

# **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 May-June 2017 precipitation was 5.64 inches, as compared to a normal of 9.26 inches. May and June weather 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. 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 20.6 ug/l as compared to an average of 26.5 ug/l for 2006-2016. Spring total phosphorus (a nutrient to feed 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 112 ug/l as compared to an average of 41.9 ug/l from 2006 - 2016.

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 27.3 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 Aphanomezon, 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**

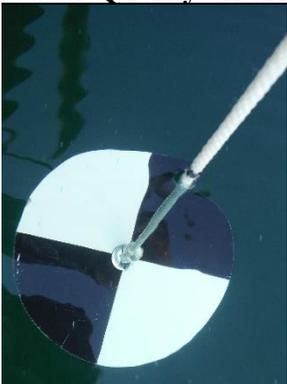


**Beach**



**Water clarity**

**Water Quality and Aquatic Plants 5-25-17**



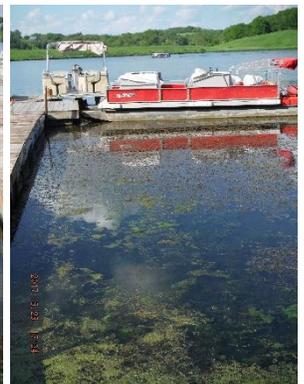
**Secchi = 21'**



**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

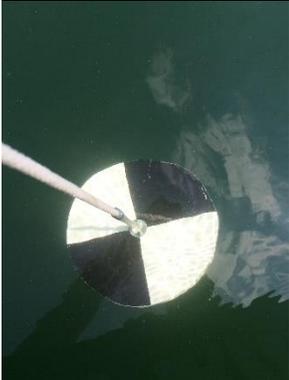


Pontoon Bay



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)**



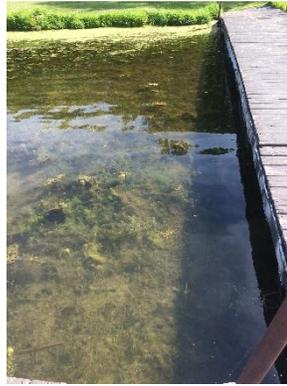
**Looking S from Fishing Pier**



**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**

**Water Quality and Aquatic Plants 7-14-17**



**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**

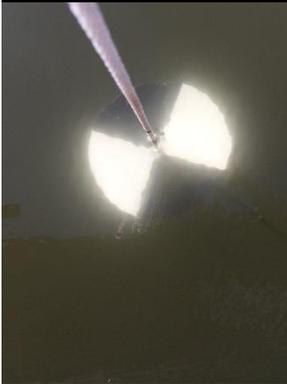


**Boating Landing Plants**



**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**

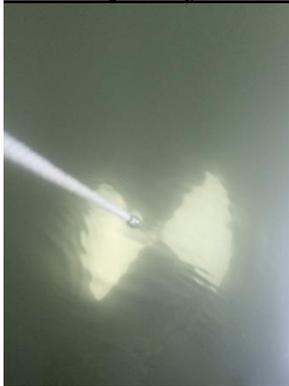


**Boat Landing N**



**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**

### **Aquatic Plant Monitoring and Management 2017**

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 *Potamogeton 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-leaf 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 a lot of rain in the previous 2 weeks. There were small green algae in the water, but no evidence of blue-greens. There were mats of decayed slender-leaf pondweed and filamentous algae at the fishing pier. Senescing slender-leaf 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-leaf 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. The mixture should also include treatment for filamentous algae to make the chemicals more effective. A second treatment may be needed in early 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 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 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 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

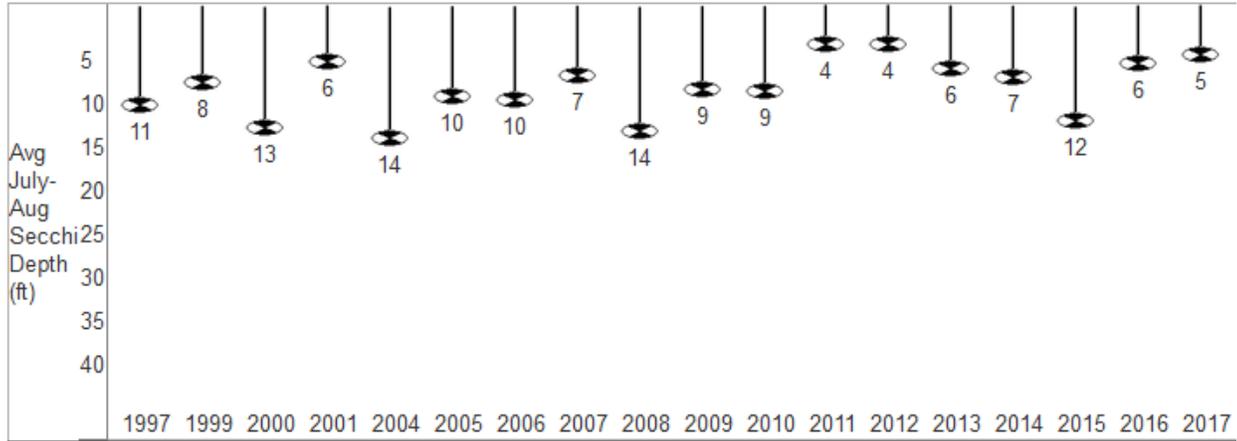
Wisconsin Lakes Partnership

**Blackhawk Lake**

Iowa County

Waterbody Number: 1239400

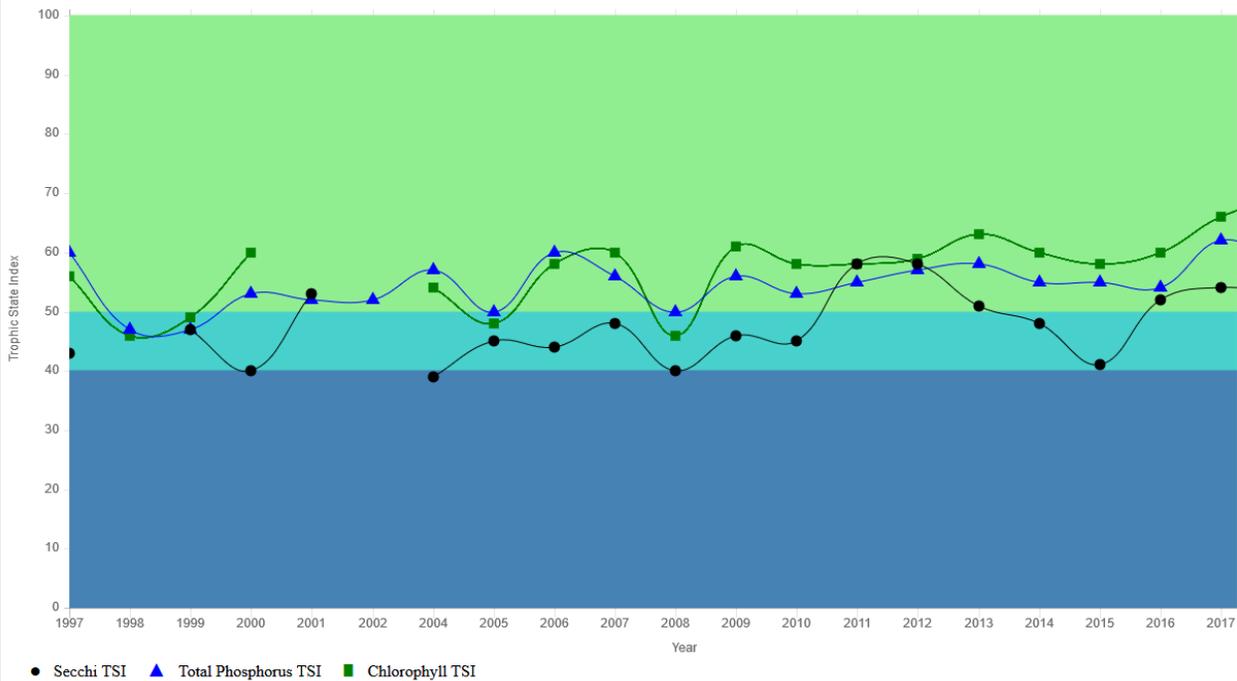
L  
D  
C



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
$TSI(Sec) = TSI(Chl) \geq TSI(TP)$	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
<b>TSI &lt; 30</b>	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.
<b>TSI 30-40</b>	Deeper lakes still oligotrophic, but bottom water of some shallower lakes will become oxygen-depleted during the summer.
<b>TSI 40-50</b>	Water moderately clear, but increasing chance of low dissolved oxygen in deep water during the summer.
<b>TSI 50-60</b>	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.
<b>TSI 60-70</b>	Blue-green algae become dominant and algal scums are possible, extensive plant overgrowth problems possible.
<b>TSI 70-80</b>	Becoming very eutrophic. Heavy algal blooms possible throughout summer, dense plant beds, but extent limited by light penetration (blue-green algae block sunlight).
<b>TSI &gt; 80</b>	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



**Eutrophic**   **Mesotrophic**   **Oligotrophic**

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 noticeable 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**



June 13, 2017

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

PERMIT# SC-2016-26-1120

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  
Lake Management Coordinator  
608-275-3329

e-copy. Bradd Sims, DNR Fisheries Manager  
Donna Sefton, DPS 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>

**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 <i>SL-2017-26-1120</i>	Permit Expiration Date <i>10/1/17</i>
Waterbody #	Fee Received <i>45-</i>

**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.**

<b>Home Address</b> Name Cobb-Highland Recreation Commission Street Address 2025 County Rd BH City Highland State WI ZIP Code 53543			<b>Waterbody Address</b> 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 <i>managebhl@mhtc.net</i>		

**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 07 N	Range 2	Name of Applicator or Firm Wisconsin Lake and Pond Resource			
Latitude 43.0256540    Longitude -90.2886260				Street or Route _____			
• Is there more than one property owner? <input type="radio"/> Yes <input checked="" type="radio"/> No • Is there surface water discharge? <input checked="" type="radio"/> Yes <input type="radio"/> No • Does the waterbody have public access? <input checked="" type="radio"/> Yes <input type="radio"/> No If all are no: considered to be a private pond				City Eldorado State WI		ZIP Code _____	
Adjacent Riparian Property Owner Names (attach sheets if necessary) 1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 6. _____				County _____ Phone Number (include area code) _____			
Name of Lake Property Owners' Association Representative or Lake District Representative (if none, please indicate)				Email Address Mark@WisconsinLPR.com			
_____				Applicator Certification Number for Category 5 Aquatic Pesticide Application JS77803 & MS2178			
_____				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 ft <sup>2</sup> = 0.18 ac	3 ft	0.54 ac-ft
2.	ft X	ft	43,560 ft <sup>2</sup> = _____ ac	ft	_____ ac-ft
3.	ft X	ft	43,560 ft <sup>2</sup> = _____ ac	ft	_____ ac-ft
4.	ft X	ft	43,560 ft <sup>2</sup> = _____ ac	ft	_____ ac-ft
5.	ft X	ft	43,560 ft <sup>2</sup> = _____ ac	ft	_____ ac-ft
6.	ft X	ft	43,560 ft <sup>2</sup> = _____ ac	ft	_____ ac-ft
7.	ft X	ft	43,560 ft <sup>2</sup> = _____ ac	ft	_____ ac-ft
8.	ft X	ft	43,560 ft <sup>2</sup> = _____ ac	ft	_____ ac-ft
9.	ft X	ft	43,560 ft <sup>2</sup> = _____ ac	ft	_____ ac-ft
<b>Estimated Acreage Grand Total</b>			<i>0.18</i> ac	<b>Calculated Volume Grand Total</b>	
					<i>0.54</i> 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? <input type="radio"/> Yes <input checked="" type="radio"/> No	DNR Use: NHI Review? <input type="radio"/> Yes <input type="radio"/> No    Describe: _____
---	--

## Chemical Aquatic Plant Control Application and Permit WPDES Pesticide Pollutant Permit Application

Form 3200-004 (R 02/17)

Page 2 of 4

### 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.)

\_\_\_\_\_ acres X \$25 per acre = \$ \_\_\_\_\_

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:

1. Mechanical harvesting
2. Manual removal
3. Sediment screens/covers
4. Dredging
5. Lake drawdown
6. Nutrient controls in watershed
7. Other: \_\_\_\_\_

Feasible?

- |                                      |                                     |
|--------------------------------------|-------------------------------------|
| <input type="radio"/> Yes            | <input checked="" type="radio"/> No |
| <input type="radio"/> Yes            | <input checked="" type="radio"/> No |
| <input type="radio"/> Yes            | <input checked="" type="radio"/> No |
| <input checked="" type="radio"/> Yes | <input type="radio"/> No            |
| <input type="radio"/> Yes            | <input checked="" type="radio"/> No |
| <input type="radio"/> Yes            | <input checked="" type="radio"/> No |
| <input type="radio"/> Yes            | <input type="radio"/> No            |

If No, Why Not?

Insufficient labor force

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**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:

Chemical Aquatic Plant Control Application and Permit  
WPDES Pesticide Pollutant Permit Application

Form 3200-004 (R 02/17)

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**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](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 volume.

Whole Lake Concentration: \_\_\_\_\_ ppm

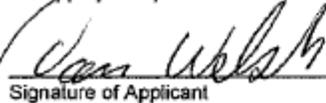
**Note: Chemical fact sheets for aquatic pesticides used in Wisconsin are available from the Department of Natural Resources at the following link: [dnr.wi.gov/Lakes/plants/factsheets/](http://dnr.wi.gov/Lakes/plants/factsheets/).**

**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.

  
Signature of Applicant

  
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.

**Chemical Aquatic Plant Control Application and Permit  
WPDES Pesticide Pollutant Permit Application**

Form 3200-004 (R 02/17)

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**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.

*Daniel 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 20 17.

Application fee received?

Yes  No

State of Wisconsin  
Department of Natural Resources  
For the Secretary

Advance notification of treatment required?

Yes  No

By Susan Grehan  
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.

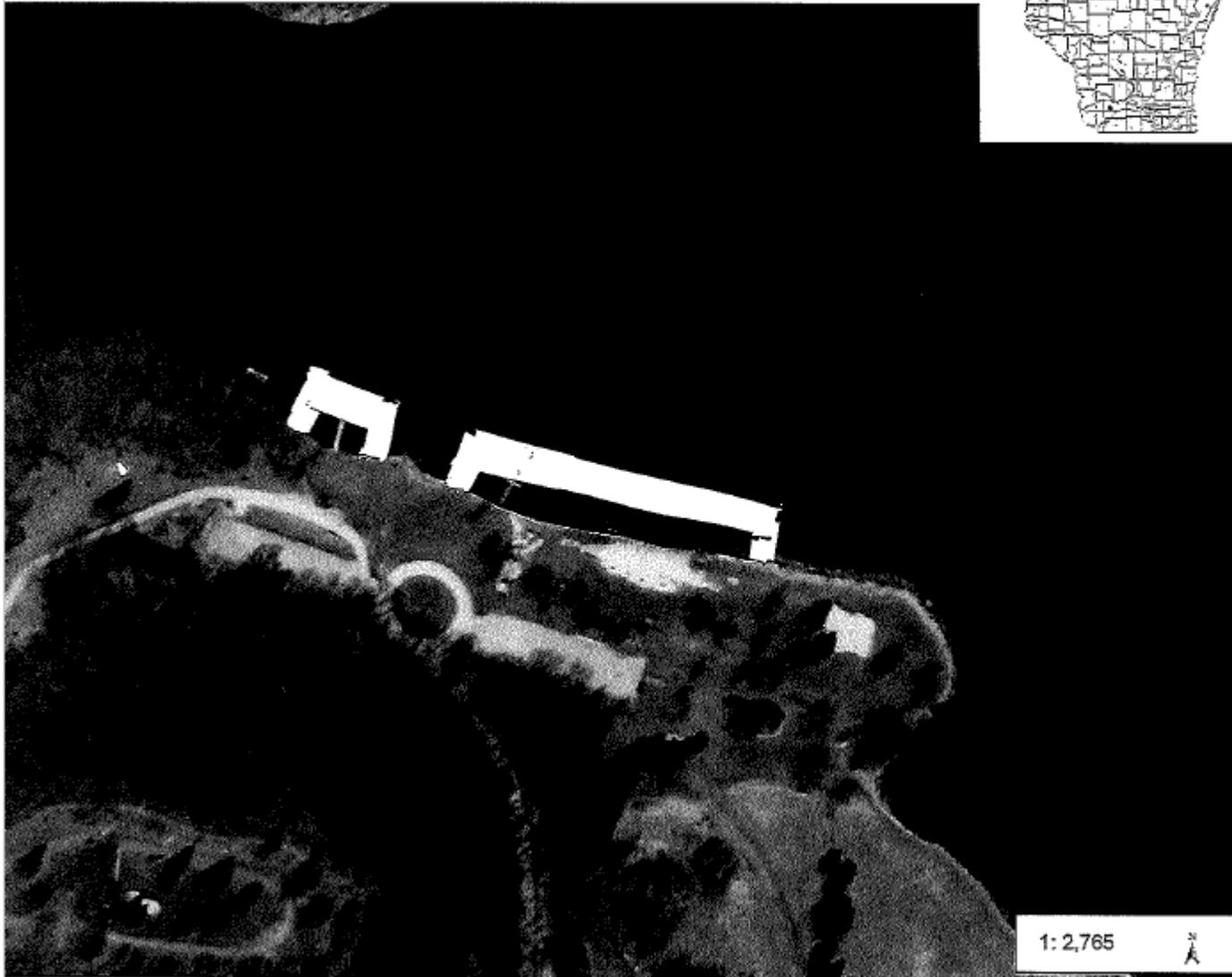


# Surface Water Data Viewer Map



## Legend

2010 Air Photos (WROC)



Treatment area is inside the white lines

.58 acres 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.

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**  
**“What Happened to Eurasian watermilfoil in  
Blackhawk Lake?”**  
**Wisconsin Lakes Convention, April 2017**

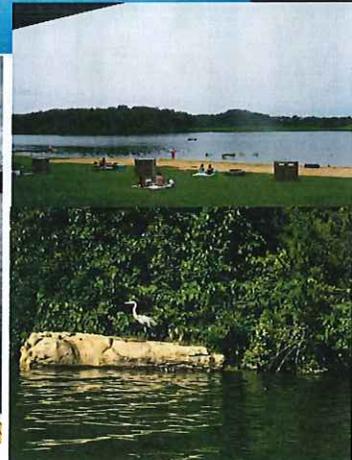
# What Happened to Eurasian Watermilfoil in Blackhawk L, WI?



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

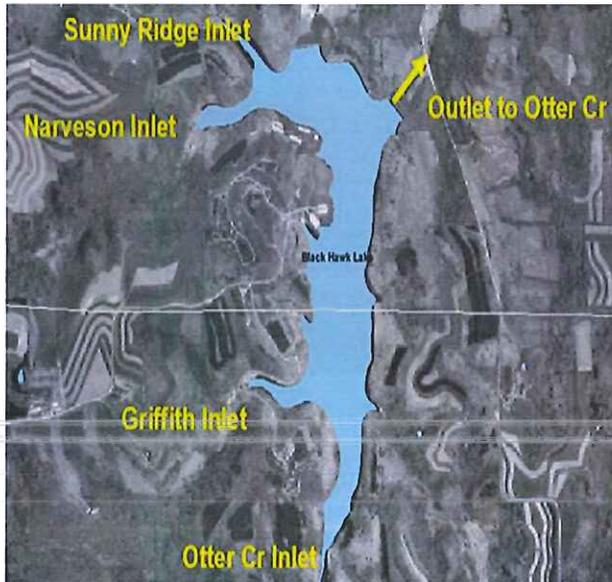
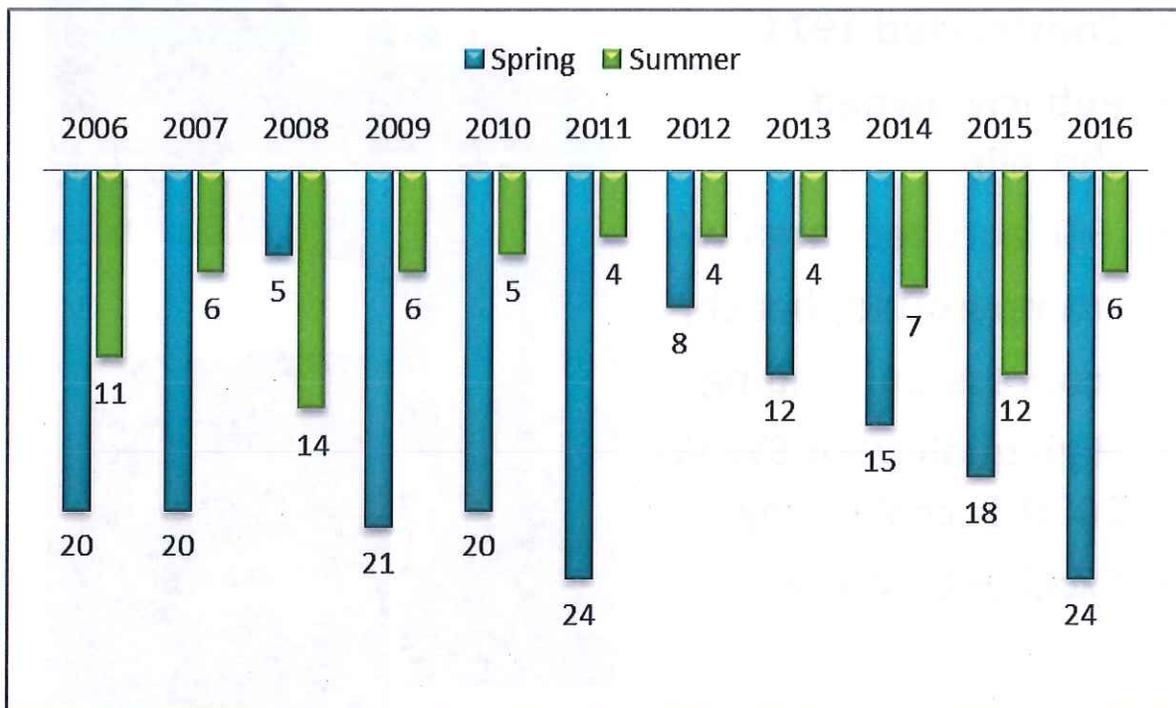


Table 1. Blackhawk L, Iowa Co., WI

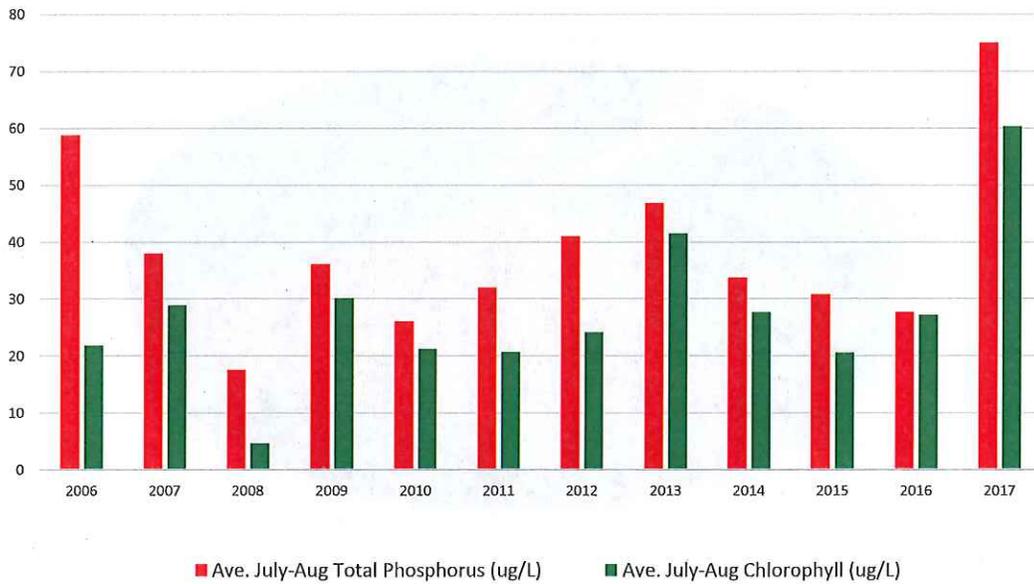
## Physical Characteristics

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 L Spring vs Summer Secchi 2006 - 2016

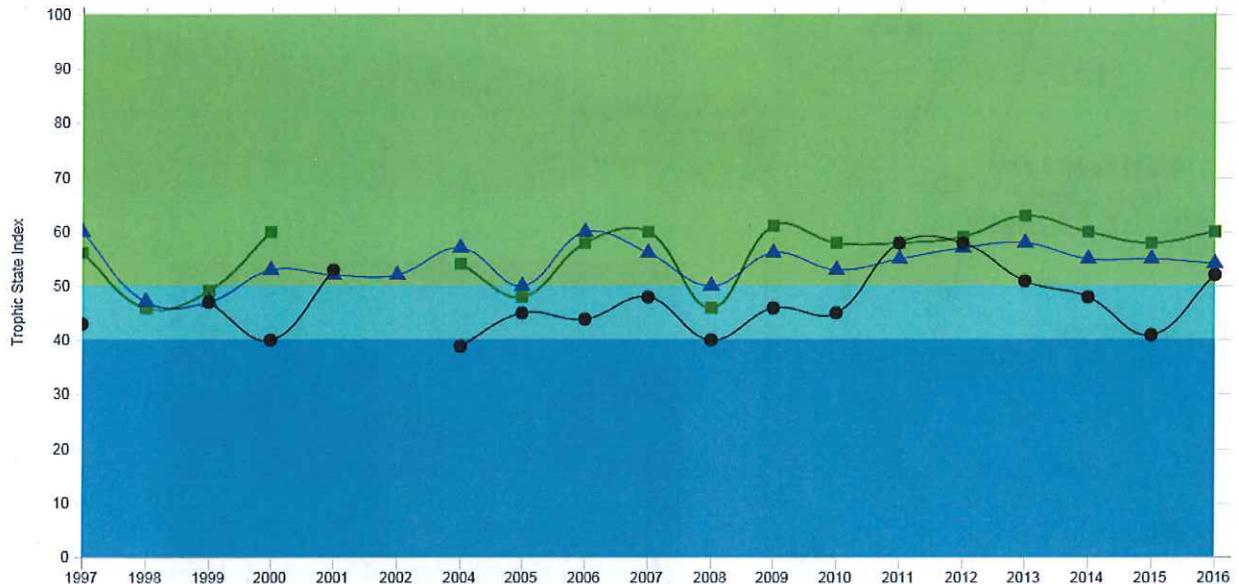


## Blackhawk Lake Total Phosphorus & Chlorophyll 2006-2017

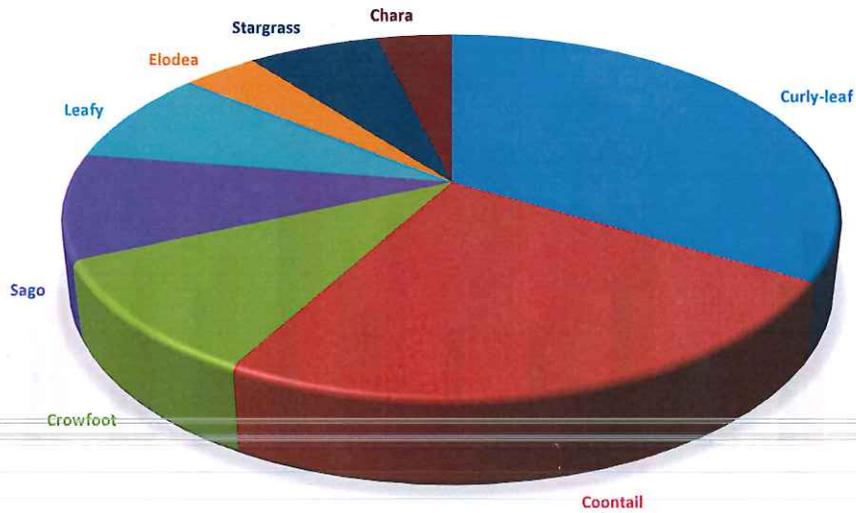


## Blackhawk L TSI 1997 - 2016

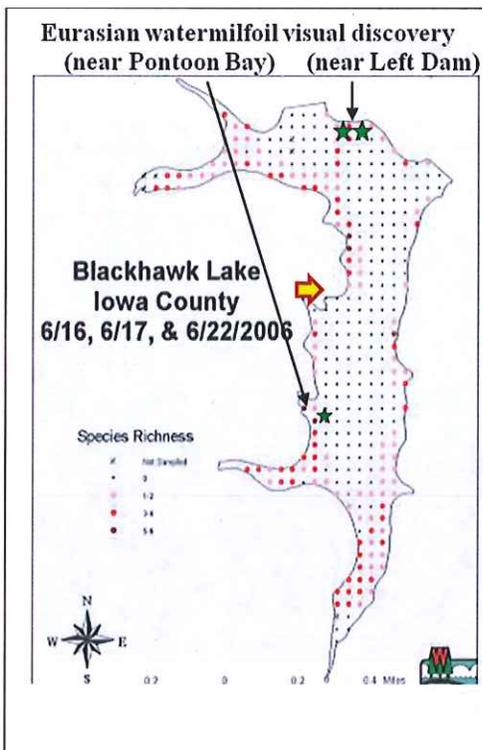
Trophic State Index Graph: Black Hawk Lake - Deep Hole - Iowa County



# 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



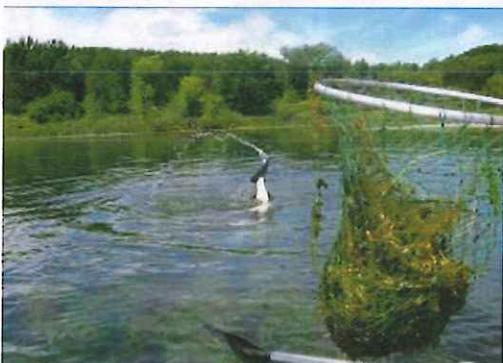
EWM post treatment

# 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

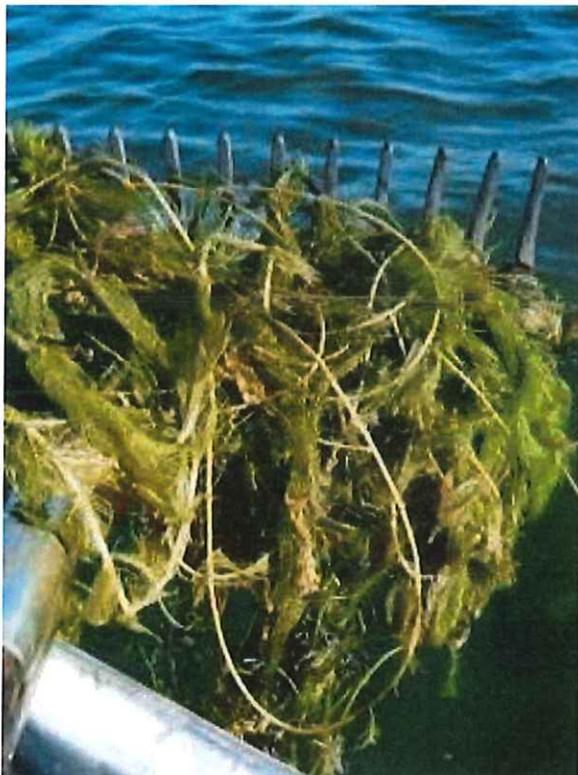


# 2010 EWM Distribution & Treatment

- 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



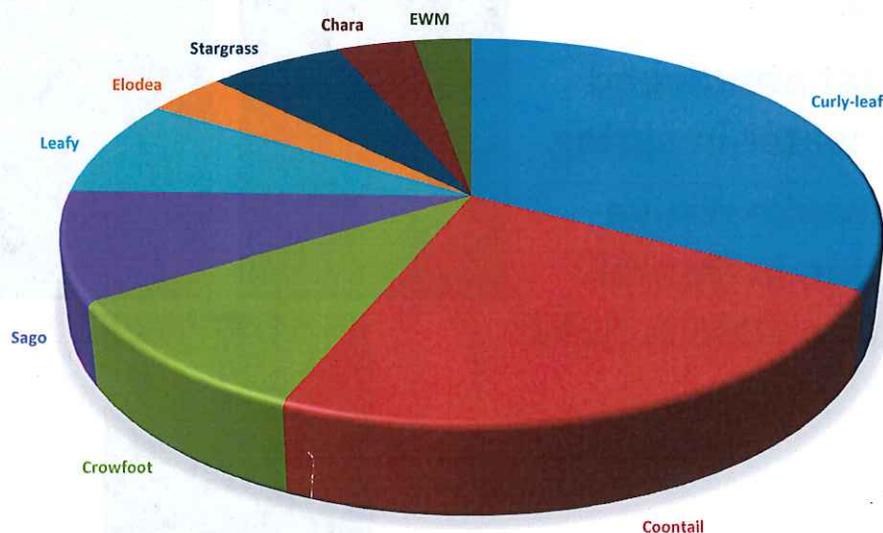
EWM treatment 2010	Application rate lbs/acre 2,4-D		
	6/14/2010	6/16/2010	Total
Treatment area			
Between green & yellow lines (2.25 acres)	55	0	55
Between yellow & red lines (1.25 acres)	55	120	175
Within red line (1.25 acres)	55	140	195
Within blue line (0.25 acre)	55	88	144

## 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

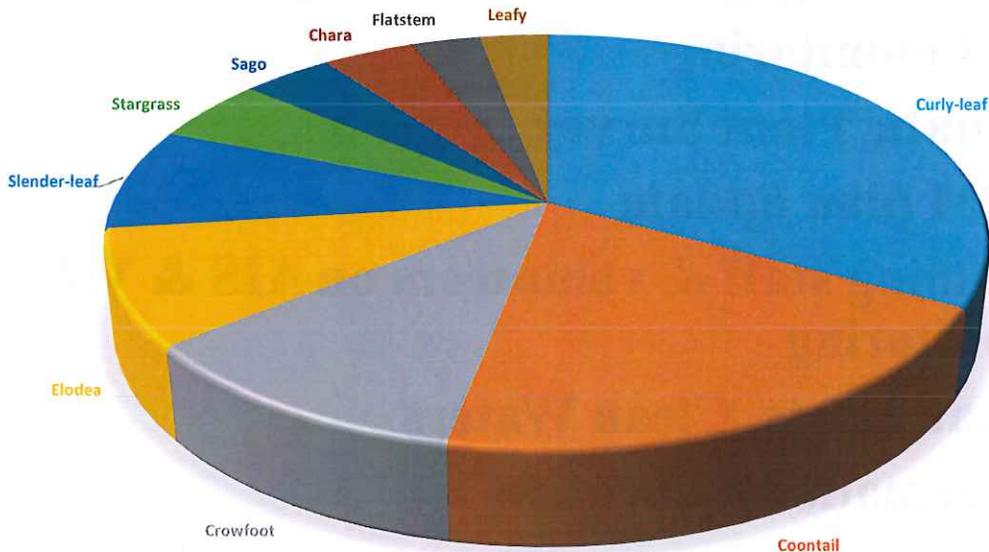
- **Monitoring, geo-locating, mapping EWM**
- **WQ monitoring**
- **Aquatic Plant Survey**
- **APM plan update**
- **Training staff & volunteers on AIS & WQ monitoring**
- **Clean Boats, Clean Waters**
- **Information/Education**

# EWM 2012 - 2016

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

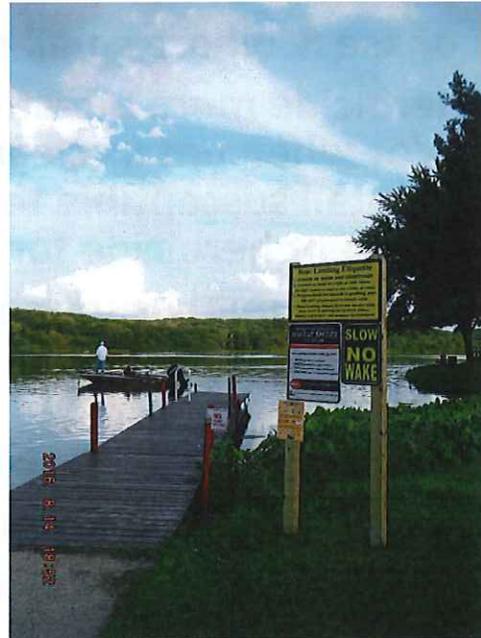


## Blackhawk L Aquatic Plant Relative Frequency June 2015

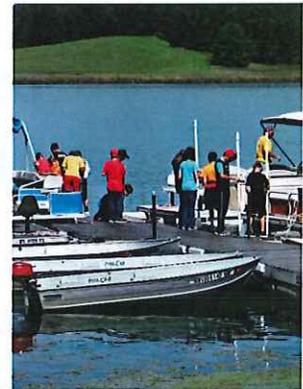


# Clean Boats, Clean Waters

- 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 3<sup>rd</sup> week May & 3<sup>rd</sup> 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

**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



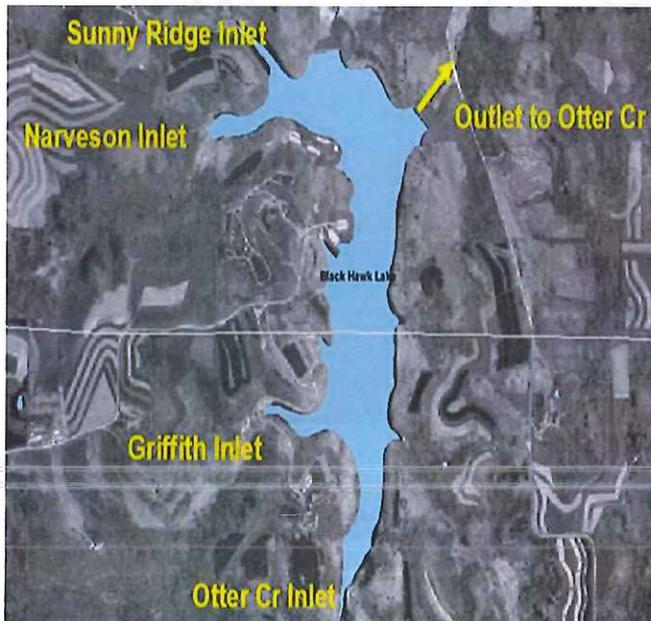
Donna Sefton and Laura Spears  
DFS Conservation Consulting  
Blue Mounds, WI

## 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

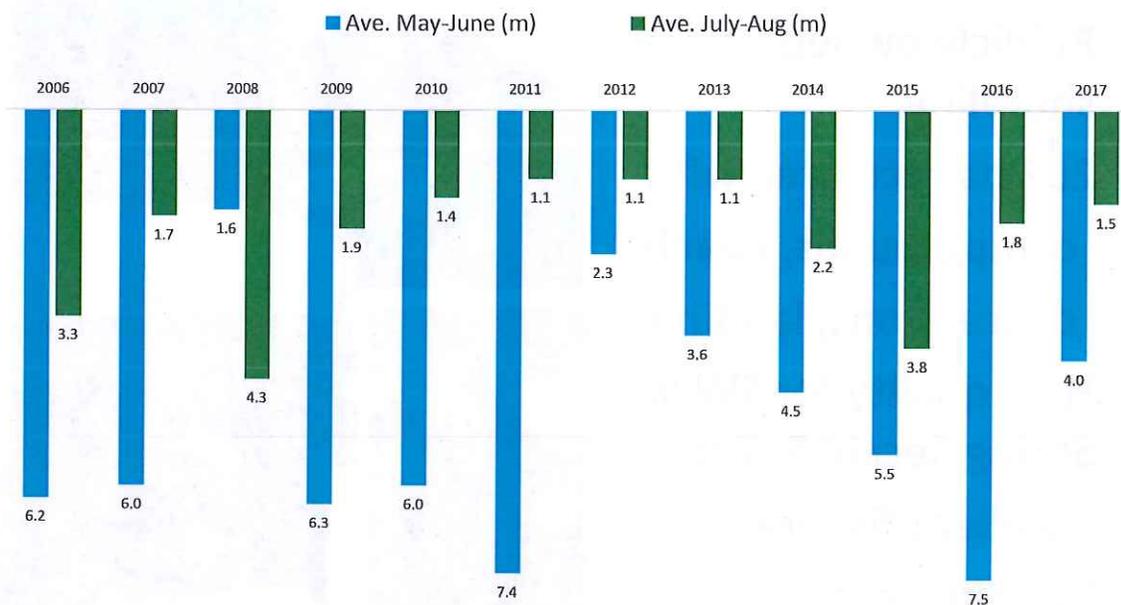


# Blackhawk L Physical Characteristics

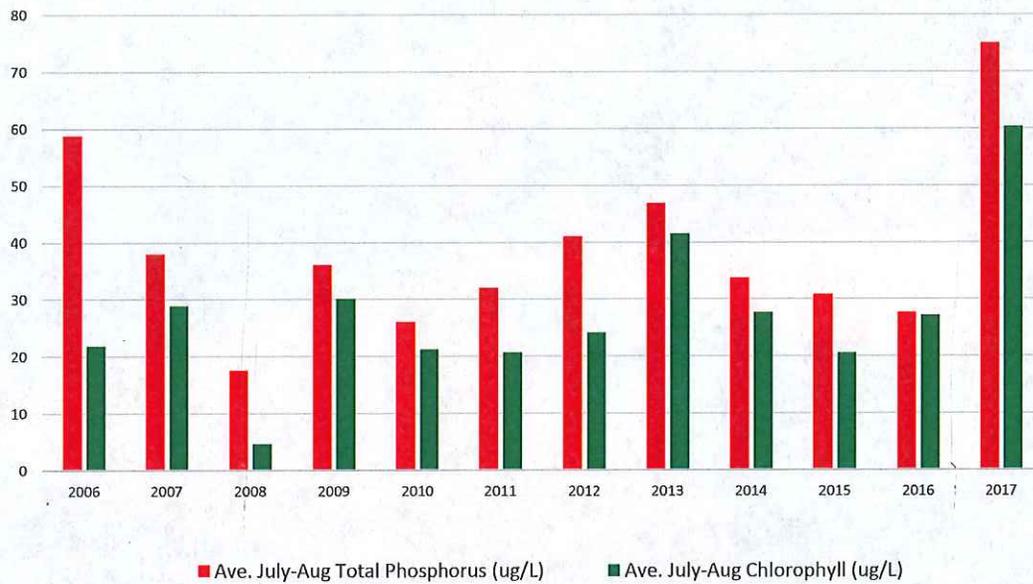


Lake Surface Area	89	hectares
Maximum Depth	13.7	meters
Mean Depth	4.5	meters
Volume	4,021,151	cubic meters
Watershed Area	3958	hectares
Littoral Area	32.4	hectares
	36	%
Max. Depth Plants	4.6	meters
Flushing Rate	2.1	times/year
Residence Time	0.48	year
Discharge	60%	hypolimnetic

## Blackhawk Lake Spring & Summer Secchi 2006-2017

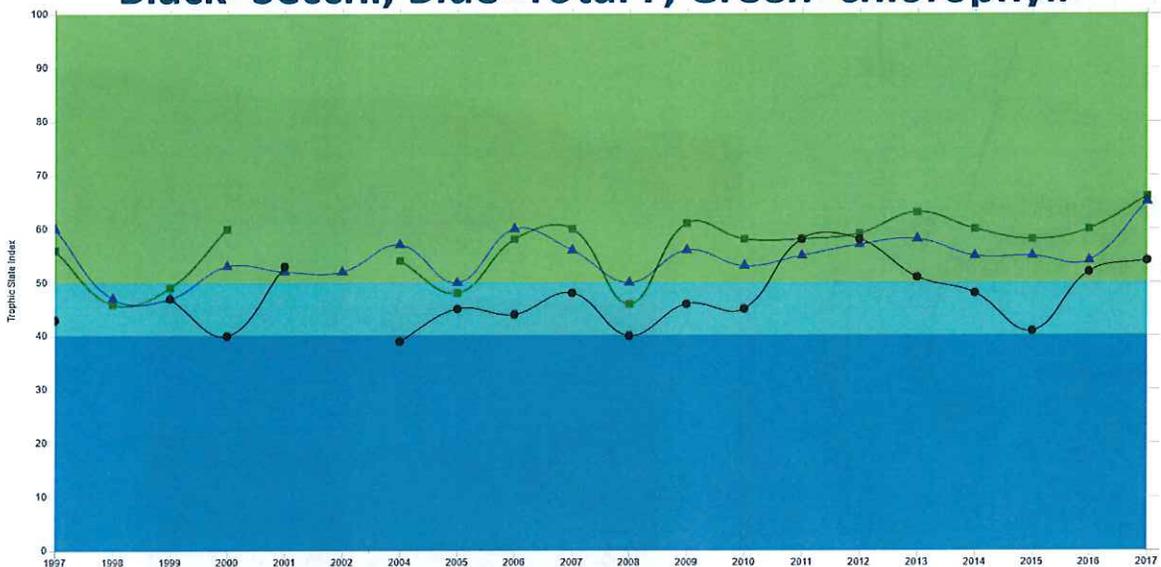


## Blackhawk Lake Total Phosphorus & Chlorophyll 2006-2017

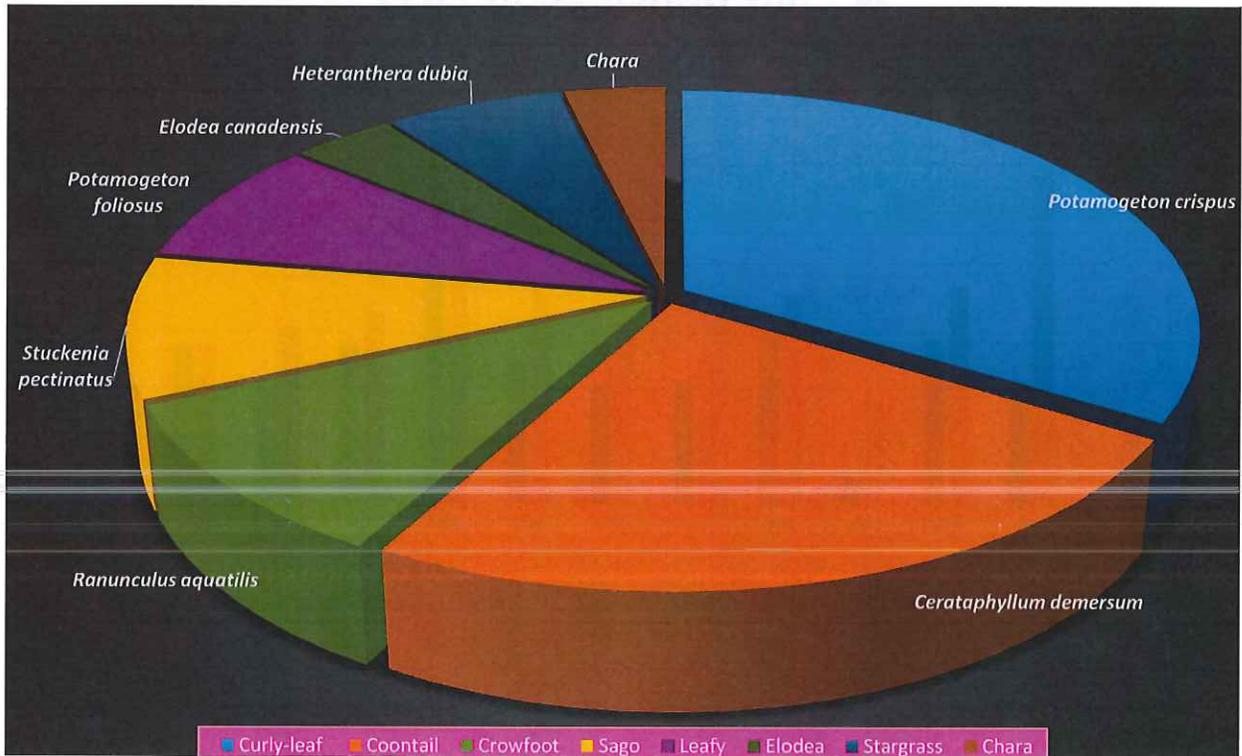


## Blackhawk L Trophic State Index (TSI) 1997 – 2017

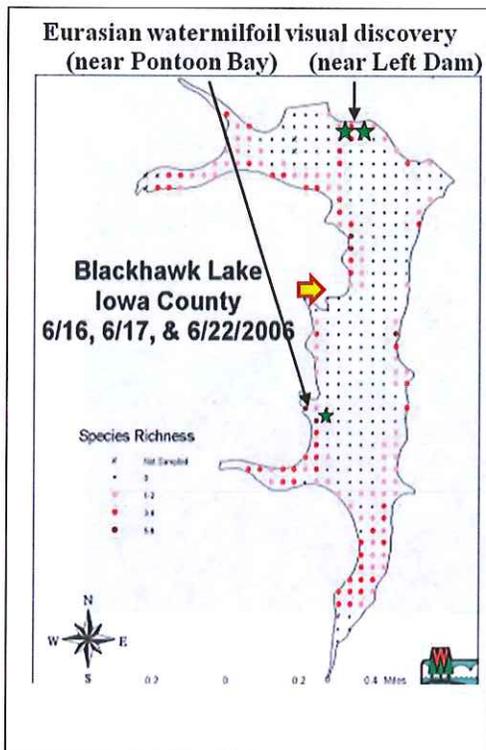
Black=Secchi, Blue=Total P, Green=chlorophyll



# Blackhawk L Aquatic Plant Relative Frequency June 2006



## Blackhawk L 2006 APS found EWM



# Early Detection/Rapid Response (EDRR) 2006



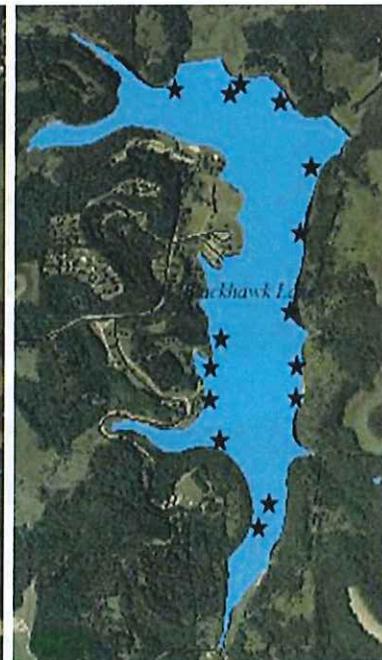
- Pioneer colonies by left dam uprooted or root crowned by scuba diver June 2006
- Collected in nets, disposed on land
- August 2006: scattered colonies in many areas
- EDRR grant from WI DNR:
  - Geolocate, map, monitor EWM
  - Survey aquatic plants, monitor WQ
  - Prepare/implement APM Plan
  - Information/education
- 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

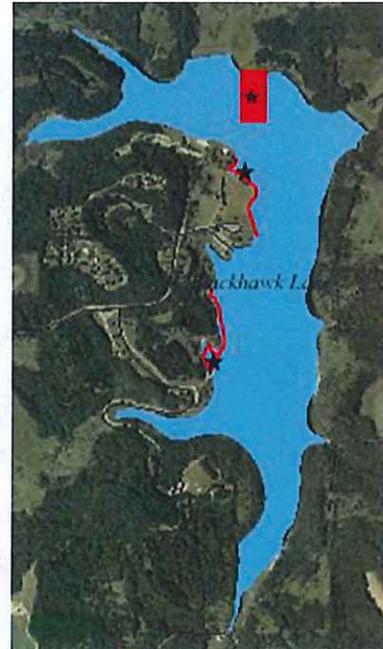


## 2009 Manual Removal

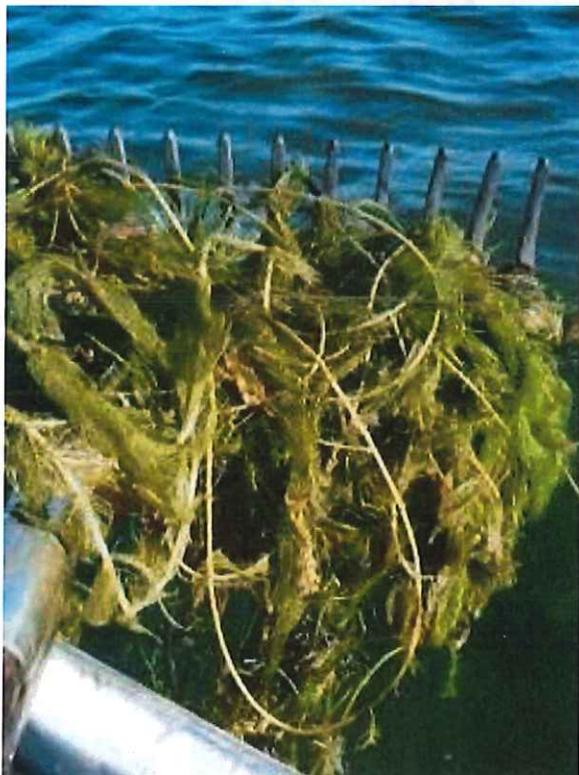


# 2010 EWM Distribution & Treatment

- 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

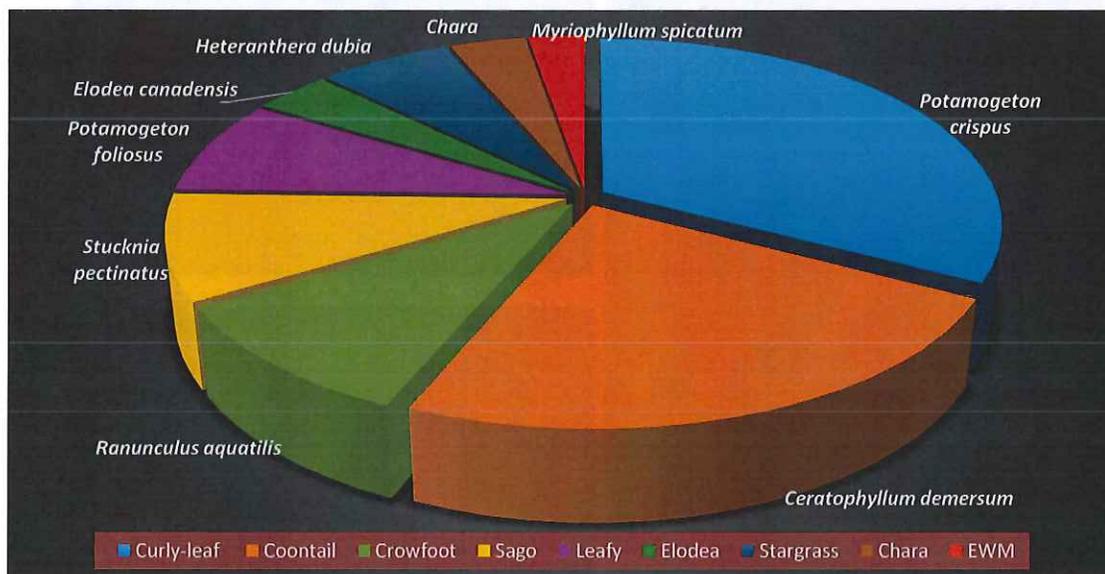
## EWM Treatment w/2,4-D granular



EWM treatment 2010	Application rate kg/0.4 ha 2,4-D		
	6/14	6/16	Total
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**

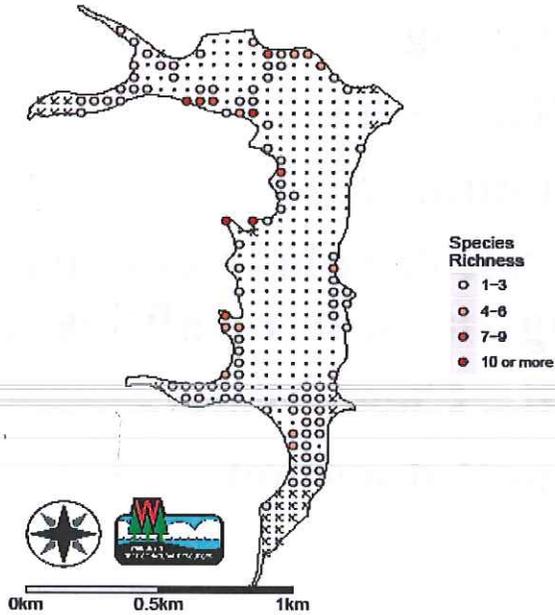
## **Aquatic Plants 2012 - 2017**

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

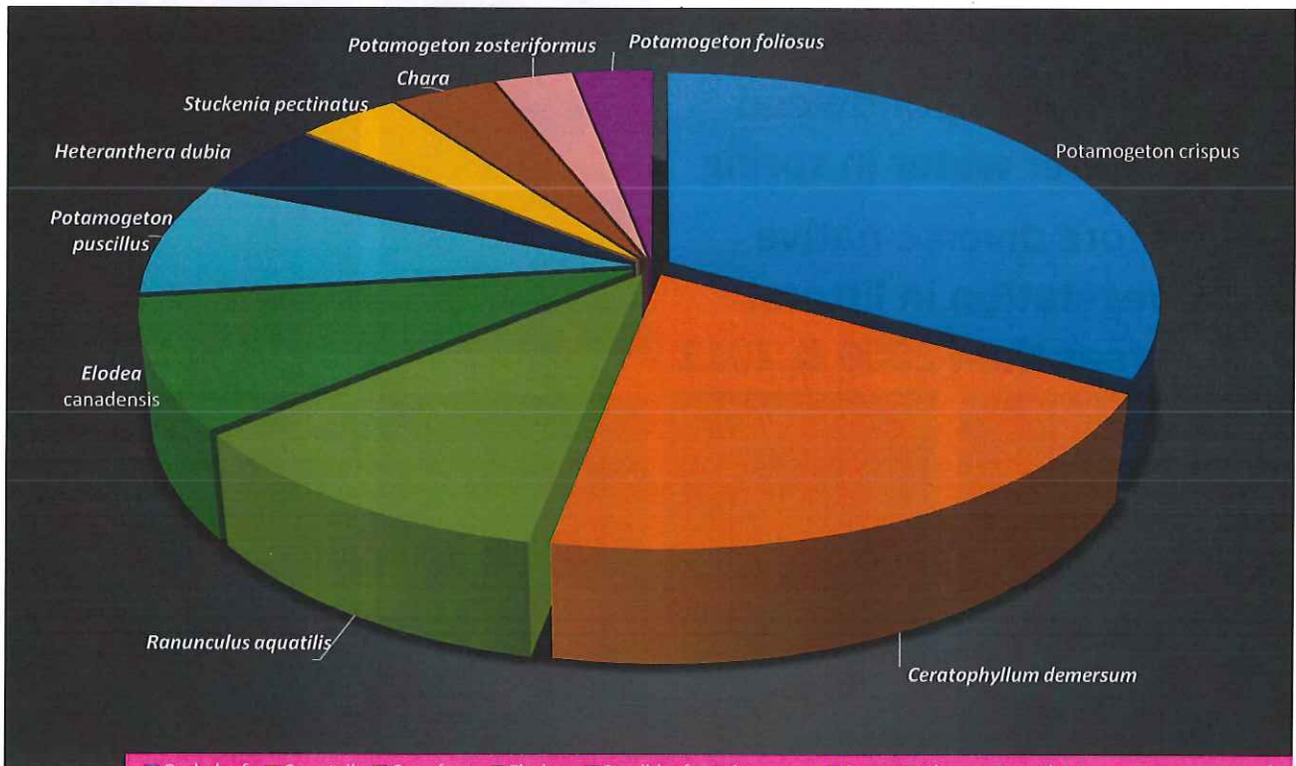


# Blackhawk L Aquatic Plant Survey Species Richness June 2015

Blackhawk Lake  
Iowa County  
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
- ?



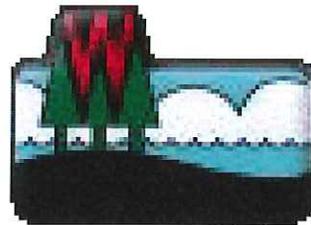
# Acknowledgements

This work was made possible by the support of:

**BLACKHAWK LAKE RECREATION AREA**



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



## Questions?

