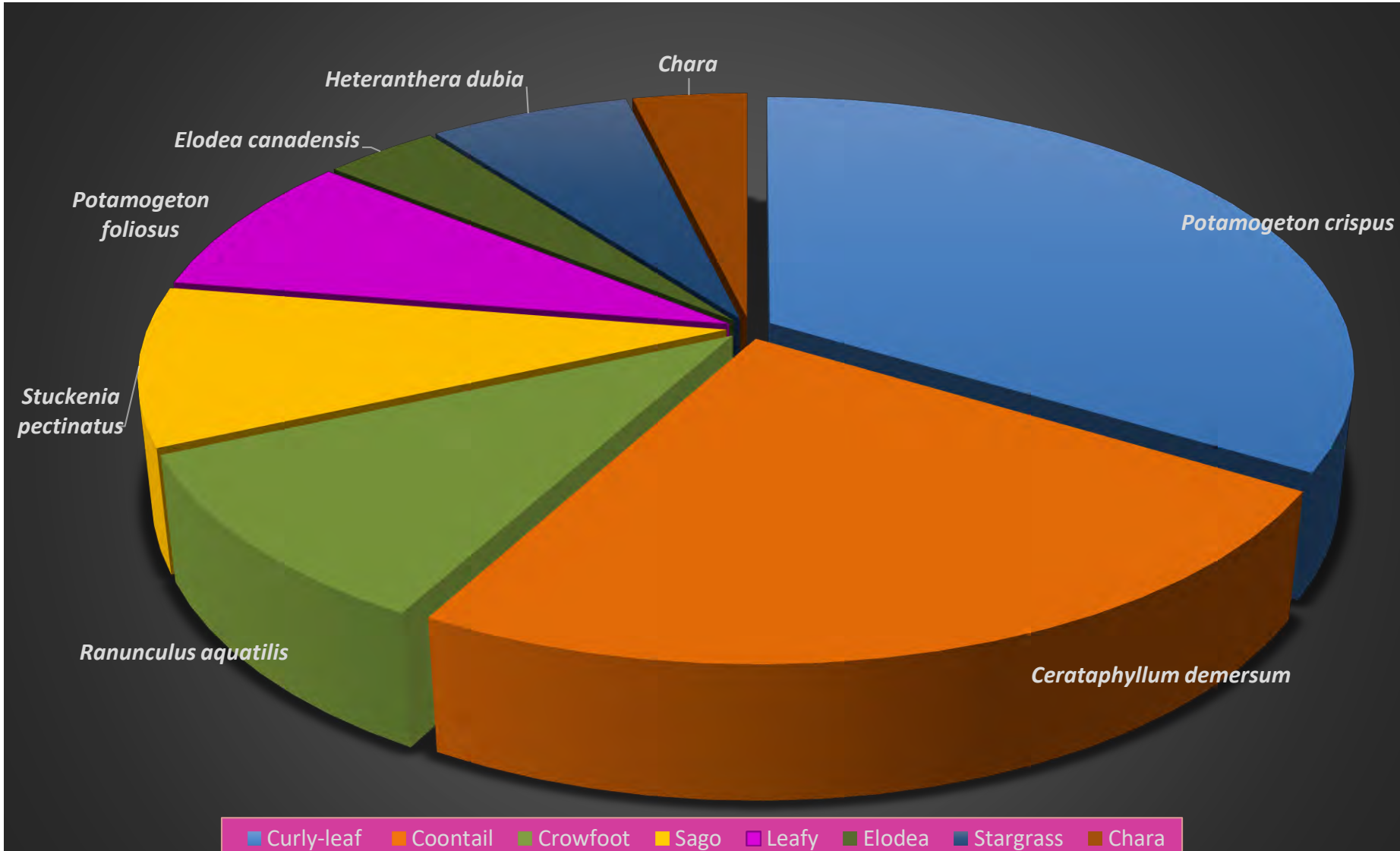


Blackhawk L Trophic State Index (TSI) 1997 – 2017

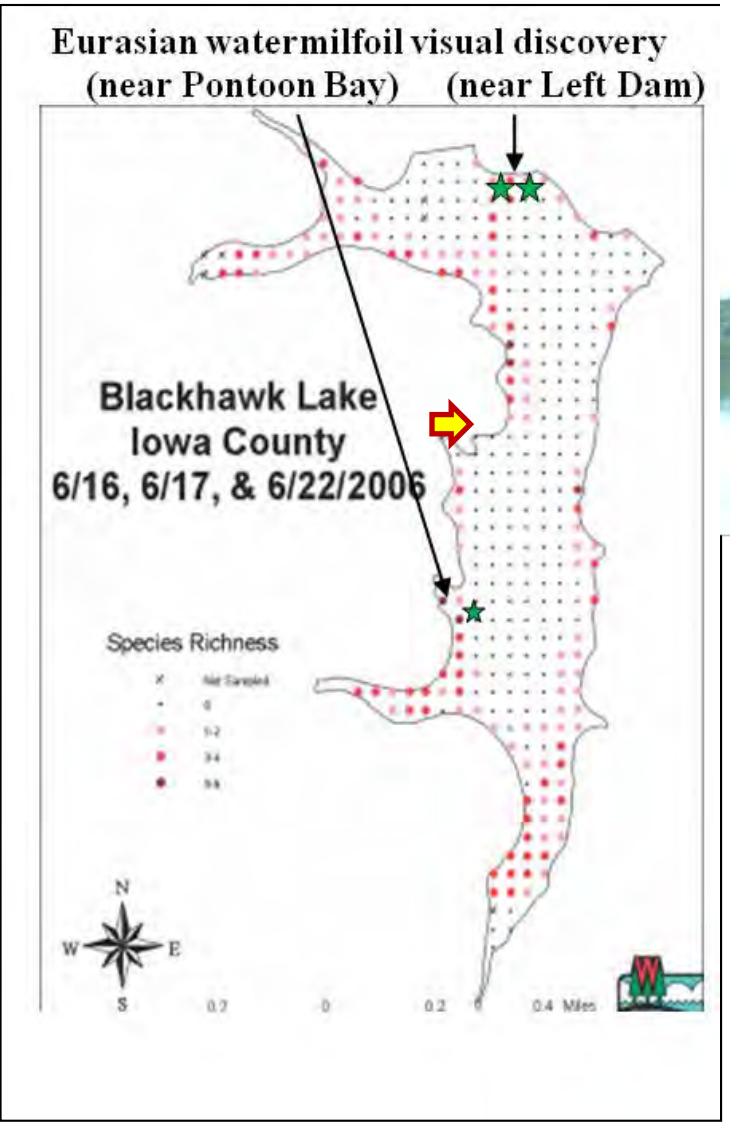
Black=Secchi, Blue=Total P, Green=chlorophyll



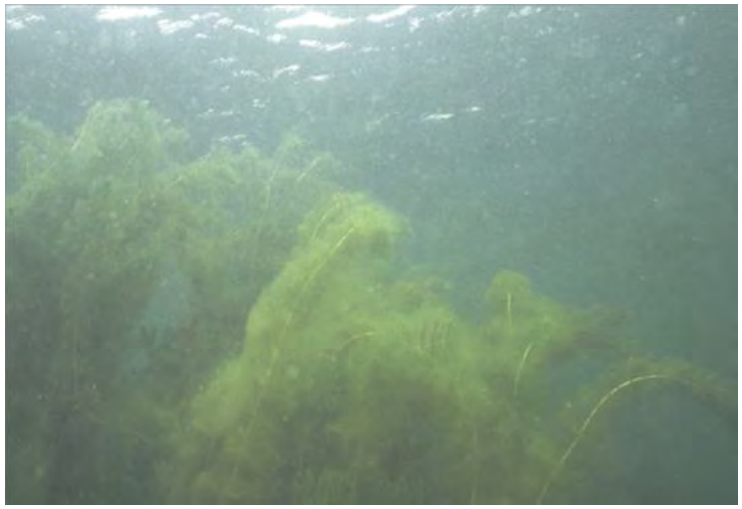
Blackhawk L Aquatic Plant Relative Frequency June 2006



Blackhawk L 2006 APS found EWM



Early Detection/Rapid Response (EDRR) 2006



- Pioneer colonies by left dam uprooted or root crowned by scuba diver June 2006
- Collected in nets, disposed on land
- August 2006: scattered colonies in many areas
- EDRR grant from WI DNR:
  - Geolocate, map, monitor EWM
  - Survey aquatic plants, monitor WQ
  - Prepare/implement APM Plan
  - Information/education
- Prevent further invasion/spread
- Control in manner that maintains native plants, water quality, fish habitat & spawning areas

2007 Distribution and Treatment

- Larger colonies
- New colonies along shorelines
- Spot treatment w/2,4-D granular
- Manual removal
- Less post-treatment, new locations

Areas treated

EWM post treatment

2008/2009 EWM Distribution & Manual Removal

- **2008**
  - **Heavy spring rains, water turbid, 1.6 m spring Secchi**
  - **No EWM, few other plants**
- **2009**
  - **Spring Secchi 6.3 m**
  - **Near pioneer infestations & S of boat concession/beach**
  - **Manually removed by snorkeler**
  - **Difficult where interspersed with other plants**

2009 Manual Removal

2010 EWM Distribution & Treatment

- Spring water clarity 6 m
- EWM abundant on 2 ha of sand ridge near left dam,

  1.8 - 3 m water

  - Treated w/2,4-D granular
- Colonies in pontoon bay & elsewhere interspersed with other plants

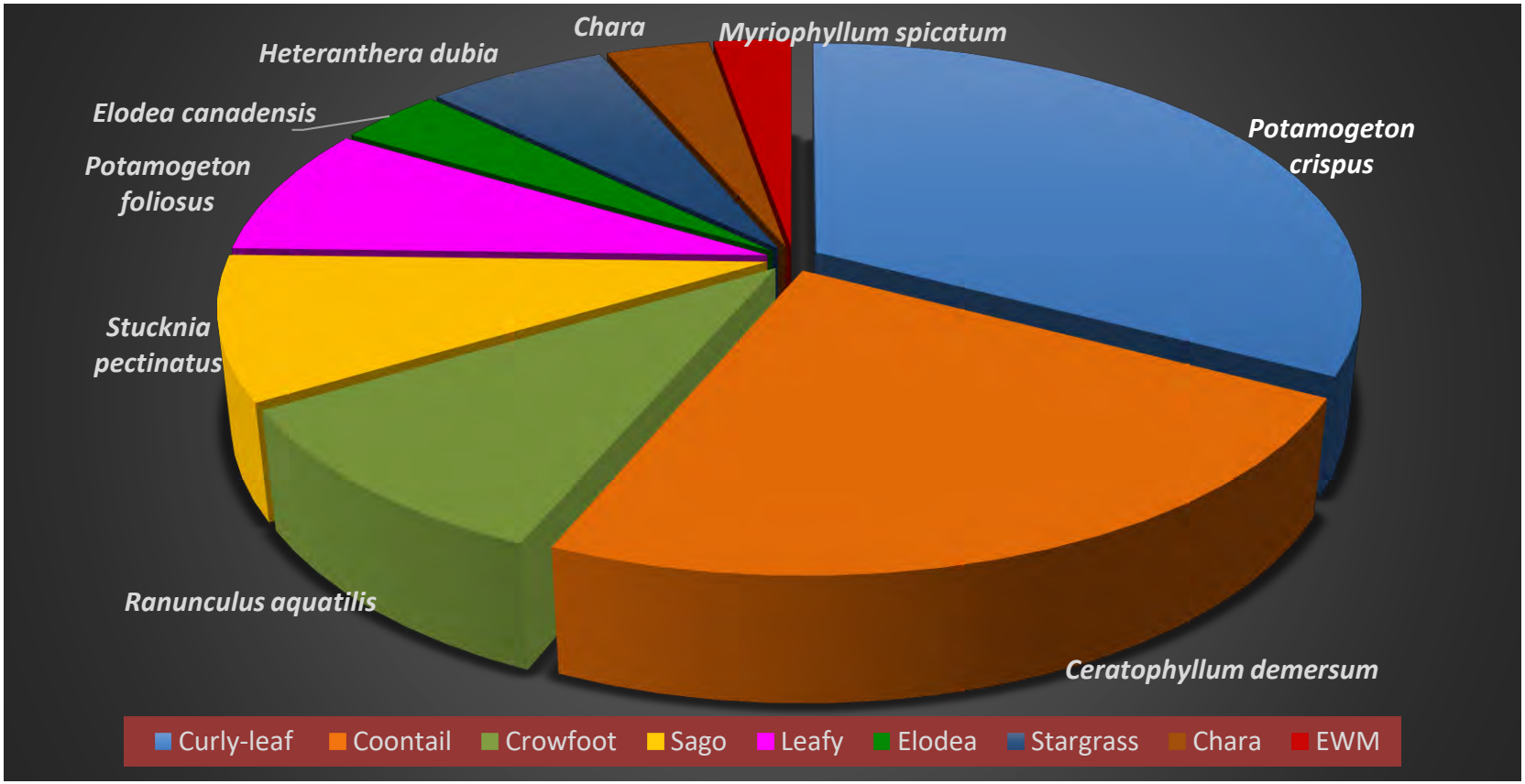
  - Not treated

EWM on Sand Ridge, June, 2010

Blackhawk Lake June 2010
EWM Treatment w/2,4-D granular

EWM treatment 2010	Application rate kg/0.4 ha 2,4-D		
Treatment area	6/14	6/16	Total
Between green & yellow lines (0.9 ha)	24	0	24
Between yellow & red lines (0.5 ha)	24	54	78
Within red line (0.5 ha)	24	63	87
Within blue line (0.1 ha)	24	40	64

Blackhawk L Aquatic Plant Relative Frequency June 2011

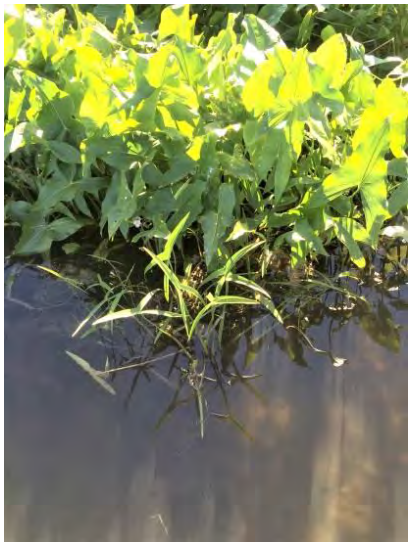


AIS Education/Prevention/Planning Grant

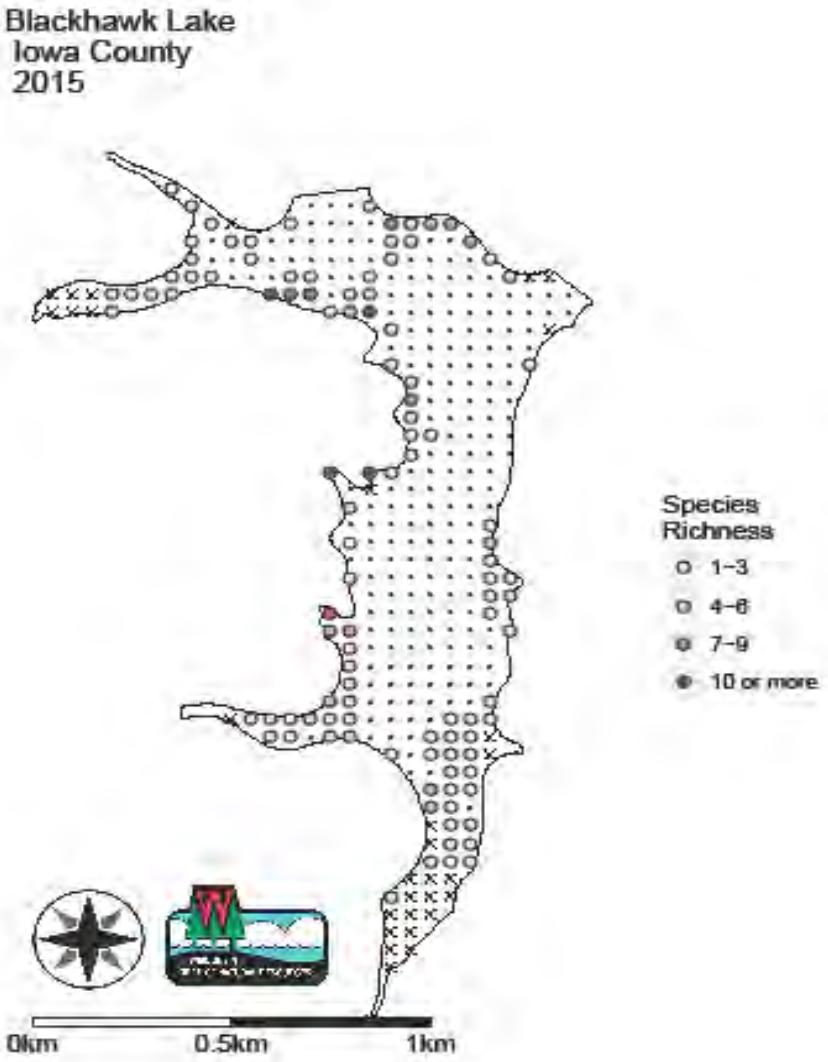
- **Monitoring, geo-locating, mapping EWM**
- **WQ monitoring**
- **Aquatic Plant Survey**
- **APM plan update**
- **Training staff & volunteers on AIS & WQ monitoring and watercraft inspections**
- **Clean Boats, Clean Waters**
- **Information/Education**

Aquatic Plants 2012 - 2017

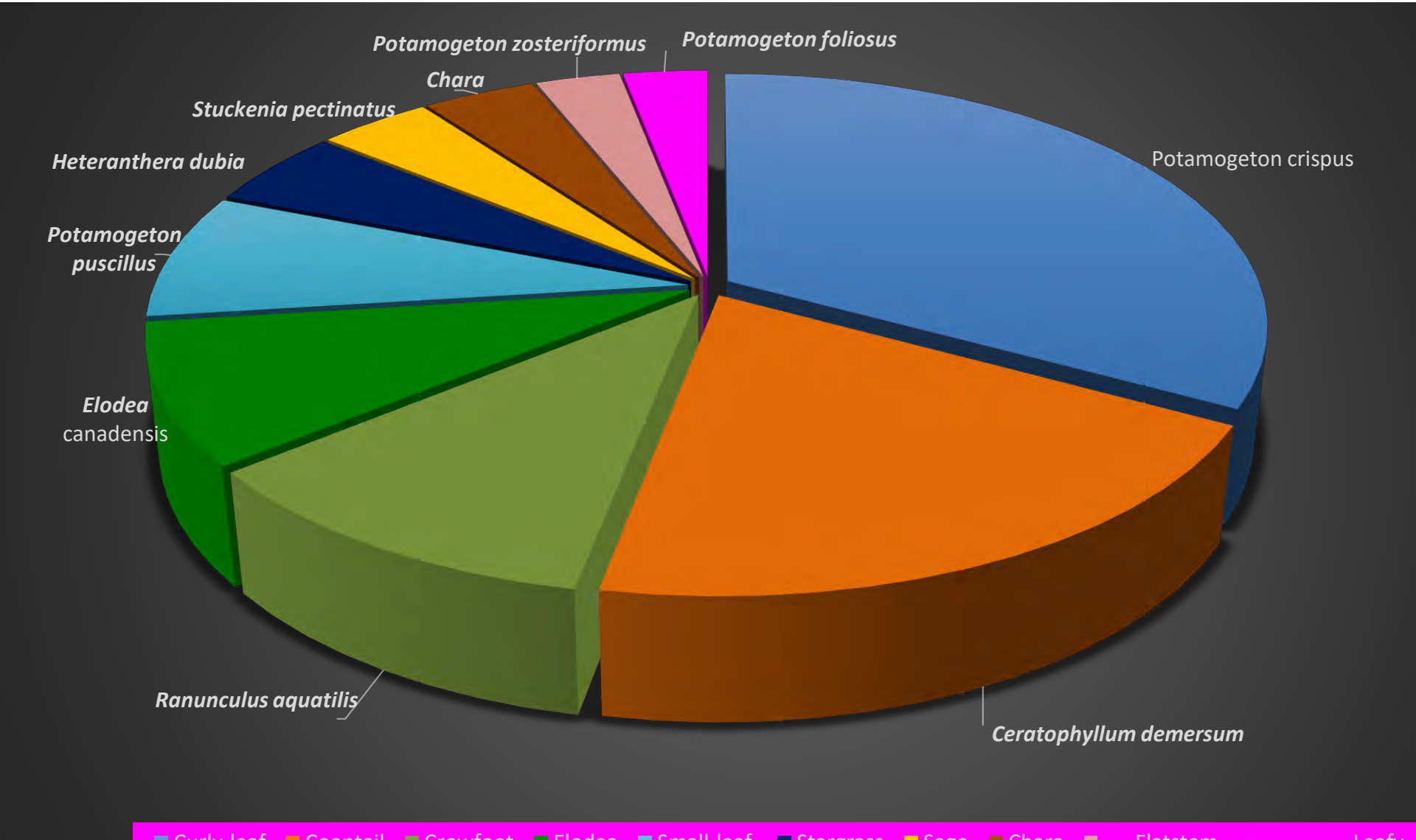
- No EWM
- Curly-leaf pondweed deeper water in spring
- More diverse native vegetation in littoral areas than 2006 & 2011



Blackhawk L Aquatic Plant Survey
Species Richness June 2015



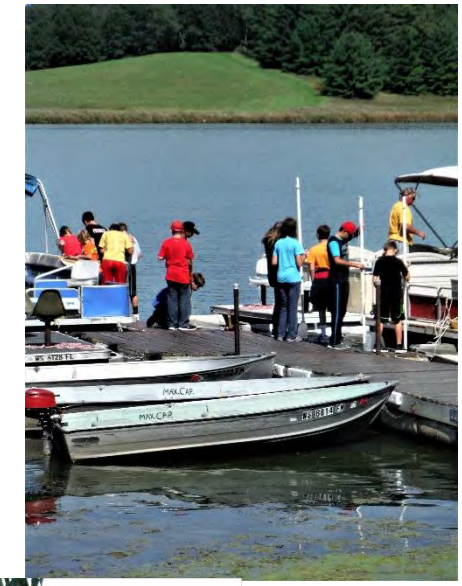
Blackhawk L Aquatic Plant Relative Frequency June 2015



Clean Boats, Clean Waters

- Prevent spread AIS signs
- Info/educational materials at office as checked in
- Electronic message board at landing
- Watercraft inspections & education priority
  - Staff
  - SW Badger RC&D

WQ & AIS Educational Workshops



Blackhawk L EWM Control Summary

- **Key to control is monitoring & rapid response**
- **Manual harvesting best during clear water phase & plants distinct colonies**
- **2,4-D granular effective on 2 ha area, but not very effective as a spot treatment on small colonies**
- **Collective competition from curly-leaf pondweed & other plants in spring limits EWM**
- **Weather that affects water clarity influences EWM distribution & abundance**
- **Since *Heteranthera dubia* & *Ceratophyllum demersum* susceptible to 2,4-D, need to use different herbicide for EWM control in future**

Why No EWM since 2011?

- Early detection/rapid response
- Collective competition of more diverse aquatic plant population (including *Potamogeton crispus*)
- 2010 2,4-D treatment on sand ridge successful
- Manual harvesting
- Weather
- Cyclic
- Weevils?
- Visual/rake surveys
- Clean Boats, Clean Waters
- Educational activities
- ?

Acknowledgements

This work was made possible by the support of:

BLACKHAWK LAKE RECREATION AREA

- **Cobb-Highland Recreation Commission**
- **Wisconsin Dept. of Natural Resources**

Questions?

Appendix 5
Blackhawk L AIS Education, Prevention, and Planning Grant (AEPP-410-14) Annual Report, 2018

BLACKHAWK LAKE AQUATIC INVASIVE SPECIES EDUCATION, PREVENTION & PLANNING GRANT (AEPP-410-14) 2018 REPORT
January 2019

Water Quality Monitoring 2018

Blackhawk Lake was monitored by DFS Conservation Consulting for Secchi disk transparency on 11 dates in 2018 (5/13, 5/22, 6/4, 6/18, 6/25, 7/6, 7/25, 8/13, 8/17, 9/10, 9/24), for phosphorus on 5/13 and for phosphorus and chlorophyll on 6/25, 7/24, and 8/17. Photos were taken of water quality and aquatic plants during each monitoring period. Data was entered into DNR's Surface Water Integrated Monitoring System (SWIMS). The 2018 water quality data and report, as well as Secchi disk transparency and Trophic State Index comparisons from 1997 – 2018 are found in Appendix A.

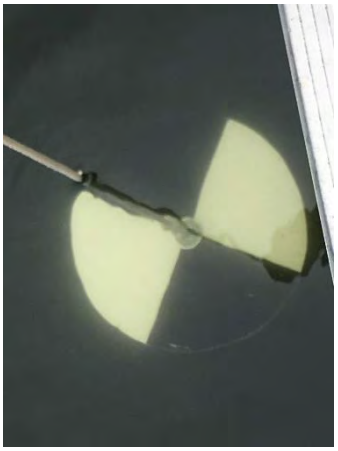
The Secchi disk clarity of Blackhawk Lake ranged from 7 to 20 feet during spring (May-June), with an average of 11.9 feet in 2018. Lower clarity at that time was generally associated with wind and rain. The May-June 2018 precipitation was 18.96 inches, as compared to a normal of 9.26 inches. Only 2008, 2012, and 2013 had lower spring average clarity. In summer (July – August), the clarity was much lower, ranging from 2 – 8.5 feet and averaging 5.4 feet. Only 2011, 2012, and 2017 had lower summer average clarity. The July-August 2018 precipitation was 9.43 inches, close to the normal of 9.57 inches. The average summer Secchi clarity at Blackhawk Lake was still more than the average for the Southwest Wisconsin Georegion in 2018 (3.9 feet).

The spring total phosphorus was 31.3 ug/l as compared to an average of 25.0 ug/l for 2006-2017. Spring total phosphorus (a nutrient to promote algae growth) is often used as an indicator of the potential for summer algae blooms. Impoundments that have more than 30 ug/L total phosphorus may experience noticeable algae blooms. Summer 2018 total phosphorus was 44.9 ug/l as compared to an average of 38.6 ug/l from 2006 - 2017.

The average summer chlorophyll (indicating the concentration of algae suspended in the water) was 96.4 ug/L as compared to a Southwest Georegion average of 34.9 ug/L and an average of 27.4 ug/l for 2006-2017. Heavy spring rains washed in phosphorus, which help promote the growth of algae. Nutrients were also made readily available for algae growth as the aquatic plants died back and release the phosphorus contained in them as the summer progressed. In August, following a period of hot, dry, calm weather, the water turned a cloudy, pea-soup blue-green color indicative of a blue-green algae bloom. The Blackhawk Lake Recreation Area posted Water Quality Advisory signs because of the potentially toxic effects of the blue-green algae. These were posted for most of the rest of the summer.

The summer Trophic State Index (TSI) based on chlorophyll during July and August was 69, indicating Blackhawk Lake was eutrophic. This TSI usually suggests blue-green algae can become dominant and algal scums are possible, as well as extensive aquatic plant overgrowth.

5-13-18 Blackhawk Lake Water Quality and Aquatic Plants

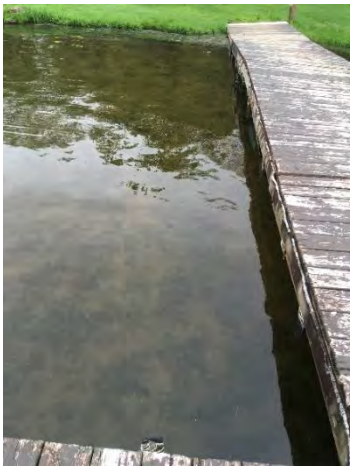


Secchi disk clarity = 7.5'

Handicapped Fishing pier

Concession Dock

Concession Dock N side



Concession Dock S side

Fishing Pier

Beach looking north

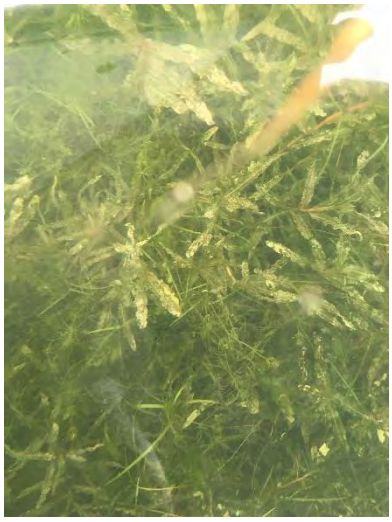
Beach looking south

5-22-18 Blackhawk Lake Water Quality and Aquatic Plants

Secchi disk clarity = 16'

Concession Dock

Concession Dock S side



Plants at Concession Dock

Handicapped Pier

Fishing Pier

Btwn Fishing Pier & Beach

From lake looking toward Beach

Beach looking S

6-4-18 Blackhawk Lake Water Quality and Aquatic Plants

Secchi disk clarity = 9'

Concession Dock

Concession Dock S side

Btwn Concession & Handicapped Pier

Chara Concession dock

Fishing Pier

Fishing Pier S side

Looking from Concession Dock toward Beach

Btwn Fishing Pier & Beach

6-18-18 Blackhawk Lake Water Quality and Aquatic Plants

Concession Dock

Concession Dock N side

Chara Concession Dock

Concession Dock

Handicapped Pier

Btwn Fishing Pier & Concession

Fishing Pier

Looking N from Beach

Enjoying the Beach

6-25-18 Blackhawk Lake Water Quality and Aquatic Plants

Secchi = 7'

Handicapped Pier

Handicapped Pier

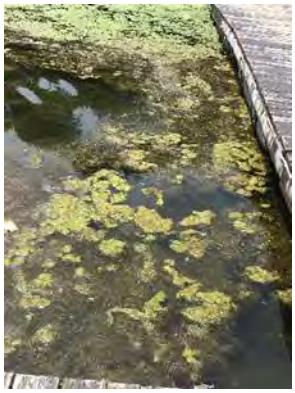
Concession Dock S

Concession Dock N

Chara at Concession

Fishing Pier

Fishing Pier N



Fishing pier N

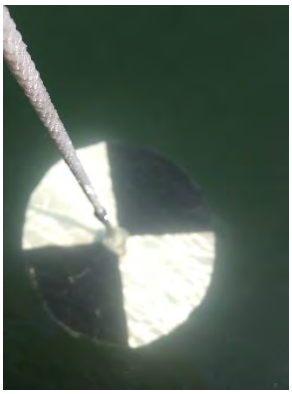
Beach looking S

Plants in S 1/3 of Beach

Beach looking N

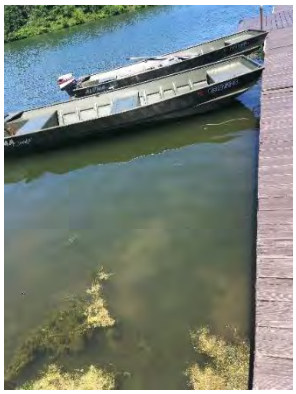
Boat Landing

7-6-18 Blackhawk Lake Water Quality and Aquatic Plants

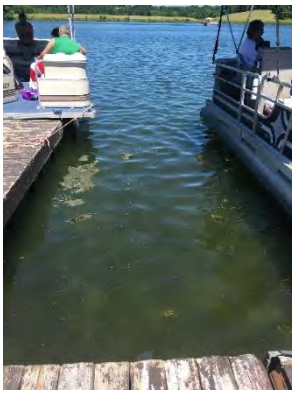


Secchi = 8.5'

Concession Dock



Concession Dock N



Concession Dock S

Handicapped Pier

Handicapped Pier S

Fishing Pier S

Fishing Pier looking S

Beach looking S

Beach looking N

Plants in S 1/3 of Beach

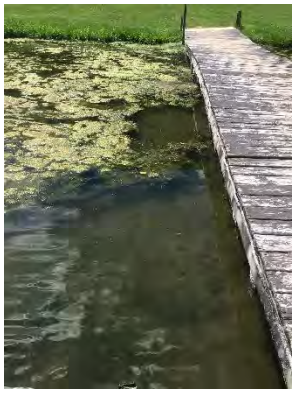
Clean Boats, Clean Waters Landing

Landing Arrowhead

7-24-18 Blackhawk Lake Water Quality and Aquatic Plants

Secchi = 7.5'

Concession Dock



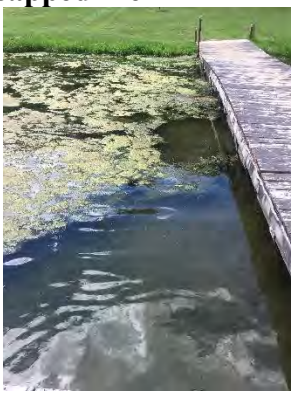
Concession Dock S

Concession Dock S

Handicapped Pier

Fishing Pier

Fishing Pier N



Fishing Pier S

Beach looking S

Beach looking N

Beach looking N

Boat Landing

Boat Landing from Dock to Shore

Boat Landing Arrowhead

Boat Landing N

8-13-18 Blackhawk Lake Water Quality and Aquatic Plants

Secchi = 2'

Concession Dock

Concession Dock from lake

Concession dock side

Handicapped Pier

Fishing pier

Beach from lake

Beach

Beach looking N

8-17-18 Blackhawk Lake Water Quality and Aquatic Plants

Secchi = 3.5

Concession Dock

Concession Dock N

Concession Dock S

Concession Dock from lake

Fishing Pier

Fishing Pier N

Beach N to Fishing Pier

Beach from lake

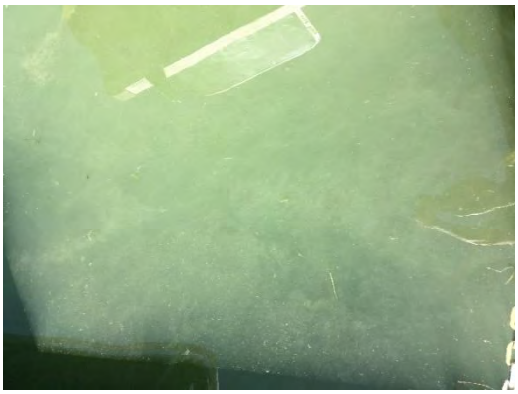
Beach

Beach looking N

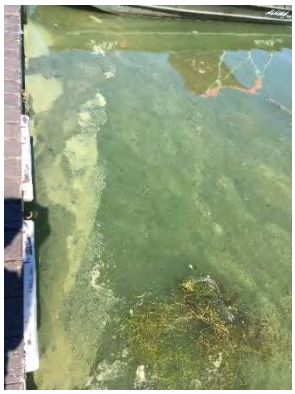
Boat Landing

9-10-18 Blackhawk Lake Water Quality and Aquatic Plants

Secchi = 3.5'

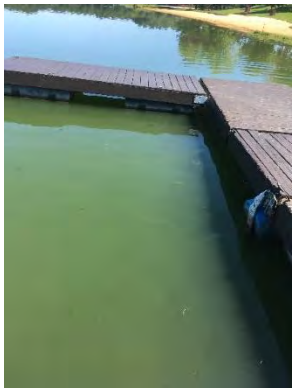


Concession Dock



Concession Dock S

Handicapped Pier



Fishing Pier

Fishing pier

Beach – fish trails in blue-green algae

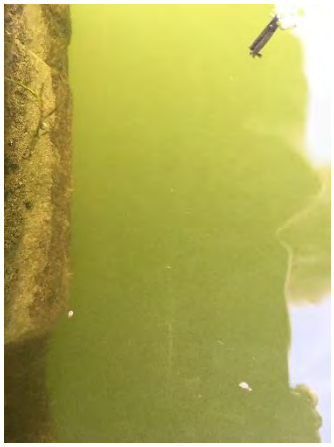
Beach looking N

Boat landing

9-24-18 Blackhawk Lake Water Quality and Aquatic Plants

Secchi = 5'

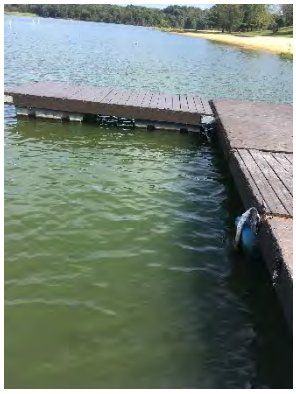
Concession Dock



Concession Dock

Handicapped Pier

Fishing Pier

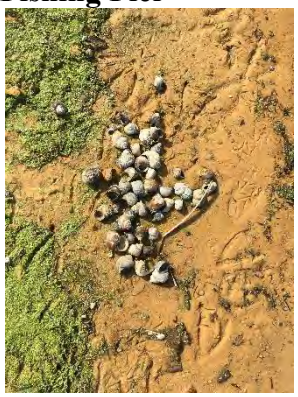


Fishing Pier

Beach from lake

Beach looking N

Beach looking S



Chinese Mystery Snails

Blue-green pigment Beach

Boat landing

Boat landing

Aquatic Plant Monitoring and Management 2018

Visual and rake boat surveys for *Myriophyllum spicatum* (Eurasian watermilfoil or EWM) and other aquatic plants were conducted on 5/13, 5/22, 6/4, 6/18, 6/25, 7/6, 7/25, 8/13, 8/17, 9/10, 9/24/18. Photos were taken and the aquatic plants were noted during each sampling date (Appendix B). No Eurasian watermilfoil was found. The predominant plants in the deeper water and sand ridge in the spring were *Potamogen crispus* (curly-leaf pondweed), *P. puscillus* (slender pondweed), *Ceratophyllum demersum* (coontail), and filamentous algae. *Ranunculus aquatilis* (white water crowfoot), *Heteranthera dubia* (water stargrass), *P. foliosus* (leafy pondweed), *Elodea canadensis* (common waterweed), coontail, *Stuckenia pectinata* (sago pondweed), and *Chara* (muskgrass) were common in the shallower water in spring. Most of these plants had senesced by August. Water stargrass became more abundant in the shallower water as the summer progressed.

The visual survey done on 5/13/18 found little aquatic plant growth, except for some curly-leaf pondweed. The Secchi clarity was 7.5 feet and the water color was greenish brown. There had been above normal precipitation in early May.

By 5/22/18, curly-leaf pondweed and slender pondweed were abundant around the concession dock, fishing pier, and handicapped fishing pier, impairing navigation and fishing, as well as in the beach area, impairing swimming. White water crowfoot, coontail, elodea, Chara, and water stargrass were also present in these areas. Many plants were covered with filamentous algae. Curly-leaf pondweed and slender pondweed were also abundant on the sand ridge and in Pontoon Bay. Despite above normal rainfall the previous two weeks, the Secchi clarity was 16 feet.

The aquatic plant survey on 6/4/18 found navigation, fishing, and swimming impaired by curly-leaf pondweed and slender pondweed at the handicapped pier, fishing pier, concession dock, and beach. Filamentous algae, *Chara*, coontail, and water stargrass were also present. Curly-leaf pondweed and slender pondweed were abundant on the sand ridge and in Pontoon Bay. Sago pondweed and white water crowfoot were also present in Pontoon Bay. The Secchi clarity was 9 feet.

In mid-May, the Blackhawk Lake Recreation Area applied for and obtained a permit for chemical treatment around the handicapped pier, concession dock, fishing pier, and beach. The permit was issued on 6/13/18 (Appendix B). The chemicals approved were Diquat for the submersed aquatic plants and Habitat for cattails. Because an endangered frog has been documented in the vicinity, the amount of Diquat was limited to 1 ppm in areas less than 2 feet in depth.

Areas around the handicapped pier, concession dock, fishing pier, and beach were treated with Diquat and copper by Wisconsin Lake and Pond Resources on 6/21/18. They injected the chemicals under the water surface using hoses in the deeper water (5-12 feet) near the sides and ends of the docks/piers and at the beach. Wisconsin DNR Lakes Coordinator, Susan Graham, supervised the chemical treatment and approved the use of a copper compound in conjunction with the Diquat to kill the filamentous algae on the plants and thus increase the efficacy of Diquat on the aquatic macrophytes. The cattails on the southern edge of the beach had not increased to become a nuisance, so Habitat was approved, but not used to control them.

On 6/16, the Secchi clarity had increased to 20 feet. There was abundant curly-leaf and slender pondweed around the concession dock and fishing pier.

By 6/25, the Secchi clarity had been reduced to 7 feet and the water color was green. Curly-leaf and slender pondweed were senescing around the concession dock. The plants around the fishing pier and beach weren't affected much from the treatment yet.

The curly-leaf pondweed and slender pondweed were gone from around the concession dock and fishing pier and were senescing elsewhere in the lake by 7/6. There was decaying filamentous algae and vegetation near the shore. The southern 1/3 of the beach had abundant water stargrass. Senescing slender pondweed and white water crowfoot covered by filamentous algae was abundant in Pontoon Bay. The Secchi clarity was 8.5 feet and the water color was green.

By 7/24, much of the vegetation had senesced throughout most of the lake except in the nearshore areas. Water stargrass was still abundant on the southern 1/3 of the beach and boat launch. Coontail, elodea, and filamentous algae were also found in the shallows around the boat launch. Arrowhead, bulrush, and cattail lined the shoreline at the boat launch. The Secchi clarity was 7.5 feet.

On 8/13, following hot and calm weather, the Secchi clarity was 2 feet and there was an obvious blue-green algae bloom as evidenced by the cloudy blue-green water color. There was little other vegetation. The Blackhawk Lake Recreation Area posted Water Quality Advisory signs because of the potentially toxic effects of the blue-green algae on humans and dogs. These signs remained up most of the rest of the summer.

The lake was sampled again on 8/17 and wind and rain had dissipated some of the algae. The Secchi was 3.5 feet and the water color was green. By 9/10, the water at the beach looked like pea soup, with trails where fish swam through. On 9/24, the Secchi clarity was 5 feet and there was blue-green pigment in the sand on the beach, evidencing decayed blue-green algae.

Clean Boats, Clean Waters

Abundant plants were found on motors, boats, and trailers, from May – July. The Southwest Badger Resource and Development Council put a priority on Clean Lakes, Clean Waters watercraft inspections and education at the Blackhawk Lake boat landing in 2018. DFS Conservation Consulting also did watercraft inspections and educational activities at the lake as the opportunity arose when they were sampling. Eurasian watermilfoil has not been found in the lake since 2011 and the inspections and educational activities are important to protecting the lake from EWM and other aquatic invasive species.

Brochures on Eurasian water milfoil and aquatic invasive species were available in a prominent place at the front desk in the office.

Education and Outreach

Donna Sefton of DFS Conservation Consulting gave a PowerPoint presentation "Water Quality and Blue-Green Algae" to 60 Middle School students and staff at Highland Schools on 11/7/18. The students learned about: 1) Blackhawk Lake water quality, aquatic plants, and algae; 2) Blue-green algae characteristics; 3) Why blue-green algae are of concern; 4) How people and pets can be protected from blue-green algae toxins; and 5) What causes algae blooms and what can be done to prevent them. A copy of the presentation is found in Appendix C. Copies were also sent to the Iowa and Lafayette County, WI, Health Departments, managers of parks with lakes in the area (e.g. Blackhawk Lake Recreation Area, Governor Dodge State Park, and Yellowstone Lake State Park), and Wisconsin DNR.

Appendix A
Blackhawk Lake Water Quality, 2018

Lake Water Quality 2018 Annual Report

Blackhawk Lake
Iowa County
Waterbody Number: 1239400

Lake Type: DRAINAGE
DNR Region: SC
GEO Region:SW

Site Name	Storet #
Black Hawk Lake - Deep Hole	253124

Date	SD (ft)	SD (m)	Hit Bottom	CHL	TP	TSI (SD)	TSI (CHL)	TSI (TP)	Lake Level	Clarity	Color	Perception
05/13/2018	7.5	2.3	NO		35.9	48		56	NORMAL	MURKY	BROWN	3-Enjoyment somewhat impaired (algae)
05/22/2018	16	4.9	NO			37			HIGH	CLEAR	BLUE	1-Beautiful, could not be nicer
06/04/2018	9	2.7	NO			45			HIGH	MURKY	GREEN	3-Enjoyment somewhat impaired (algae)
06/18/2018	20	6.1				34			NORMAL	CLEAR	BLUE	1-Beautiful, could not be nicer
06/25/2018	7	2.1		17.4	25.7	49	56	53	HIGH	MURKY	GREEN	3-Enjoyment somewhat impaired (algae)
07/06/2018	8.5	2.6	NO			46			HIGH	MURKY	GREEN	3-Enjoyment somewhat impaired (algae)
07/24/2018	7.5	2.3	NO	14.7	23.8	48	55	53	HIGH	MURKY	GREEN	3-Enjoyment somewhat impaired (algae)
08/13/2018	2	0.6	NO			67			NORMAL	MURKY	GREEN	5-Enjoyment substantially impaired (algae)
08/17/2018	3.5	1.1		178	66	59	74	61	NORMAL	MURKY	GREEN	4-Would not swim but boating OK (algae)
09/10/2018	3.5	1.1	NO			59			HIGH	MURKY	GREEN	5-Enjoyment substantially impaired (algae)
09/24/2018	5	1.5	NO			54			HIGH	MURKY	GREEN	4-Would not swim but boating OK (algae)

Date	Collector Comments
05/13/2018	water temp 59- air temp 66- cloudy- breeze 5 mph. Some small curly-leaf pondweed- no other plants visible. No Eurasian watermilfoil.
05/22/2018	65- cloudy- calm to 5 mph breeze. 5" rain previous 2 weeks. No Eurasian watermilfoil. Curly-leaf pondweed abundant on sand ridge- with P. puscillus and sago pondweed in Pontoon Bay- Curly-leaf and P. puscillus abundant at concession dock + fishing pier- along with some filamentous algae- water buttercup- water stargrass- coontail- and elodea- impairing navigation and fishing.
06/04/2018	70- cloudy- breezy 5-10 mph- 1.5" rain 6/2-6/3. Curly-leaf pondweed- P. puscillus impairing navigation- fishing + swimming at concession dock- fishing pier- and beach. Chara- filamentous algae- water stargrass- coontail also present. Curly-leaf + P. puscillus on sand ridge. Curly-lead with P. puscillus- sago- water buttercup in Pontoon Bay.
06/18/2018	70s- clear- calm to slight breeze. No Eurasian watermilfoil. P. puscillus abundant around concession dock- fishing pier- sand ridge- beach. Some curly-leaf pondweed.
06/25/2018	70s- wind 10-15 mph- moderate waves- 4" rain week before. Diquat + copper sulfate applied to concession dock- fishing pier- beach on 6/21. Curly-leaf + P. puscillus sensescing around concession dock- not much effect of treatment from fishing pier to beach.

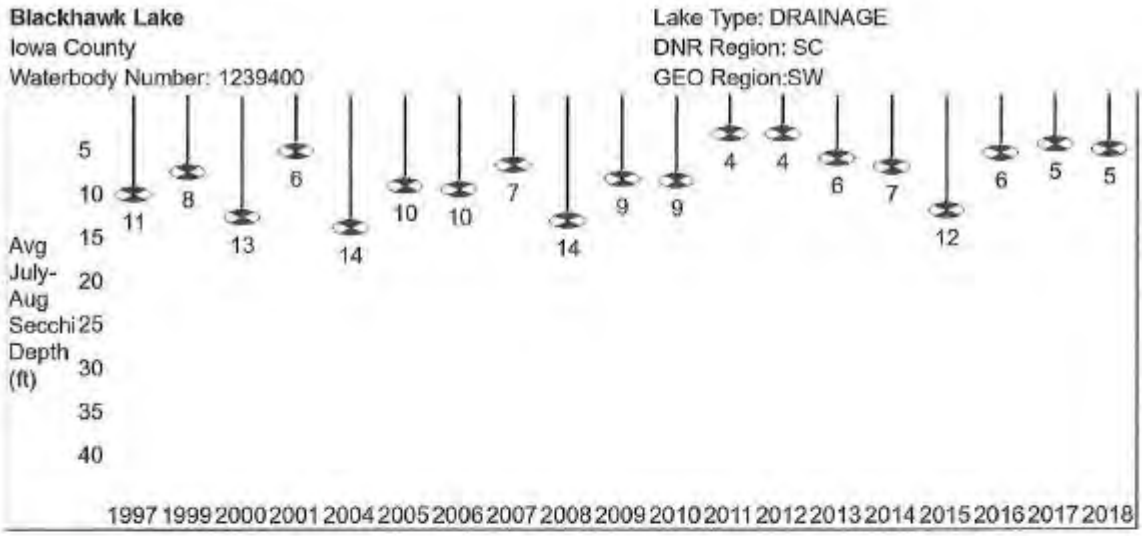
07/06/2018	80s- clear- calm to slight breeze. Curly-leaf pondweed- P. pusillus gone around concession dock + fishing pier- senescing elsewhere in lake- decaying filamentous algae + vegetation near shore. Water stargrass in S. 1/3 of beach. Pontoon Bay senescing P. pusillus covered by filamentous algae.
07/24/2018	80- humid- breeze 5 mph. algae bloom forming. Concession dock + fishing pier: little vegetation in area treated- some filamentous algae- coontail. Beach: S. 1/3 water stargrass + coontail. Most plants in lake senesced- nothing visible on sand ridge. Boat launch: water stargrass- some coontail- elodea- filamentous algae- arrowhead- bulrush- cattail.
08/13/2018	80s- clear- slight breeze- previous week hot- calm- no rain. Little vegetation. Blue-green algae bloom. Blackhawk L Recreation Area posted Water Quality Advisory signs.
08/17/2018	75- calm to 5 mph breeze- humid- 2.5" rain in past 2 days. Still blue-green algae bloom- but not as abundant. Concession dock + S 1/3 of beach: water stargrass impairs navigation.
09/10/2018	70s- sunny- slight breeze- ripple waves. 10" rain between 8/20 - 8/30. Blue-green algae bloom like pea soup. Blackhawk L Recreation Area posted Water Quality Advisory signs.
09/24/2018	Mostly sunny- slight breeze 0-5 mph. Still algae visible in water- but not as much as on 9/10/18. Most plants have senesced. Some residual blue-green algae pigment on beach.

Date	Data Collectors	Project
05/13/2018	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake
05/22/2018	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake
06/04/2018	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake
06/18/2018	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake
06/25/2018	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake
07/06/2018	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake
07/24/2018	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake
08/13/2018	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake
08/17/2018	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake
09/10/2018	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake
09/24/2018	Donna Sefton	Citizen Lake Monitoring - Water Quality - Black Hawk Lake; Blackhawk Lake

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.

Wisconsin Department of Natural Resources **Wisconsin Lakes Partnership**

Report Generated: 12/11/2018

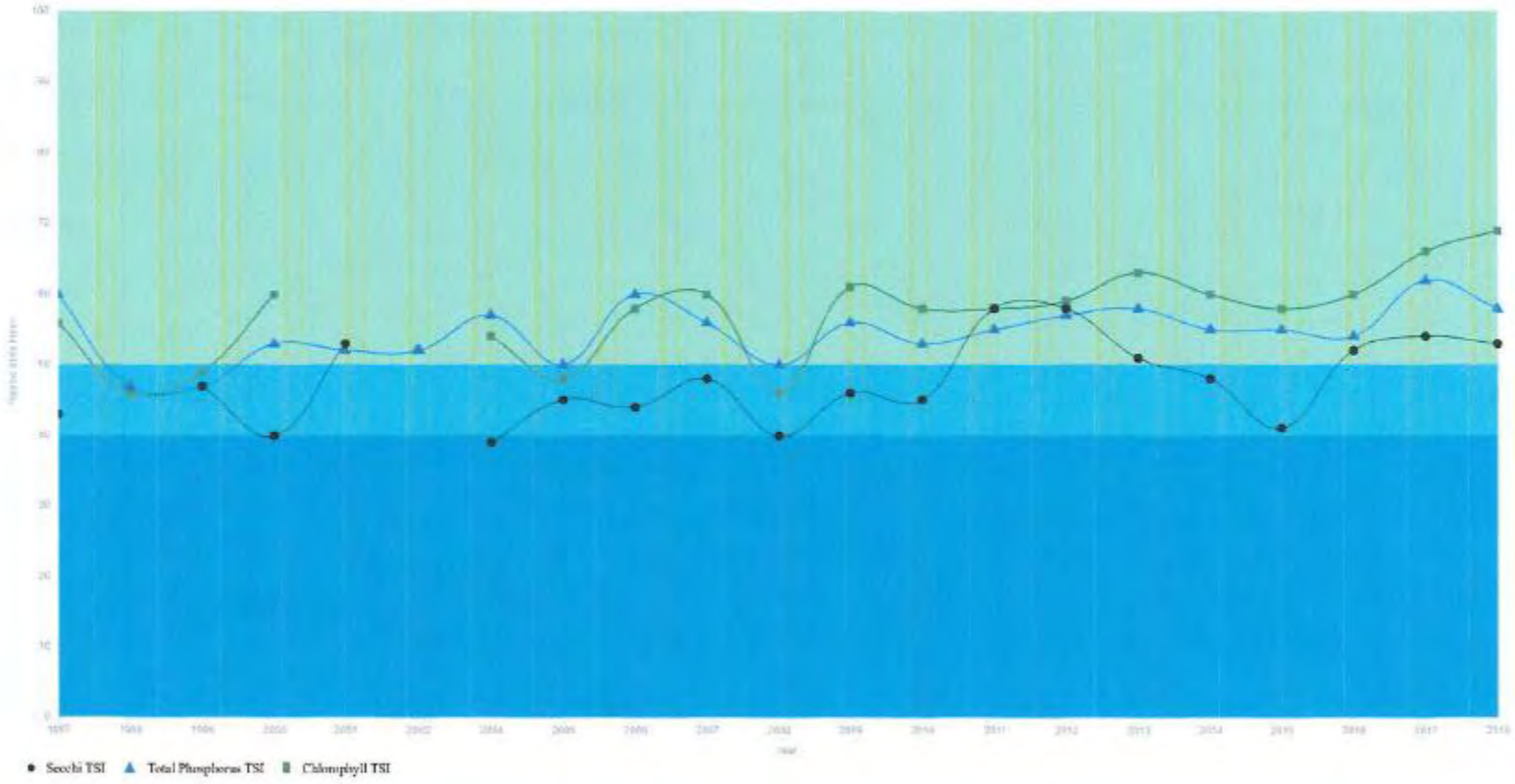


Past secchi averages in feet (July and August only).

Year	Secchi Mean	Secchi Min	Secchi Max	Secchi Count
1997	10.63	6.75	14.5	2
1999	8	8	8	1
2000	13.2	2	19	5
2001	5.5	5.5	5.5	3
2004	14.3	14.3	14.3	2
2005	9.5	8.5	10.5	2
2006	10	8	13	5
2007	7.29	3	18	12
2008	13.56	12.25	15	4
2009	8.75	4	15.75	6
2010	9	4.5	17	5
2011	3.67	3	5	3
2012	3.67	3	4	3
2013	6.33	3	10	3
2014	7.33	3	14	3
2015	12.38	7	17	4
2016	5.83	3	10.5	3
2017	4.88	2.5	8	4
2018	5.38	2	8.5	4

Report Generated: 12/11/2018

Trophic State Index Graph: Black Hawk Lake - Deep Hole - Iowa County



Black Hawk Lake - Deep Hole 2018 Results

Black Hawk Lake - Deep Hole was sampled **11** different days during the 2018 season Parameters sampled included:

- water clarity
- total phosphorus
- chlorophyll

The average summer (July-Aug) secchi disk reading for Black Hawk Lake - Deep Hole (Iowa County, WBIC: 1239400) was 5.38 feet. The average for the Southwest Georegion was 3.9 feet. Typically the summer (July-Aug) water was reported as **MURKY** and **GREEN**. This suggests that the secchi depth may be mostly impacted by algae. Algal blooms are generally considered to decrease the aesthetic appeal of a lake because people prefer clearer water to swim in and look at. Algae are always present in a balanced lake ecosystem. They are the photosynthetic basis of the food web. Algae are eaten by zooplankton, which are in turn eaten by fish. You will know algae are causing reduced Secchi depth if the water generally appears green when you assess the color against the white background of the secchi disc.

Chemistry data was collected on Black Hawk Lake - Deep Hole. The average summer Chlorophyll was 96.4 µg/l (compared to a Southwest Georegion summer average of 34.9 µg/l). The summer Total Phosphorus average was 44.9 µg/l. Lakes that have more than 20 µg/l and impoundments that have more than 30 µg/l of total phosphorus may experience noticable algae blooms.

The overall Trophic State Index (based on chlorophyll) for Black Hawk Lake - Deep Hole was 69. The TSI suggests that Black Hawk Lake - Deep Hole was **eutrophic**. This TSI usually suggests blue-green algae become dominant and algal scums are possible, extensive plant overgrowth problems possible.

Appendix B
Blackhawk Lake Aquatic Plant Management Permit, 2018

State of Wisconsin
DEPARTMENT OF NATURAL RESOURCES
3911 Fish Hatchery Road
Fitchburg WI 53711-5397

Scott Walker, Governor
Daniel L. Meyer, Secretary
Telephone 608-266-2621
Toll Free 1-888-936-7463
TTY Access via relay - 711

June 13, 2018

Cobb-Highland Recreation Commission
2025 County Rd BH
Highland, WI 53543

PERMIT# SC-2018-25-1157

Subject: Aquatic Plant Management Permit for Blackhawk Lake, Iowa County

Dear Applicant:

Enclosed is your permit for chemical control of dense aquatic plants in 1.1 acres of Blackhawk Lake, Iowa County, Wisconsin. Your permit application has been reviewed and meets the minimum requirements by law and a permit is being issued. Issuance of the permit is not an endorsement or approval for the action authorized.

Permit Conditions:

1. Treatments are limited in area to protect native plants and shoreline habitat for animals that have been documented in the area. Treatment areas are intended to allow shorefishing for anglers, and reduce difficulties with navigation from the pier. Cattail control is allowed to help reclaim the beach area.

2. An endangered frog has been documented in the vicinity, so there are some limits on application rates of diquat. The following herbicides are permitted for use in this pond: diquat (at a dose of 1.0 ppm) and Habitat. Diquat is approved for use at 1.0 ppm for the treatment area where the average depth is 2 feet. (1 gallon per surface acre). A permit amendment must be issued by the department if any herbicide or applicator not already listed on the application form will be added.

   Diquat is inactivated when it comes in contact with sediment, so care must be taken to avoid propeller stirring of the sediment in an area to be treated. The applicator should operate the boat in at least 3' of water, and spray toward shore. This will put the diquat where it's needed without stirring up the bottom.

   Habitat is to control the cattails which are encroaching on the beach area.

3. The herbicide applicator must follow the disinfection protocol following the signature to reduce the possible spread of fish diseases or other invasive species.

4. Pesticide treatment area signs must identify the areas that are treated with chemicals, and remain posted for the duration of any use restrictions according to the chemicals used.

5. **Supervision of this treatment by DNR staff is required.** Supervision is explained in Section NR107.07(1)(2), Wisconsin Administrative Code. The applicator must schedule supervision by calling me at 608-275-3329 in advance of proposed treatment. (4 day prior is not necessary for this permit).

6. The permit holder must submit form 3200-111 (available online), "Aquatic Plant Management Herbicide Treatment Record", for each treatment as follows:

    1. **Immediately, if any unusual circumstances occur during the treatment.**
    2. **Within 30 days, if treatment occurred.**
    3. **By October 1 of this year, if no treatment occurred.**

Thank-you for complying with Chapter NR 107, Wisconsin Administrative Code concerning aquatic plant management.

Sincerely,

Susan Graham

Susan Graham
Lake Management Coordinator
608-275-3329

e-copy. Bradd Sims, DNR Fisheries Manager
Donna Sefton, DFS Conservation Consulting

DISINFECTION PROTOCOLS

Conditions related to invasive species movement. The applicant and operator agree to the following methods required under s. NR 109.05(2), Wis. Adm. Code for controlling, transporting and disposing of aquatic plants and animals, and moving water:

• Aquatic plants and animals shall be removed and water drained from all equipment as required by s. 30.07, Wis. Stats., and ss. NR 19.055 and 40.07, Wis. Adm. Code.

• Operator shall comply with the most recent Department-approved 'Boat, Gear, and Equipment Decontamination and Disinfection Protocol', Manual Code # 9183.1, available at **http://dnr.wi.gov/topic/invasives/disinfection.html**

State of Wisconsin DNR
DNR Department of Natural Resources
Water Permit Contral Intake – attn. APM
PO Box 7185
Madison, WI 53707-7185

Chemical Aquatic Plant Control Application and Permit
Wisconsin Pollutant Discharge Elimination System (WPDES)
Pesticide Pollutant Permit Application

Form 3200-004 (R 02/17)

Notice: Use of this form is required by the Department for any application filed pursuant to s. 281.17(2), Wis. Stats., and Chapters NR 107, 200 and 205, Wis. Adm. Code. This permit application is required to request coverage for pollutant discharge into waters of the state. Personally identifiable information on this form may be provided to requesters to the extent required by Wisconsin's Open Records Law [ss. 19.31-19.39, Wis. Stats.].

DNR Use Only	
ID Number: SC-2018-25-1157	Permit Expiration Date:
Waterbody #: 1239400	Fee Received: $70

Section I – Applicant Information – Name of Permit Applicant. Also indicate names and addresses of all individuals, associations, communities or town sanitary districts sponsoring treatment. Attach additional sheets if necessary.

Home Address

Name: Cobb-Highland Recreation Commission
Street Address: 2025 County Rd BH
City: Highland | State: WI | Zip: 53543

Waterbody Address

Name: Daniel Welsh
Street Address: 2025 County Rd BH
City: Highland | State: WI | Zip: 53543

Phone Number (include area code): Primary 608-623-2707 x | Secondary 608-574-5573
Email Address: bhlake@mhtc.net

Section II – Aquatic Plant Control Location

Water body to be Treated (water body where treatment area is located): Blackhawk Lake
Lake Surface Area: 220.00 acres
Estimated Surface Area that is 10 Feet or Less in Depth: acres

County: Iowa | Section: 6 | Township: 07 N | Range: 2 (E / W)
Name of Applicator or Firm: Wisconsin Lake and Pond Resource

Latitude: 43.025654 | Longitude: -90.288626
Street or Route:

Is there more than one property owner? ○ Yes ◉ No
Is there surface water discharge? ◉ Yes ○ No
Does the water body have public access? ◉ Yes ○ No
If all are no the it is considered to be a private pond

City: Eldorado | State: WI | Zip:

Adjacent Riparian Owner Names
1. Type Name Here

County:
Phone Number (include area code): x
Email Address: Mark@WisconsinLPR.com
Applicator Certification Number for Category 5 Aquatic Pesticide Application: JS77803 & MK82178 OK
Business Location License Number (if applicable): 93-015182-012226

Name of Lake Property Owners' Association Representative or Lake District Representative (if none, please indicate):
Restricted Use Pesticide License Number (if applicable):

Area(s) Proposed for Control: (Note details in permit cover letter for final permitted sizes of treatment areas.)

Treatment Length		Treatment Width			Estimated Acreage		Average Depth		Calculated Volume	
2,400	ft. x	20	ft. ÷ 43,560 ft.² =		1.10	ac	3	ft =	3.31	ac-ft
			Estimated Acreage Grand Total		1.10	ac		Calculated Volume Grand Total	3.31	ac-ft

If the estimated acreage is greater than 10 acres, or is greater than 10 percent of the estimated area 10 feet or less in depth in Section II, complete and attach Form 3200-004A, Large-Scale Treatment Worksheet. Private pond treatments are exempted from this requirement.

Is the area with in or adjacent to a sensitive area designated by the Department of Natural Resources.
○ Yes ◉ No

DNR Use:
NHI Review? ☒ Yes ☐ No Describe:
See cover letter

Section III - Fees

1. s. NR 107.11(1), Wis. Adm. Code, lists the conditions under which the permit fee is limited to the $20 minimum charge.
2. s. NR 107.11(4), Wis. Adm. Code, lists the uses that are exempt from permit requirements.
3. s. NR 107.04(2), Wis. Adm. Code, provides for a refund of acreage fees if the permit is denied or if no treatment occurs.
4. Fee calculations: If Proposed treatment is over 0.25, calculate acreage fee:
(round up to nearest whole acre, to maximum of 50 acres)

1.10 acres X $25 per acre = $ $50.00

If proposed treatment is less than 0.25 acre, acreage fee is $0

Acreage Fee (from above)	$ 50.00
Basic Permit Fee (non-refundable)	$ 20.00
Total Fee Enclosed	$ 70.00

Site Map: Attach a sketch or a printed map of lake indicating area and dimensions of each individual area where plant control is desired and flow of surface water outside treatment area. Also show location of property owners riparian to and adjacent to the treatment area. Attach a separate list of owners and corresponding treatment dimension coded to the lake map, if necessary.

Section IV - Reasons for Aquatic Plant Control

Is this permit being requested in accordance with an approved Aquatic Plant Management Plan? ◉ Yes ○ No

Treatment Type
◉ Lake ○ Pond ○ Wetland ○ Marina ○ Other

Goal of Aquatic Plant Control:	Nuisance Caused By:
☑ Maintain navigation channel	☐ Algae
☑ Maintain boat landing and carry in access	☑ Emergent water plants (majority of leaves & stems growing above water surface, e.g. cattail, bulrushes)
☐ Improve fish habitat	☐ Floating water plants (majority of leaves floating on water surface, e.g., water lilies, duckweed)
☑ Maintain swimming area	☑ Submerged water plants (leaves & stems below surface, flowering parts may be exposed: milfoil, coontail)
☐ Control of invasive exotics	☐ Other
☐ Other	

List Target Plants

Note: Different plants require different chemicals for effective treatment. Do not purchase chemical before identifying plants.

increased amount of re-invading cattails and mixed submersed native plants

Section V - Chemical Control

Alternatives to Chemical Control:	Feasible?	If No, Why Not?
1. Mechanical harvesting	○ Yes ◉ No	Insufficient labor force/resources
2. Manual removal	○ Yes ◉ No	Insufficient labor force/resources
5. Sediment screens/covers	○ Yes ◉ No	
6. Dredging	◉ Yes ○ No	Dollar resources not available at the time
7. Lake drawdown	○ Yes ◉ No	
8. Nutrient controls in watershed	○ Yes ◉ No	
9. Other:	○ Yes ◉ No	

Note: If proposed treatment involves multiple properties, consider feasibility of EACH alternative for EACH property owner.

If you checked yes to any of the alternatives listed above, please explain your decision to use chemical controls:

referral by DNR water plant specialist

Trade Name of Proposed Chemical(s)
Diquat and Habitat and/or recommendations from WLPR and WDNR

Method of Application: Spot
Will surface water outflow and/or overflow be controlled to prevent chemical loss? ◉ Yes ○ No

Have the proposed chemicals been permitted in a prior year on the proposed site? ○ All ◉ Some ○ None

What were the results of the treatment?
Moderate control - needed retreatment

For private ponds and wetlands please ignore the next question
Is the treatment area greater than 5% of surface area? ○ Yes ◉ No
If yes, calculate whole lake concentration (in ppm). Refer to DNR Lake pages http://dnr.wi.gov/lakes to answer the following:

Does the lake stratify? ○ Yes ○ No
If yes, calculate whole lake concentration using volume above thermocline.
If no, calculate whole lake concentration using total lake value
Whole Lake Concentration _____ ppm

Note: Chemical fact sheets for aquatic pesticides used in Wisconsin are available from the Department of Natural Resources upon request.

Section VI- Applicant Responsibilities and Certification

1 The applicant has prepared a detailed map which shows the length, width and average depth of each area proposed for the control of rooted vegetation and the surface area in acres or square feet for each proposed algae treatment.

2 The applicant understands that the Department of Natural Resources may require supervision of any aquatic plant management project involving chemicals. Under s.NR 107.07 Wis. Adm. Code, supervision may include inspection of the proposed treatment area, chemicals and application equipment before, during or after treatment. The applicant is required to notify the regional office 4 working days in advance of each anticipated treatment with the date, time, location and size of treatment unless the Department waives this requirement. Do you request the Department to waive the advance notification requirement?

◉ Yes ○ No

3 The applicant agrees to comply with all terms or conditions of this permit, if issued, as well as all provisions of Chapter NR 107, Wis. Adm. Code. The required application fee is attached.

4 The applicant has provided a copy of the current application to any affected property owners' association inland Lake District and, in the case of chemical applications for rooted aquatic plants, to all owners of property riparian or adjacent to the treatment area. The applicant has also provided a copy of the current chemical fact sheet for the chemicals proposed for use to any affected property owner's association or inland Lake District.

5 Conditions related to invasive species movement. The applicant and operator agree to the following methods required under s.NR 109.05(2), Wis. Adm. Code for controlling, transporting and disposing of aquatic plants and animals, and moving water:

- Aquatic plants and animals shall be removed and water drained from all equipment as required by s.30.07, Wis. Stats., and ss. NR 19.055 and 40.07, Wis. Adm. Code.
- Operator shall comply with the most recent Department-approved 'Boat, Gear, and Equipment Decontamination and Disinfection Protocol', Manual Code #9183.1, available at http://dnr.wi.gov/topic/invasives/disinfection.html

☑ Check if you are signing as Agent for Applicant.
I hereby certify that the above information is true and correct and that copies of this application have been provided to the appropriate parties named in Section II and that the conditions of the permit and pesticide use will be adhered to.

All portions of this permit, map and accompanying cover letter must be in possession of the chemical applicator at the time of treatment. During treatment all provisions of Chapter NR 107 107.07 and NR 107.08, Wis. Adm. Code, must be complied with, as well as the specific conditions contained in the permit cover letter.

Section VII - WPDES Permit Request

Is WPDES coverage being requested? Refer to http://dnr.wi.gov/topic/wastewater/aquaticpesticides.html for more information.

◉ No ○ Yes - complete section VII with signature.

◉ Already have WPDES
○ WPDES coverage not needed

Select which permit you are requesting: ○ WI-0064556-1 Aquatic Plants, Algae & Bacteria
○ WI-0064564-1 Aquatic Animals
○ WI-0064581-1 Mosquitoes & other Flying Insects

Indicate WPDES permittee responsible for the pollutant discharge: ○ Applicator ◉ Sponsor

Do you expect the pest control activity will result in a detectable pollutant discharge to waters of the state beyond the treatment area boundary or a pollutant residual in waters of the state after the treatment project is completed? ○ Yes ◉ No
If yes, identify the pollutant(s):

Are you planning to incorporate integrated pest management principles, as specified in the WPDES permit, into your pest control activity to minimize any pollutant residual or pollutant discharge beyond the treatment area? ○ Yes ○ No

Type of WPDES coverage being requested: ◉ One Treatment Site ○ Statewide Coverage

For informational purposes, select areas of WI for most of your aquatic treatments: ☐ NE ☐ NW ☑ SW ☐ SE

Is WPDES coverage being requested for more than 1 year? ◉ Yes ○ No
If yes, the permittee will remain in "active" WPDES status until a Notice of Termination is submitted

Section VIII – Permit to Carry Out Chemical Treatment (Leave Blank – DNR Use Only)

The foregoing application is approved. Permission is hereby granted to the applicant to chemically treat the waters described in the application during the season of 20 18.

Application fee received? ☒ Yes ○ No

Advance notification of treatment required? ☒ Yes ○ No

State of Wisconsin
Department of Natural Resources
For the Secretary

By Susan Graham
Regional Director or Designee

6/13/18
Date Signed

6/13/18
Date Mailed

Please Note:

If you believe that you have a right to challenge this decision, you should know that Wisconsin statutes and administrative rules establish time periods within which requests to review Department decisions must be filed.

For judicial review of a decision pursuant to ss. 227.52 and 227.53, Wis. Stats., you have 30 days after the decision is mailed or otherwise served by the Department, to file your petition with the appropriate circuit court and serve the petition on the Department. Such a petition for judicial review shall name the Department of Natural Resources as the respondent.

This notice is provided pursuant to s. 227.48(2), Wis. Stats.

To request a contested case hearing pursuant to s. 227.42, Wis. Stats., you have 30 days after the decision is mailed, or otherwise served by the Department, to serve a petition for hearing on the Secretary of the Department of Natural Resources. The filing of a request for a contested case hearing is not a prerequisite for judicial review and does not extend the 30-day period for filing a petition for judicial review.


Blackhawk Lake Chemical Treatment Areas 2018
Black Hawk L.
Black Hawk L
Legend
Rivers and Streams
Intermittent Streams
Lakes and Open water
Index to EN_Image_Basemap_Leaf_Off
Notes
0.1
0
0.03
0.1 Miles
NAD_1983_HARN_Wisconsin_TM
1: 1,826
DISCLAIMER: The information shown on these maps has been obtained from various sources, and are of varying age, reliability and resolution. These maps are not intended to be used for navigation, nor are these maps an authoritative source of information about legal land ownership or public access. No warranty, expressed or implied, is made regarding accuracy, applicability for a particular use, completeness, or legality of the information depicted on this map. For more information, see the DNR Legal Notices web page: http://dnr.wi.gov/legal/

Appendix C
"Water Quality and Blue-green Algae"
Power Point Presentation, 2018

Water Quality and Blue Green Algae

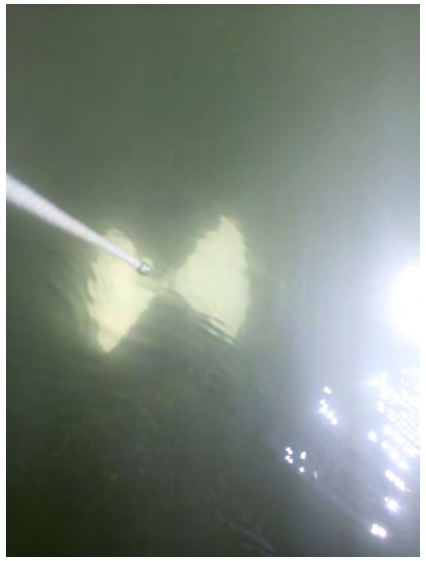
Donna Sefton

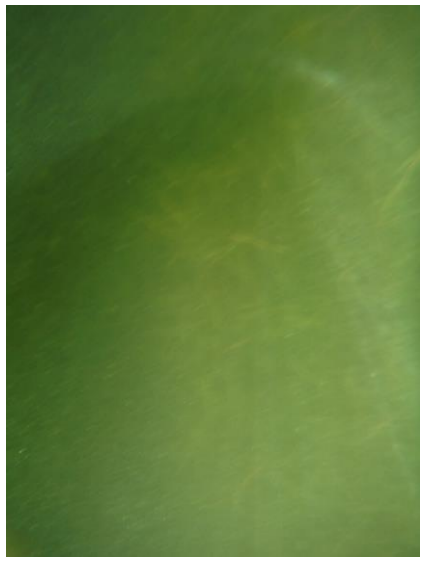
Aquatic Ecologist

Learn About

- Blackhawk L water quality, aquatic plants, and algae
- What are blue green algae
- Why they are of concern
- How you can protect yourself and your pets
- What can be done to prevent algae blooms

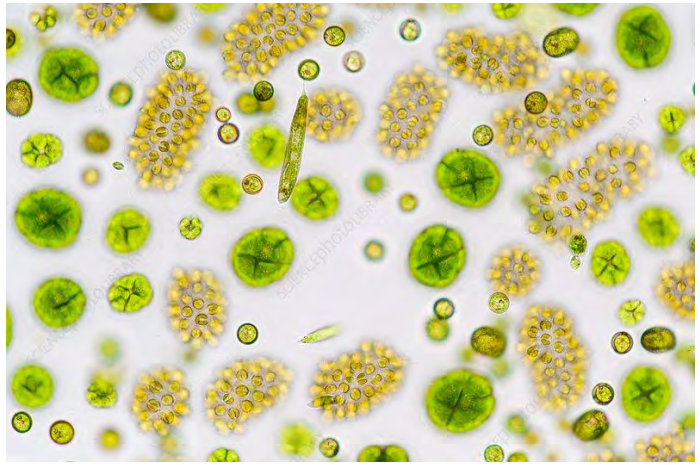
Blackhawk Lake Water Quality

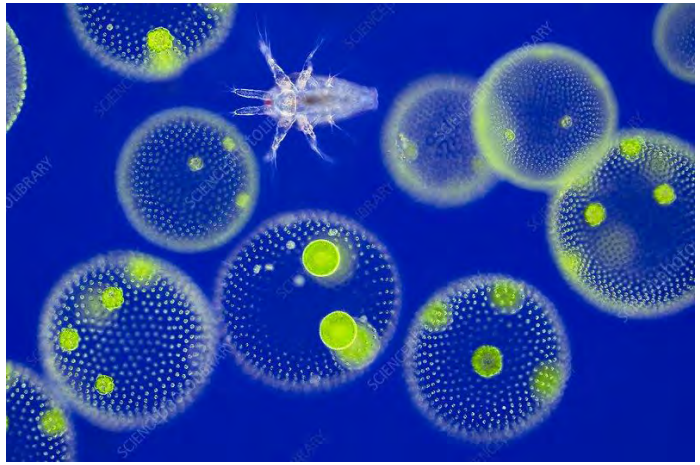




Eurasian Water Milfoil

What Are Algae?

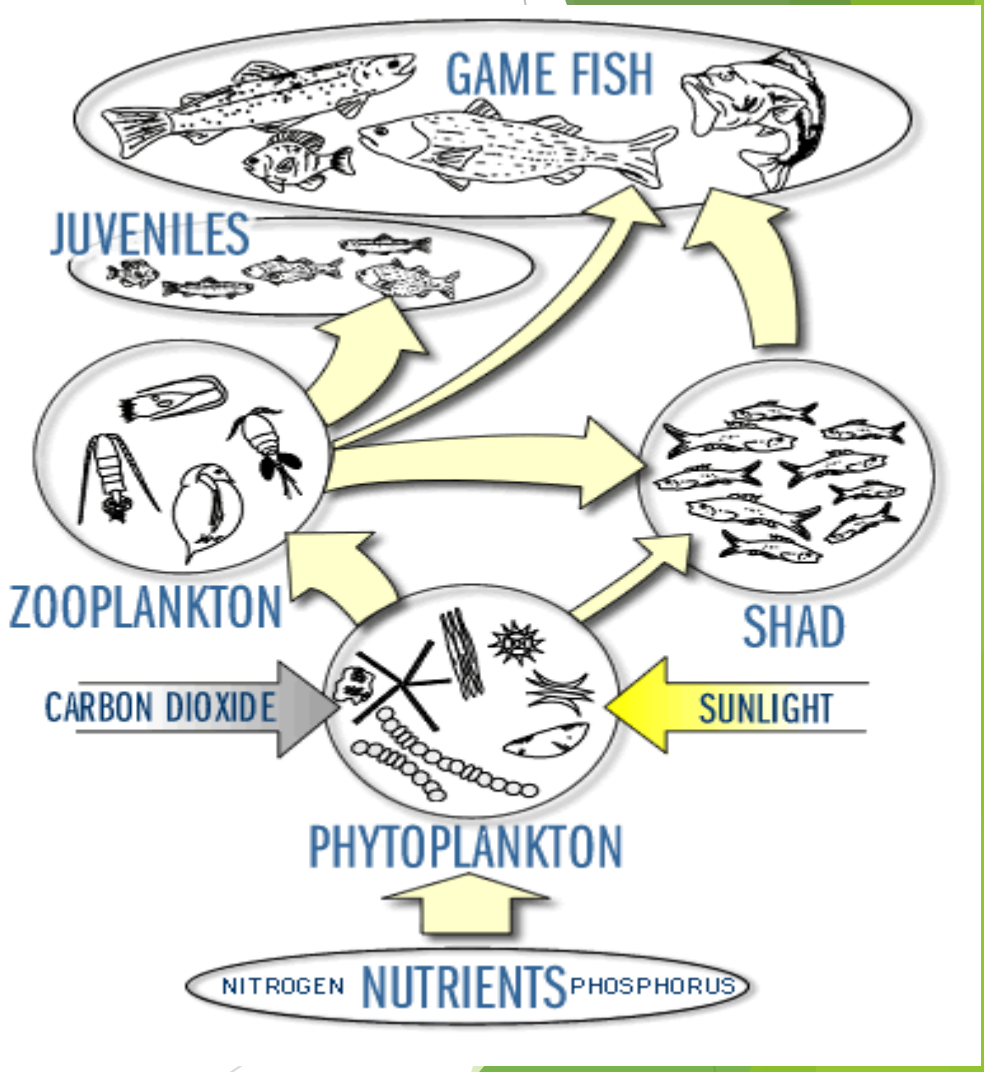




Algae

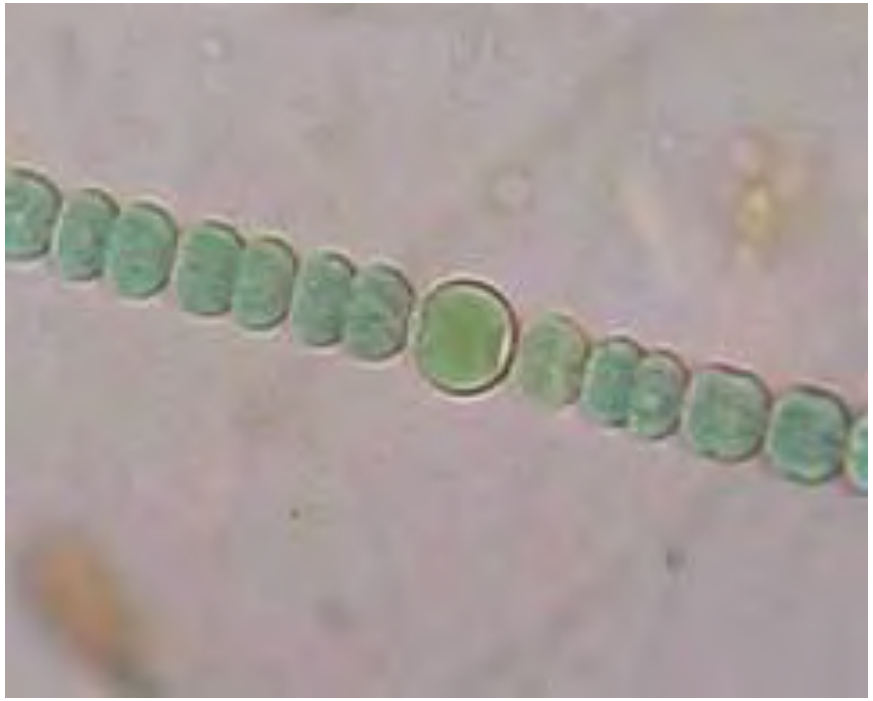
- Contain chlorophyll pigment
- Carry out photosynthesis:

  light + CO_2 + H_2O = carbohydrates + O_2
- Lack roots, stems, leaves
- Microscopic, multicellular, colonies
- Nutrients (fertilizers like nitrogen & phosphorus) make grow
- Phytoplankton base of food web
- Having some algae good - blooms, blue green algae not good



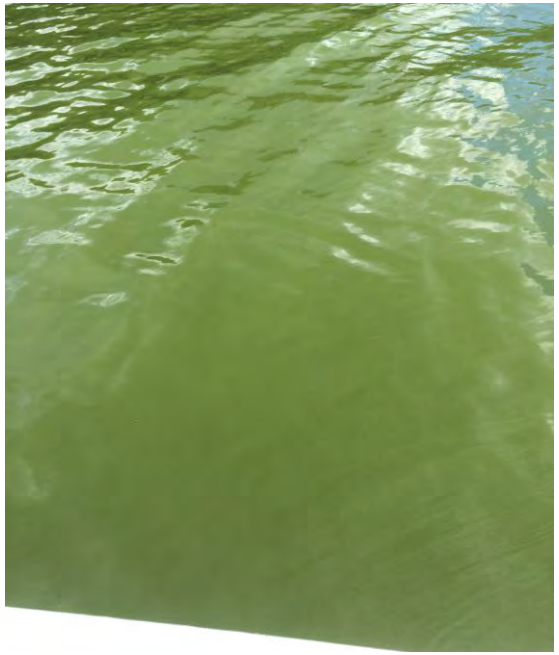
What Are Blue Green Algae?

- Primitive, among oldest living things (3 billion yrs)
- Cyano (blue-green) bacteria
- Microscopic, but may form filaments or colonies



Why Are Blue Green Algae of Concern?

- Turn water green, like pea soup
- Produce blue-green paint slick on decay
- Can produce toxins harmful to humans & animals



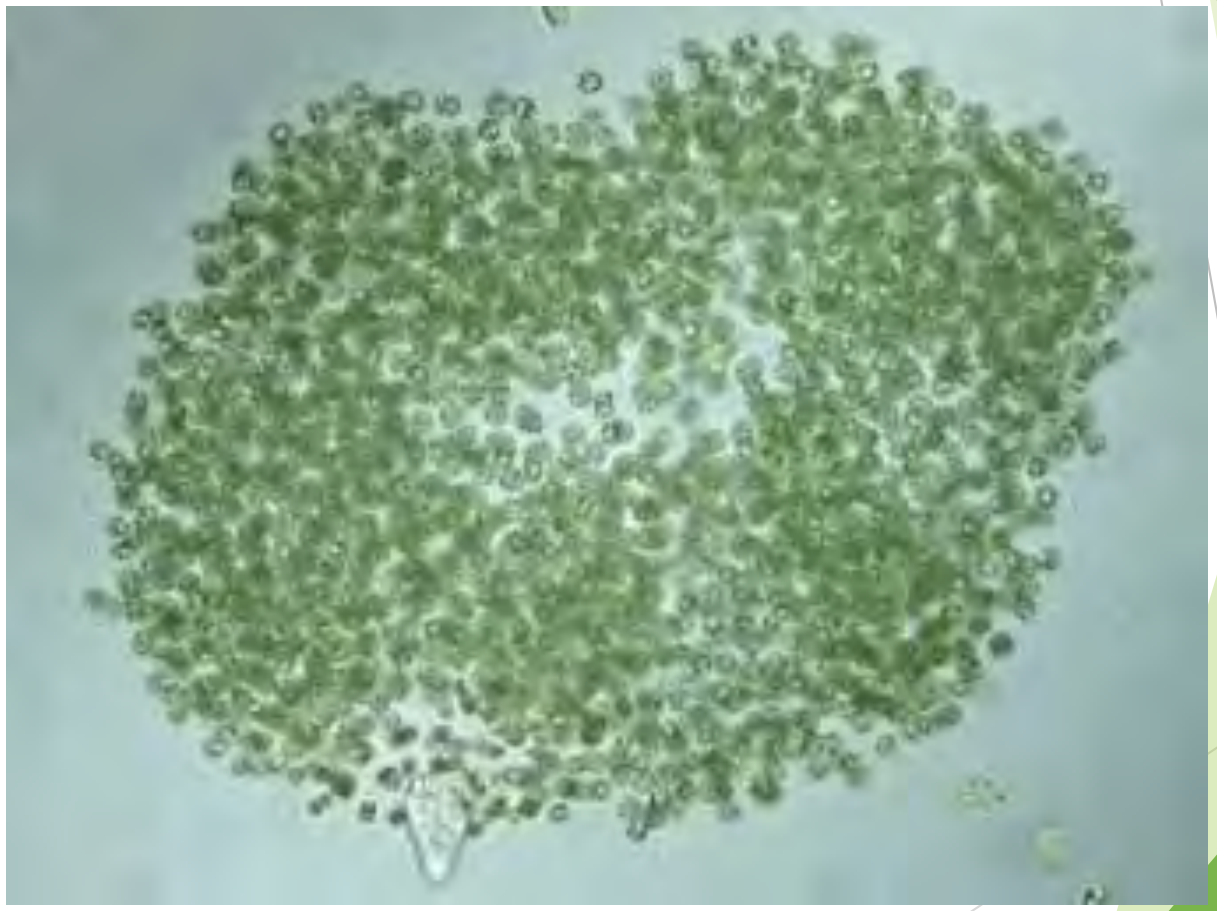
Other Concerns with Blue Green Algae

- Unsightly water
- Taste and odor, toxins
- Reduce light penetration
- Uses oxygen when decays
- Fish kills
- Not desirable food for zooplankton or fish

Anabaena (Annie)

Aphanizomenon (Fanny)

Microcystis (Mike)



Blue green algae toxins & symptoms

- Skin
  - rash, hives, blisters

- Gastrointestinal system
  - stomach pain, nausea, vomiting, diarrhea

Blue green algae toxins & symptoms

- Respiratory system
  - runny eyes/nose, sneezing, cough, sore throat, allergies, asthma, difficulty breathing

- Liver
  - weakness, tissue damage, tumors

Blue green algae toxins & symptoms

- Headache, fever

- Nervous system
  - fatigue, seizures, disorientation, paralysis

Should you let your kids or pets play in this?

BAD IDEA!

Algae are common in lakes and rivers. But at high concentrations a type called "blue-green" algae can make people and animals sick.

What to look for:

- Does the water look "pea soupy"?
- Does it smell swampy?

Blue-green algae can:

- irritate skin, eyes and nasal passages and make you sick.
- poison your pets or livestock – animals have died from it.

If you or your pets have come in contact with blue-green algae, **wash thoroughly.** Think you or animals are sick from it? Call a doctor or veterinarian immediately.

When in doubt, best keep out!

This poster prepared by the Minnesota Interagency Work Group on Blue-Green Algae.

In Wisconsin - http://dnr.wi.gov/lakes/bluegreenalgae/

CAUTION

WATER QUALITY ADVISORY

This water may contain blue-green algae capable of producing toxins that can be dangerous to humans and pets.

FOR YOUR SAFETY

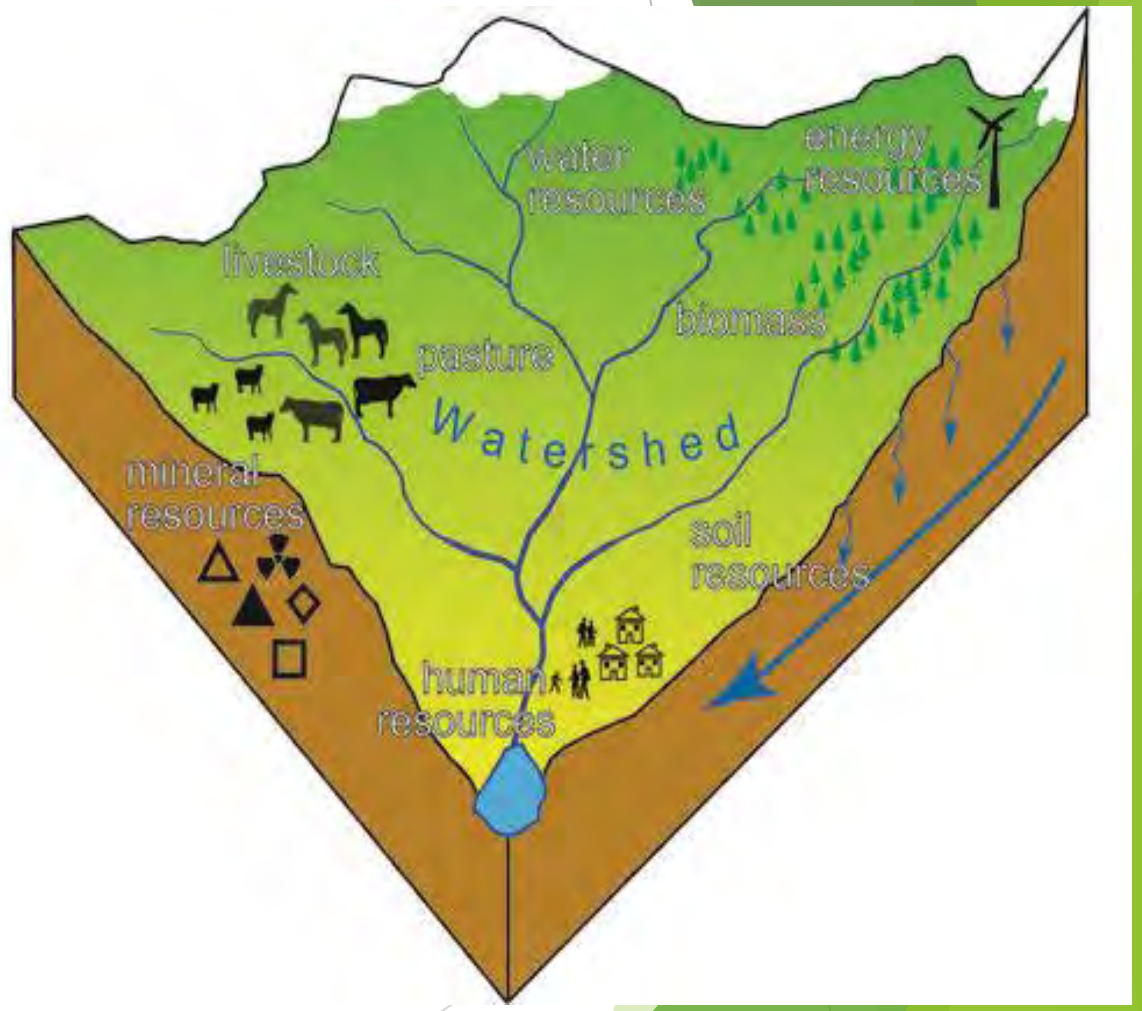
- If water is cloudy, looks like green paint or pea soup, or has a floating scum layer or floating clumps
  - -Do not swim or swallow water
  - -Do not allow pets to swim or drink
  - -Do not allow children to play in scum layer from shoreline
- Rinse off after swimming

For more information please contact the

LOCAL HEALTH DEPARTMENT at (___) ____-_____

What Causes Algae Blooms?

- Fertilizers containing nutrients - nitrogen & phosphorus - make grow
- 1 lb phosphorus = 500 lbs of algae
- Activities in watershed affect WQ
- Nutrients & soil wash in
- Nutrients released when larger aquatic plants die off
- Algae multiply quickly in hot & calm weather



What Can Be Done to Prevent Algae Blooms?

- Use only amount of fertilizer needed at proper time

- Prevent soil erosion

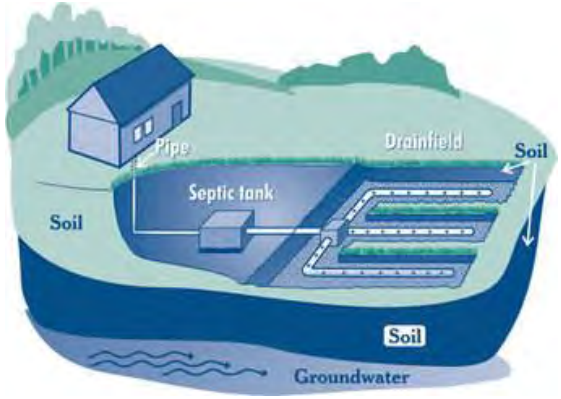
- Manage animal waste storage and spreading

What Can Be Done to Prevent Algae Blooms?

- Keep/restore native vegetation along shore - **don't mow to water's edge**

- Protect/restore wetlands

- Ensure septic systems working properly



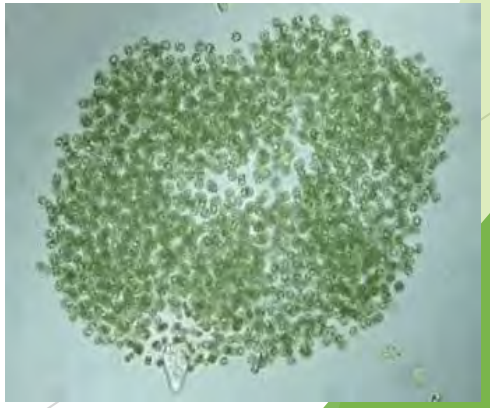
What Can Be Done to Prevent Algae Blooms?

- Reduce Stormwater Runoff
  - Basins
  - Erosion control materials
  - Keep waste, leaves out of storm drains

Blue Green Algae Summary

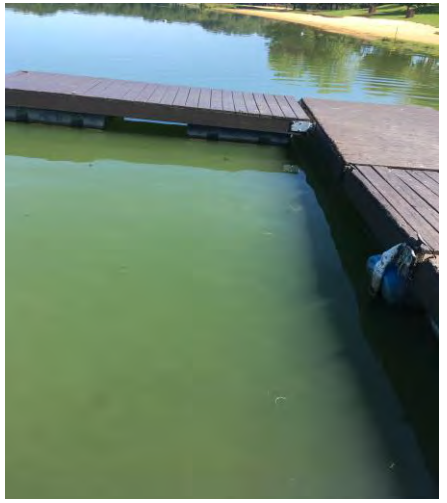
- Contain blue green chlorophyll pigment
- Photosynthesize
- No roots, stems, leaves
- Primitive, more like bacteria

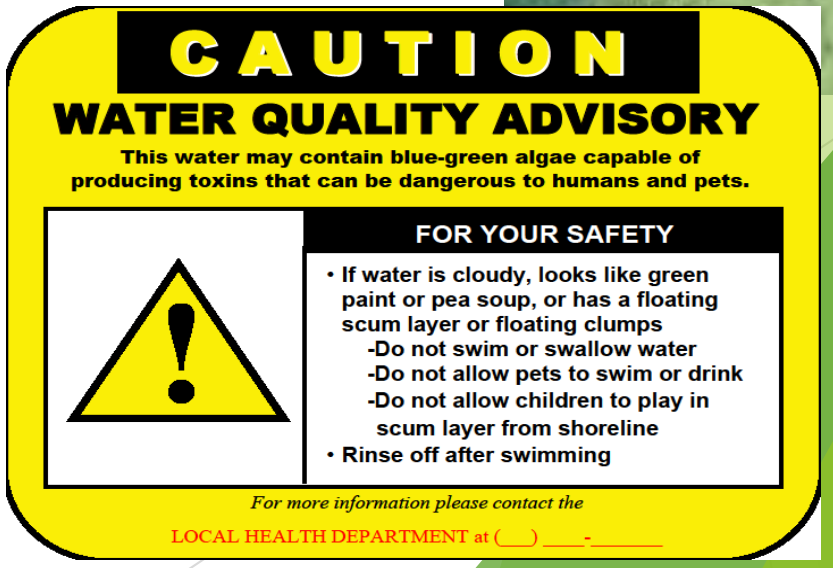
- Microscopic cells, filaments, colonies



Blue Green Algae Summary

- Make water cloudy, pea soup, blue green paint slick, scummy
- Can produce toxins: skin, liver, respiratory, nervous system
- Keep people & pets out of water if present - **don't wade, swim, swallow**
- Wash thoroughly if contact
- If sick after exposure, contact doctor or vet
- Best management practices to prevent



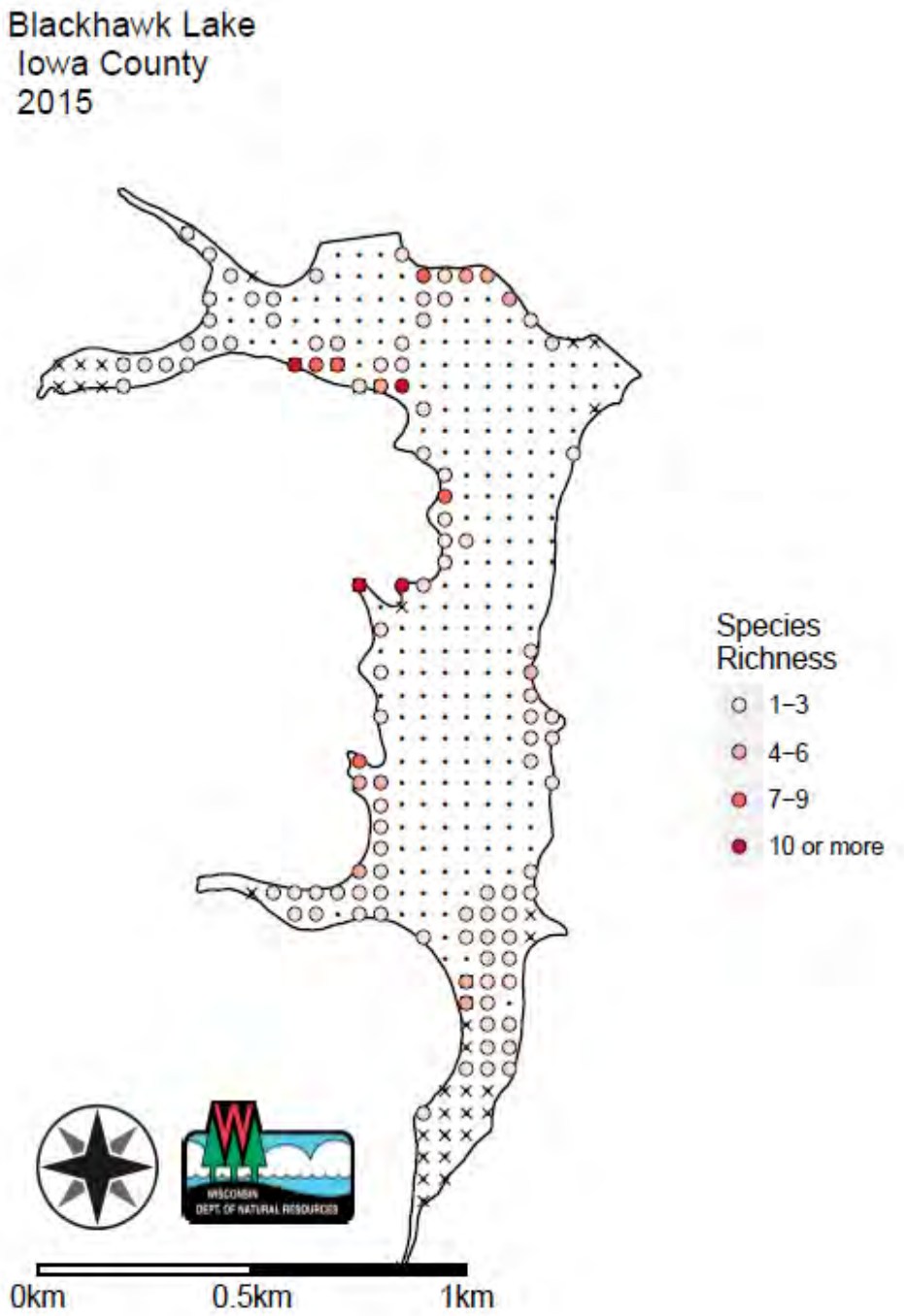


Enjoy Blackhawk Lake!

Questions?

Appendix 6
Blackhawk Lake Point-Intercept Aquatic Plant Survey, June 2015

Blackhawk L Aquatic Plant Survey Species Richness June 2015

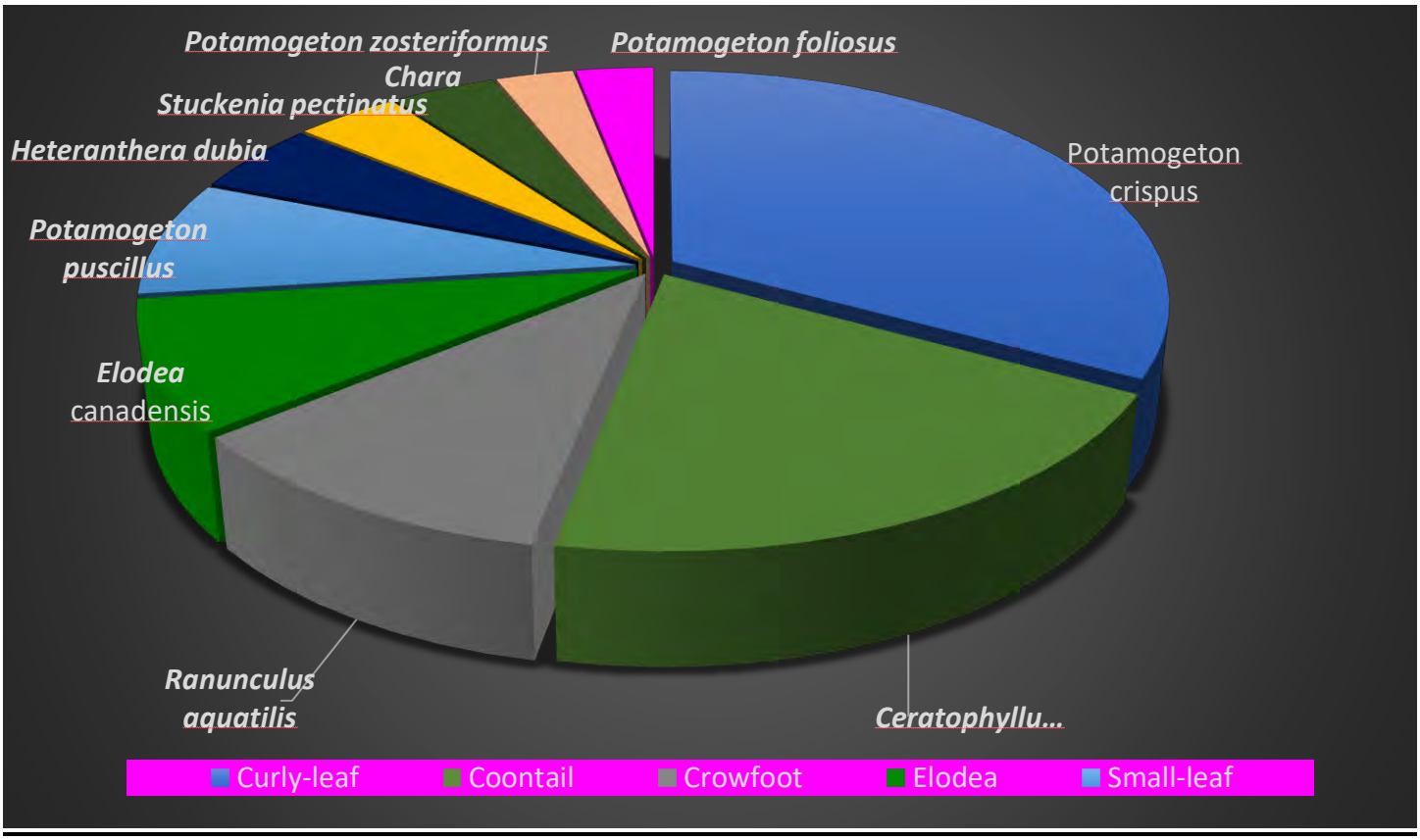


Blackhawk Lake 2015 Aquatic Plant Survey Summary

	RELATIVE		# SITES			FLORISTIC
	FREQUENCY	FREQ OCCUR	SAMPLED	AVE RAKE	# SITES	QUALITY
SPECIES	% NON ALGAE	VEG AREAS	W/SPECIES	FULLNESS	VISUAL	RATING
SPECIES COLLECTED AT SITES						
Potamogenton crispus	33	69.66	62	1.29	15	0
(curly-leaf pondweed)						
Ceratophyllum demersum	20.2	42.7	38	1.47	18	3
(coontail)						
Filamentous algae		29.21	26	1.35	28	0
Ranunculus aquatilis	11.2	23.6	21	1.43	9	8
(white water crowfoot)						
Elodea canadensis	9	19.1	17	1.18	8	3
(common water weed)						
Potamogen pusillus	8	16.85	15	2	6	7
(slender pondweed)						
Heteranthera dubia	5.3	11.24	10	1.2	11	6
(water stargrass)						
Stuckenia pectinata	4.3	8.99	8	1.25	4	3
(sago pondweed)						
Chara **spp.**	3.7	7.87	7	1.43	2	7
(muskgrass)						
Potamogeton zosteriformus	2.7	5.62	5	1.6	1	6
(flat-stem pondweed)						
Potamogen foliosus	2.7	5.62	5	1.4	4	6
(leafy pondweed)						
# of species sampled = 11; # with Floristic Quality Index Rating = 9						

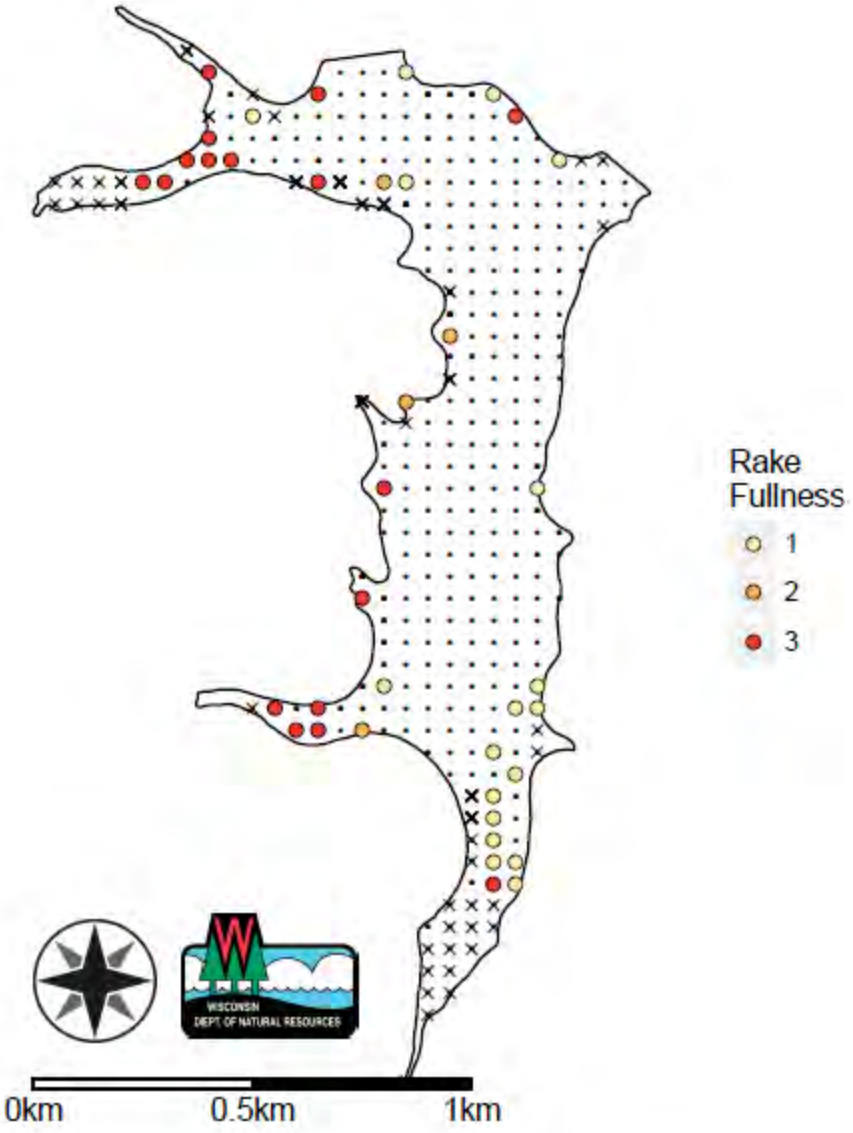
SPECIES ONLY VISUALLY OBSERVED	
Lemna minor	4
(small duckweed)	
Potamogen nodosus	7
(long leaf pondweed)	
Sagittaria breviostra	9
(midwestern arrowhead)	
Sagittaria latifolia	3
(common arrowhead	
Schoenoplectus acutus	6
(hardstem bulrush)	
Schoenoplectus tabernaemontani	4
(soft-stem bulrush)	
Typha latifolia	1
(broadleaf cattail)	
Wolffia columbiana	5
(common watermeal)	
# of macrophyte species only visually observed = 8	
AVE FLORISTIC QUALITY RATING = 5.47	
FLORISTIC QUALITY INDEX = 22.556	

Blackhawk L Aquatic Plant Relative Frequency June 2015

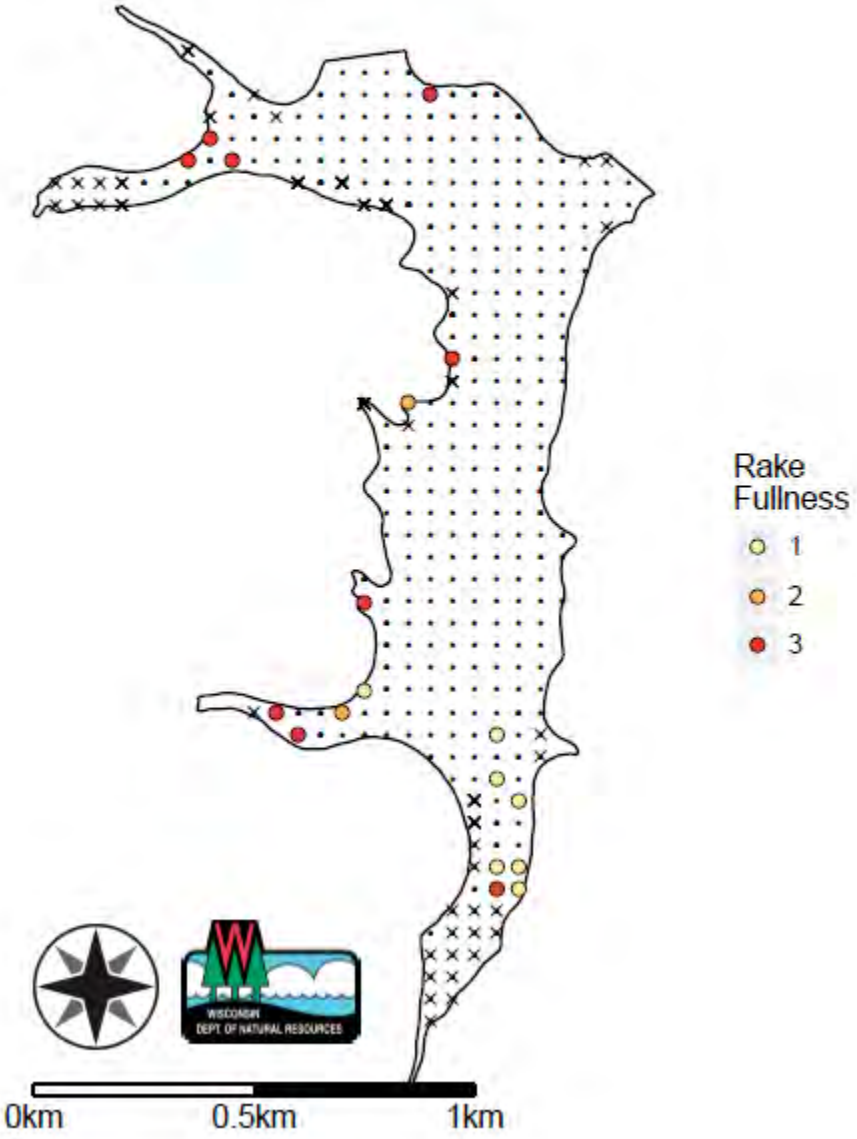


Note: Common name for *Potamogen puscillus* is slender pondweed**.**

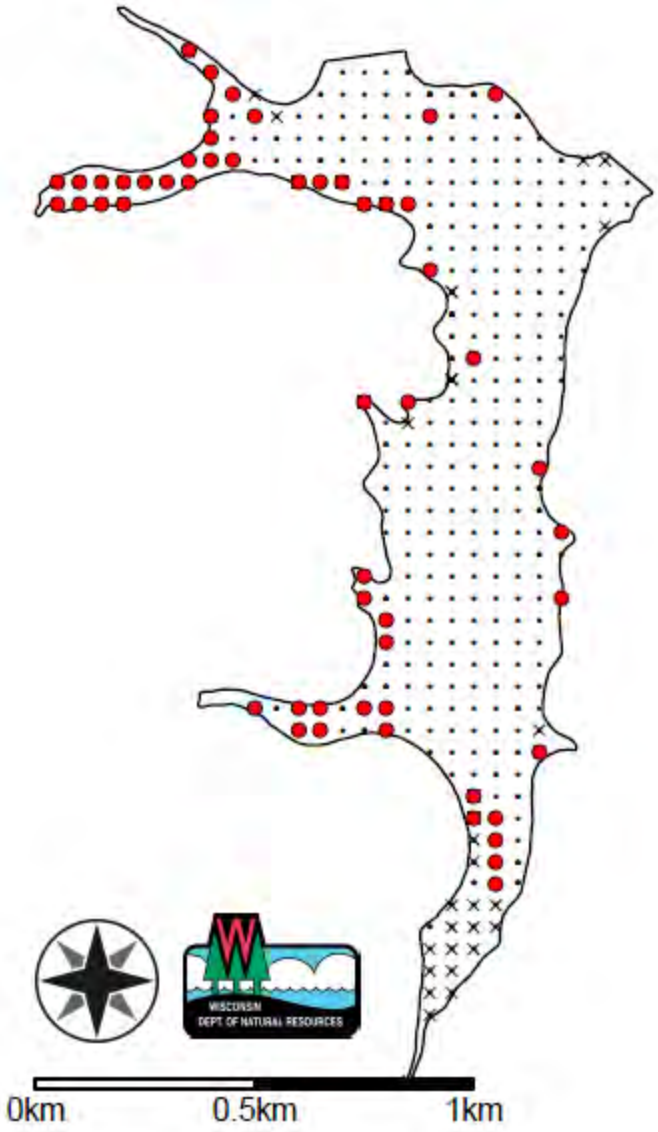
Blackhawk Lake
Iowa County
2015
Ceratophyllum demersum



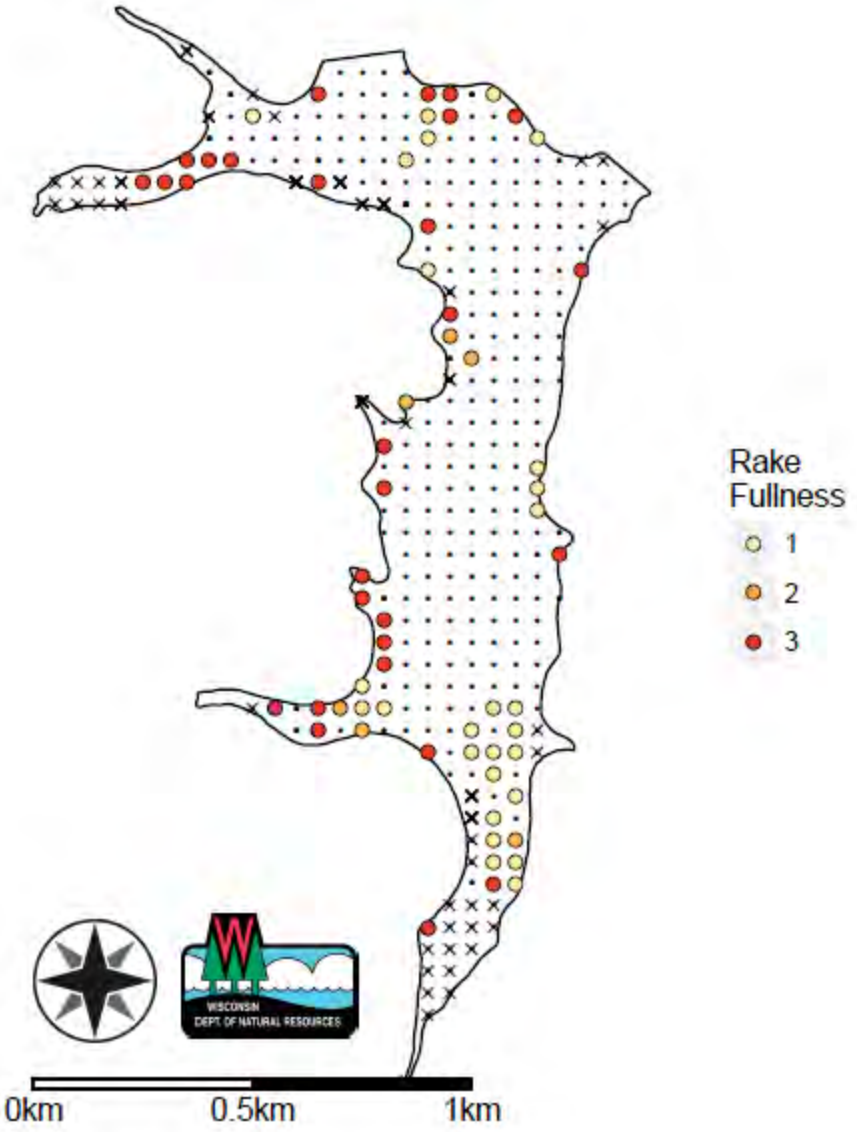
Blackhawk Lake
Iowa County
2015
Elodea canadensis



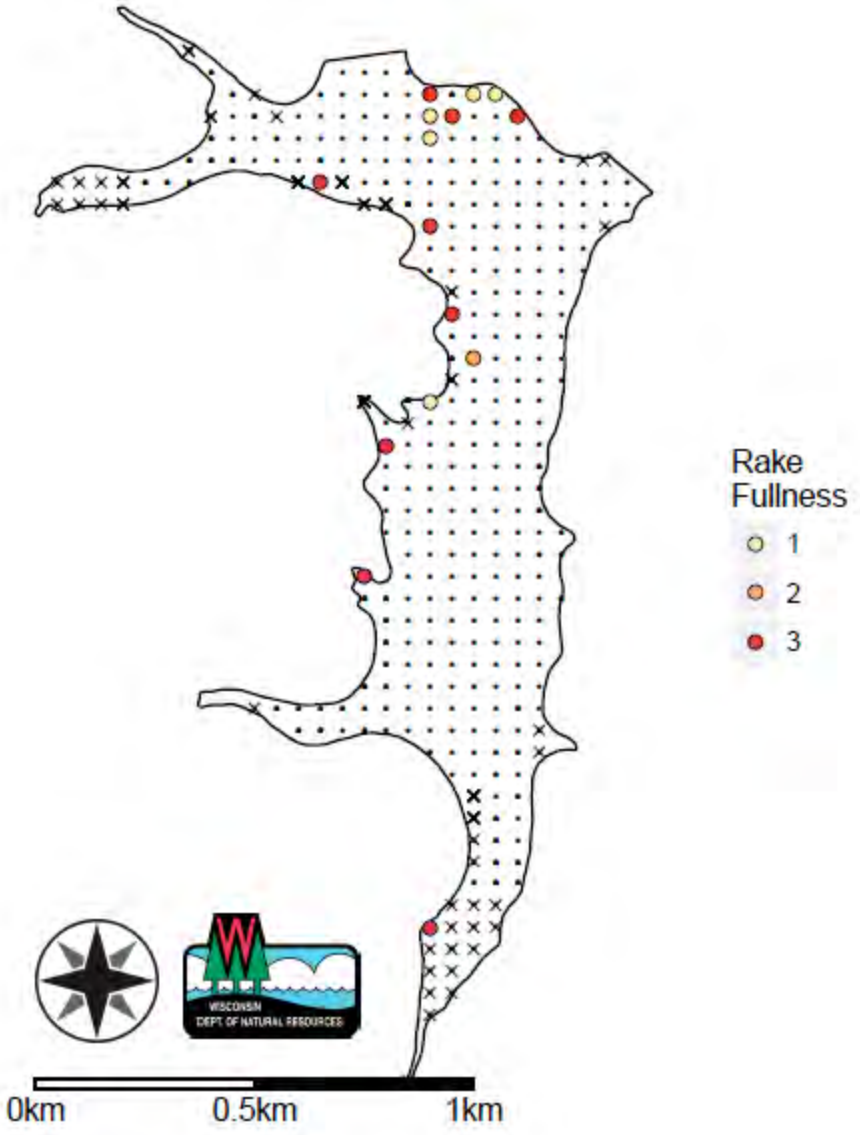
Blackhawk Lake
Iowa County
2015
Filamentous algae



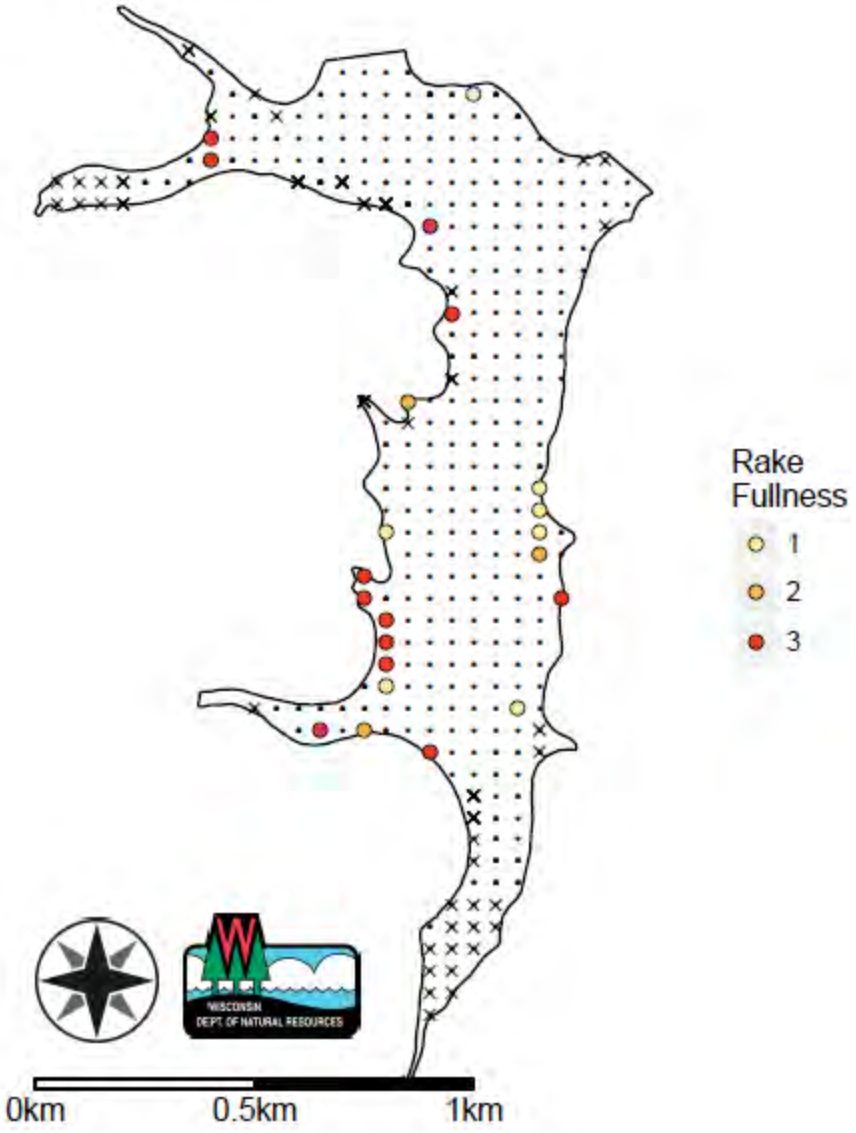
Blackhawk Lake
Iowa County
2015
Potamogeton crispus



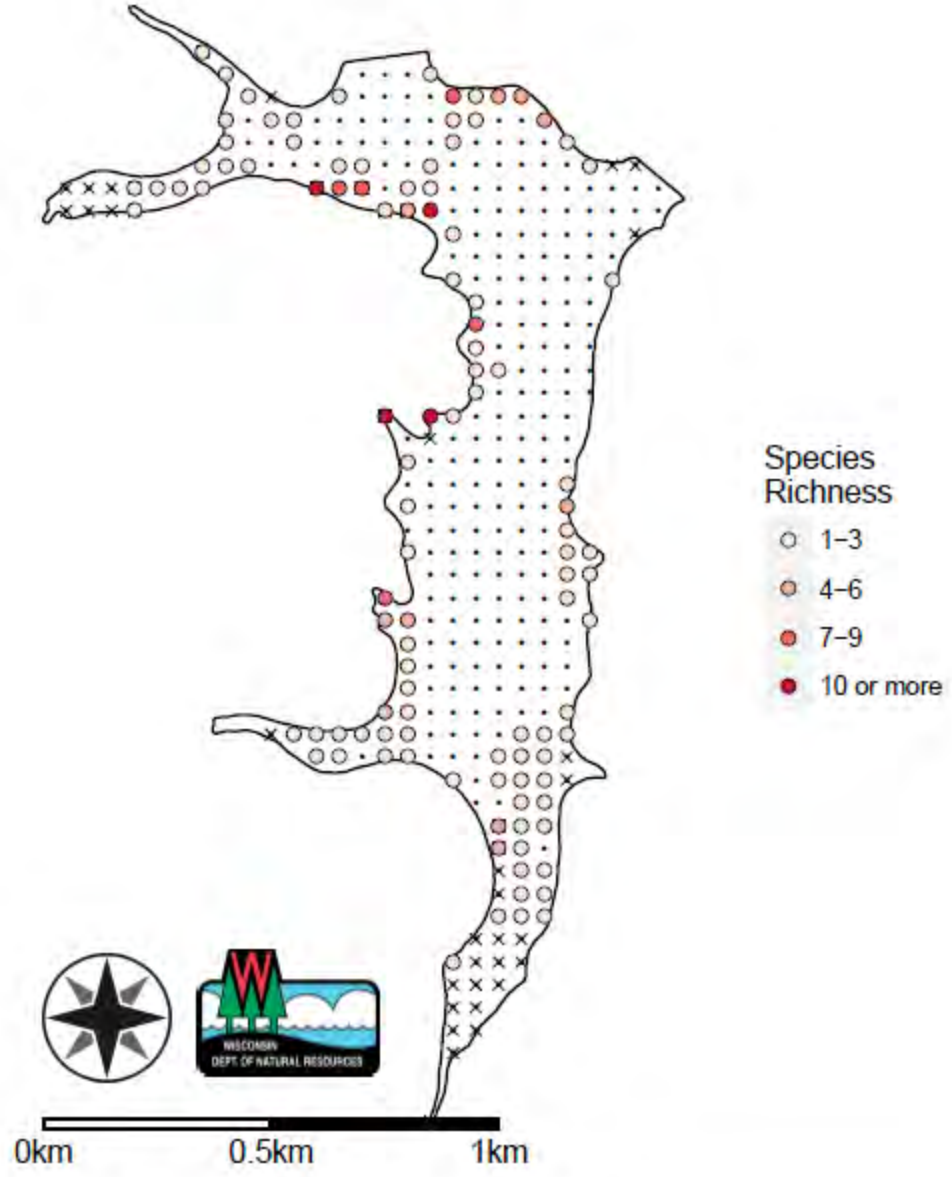
Blackhawk Lake
Iowa County
2015
Potamogeton pusillus



Blackhawk Lake
Iowa County
2015
Ranunculus aquatilis



Blackhawk Lake
Iowa County
2015



Blackhawk Lake Aquatic Plant Survey 2015