Lac Courte Oreilles 2015 Aquatic Plant Management Report

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Courte Oreilles Lakes Association

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Table of Contents

LIST OF APPENDICES

1.0 INTRODUCTION / SUMMARY

The Courte Oreilles Lakes Association (COLA) is the State recognized lake association responsible for the management of Lac Courte Oreilles' aquatic invasive species (AIS), with the species of particular concern being Potamogeton crispus (curly-leaf pondweed – CLP) on Lac Courte Oreilles and Little Lac Courte Oreilles (Lakes). Stantec Consulting Services, Incorporated (Stantec) was contacted by COLA to provide a chemical herbicide treatment and an aquatic plant survey. Stantec furnished all labor, materials, tools and equipment necessary to perform all operations in connection with the chemical application of herbicides in select locations of the Lakes. This report provides a summary of observations, conclusions and recommendations for the chemical treatment of AIS and nuisance aquatic plant growth from 2015 and for the upcoming 2016 season.

This Aquatic Plant Management Report was produced as part of the aquatic plant management activities for the Lakes and COLA. The goal of the project was to control stands of CLP aquatic plant growth, encourage growth of native aquatic plants that are out competed by CLP, help improve the health of the lake ecosystem by restoring native habitat, and improve the recreational and aesthetic value of the Lakes. This report reviews existing and historical data for the Lake and activities that were conducted during 2015.

1.1 LAKE MORPHOLOGY

Lac Courte Oreilles is a 5,139 acre lake located in the Towns of Bass Lake and Sand Lake, Sawyer County, Wisconsin near the City of Hayward. Lac Courte Oreilles has a maximum depth of 90 feet and a mean depth of 33 feet. Little Lac Courte Oreilles is a 221 acre lake located in the Town of Bass Lake, Sawyer County, Wisconsin with a maximum depth of 46 feet and mean depth of 12 feet. COLA is an active lake association that has been managing aquatic plants on the Lakes through surveys and chemical treatments. Curly-leaf pondweed, AIS, has been chemically treated on Lac Courte Oreilles since 2009.

1.2 2015 AQUATIC PLANT MANAGEMENT

COLA contracted Stantec for the 2015 chemical treatment of CLP, who was issued a permit to chemically treat up to 9 acres of aquatic invasive species (CLP) based on 2014 post-treatment survey results for the 2015 season by the Wisconsin Department of Natural Resources (WDNR) as follows: 6 acres in Musky Bay, 1.5 acres in Barbertown Bay, and 1.5 acres in Stucky Bay. A copy of the approved permit is included in Appendix B. Areas of CLP mapped during 2015 pre-treatment surveys are included in Figures 1-4.

Before treatments began, a pre-treatment survey was necessary to verify the presence of CLP within the proposed treatment areas outlined in the permit. The survey was completed as full point-intercept aquatic plant surveys in Musky Bay, Stucky Bay, and Barbertown Bay on May 20, 2015. CLP was present in all locations, with a large increase in Musky Bay, up from 2014 post-

treatment survey of 6 acres to 25.32 acres. Stucky Bay had 0.5 acres of CLP growth while Barbertown Bay was surveyed at 1.00 acres. Full results are found in the following sections.

Chemical treatment for CLP was initially completed on May 21, 2015 to all areas of Stucky and Barbertown Bays (Figures 3-4). However, the areas of CLP mapped in Musky Bay exceeded the permitted amount, so only 7.5 acres were treated at this time. To manage the remaining 17.82 acres of CLP in Musky an addition to the permit, including large scale requirements, was sought & approved by the WDNR. The remaining areas of CLP growth were treated on June 2, 2015 (Figures 1-2).

The first treatment on May 21 was a combination contact and systemic herbicides. Liquid Aquathol-K® (active ingredient endothall) and liquid Clearcast 2.7g® (active ingredient imazamox) were applied at 2.0 parts per million (ppm) and 200 parts per billion (ppb), respectively, within largest area of CLP growth in Musky Bay (Area F, Figure 1) mapped during the 2015 pre-treatment survey. In order to reduce agricultural watering restrictions for cranberry farms adjacent to Stucky Bay, only liquid Aquathol K was used and applied at a rate of 3.0 ppm as there is no agricultural water use restriction for this product. There are no active cranberry operations in or adjacent to Barbertown Bay, where granular Clearcast 2.7g was applied at 250 ppb along with Aquathol K at 2.0 ppm.

Once additional acreage was added to the permit for the remainder of CLP in Musky Bay, a second application was completed on June 2, 2015. Following the same approach as the May 21 treatment, the rest of Area F was treated with the same rates with a combination of the contact herbicide Aquathol K and systemic herbicide Clearcast. The remaining areas in Musky Bay were treated with liquid Aquathol K at 3.0 ppm. Areas of CLP growth in Little Lac Courte Oreilles were not managed by herbicide application at this time as they were designated for hand pulling efforts by COLA members due to their small size. In compliance with Federal and State regulations, treatment records were completed and are included in Appendix C.

1.3 2015 AQUATIC PLANT SURVEYS

Prior to treatment, the aquatic plant community of all areas was surveyed on May 20, 2015 by Stantec, Inc. in areas permitted for CLP management: Musky, Stucky, and Barbertown Bays. These surveys were repeated at all sample locations 41 days post-treatment on June 29 - July 1, 2015. In addition to treated bays, a new area of CLP on Lac Courte Oreilles was located by COLA and surveyed by Stantec at this time along with a full, point-intercept survey on adjoining Little Lac Courte Oreilles.

All surveys were completed according to the point intercept sampling method according to WDNR specifications at sample locations created. WDNR research staff determined the sampling point resolution in accordance with the WDNR guidance and provided a base map with the specified sample point locations. Within Musky Bay, the sample resolution was doubled from WDNR standards to a denser 55 meter grid with 394 pre-determined intercept points. Latitude and longitude coordinates and sample identifications were assigned to each intercept

point on the grid. Geographic coordinates were uploaded into a global positioning system (GPS) receiver. The GPS unit was then used to navigate to intercept points. At each intercept point, plants were collected by tossing a specialized rake on a rope and dragging the rake along the bottom sediments. All collected plants were identified to the lowest practicable taxonomic level (e.g., typically genus or species) and recorded on field data sheets. Visual observations of aquatic plants were also recorded. Water depth and, when detectable, sediment types at each intercept point were also recorded on field data sheets. Further description of methods used and data calculated from these surveys is included in Appendix A.

1.3.1 Musky Bay

The pre-treatment survey was carried out May 20, 2015, and included sampling at the same 394 intercept points used for the 2015 post-treatment survey on Jun 30, 2015. The aquatic macrophyte community of Musky Bay was very diverse each year. Table 1 lists the aquatic plant community statistics during the 2010 pre-treatment, 2011 - 2015 post-treatment, and historical 2007 aquatic plant surveys.

Table 1: Aquatic Plant Community Statistics, Musky Bay - Lac Courte Oreilles, Sawyer County, Wisconsin.

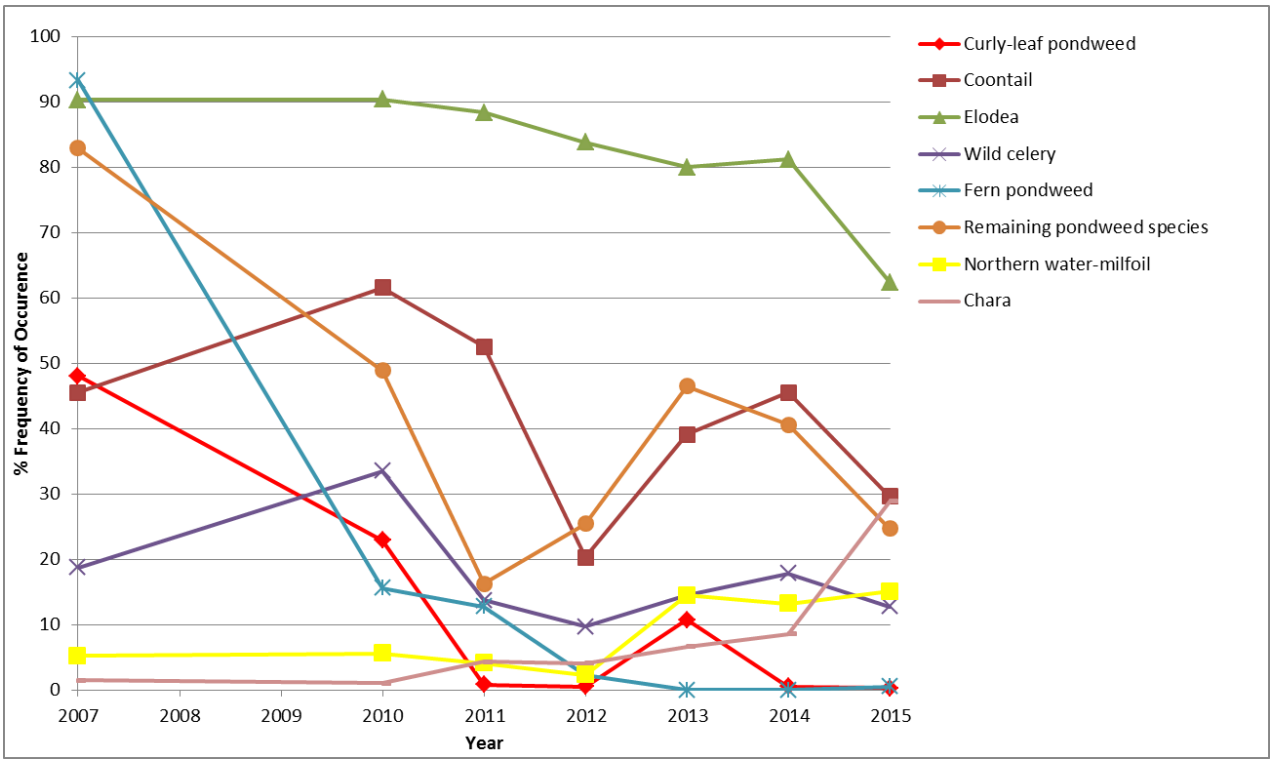
	2007	2010	2011	2012	2013	2014	2015
F.o.o. at sites shallower than maximum depth of plants	100	99.22	95.69	94.67	96.45	96.9	91.43
Simpson Diversity Index	0.84	0.85	0.75	0.69	0.82	0.81	0.85
Avergage number of all species per site	3.58	3.14	2.13	1.63	2.31	2.28	2.02
Average number of all species per vegetated site	3.58	3.16	2.23	1.72	2.39	2.35	2.21
Average Number of native species per site	3.54	2.91	2.11	1.62	2.2	2.27	2.02
Average Number of native species per vegetated site	3.54	2.93	2.22	1.71	2.29	2.34	2.21
Species Richness	29	25	26	23	26	25	27
Community FQI	35.03	29.82	30.86	29.46	31.02	30.06	32.6
Average Coefficient of Conservatism	6.74	6.22	6.42	6.43	6.33	6.41	6.52

In 2015, vegetation was identified to a maximum depth of 9.0 feet (photic zone). This encompasses most of Musky Bay as depths greater than this are found only in a small, deep hole in the eastern portion of the Bay. Aquatic vegetation was detected at 91.43 percent (%) of photic zone intercept points.

A diverse plant community was again sampled during the 2015 survey. The Simpson Diversity Index value of the community was 0.85, taxonomic richness was 27 species, and there was an average of 2.02 species identified at points that were within the photic zone and an average of 2.21 species present at vegetated points.

The most abundant aquatic plant identified during the aquatic plant survey was common waterweed (*Elodea canadensis*). It exhibited a 62.3% frequency of occurrence (percent of photic zone intercept points at which the taxa was detected), was present at 68.2% of sites with vegetation, and had a 30.8% relative frequency of occurrence. Common waterweed has historically been the most common species found since surveys began in 2007. Table 2 in Appendix D includes the abundance statistics for each species from 2007 and 2010-2015.

Coontail (*Ceratophyllum demersum)* was the next most abundant species and has been throughout all surveys. As the third most abundant species, muskgrass (*Chara sp.*) increased dramatically from 2014. Muskgrass is actually a macro-algae, not a true aquatic plant, and typically does not grow dense enough to become a nuisance. It has been present in Musky Bay at background levels that increased at low rates from year to year, but is more locally present at other locations of Lac Courte Oreilles. The following chart displays changes in the most prevalent species of Musky Bay over time.



The third most abundant aquatic plant identified during the 2015 aquatic plant survey was wild celery (*Vallisneria americana).* It exhibited a 40.04% frequency of occurrence, was present at 44.3% of the sites with vegetation, and had a 13.7% relative frequency of occurrence. Much like common waterweed, growth of wild celery is usually considerable and has been one of the five most common plant species surveyed annually.

One aquatic invasive species was sampled in 2015; curly-leaf pondweed. Curly-leaf pondweed has been present within the system since 2005, often times becoming a nuisance through dense growth prior to active management. In both 2014 and 2015, it appears to have become reduced over historical levels. CLP was present at only one sample location, or 0.26% photic zone locations with a frequency of occurrence of 0.28% in vegetated areas, covering 0.5 acres (Figure 5).

MANAGEMENT RESULTS

To compare between years, statistical analysis completed using a Chi-square test with a 5% Type-I error rate. This error rate is standard in ecological studies and equals that there is a 5% chance of claiming statistically significant change when no real change occurred. Only those species that display a p-value of 0.05 or lower changed significantly population-wise between years. To calculate these values, the total number of sample locations each species was found at is compared between years. CLP data from 2007 was absent, so 2008 data was used in its place. The following table displays statistical changes, if any, for each species sampled in 2015 versus the 2014 survey and historical, 2007 pre-management data. An expanded table containing 2015 data compared to all years (2007and 2010-2014) is included in Appendix D.

Table 3: Statistical Significance of Species Between Sampling Events, Musky Bay - Lac Courte Oreilles, Sawyer County, Wisconsin.

	2015 v 2014			2015 v 2007		
Specie	**+ / -**	**P-Value**	**significance**	**+ / -**	**P-value**	**significance**
Curly-leaf pondweed	↓	0.562958702	n.s.	↓	**1.53254E-34**	***
Filamentous algae	no change	#DIV/0!	#DIV/0!	↓	**0.0001169**	***
Water marigold	↑	**0.010901305**	*	↑	0.164525129	n.s.
Coontail	↓	4.65547E-06	***	↓	**0.000235906**	***
Chara	↑	**6.47549E-13**	***	↑	**2.92392E-10**	***
Needle spikerush	↑	0.401469445	n.s.	↑	0.096487031	n.s.
Elodea	↓	7.95457E-09	***	↓	**2.63756E-10**	***
Water horsetail	↑	0.317003243	n.s.	↑	0.559398427	n.s.
Water stargrass	↑	**0.000907373**	***	↑	**0.011818526**	*
Quillwort	no change	#DIV/0!	#DIV/0!	↓	**0.002896887**	**
Small duckweed	no change	#DIV/0!	#DIV/0!	no change	#DIV/0!	#DIV/0!
Forked duckweed	↓	0.244588428	n.s.	↑	0.241676048	n.s.
Watermoss	no change	#DIV/0!	#DIV/0!	no change	#DIV/0!	#DIV/0!
Northern water-milfoil	↓	0.74711475	n.s.	↑	0.309190707	n.s.
Dwarf water-milfoil	↑	0.562958702	n.s.	↓	0.256015873	n.s.
Slender naiad	↑	0.442727506	n.s.	↑	0.066897233	n.s.
Spatterdock	↓	0.477255458	n.s.	↓	0.450331428	n.s.
White water lily	↓	0.33019617	n.s.	↓	0.936395973	n.s.
Pickerelweed	no change	1	n.s.	↓	0.422758509	n.s.
Large-leaf pondweed	↓	0.192417735	n.s.	↓	**5.87855E-14**	***
Leafy pondweed	no change	#DIV/0!	#DIV/0!	↓	0.08609691	n.s.
Frie's pondweed	no change	#DIV/0!	#DIV/0!	↓	**0.000576312**	***
Variable pondweed	no change	1	n.s.	↓	0.051884437	n.s.
Illinois pondweed	no change	#DIV/0!	#DIV/0!	↓	**0.0001169**	***
Floating-leaf pondweed	↓	0.317003243	n.s.	no change	#DIV/0!	#DIV/0!
White-stem pondweed	↓	0.824416681	n.s.	↑	**0.003644774**	**
Small pondweed	no change	#DIV/0!	#DIV/0!	↓	**4.38645E-08**	***
Clasping-leaf pondweed	↓	**2.12968E-08**	***	↓	**2.36142E-16**	***
Fern pondweed	↑	0.156772087	n.s.	↓	**1.43E-105**	***
Flat-stem pondweed	↓	0.862718576	n.s.	↓	**2.10993E-18**	***
Stiff water crowfoot	↑	0.562958702	n.s.	↓	**1.38049E-05**	***
Grass-leaved arrowhead	no change	#DIV/0!	#DIV/0!	↓	**0.01511549**	*
Arrowhead species	↑	0.178329084	n.s.	↑	0.781246063	n.s.
Hard-stem bulrush	↑	0.317003243	n.s.	↓	0.422758509	n.s.
Bur-reed species	↓	0.317003243	n.s.	no change	#DIV/0!	#DIV/0!
Floating-leaved bur-reed	no change	#DIV/0!	#DIV/0!	↓	**0.01511549**	*
Narrow-leaved bur-reed	↑	0.562958702	n.s.	↑	0.408627867	n.s.
Large duckweed	no change	#DIV/0!	#DIV/0!	no change	#DIV/0!	#DIV/0!
Wild celery	↓	**0.045856842**	*	↓	**0.000379411**	***

*, **, *** - Levels of significance.
n.s. - Change not significant
--- - Specie was not sampled in both comparison years

Reduction of CLP, the main goal of the treatments, has been largely successful in Musky Bay since 2010. Originally, over 90 acres were managed which, over time, has been drastically reduced. However, due a large accumulation of turions, reproductive structure for CLP, within the sediment, patches of CLP growth pop up each year. These patches vary in location and density between years and, until exhausted, may continue to cause nuisance within Musky Bay.

This scenario played out again in 2015. Going into the 2015 season, the 2014 post-treatment survey mapped 1.50 across three scattered locations. However, during the 2015 pre-treatment survey 25.32 acres of CLP were mapped. Much of this is assumed to be growth from turions accumulated within the sediment. Since curly-leaf pondweed naturally dies back in mid-summer, surveys conducted after mid-late July may not accurately map stands of CLP growth for permitting purposes the following year. To account for this, following treatment, the 2015 post-treatment survey was done within 45 of initial application and mapped only one location of CLP growth for 0.50 acres. No active CLP growth was noted growing between sample points at this time as well, equating to a 98% reduction in 2015.

However, COLA members noted new growth of CLP in Musky Bay, specifically the northern portion, late in the growing season (mid-September). This may be a second growth from turions already present. Areas were noted and mapped by COLA members, but no treatment took place.

Native species restoration and limiting non-target impact is also an important goal of all AIS management. Though successful, CLP control within Musky Bay has not been without impact to non-target native species, which peaked in 2012 following consecutive years of aggressive herbicide applications of endothall at bay-wide rates. A change in management in 2013 helped to continue control of CLP, but be less impactful to native, non-target species. Numbers and overall spread of native species responded well in 2014, which continued into 2015. Between 2015 and 2014 two species declined significantly. The following is a breakdown of these species with additional comments:

a. **Clasping-leaf pondweed** – Down from 2014 and 2007, but has been highly cyclical over the period of data collection. This species has varied across all years, increasing one year then decreasing the next, and appears to be inversely related to white-stem pondweed abundance (when one decreases, the other increases and vice-versa). If the cycle plays out, 2016 will see an increase in clasping-leaf abundance.

b. **Wild celery** – This species has been one of the five most common species sampled across all years and, though down from 2014 levels, the change is not concerning as it is simply inter-annual variation.

When comparing 2015 survey data to historical, 2007 pre-management data, it would appear at first glance that management has had a profound, negative affect on native species as 15 are indicated to have declined significantly. However, of these species, the indicated declines of quillwort, floating-leaf bur-reed, and grass-leaved arrowhead are exaggerated due to the conditions inferred in the statistical comparison. In 2007, the sample set of points was much smaller compared to 2010 and beyond, where a denser survey grid introduced more sample points. When increasing sample points, the statistical comparison assumes the same conditions would apply to all components in Musky Bay. However, the habitat requirements for these species (shallow, sandy areas) occupy only a small portion of Musky Bay with all three species

present at low levels. Though the sample points increase, the area of suitable habitat remained the same. For a better comparison in any change, 2010 data should be used, which shows no statistical change from 2010 to 2015.

Along with the above species, common waterweed, coontail, and wild celery also showed significant declines from 2007. Concern for these three species is also lessened. For both coontail and elodea, 2007 experience very high growths with both species adding considerable nuisance conditions with curly-leaf pondweed. Both species are still present in high numbers and considerable components of the aquatic community. Wild celery, as noted prior, varies annually.

Of those that have shown significant decline from 2007, the most concern should be placed on the following species:

a. Large-leaf pondweed – Experienced a significant decline from 2007 to 2010 without any large-scale treatment taking place. Decline continued into 2011 when species wasn't sampled. Large-leaf pondweed was again found during the 2012 survey and increased significantly from 2012 to 2013 before a slight decrease in 2014 which continued into 2015. Large-leaf pondweed is a valuable plant, providing excellent habitat for fish throughout their life.

b. **Illinois Pondweed** – Though it has shown to have decreased significantly from 2007 to 2015, it was not found during the 2010 survey, before initial whole-bay treatments took place. It's presence in other areas of the lake is highly variable year to year. However, it's absence from most surveys since 2010 may be of some concern

c. **Fern pondweed** – Significant decrease across all comparison years, especially 2007 to 2014 when no plants were found. Though the largest decrease was from 2007 to 2010 (before whole-bay treatments began), all treatments likely had effect on it since with greatest impact coming from 2011 to 2012 after back to back whole-bay endothall applications. This species is dominant in other portions of Lac Courte Oreilles and once played a significant role in the plant community of Musky Bay. 2015 was the first year since 2012 this species was sampled.

d. **Flat-stem pondweed** – This species was significantly reduced by original CLP management techniques to the point of not being found in 2012. Though it has decreased significantly from 2007, it has also increased significantly from its 2012 absence and has nearly doubled from 2013, showing strong signs of recovery.

e. **Stiff water crowfoot** – After a significant increase from 2007 to 2010, this specie has experienced a significant downturn since treatments began. It remained at very low levels from 2013 to 2015, though slightly increased form 2014.

In conjunction with individual species, the community as a whole was visibly affected from 2007 to 2012, but has rebounded since 2013, with many indices at all-time highs since CLP management, showing a recovering system. Simpson diversity, which calculates the evenness of the spread of species throughout the sample area, was the highest overall since data collection began in 2007. This shows that the species present are not just in small, isolated areas but spread throughout the Bay, increasing diversity. In addition, the number of individual species sampled was the highest in 2015 since management of CLP began in 2010, also indicating a recovery.

Floristic quality index (FQI) can also be used to gauge changes in aquatic plant community. Higher FQI numbers indicate higher floristic quality and biological integrity and a lower level of disturbance impacts. FQI varies around the state of Wisconsin and ranges from 3.0 to 44.6 with an average FQI of 22.2 (WDNR, 2005). FQI is calculated by using Coefficient of Conservatism values (C values), which are assigned to each individual species and relate to a plant species' ability to tolerate disturbance. Low C values (0-3) indicate that a species is very tolerant of disturbance, while high C values (7-10) indicate species with a low tolerance of disturbance. Intermediate C values (4-6) indicate plant species that can tolerate moderate disturbance. It should be noted that filamentous algae and CLP do not have assigned C values, and therefore were not included in the FQI.

The FQI calculated from the 2015 aquatic plant survey data was 32.6, the highest value since CLP management began in 2010. This value indicates a significantly healthy and less disturbed community. The average coefficient of conservatism (C) was 6.52 in 2015, also the highest since 2010. Currently, all metrics are pointing upward, indicating a recovering, and increasingly healthy aquatic plant community in Musky Bay.

1.3.2 Stucky Bay

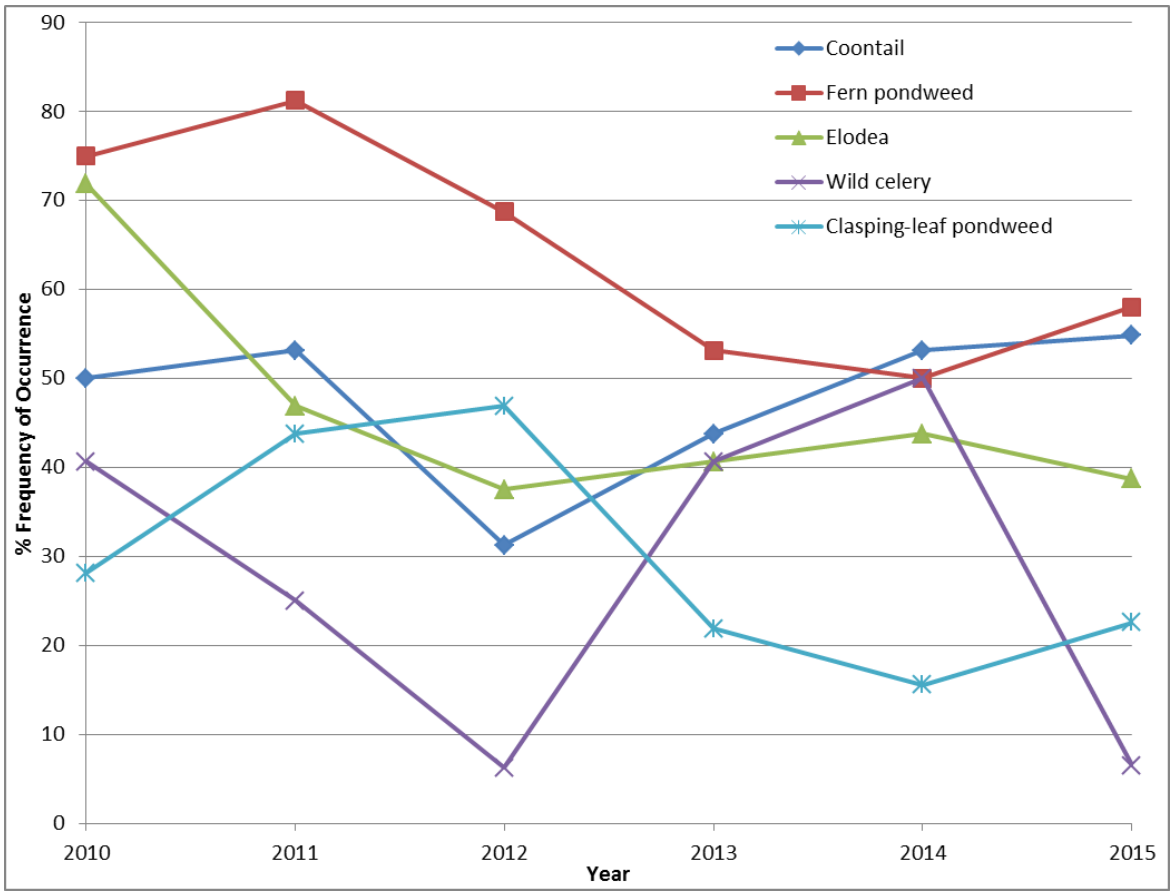
CLP is also present in within Stucky Bay. The pre-treatment survey to map existing CLP was completed in 2015 during the same time as the Musky Bay survey and 0.5 acres of CLP was found within Stucky for treatment. Following treatment, a post-treatment survey was completed on July 1, 2015 (excluding the private Jonjack canal) that used the same points established during 2011. The aquatic macrophyte community of Stucky Bay was incredibly diverse each year. Table 4 lists the aquatic plant community statistics during the 2011-2015 post-treatment aquatic plant surveys and 2010 baseline survey.

Table 4: Aquatic Plant Community Statistics, Stucky Bay - Lac Courte Oreilles, Sawyer County, Wisconsin.

	2010	2011	2012	2013	2014	2015
F.o.o. at sites shallower than maximum depth of plants	100	100	84.38	96.88	100	96.77
Simpson Diversity Index	0.91	0.88	0.84	0.91	0.89	0.91
Avergage number of all species per site	4.72	3.59	2.53	3.41	3.34	3.65
Average number of all species per vegetated site	4.72	3.63	3	3.52	3.34	3.77
Average Number of native species per site	4.69	3.56	2.41	3.31	3.34	3.55
Average Number of native species per vegetated site	4.69	3.49	2.85	3.42	3.34	3.67
Species Richness	20	21	13	20	17	20
Community FQI	27.3	27.07	20.78	24.98	24.01	26.38
Average Coefficient of Conservatism	6.26	6.21	6	5.89	5.82	6.05

In 2015, aquatic vegetation was detected at 96.8% of photic zone intercept points. A diverse plant community was sampled during the 2015 post-treatment survey. Simpson Diversity Index value was 0.91, taxonomic richness was 20 species, and there was an average of 3.77 species identified at vegetated survey locations. All major measures of the Stucky Bay plant community are within the normal range across previous surveys, indicating a stable condition.

The most abundant aquatic species identified during the 2015 aquatic plant survey were fern pondweed (*Potamogeton robbinsii*), coontail, and common waterweed. These three species have been some of, if not the most, prevalent throughout all surveys. Table 5 in Appendix D includes the abundance statistics for each species found during the surveys. The following chart displays changes in the most prevalent species of Stucky Bay over time.



One aquatic invasive species was sampled in 2015; curly-leaf pondweed. Curly-leaf pondweed has been present within Lac Courte Oreilles since 2005 and Stucky Bay since at least 2010. CLP within Stucky Bay has varied year to year, depending on management actions and is mostly found in a small bed in front of the outflow of the private Jonjack agricultural canal. In 2015, CLP has expanded over historical levels, encroaching on deeper water to the west. CLP was present at three sample locations, or 9.68% photic zone locations with a frequency of occurrence of 10.00% in vegetated areas. In addition, three locations of CLP growth were noted and recorded between survey sample locations, giving a total coverage of 3.39 acres (Figure 6).

MANAGEMENT RESULTS

To compare between years, statistical analysis was completed using the same Chi-square test described under Musky Bay's Management Results. The following table displays statistical changes, if any, for each species sampled in 2015 versus the 2014 survey and initial, 2010 data. An expanded table containing 2015 data compared to all years (2010-2014) is included in Appendix D.

Table 6: Statistical Significance of Specie between Sampling Events, Stukey Bay - Lac Courte Oreilles, Sawyer County, Wisconsin.

	2015 vs 2014			2015 vs 2010		
Specie	**+ / -**	**P-Value**	**significance**	**+ / -**	**P-Value**	**significance**
Curly-leaf pondweed	↑	0.076041476	n.s.	↑	0.641374408	n.s.
Water marigold	↑	**0.019864892**	*	↑	0.229556214	n.s.
Coontail	no change	1	n.s.	↑	0.802492879	n.s.
Muskgrass	↓	0.229556214	n.s.	↑	0.150762775	n.s.
Elodea	↓	0.610732731	n.s.	↓	**0.005741942**	**
Water star-grass	↑	0.162313149	n.s.	↑	0.162313149	n.s.
Small duckweed	---	---	---	---	---	---
Forked duckweed	---	---	---	---	---	---
Common watermoss	---	---	---	---	---	---
Northern water-milfoil	↑	0.097594155	n.s.	↓	0.77716177	n.s.
Slender naiad	↓	0.08627557	n.s.	↓	0.08627557	n.s.
Spatterdock	↓	0.688787592	n.s.	↑	0.641374408	n.s.
White water lily	↓	0.52183939	n.s.	↑	0.449691798	n.s.
Pickerelweed	---	---	---	↓	0.313499946	n.s.
Large-leaf pondweed	↓	0.313499946	n.s.	↓	0.002496909	**
Variable pondweed	---	---	---	↓	0.313499946	n.s.
Illinois pondweed	↑	0.554267836	n.s.	↑	0.150762775	n.s.
Floating-leaf pondweed	↑	0.554267836	n.s.	↓	0.641374408	n.s.
White-stem pondweed	↓	0.226476066	n.s.	↑	0.229556214	n.s.
Small pondweed	↑	0.313499946	n.s.	↓	0.011835452	*
Clasping-leaf pondweed	↑	0.52183939	n.s.	↓	0.563702862	n.s.
Fern pondweed	↑	0.616385598	n.s.	↓	0.114316776	n.s.
Flat-stem pondweed	↑	**0.002864325**	**	↓	0.126740266	n.s.
Stiff water crowfoot	↑	**0.038867104**	*	↑	0.688787592	n.s.
Arrowhead species	---	---	---	---	---	---
Large duckweed	↑	0.554267836	n.s.	↑	0.150762775	n.s.
wild celery	↓	**9.9311E-05**	***	↓	**0.001170681**	**

*, **, *** - Levels of significance.
n.s. - Change not significant
--- - Specie was not sampled in both comparison years

Only one species present in 2014 was not sampled in 2015; large-leaf pondweed (*Potamogeton amplifolius*). However, three native species present in past surveys but not in 2014 were again found during the 2015 post-treatment survey; water marigold (*Bidens beckii*), small pondweed (*Potamogeton pusillus*), and stiff water crowfoot (*Ranunculus aquatilis*).

Under statistical comparison, only wild celery declined significantly from 2014 to 2015, but is not a cause for a concern due to a variable life cycle in previous surveys. Common waterweed has declined significantly from 2010 levels. However, common waterweed was likely near a historical high point in Stucky Bay in 2010 as its presence was almost double that of any following survey. Since then, it has varied year to year, but neither increased nor decreased significantly while returning to normal levels. Three species were shown to have increased significantly from 2015; water marigold, flat-stem pondweed (*Potamogeton zoseteriformis*), and stiff water crowfoot. A healthy aquatic plant community varies year to year in assemblage and individual species densities, as is the case within Stucky Bay. All three of these species have varied between years and any change noted is simply natural, not affected by CLP management.

Reduction of CLP is the main goal of the project and this species saw an increase from 2014 with a return to 2013 levels, but still below historical highs in 2012. New mapping of CLP found it expanded from areas treated in 2015 and newly established in deeper areas of the Bay, but still within a single bed. Areas of CLP in deeper water were sporadic, with CLP just a background part of the community. The agricultural channel for the connected cranberry bogs was not surveyed at this time.

1.3.3 Barbertown Bay

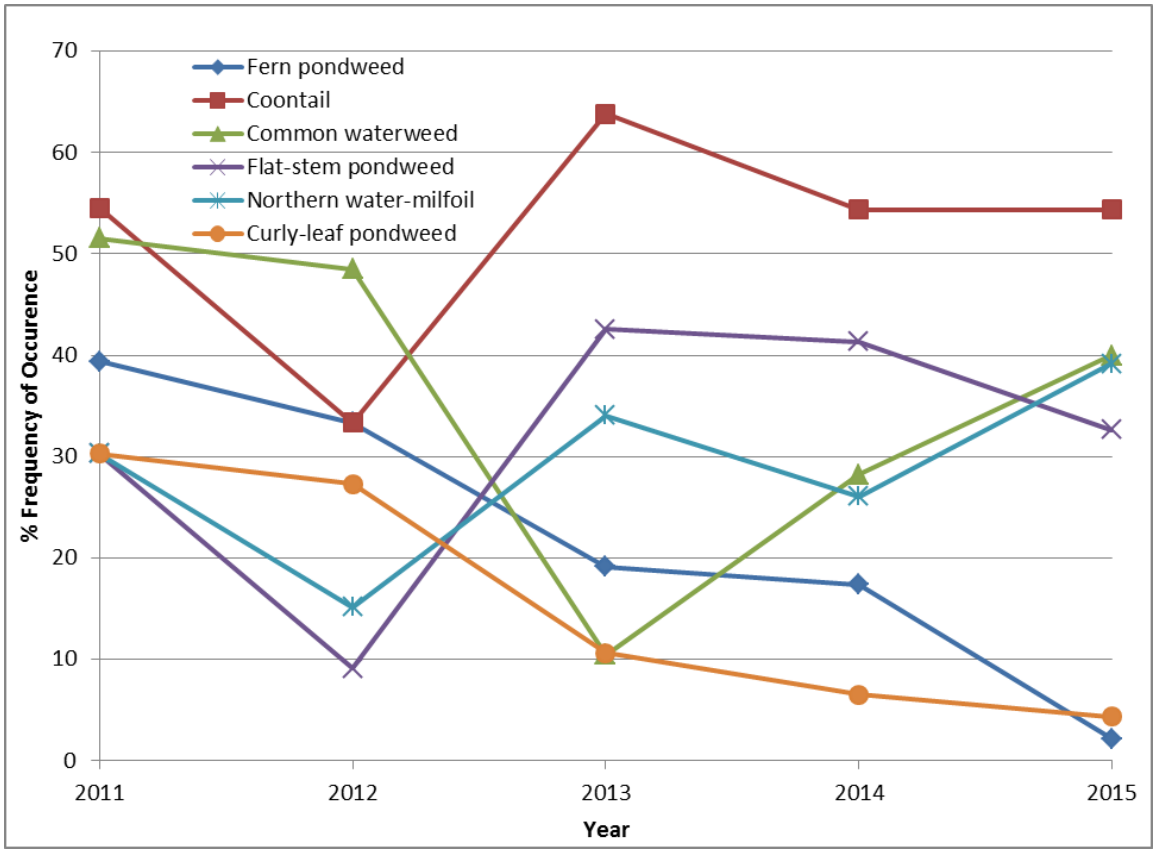
CLP is also present in within Barbertown Bay. The pre-treatment survey was completed in 2015 during the same time as the Musky and Stucky Bay surveys and mapped 1.00 acres for treatment in 2015. Following this treatment, a post-treatment survey was completed on July 1, 2015 at the same 47 sample locations. The aquatic macrophyte community of Barbertown Bay has been very diverse each year. Table 7 lists the aquatic plant community statistics during the 2011 - 2015 post-treatment aquatic plant surveys.

Table 7: Aquatic Plant Community Statistics, Barbertown Bay - Lac Courte Oreilles, Sawyer County, Wisconsin.

	2011	2012	2013	2014	2015
F.o.o. at sites shallower than maximum depth of plants	93.9	84.85	100	95.65	91.3
Simpson Diversity Index	0.93	0.91	0.91	0.92	0.91
Avergage number of all species per site	4.18	2.88	3.49	3.22	3.17
Average number of all species per vegetated site	4.45	3.39	3.49	3.36	3.48
Average Number of native species per site	3.73	2.61	3.38	3.15	3.13
Average Number of native species per vegetated site	4.13	3.07	3.38	3.3	3.43
Species Richness	26	20	24	28	28
Community FQI	28.14	26.38	29.21	32.75	32.95
Average Coefficient of Conservatism	6	6.05	6.23	6.42	6.46

In 2015, the plant community of Barbertown Bay was very comparable to past surveys. Aquatic vegetation was detected at 91.3% of photic zone intercept points with a diverse plant community. Simpson Diversity Index value was 0.91, taxonomic richness was 28 species, and an average of 3.48 species identified at vegetated survey locations. All major measures of the Stucky Bay plant community are within the normal range across previous surveys, indicating a stable condition.

The most abundant aquatic species identified during the 2015 aquatic plant survey were coontail, northern water-milfoil (*Myriophyllum sibiricum*), and common waterweed. Coontail and elodea have consistently been two of the three most common species throughout all surveys with the other most common species varying from year to year, but often a species of pondweed (fern or flat-stem). Curly-leaf pondweed was the third most common species in 2012, but has since declined with active management. Table 8 in Appendix D includes the abundance statistics for each species found during the surveys. The following chart displays changes in the most prevalent species of Stucky Bay over time.



One aquatic invasive species was sampled in 2015; curly-leaf pondweed. CLP within Barbertown Bay differs from other locations above being that it is mostly found growing in very shallow water around one foot in depth almost rimming the northern portion of the Bay. In Stucky and Musky Bays, CLP is not typically found that shallow, being 2-4' in depth in Stucky Bay and 3-6 in Musky Bay. Even being in such shallow water, the CLP in Barbertown Bay doesn't

grown dense, often underlying beds of white water-lily. Despite active management since 2012, CLP has remained scattered in Barbertown, neither increasing nor decreasing. Locations of CLP growth were noted and recorded during the 2015 post-treatment survey across three areas, giving a total coverage of 3.44 acres (Figure 7).

MANAGEMENT RESULTS

To compare between years, statistical analysis was completed using the same Chi-square test described previously. The following table displays statistical changes, if any, for each species sampled in 2015 versus the 2014 survey and initial, 2011 data. An expanded table containing 2015 data compared to all years (2010-2014) is included in Appendix D.

Table 9: Statistical Significance of Specie between Sampling Events, Barbertown Bay - Lac Courte Oreilles, Sawyer County, Wisconsin.

	2015 vs 2014			2015 vs 2011		
Specie	**+ / -**	**P-Value**	**significance**	**+ / -**	**P-Value**	**significance**
Curly-leaf pondweed	↓	0.645800395	n.s.	↓	**0.001318149**	**
Filamentous algae	---	---	---	↓	**0.005849925**	**
Water marigold	no change	1	n.s.	↑	0.399106946	n.s.
Watersheild	no change	1	n.s.	↓	0.362025059	n.s.
Coontail	no change	1	n.s.	↓	0.904823552	n.s.
Muskgrass	↓	0.583079804	n.s.	↑	0.722982294	n.s.
Needle spikerush	↑	0.645800395	n.s.	↑	0.139049195	n.s.
Creeping spikerush	↑	0.314722586	n.s.	↑	0.399106946	n.s.
Elodea	↑	0.376123623	n.s.	↓	0.171695199	n.s.
Water star-grass	↑	**0.020469207**	*	↑	0.203073762	n.s.
Brown-fruited rush	---	---	---	↓	0.087405335	n.s.
Small duckweed	---	---	---	↓	0.229772227	n.s.
Forked duckweed	↓	0.167952607	n.s.	↑	0.399106946	n.s.
Common watermoss	---	---	---	↓	0.087405335	n.s.
Northern water-milfoil	↑	0.184312993	n.s.	↑	0.460489944	n.s.
Dwarf water-milfoil	↓	0.30679006	n.s.	↑	0.399106946	n.s.
Bushy pondweed	↓	0.459746555	n.s.	↓	0.371232531	n.s.
Spatterdock	no change	1	n.s.	↑	0.682119285	n.s.
White water lily	no change	1	n.s.	↓	0.547919578	n.s.
Pickerelweed	↑	0.15285977	n.s.	↑	0.23009697	n.s.
Large-leaf pondweed	no change	1	n.s.	↑	0.776476339	n.s.
Ribbon-leaf pondweed	↓	0.314722586	n.s.	---	---	---
Variable pondweed	↓	0.645800395	n.s.	↓	0.715319954	n.s.
Illinois pondweed	↓	0.557344845	n.s.	↓	0.362025059	n.s.
Floating-leaf pondweed	↓	0.314722586	n.s.	↓	**0.005849925**	**
Small pondweed	---	---	---	↓	0.229772227	n.s.
White-stem pondweed	↑	0.725936125	n.s.	↑	0.052975843	n.s.
Clasping-leaf pondweed	↑	0.725936125	n.s.	↓	0.547919578	n.s.
Fern pondweed	↓	**0.014137315**	*	↓	**1.57107E-05**	***
Flat-stem pondweed	↓	0.390541652	n.s.	↑	0.878304802	n.s.
Stiff water crowfoot	no change	1	n.s.	↓	0.052389402	n.s.
Arrowhead sp.	no change	1	n.s.	↑	0.399106946	n.s.
Hard-stem bulrush	no change	1	n.s.	↓	0.362025059	n.s.
Water bulrush	no change	1	n.s.	↑	0.399106946	n.s.
Comon bur-reed	---	---	---	---	---	---
Bur-reed specie	---	---	---	↓	0.229772227	n.s.
wild celery	no change	1	n.s.	↑	0.325041882	n.s.

*, **, *** - Levels of significance.
n.s. - Change not significant
--- - Specie was not sampled in both comparison years

Two species present in 2014 were not sampled in 2015; ribbon-leaf pondweed (*Potamogeton epihydrus*) and floating-leaf pondweed (*Potamogeton natans*). These species are sporadic in Barbertown Bay, often in shallow water outside of sample points. Though neither was directly in 2015, both were noted growing between sample points. In conjunction, two "new" native species were present in during the 2015 post-treatment survey; pickerelweed (*Pontederia cordata*) and creeping spikerush (*Eleocharis palustris*). Both species are emergent, near-shore aquatic plants that, though not sampled in past surveys, were still present within Barbertown Bay.

Only fern pondweed declined significantly from 2014 to 2015 and its decline is a concern. Fern pondweed had been one of the most common species in the Bay in 2011-2012, but has declined since to surveyed lows in 2015. Treatments in Musky Bay, though more aggressive with application rates, definitely had an effect to populations of fern pondweed there. It's possible the decline noted in Barbertown Bay is also connected to CLP management, but applications of herbicide in this area have been in much smaller scale, leading to lower rates and contact time. One species was shown to have increased significantly from 2015; water star-grass (*Heteranthera dubia*). The increase of water star-grass is not tied to CLP management as 2015 proved to be prolific year for the species across the State.

Reduction of CLP is the main goal of the project and this species saw a slight decrease from 2014 to the lowest level since 2011, leading towards a statistically significant decline from original conditions. New mapping of CLP found it within most areas managed in 2015 and in one isolated, deeper area of the Bay. Populations of CLP previously present in front of Trails End Resort shoreline were not identified in 2015. However, a small clump of plants was noted just north of the property, outside of direct survey areas.

1.3.4 Lac Courte Oreilles - New CLP Area

During the 2015 post-treatment surveys, COLA forwarded information on a newly identified area of CLP growth located on the far eastern portion of the lake along the south shore. New survey points were established within this area to map the CLP and accompanying plant community, establishing 30 sample locations.

This part of the lake is largely a shallow sand and bar that drops in to deep water (>20'). The lake bed is compromised largely of sand and gravel with some rocky areas here and is not an ideal habitat for CLP growth. However, the very near-shore portion of this area has a man-made channel roughly 20 feet wide dug parallel to the shore and approximately 30-50 feet out from the shoreline to allow for boat access and mooring to private piers. Soft, organic sediment has accumulated from wave action and detritus collection / decomposition within the channel, creating more favorable conditions for CLP growth. All CLP noted within this newly established population was located within the channel, creating narrow communities of the invasive.

The area directly in the channel contained a mix of plants similar to those found in above locations (fern pondweed, common waterweed, etc) while the area outside the channel, being

shallow and sandy, provides habitat that varies from much of the other locations sampled. This leads to a unique assemblage of plants when compared to previously surveyed areas. Points established at this time will be used to collect future data in order to assess success of CLP management, if chosen, and effect on the local plant community. In total, 2.00 acres of CLP growth among two 1.00 acre beds was mapped in 2015 (Figure 8).

1.3.5 Little Lac Courte Oreilles Full Point-Intercept Survey

Little Lac Courte Oreille is a 221 acre lake immediately downstream of Lac Courte Oreilles, connect by a navigable river channel. In 2014, COLA was made aware of a possible pioneer CLP infestation within the lake and requested a formal survey be completed to verify and map any presence. At this time, a full littoral zone survey was completed on Little LCO. Possible locations of CLP growth and their coordinates were forwarded to Stantec as areas to double check as well. In areas indicated as potentially having CLP growth, extra samples and visuals were completed as to thoroughly survey the area. One location of CLP totaling approximately 0.50 acres was surveyed and mapped. It was found near shore in a shallow, soft-sediment bay opposite where the river enters the lake. No CLP was present in areas outlined by COLA.

To further assess the plant community of Little Lac Courte Oreilles and document the spread or presence of AIS within, a full point-intercept survey was completed on June 29-30, 2015. This survey used locations established by WDNR, following all WDNR point-intercept protocols. The 41-meter spaced grid created for Little LCO increased total survey points to 529 across the entire lake and included portions of the River downstream of County Road E.

During both years, the aquatic plant community of Little Lac Courte Oreilles was very healthy. In 2014, only a limited survey was completed and, as expected, community indices increased across the board in 2015 with a more comprehensive, full point-intercept survey. A total of 33 native species were sampled in 2015, with excellent spread throughout the lake as indicated by the high Simpson Diversity Index of 0.93. The species found in 2015 are of high value with an average C of 6.81 and many species with C values of 8-10, leading to a high FQI of 38.54. Vasey's pondweed is uncommon in Wisconsin and listed as a State species of Special Concern. Species of special concern are those species where the level of abundance or spread through Wisconsin may have a problem, but has not yet been proven and are designated as such to focus attention before they become threatened or endangered. Table 10 lists the aquatic plant community statistics during the aquatic plant surveys. Abundance statistics for each species sampled in included in Table 11, Appendix D.

Table 10: Aquatic Plant Community Statistics,Little Lac Courte Oreilles, Sawyer County, Wisconsin.

	2014	2015
F.o.o. at sites shallower than maximum depth of plants	83.03	86.75
Simpson Diversity Index	0.87	0.93
Avergage number of all species per site	1.93	2.95
Average number of all species per vegetated site	2.33	3.4
Average Number of native species per site	1.93	2.95
Average Number of native species per vegetated site	2.32	3.4
Species Richness	17	33
Community FQI	25.75	38.54
Average Coefficient of Conservatism	6.44	6.81

Though a diverse plant community was identified within Little Lac Courte Oreille, two invasive species were identified growing: curly-leaf pondweed and Eurasian water-milfoil (*Myriophyllum spicatum*). Curly-leaf pondweed was first identified within Little LCO in 2014 by members of COLA and later mapped and confirmed at one isolated location by Stantec. This species was again sampled at only one location in 2015 and adjacent to the area found in 2014. The location in 2015 was not directly on a pre-determined sample location and was identified while navigating between points and mapped at this time. Approximately 20-30 plants growing in a small clump were collected here (Figure 9).

Eurasian water-milfoil (EWM) is an aquatic invasive species spread throughout Wisconsin. It grows in dense, monotypic stands out competing more desirable, native vegetation. The dense growth patterns of EWM limit predator opportunities and decreased overall fisheries habitat health within the lake. Often, it grows to the water's surface and spreads out, creating a hamper to navigation and nuisance in the lake. Though several lakes nearby have confirmed populations of EWM (Round Lake and Whitefish Lake), none had been found prior to the 2015 survey in Little Lac Courte Oreilles.

During the 2015 survey, two small locations of EWM growth were noted between survey points covering approximately 0.48 acres (Figure 9). At this time, all EWM noted at these locations was mapped and pulled from the lake bed with a specimen sent to the WDNR for confirmation and the rest properly discarded. The location was forwarded to COLA for further monitoring and hand pulling.

2.0 MANAGEMENT RECOMMENDATIONS

It is important that appropriate management actions and monitoring continue on a yearly basis to ensure that nuisance invasive aquatic plant growth, in this case CLP and EWM does not reach unmanageable levels. For 2015, CLP growth was greatly reduced from pre-treatment levels with an overall positive trend with native plant numbers continuing to increase over historic

levels. However, turions from the invasive plant are viable for many years within the lake bottom and can continue to provide a seed bank of CLP growth for an extended period of time, possibly triggering a second, later growth as noted in Musky Bay. Because of the historically high growth levels of the plant in Musky Bay, a large turion bank may still exist. To get a more accurate assessment of the amount of CLP growth from these turions a pre-treatment survey before any management action in 2016 and beyond is highly recommended in conjunction with a post-treatment survey approximately 30 -45 days after treatment to assess potential impacts to the surrounding plant community.

A new location of CLP growth was noted in Lac Courte Oreilles in 2015 along with a new infestation of EWM in Little Lac Courte Oreilles. Currently, post-treatment surveys focus only on small locations when compared to the whole lake. With the finding of a new CLP population, it is suggested that the 2016 post-treatment survey be completed as a full point-intercept survey across all of Lac Courte Oreilles. However, the points will have further spacing that that currently established. It is recommended to keep the current grid within Barbertown, Musky, and Stucky Bays while using the expanded grid on the rest of the lake. This will more accurately map the spread of AIS within known areas while also expanding the search to the rest of the lake and provide an updated whole-lake aquatic plant community snapshot.

Given the data from this year, as well as the last several years, we would recommend the following course of action with depending on what is found during the 2016 spring pre-treatment survey;

Musky Bay – Based on prior success of mixed herbicide application, use of this process is recommended again for 2016. Though CLP remaining after treatment in 2015 was only a single, small location a larger area of growth was noted late in the year by COLA members. This area should be carefully surveyed prior to 2016 management for accurate mapping.

A mixture of liquid endothall and imazamox applied at a ratio of approximately 2.0 ppm to 200 ppb, respectively has proven successful at controlling CLP. Due to the large volume of surrounding water and diffusion of herbicide outside of target areas, treatment areas should be increased to a minimum of 1.0 acres to maintain target rates for success. Additionally, if any areas are within 200 feet of active cranberry irrigation canals, ONLY endothall applied at 3.0 – 4.0 ppm should be completed to prevent potential conflicts with irrigation.

Should the need for larger, contiguous treatment areas or whole-bay approach be necessary beyond 2016, applications should be done with imazamox only at 250 ppb within treatment areas if less than 20 acres total or at whole-bay rates of 45-50 ppb if greater than 20 acres. These applications have shown success in past management within the bay while being less injurious to native plant communities.

Remaining Areas – if the spring pre-treatment surveys find CLP remaining in Stucky Bay and the newly mapped area in eastern LCO, a similar management regime as stated above for Musky Bay should be used; mixed application of endothall and imazamox, liquid or granular, at 2.0

ppm and 200 ppb, respectively, with care taken to avoid any potential agricultural irrigation restrictions in Stucky Bay. If CLP locations within Stucky Bay are within 200' of the agricultural irrigation area, applications should be done only with Aquathol-K at 3.00 ppm.

The CLP within Barbertown Bay is recommended to consider discontinuing herbicide management in 2016 and simply monitoring the infestation for one complete season. Even with active management each year since 2011, it has remained within a shallow rim of the Bay. The current population does not grow dense or cause nuisance at this time. It is recommended to revisit CLP management in Barbertown Bay for 2017, if desired, based on a full year of monitoring and the results of those surveys.

Little Lac Courte Oreilles – Currently, CLP is found in only a small, near shore location in shallow water. As a pioneer infestation, hand pulling is the best option. It will take very little time to complete and be easily done with soft-sediment and small overall size. It should be completed once plants become easily identifiable, or 6-10" in height, and continued throughout the year. Continued monitoring should be completed, with survey locations repeated at the same time as surveys on Lac Courte Oreilles. If hand pulling is not desired, application of Aquathol-K at 3.0 – 4.0 ppm to areas of active CLP growth is recommend.

With the finding of a pioneer population of EWM in Little LCO, extreme care must be taken to act quickly so it does not spread. All plants found growing in 2015 were pulled, but it is likely some still remain. Going in to 2016, an application of a mixture of endothall and 2,4-D at 1.4 and 1.6 ppm, respectively or diquat alone at the maximum label rate is recommended. For either option, early season application is encouraged, given the small area of infestation. This application method has proven successful for EWM control throughout Wisconsin. Small infestation can be difficult to control due to reduced size and overall amount of product applied versus the surrounding water volume. To combat this, any treatment area should be increased to 1.0 acres minimum to ensure proper rates and contact time for control.

Additionally, as described above, we recommend completing any post-treatment survey for Lac Courte Oreilles and Little Lac Courte Oreilles as full point-intercept surveys across the entire lake for 2016. Though CLP has been extensively reduced from historical levels, complete extirpation of this AIS from the Lake is extremely unlikely. Current populations of AIS will fluctuate yearly and control actions should be altered accordingly. It is possible, if COLA is interested, as AIS populations come under control to a small and more manageable size, that COLA members can monitor the lake for historic and new AIS infestations and contract with a qualified consultant on as needed basis, as a cost saving measure.

Because of COLA's proactive approach in dealing with AIS, the current populations of CLP within the Lake are decreasing, improving the health and ecosystem on the system. However, the Lac Courte Oreilles Lakes Association should continue to be involved in some type of aquatic plant management program to help manage invasive aquatic plant growth of CLP. AIS are extremely opportunistic plants and can grow to nuisance levels in a very short period of time. Continued management should occur to ensure the health, aesthetic and recreational value of

the lake is not degraded. This should occur through a two pronged approach of augmenting the native plant community while targeting reductions in the invasive plants.

The Lac Courte Oreilles Lakes Association must remain proactive in their approach. With COLA's continued commitment to ensuring the health, aesthetic and recreational values of Lac Courte Oreilles are preserved with active aquatic plant management; the quantity of exotic species such as CLP found on Lac Courte Oreilles will be appropriately controlled. Stantec appreciates working for COLA this past treatment season and we look forward to working with you on future projects. Please feel free to contact us if you have any questions regarding the 2015 chemical treatment or with additional concerns.

Stantec appreciates working for the Association this past treatment season and we look forward to working with you on future projects.

APPENDICES

Appendix A

Supporting Aquatic Plant Survey Methods and Documentation

The point intercept method was used to evaluate the existing emergent, submergent, floating-leaf, and free-floating aquatic plants. If a species was not collected at a specific point, the space on the datasheet was left blank. For the survey, the data for each sample point was entered into the WDNR "Worksheets" (i.e., a data-processing spreadsheet) to calculate the following statistics:

Taxonomic richness (the total number of taxa detected)

- **Maximum depth of plant growth**
- **Community frequency of occurrence** (number of intercept points where aquatic plants were detected divided by the number of intercept points shallower than the maximum depth of plant growth)
- **Mean intercept point taxonomic richness** (the average number of taxa per intercept point)
- **Mean intercept point native taxonomic richness** (the average number of native taxa per intercept point)
- **Taxonomic frequency of occurrence within vegetated areas** (the number of intercept points where a particular taxon (e.g., genus, species, etc.) was detected divided by the total number of intercept points where vegetation was present)
- **Taxonomic frequency of occurrence at sites within the photic zone** (the number of intercept points where a particular taxon (e.g., genus, species, etc.) was detected divided by the total number of intercept points which are equal to or shallower than the maximum depth of plant growth)
- **Relative taxonomic frequency of occurrence** (the number of intercept points where a particular taxon (e.g., genus, species, etc.) was detected divided by the sum of all species' occurrences)
- **Mean density** (the sum of the density values for a particular species divided by the number of sampling sites)
- **Simpson Diversity Index (SDI**) is an indicator of aquatic plant community diversity. SDI is calculated by taking one minus the sum of the relative frequencies squared for each species present. Based upon the index of community diversity, the closer the SDI is to one, the greater the diversity within the population.

Floristic Quality Index (FQI) (This method uses a predetermined Coefficient of Conservatism (C), that has been assigned to each native plant species in Wisconsin, based on that species' tolerance for disturbance. Non-native plants are not assigned conservatism coefficients. The aggregate conservatism of all the plants inhabiting a site determines its floristic quality. The mean C value for a given lake is the arithmetic mean of the coefficients of all native vascular plant species occurring on the entire site, without regard to dominance or frequency. The FQI value is the mean C times the square root of the total number of native species. This formula combines the conservatism of the species present with a measure of the species richness of the site.

Appendix B

2015 Aquatic Plant Management Permit

WISCONSIN
DEPT. OF NATURAL RESOURCES

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Scott Walker, Governor
Cathy Stepp, Secretary
John Gozdzialski, Regional Director

Northern Region Headquarters
810 W. Maple Street
Spooner, Wisconsin 54801
Telephone 715-635-2101
FAX 715-635-4105
TTY 715-635-4001

April 27, 2015

Permit # NO-2015-58-458

Lac Courte Oreilles Lakes Association
Steve Umland
P.O. Box 702
Hayward, WI 54582

Dear Mr. Umland:

Enclosed you will find your approved Aquatic Plant Management permit for chemical treatment on Lac Courte Oreilles in Sawyer County. Your application has been approved for the area described and may not be expanded. Details of the approved treatment area are as follows:

Township 39N Range 9E Sec. 10

Specific Project Description (as shown on application form).

1. Early season CLP control on 3 sites covering a maximum of 9 acres and performed while water temperatures are averaging less than 60 degrees F. Treatment after May 31 will be allowed only if it can be shown that CLP is still in an early growth form and not forming significant numbers of turions, and if native plants are not yet actively growing.
2. Disturbance of wild rice is prohibited.
3. Treatment is to be scheduled to avoid inclement weather/wind that would hinder efficacy.
4. All requirements for notification according to NR 107.07(3) must be satisfied prior to treatment. All riparian residents within 150 feet of a treated area must be properly notified per NR107.04(4).
5. Posting shall occur as specified in NR107.08(7). Signage must remain in place a minimum of one day and the full period specified on the chemical product label.
6. Follow the DNR pre and post treatment plant monitoring protocols.
7. Permission is not granted to enter or treat the drainage ditch on the private property of Jonjak Farms.
8. Stukey Bay is a source of water when needed for irrigation at times for cranberry operation of Jonjak Farms. Waters within 200 feet of the irrigation canal receiving Clearcast 2.7G treatment may be used for irrigation as long as concentrations are at or below 50 ppb. If you wish to apply Clearcast2.7g at 250 ppb to Stukey Bay, a water assay must be completed by an acceptable method as soon as possible following the treatment to insure that the concentration is below 50 ppb. The results of the residual assay should be communicated to me as soon as it is available. If you choose to use Aquathol in Stukey Bay within 200 feet of the irrigation ditch, there are no additional conditions.

Please note these selected permit conditions (refer to Section NR 107.08 for complete details):

1. Four-day advance notification of treatment is required unless exempted in Section VII of the application.
2. Treatment sites must be posted a minimum of one day or as specified in the use restrictions on the chemical label.
3. The Aquatic Plant Treatment Record must be submitted within 30 days after treatment or by October 1 if no treatment occurs.
4. All equipment used for the project shall be de-contaminated following the most current protocols for invasive and exotic viruses and species prior to use and after use.

Thank you for complying with the provisions of Wis. Adm. Code NR 107 concerning the use of aquatic pesticides for plant management. Feel free to contact Mark Sundeen at the Spooner Service Center at 715/635-4074 or mark.sundeen@wisconsin.gov , for further information.

Sincerely,

Mark Sundeen

John Gozdzialski
Northern Region Director

Enc.

Date Mailed April 27-2015

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: NO-2015-58-458	Permit Expiration Date: 10/1/2015
Waterbody #: 2390800	Fee Received: 245.00

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: Lac Courte Oreilles Lakes Association, Inc.

Street Address: PO Box 702

City: Hayward | State: WI | ZIP Code: 54582

Lake Address

Name: Lac Courte Oreilles Lakes Association

Street Address: PO Box 702

City: Hayward | State: WI | ZIP Code: 54582

Phone Number (include area code)

Primary: 612-308-5572 Secondary: 715-865-3166

Email Address: UMLANDSTUDIOS@CENTURYTEL.NET

Section II – Aquatic Plant Control Location

Waterbody to be Treated (waterbody where treatment area is located): Lac Courte Oreilles

Lake Surface Area: 5039 acres

Estimated Surface Area that is 10 Feet or Less in Depth: 350 acres

County: Saywer | Section: 06 | Township: 39 N | Range: 08 ☐ E ☒ W

Latitude: | Longitude:

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. All participants are riparian property owners of LCO
2.
3.
4.
5.
6.
7.

Name of Lake Property Owners' Association Representative or Lake District Representative (if none, please indicate) - CLP representative for COLA: STEVE UMLAND

Name of Applicator or Firm: Stantec, Inc.

Street or Route: 209 Commerce Parkway, 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

Business Location License Number (if applicable): 93-020291-011079

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.	Barbertown	ft. X	see map	ft. ÷ 43,560 ft.² =		1.5	4	ft.
B.	Stucky Bay	ft. X	see map	ft. ÷ 43,560 ft.² =		1.5	4	ft.
C.	Musky Bay	ft. X	see map	ft. ÷ 43,560 ft.² =		6	5	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: 9

Total from Attached Sheets:

Grand Total: 9

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:

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.)

9 acres X $25 per acre = $ 225

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

Enter Acreage Fee (from above) 225

Total Fee Enclosed ..... $ 245

☐ **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.

Curly-leaf pondweed

*Acreage is approximate. All areas will be resurveyed prior to 2015 treatments

Section V – Chemical Control

Alternatives to Chemical Control:	Feasible?		If No, Why Not?
1. Mechanical harvesting	☐ Yes	☒ No	Spreads plant debris
2. Hand pulling	☐ Yes	☒ No	Too large an area
3. Hand raking	☐ Yes	☒ No	Too large an area
4. Hand cutting	☐ Yes	☒ No	Too large an area
5. Sediment screens/covers	☐ Yes	☒ No	other potential ecological system damage
6. Dredging	☐ Yes	☒ No	too costly
7. Lake drawdown	☐ Yes	☒ No	no ability to drawdown
8. Nutrient controls in watershed	☐ Yes	☒ No	not a control option for immediate concerns
9. Other: _____	☐ Yes	☐ No	

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

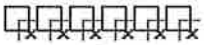
If you checked yes to any of the alternatives listed above, please explain your decision to use chemical controls:

Sundeen, Mark R - DNR

From: Kordus, Mark <Mark.Kordus@stantec.com>
Sent: Friday, April 10, 2015 9:02 AM
To: Sundeen, Mark R - DNR
Cc: STEVE (umlandstudios@centurytel.net); Scharl, James
Subject: COLA permit

Mark – please change the permit for COLA with regard to application rates for ClearCast (liquid) to 200 PPB, granular (ClearCast 2.7G) can stay at 250 PPB, label and registration issue. Thank you, please let me know if you have any questions.

Mark Kordus
Associate
Stantec
2841 Stanley Street Stevens Point WI 54481-2179
Phone: (715) 344-9480
Cell: (715) 781-9976
Fax: (715) 344-9481
Mark.Kordus@stantec.com



Section V – Chemical Control (continued)

Trade Name of Proposed Chemical(s)

Musky & Stucky Bays: Mixture of Aquathol K (liquid endothall) and Clearcast (imazamox) applied at 2.0 PPM and 250 PPB. For areas within 200' of active irrigation canals, ONLY Aquathol K applied at 3.0 PPM (9.5 gal/ac)

Barbertown Bay: Mixture of Aquathol K and Clearcast applied at 2.0 PPM and 250 PPB

Method of Application: Stantec's granular forced-air blower & liquid sub-surface application systems

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?
All above methods were either used in 2014 and/or used in past treatments with good results in controlling CLP and limiting impact to native species

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.

Signature of Applicant

MAR 15, 2015
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.

Signature of Authorized Representative | STEVEN L. VINLAND Printed Name | MAR 15, 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 20/5.

Application fee received? ☒ Yes ☐ No

Advance notification of treatment required? ☒ Yes ☐ No

State of Wisconsin
Department of Natural Resources
For the Secretary

By Mark Sundeen
Regional Director or Designee

April 27-2015 Date Signed | April 27-2015 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.

Appendix C

2015 Aquatic Plant Treatment Records

State of Wisconsin
Department of Natural Resources
dnr.wi.gov

Aquatic Plant Management Herbicide Treatment Record

Form 3200-111 (R 11/11)

Notice: Completion of this form is a condition of the permit and provides records required by WDNR (NR 107) and DATCP (ATCP 29.21 and 29.22). The Department may not issue you future permits unless you complete and submit this form. Personal information collected will be used for administrative purposes and may be provided to requesters to the extent required by Wisconsin's Open Records Law [ss. 19.31-19.39, Wis. Stats.].

Submit this form: **(1) immediately if any unusual circumstances occurred during treatment**
(2) as soon after treatment as possible, no later than 30 days
(3) by October 1 if no treatment occurred

Completion of this form along with the permit satisfies the requirements of WDNR (NR 107) and DATCP (ATCP 29.21 and 29.22).

General Permit Information

Permit Number	Waterbody Name (including ponds, e.g., Smith Pond)
NO-2015-58-458	Lac Courte Oreilles
County	**Permit Holder Name (Customer Name)**
Sawyer	Courte Oreilles Lakes Association

Permit Holder Address	City	State	ZIP Code
PO Box 702	Hayward	WI	54582

Treatment Information

Treatment Date (mm/dd/yyyy)	Starting Time (24 hr)	Ending Time (24 hr)	Water Temp (°C)	Ambient Air Temp (°C)
05/21/2015	8:15	13:00	55 F	65 F

Wind Speed (mph)	Wind Direction	Expected Duration of Chemical Residuals
5-10	W	7

Adverse Conditions Noted (i.e., dead fish, spawning fish, algae bloom, etc.)

If adverse conditions noted, indicate corrective actions taken

Onsite Supervision Present? ◯ Yes ◉ No | If Yes, Supervisor Name

Mixing and Loading Site Location (if other than business site or from prepackaged retail container or applied with equipment with a total capacity of not more than 5 gallons liquid or 50 pounds dry)
Lac Courte Oreilles boat landing

Herbicide Treatment and Water Use Restrictions Signs Posted In Accordance With NR 107? ◉ Yes ◯ No

Applicator shall provide each customer with a free copy of each pesticide label used (if requested)

Applicator Information

Individual or Business Name	Telephone Number
Stantec, Inc.	715-781-9976

Street Address		
209 Commerce Parkway		
City	**State**	**ZIP Code**
Cottage Grove	WI	53527

Individuals Making Pesticide Application:	Last Name	First	Certification #
	Scharl	James	77803
	Caplan	Chris	92671

Name of Person Completing Form	Signature	Date Signed	DNR Use Only
James Scharl			Date Received

Sheet 2 of 2 Date: 06/08/2015

Aquatic Plant Management Herbicide Treatment Record

Form 3200-111 (R 11/11)

Treatment Site and Chemical Information (attach additional sheets if necessary)

Site No, Property Name, Address / Fire No	Treated Acreage	Permitted Acreage	Sensitive Area?	Latitude	Longitude	Herbicide Name: Aquathol K, EPA Reg No.: 70506-176 — Amount Applied	Concentration (mg/l = ppm)	Herbicide Name: Clearcast, EPA Reg No.: 241-437-67690 — Amount Applied	Concentration (mg/l = ppm)	Herbicide Name: Clearcast 2.7g, EPA Reg No.: 241-439-67690 — Amount Applied	Concentration (mg/l = ppm)
Musky Bay*	7.5	7.5	☐ Y			45.5	2.0 ppm	16.2	200 ppb	---	---
Stucky Bay	0.5	0.5	☐ Y			5.0	3.0 ppm	---	---	---	---
Barbertown Bay	1.0	1.0	☐ Y			7.0	2.0 ppm	---	---	125	250 ppb
TOTAL	9.0	9.0	☐ Y								
			☐ Y								
*addtional acreage over permitted			☐ Y								
amount found during pre-survey			☐ Y								
to be treated at a later date			☐ Y								
			☐ Y								
			☐ Y								
			☐ Y								
			☐ Y								
			☐ Y								
			☐ Y								
			☐ Y								
			☐ Y								
			☐ Y								
			☐ Y								
			☐ Y								
			☐ Y								
					Totals	57.5		16.2		125	

Aquatics at Treatment Site: TS = Target Species SP = Species Present

TS	SP	Species	Site(s)	TS	SP	Species	Site(s)	TS	SP	Species	Site(s)	TS	SP	Other Aquatics	Site(s)
☐	☐	Cattail		☐	☒	Filamentous Algae		☐	☐	Planktonic Algae		☐	☒	White-Stem Pondweed	
☐	☒	Chara		☐	☒	Flat-Stem Pondweed		☐	☐	Purple Loosestrife		☐	☐	Wild Celery	
☐	☒	Coontail		☐	☐	Floating-Leaf Pondweed		☐	☒	Richardson Pondweed		☐	☒	spatterdock	
☒	☐	Curly-Leaf Pondweed		☐	☒	Illinois Pondweed		☐	☒	Robbins Pondweed		☐	☐		
☐	☒	Duckweed		☐	☒	Large-Leaf Pondweed		☐	☐	Sago Pondweed		☐	☐		
☐	☒	Elodea		☐	☒	Northern Milfoil		☐	☐	Watershield		☐	☐		
☐	☐	Eurasian/hybrid Milfoil		☐	☐	Phragmites		☐	☒	White Water Lily		☐	☐		

State of Wisconsin
Department of Natural Resources
dnr.wi.gov

Aquatic Plant Management Herbicide Treatment Record

Form 3200-111 (R 11/11)

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Submit this form: **(1) immediately if any unusual circumstances occurred during treatment**
(2) as soon after treatment as possible, no later than 30 days
(3) by October 1 if no treatment occurred

Completion of this form along with the permit satisfies the requirements of WDNR (NR 107) and DATCP (ATCP 29.21 and 29.22).

General Permit Information

Permit Number	Waterbody Name (including ponds, e.g., Smith Pond)
NO-2015-58-458	Lac Courte Oreilles
County	**Permit Holder Name (Customer Name)**
Sawyer	Courte Oreilles Lakes Association

Permit Holder Address	City	State	ZIP Code
PO Box 702	Hayward	WI	54582

Treatment Information

Treatment Date (mm/dd/yyyy)	Starting Time (24 hr)	Ending Time (24 hr)	Water Temp (°C)	Ambient Air Temp (°C)
06/02/2015	12:00	15:00	62 F	70 F

Wind Speed (mph)	Wind Direction	Expected Duration of Chemical Residuals
5-10	SSW	7

Adverse Conditions Noted (i.e., dead fish, spawning fish, algae bloom, etc.)

If adverse conditions noted, indicate corrective actions taken

Onsite Supervision Present? ◯ Yes ◉ No

If Yes, Supervisor Name

Mixing and Loading Site Location (if other than business site or from prepackaged retail container or applied with equipment with a total capacity of not more than 5 gallons liquid or 50 pounds dry)

Lac Courte Oreilles boat landing

Herbicide Treatment and Water Use Restrictions Signs Posted In Accordance With NR 107? ◉ Yes ◯ No

Applicator shall provide each customer with a free copy of each pesticide label used (if requested)

Applicator Information

Individual or Business Name	Telephone Number
Stantec, Inc.	715-781-9976

Street Address		
209 Commerce Parkway		
City	**State**	**ZIP Code**
Cottage Grove	WI	53527

Individuals Making Pesticide Application:	Last Name	First	Certification #
	Scharl	James	77803
	Last Name	First	Certification #
	Kordus	Mark	82178
	Last Name	First	Certification #

Name of Person Completing Form	Signature	Date Signed	DNR Use Only
James Scharl			Date Received

Sheet 2 of 2 Date: 06/08/2015

Aquatic Plant Management Herbicide Treatment Record

Form 3200-111 (R 11/11)

Treatment Site and Chemical Information (attach additional sheets if necessary)

Site No, Property Name, Address / Fire No	Treated Acreage	Permitted Acreage	Sensitive Area?	Latitude	Longitude	Herbicide Name: Aquathol K EPA Reg No.: 70506-176		Herbicide Name: Clearcast EPA Reg No.: 241-437-67690		Herbicide Name: EPA Reg No.:	
						Amount Applied	Concentration (mg/l = ppm)	Amount Applied	Concentration (mg/l = ppm)	Amount Applied	Concentration (mg/l = ppm)
A*	0.5	0.5	☐ Y			5.25	3.0 ppm				
B	1.23	1.23	☐ Y			12.75	3.0 ppm				
C	2.55	2.55	☐ Y			26.5	3.0 ppm				
D	0.5	0.5	☐ Y			5.25	3.0 ppm				
E	0.5	0.5	☐ Y			5.25	3.0 ppm				
F	9.53	9.53	☐ Y			49.5	2.0 ppm	19.8	200 ppb		
G	2.51	2.51	☐ Y			26.25	3.0 ppm				
H	0.5	0.5	☐ Y			5.25	3.0 ppm				
TOTAL	17.82	17.82	☐ Y								
*see attached map for all areas			☐ Y								
			☐ Y								
			☐ Y								
			☐ Y								
			☐ Y								
			☐ Y								
			☐ Y								
			☐ Y								
			☐ Y								
			☐ Y								
			☐ Y								
			☐ Y								
Totals						136		19.8			

Aquatics at Treatment Site: TS = Target Species SP = Species Present

TS	SP		Site(s)	TS	SP		Site(s)	TS	SP		Site(s)	TS	SP	Other Aquatics	Site(s)
☐	☐	Cattail		☐	☒	Filamentous Algae		☐	☐	Planktonic Algae		☐	☒	White-Stem Pondweed	
☐	☒	Chara		☐	☒	Flat-Stem Pondweed		☐	☐	Purple Loosestrife		☐	☐	Wild Celery	
☐	☒	Coontail		☐	☐	Floating-Leaf Pondweed		☐	☒	Richardson Pondweed		☐	☒	spatterdock	
☒	☐	Curly-Leaf Pondweed		☐	☒	Illinois Pondweed		☐	☒	Robbins Pondweed		☐	☐		
☐	☒	Duckweed		☐	☒	Large-Leaf Pondweed		☐	☐	Sago Pondweed		☐	☐		
☐	☒	Elodea		☐	☒	Northern Milfoil		☐	☐	Watershield		☐	☐		
☐	☐	Eurasian/hybrid Milfoil		☐	☐	Phragmites		☐	☒	White Water Lily		☐	☐		

Appendix D

Tables

Table 2: Frequency of Occurrence of Aquatic Plant Species by Year, Musky Bay - Lac Courte Oreilles, Sawyer County, Wisconsin.

	2007** Survey		2010 Survey		2011 Survey		2012 Survey		2013 Survey		2014 Survey		2015 Survey	
Species	**% F.o.O.***	**Avg. Density**	**% F.o.O.***	**Avg. Density**	**% F.o.O.***	**Avg. Density**	**% F.o.O.***	**Avg. Density**	**% F.o.O.***	**Avg. Density**	**% F.o.O.***	**Avg. Density**	**% F.o.O.***	**Avg. Density**
Curly-leaf pondweed	**48**	**1.34**	**22.86**	**1.00**	**0.76**	**1.00**	0.51	1.00	10.68	1.05	0.52	1.00	0.26	1.00
Filamentous algae	2.99	1.50	---	---	1.52	1.00	---	---	---	---	---	---	---	---
Water marigold	1.49	1.00	10.91	1.00	6.85	1.00	2.03	1.00	0.25	1	1.81	1.00	5.19	1.00
Watershield													0.26	1.00
Coontail	45.52	1.30	61.56	1.10	52.54	1.01	20.3	1.06	39.09	1.11	45.48	1.13	29.61	1.04
Chara	1.49	1.00	1.04	1.00	4.31	1.00	4.06	1.00	6.6	1.04	8.53	1.00	28.83	1.01
Needle spikerush	---	---	0.78	1.00	2.03	1.00	0.76	1.00	0.25	1	1.29	1.00	2.08	1.00
Elodea	90.3	1.20	90.31	1.50	88.32	1.12	83.76	1.46	79.95	1.23	81.14	1.04	62.34	1.00
Water horsetail													0.26	1.00
Water stargrass	---	---	---	---	0.25	1.00	2.03	1.00	1.78	1	0.78	1.00	4.68	1.00
Quillwort	1.49	1.00	---	---	0.25	1.00	---	---	---	---	---	---	---	---
Small duckweed	---	---	0.26	1.00	0.25	1.00	0.76	1.00	0.25	1	---	---	---	---
Forked duckweed	---	---	0.26	1.00	1.02	1.00	0.51	1.00	0.76	1	2.07	1.00	1.04	1.00
Watermoss	---	---	---	---	---	---	0.76	1.00	---	---	---	---	---	---
Northern water-milfoil	5.22	1.29	5.57	1.00	4.06	1.00	2.28	1.00	14.47	1.09	13.18	1.02	15.06	1.03
Dwarf water-milfoil	1.49	1.00	0.52	1.00	0.51	1.00	0.51	1.00	0.25	1	0.26	1.00	0.52	1.00
Slender naiad	2.24	1.00	0.26	1.00	0.25	1.00	---	---	1.52	1.17	5.17	1.00	6.49	1.00
Spatterdock	1.49	1.00	0.26	1.00	1.02	1.00	0.51	1.00	1.27	1	1.29	1.00	0.78	1.00
White water lily	0.75	1.00	1.4	1.30	4.06	1.00	4.57	1.00	9.64	1	5.94	1.00	4.42	1.00
Pickerelweed	0.75	1.00	---	---	0.25	1.00	0.51	1.00	0.25	1	0.26	1.00	0.26	1.00
Large-leaf pondweed	11.94	1.00	3.9	1.00	---	---	0.76	1.00	4.06	1	2.58	1.00	1.3	1.00
Leafy pondweed	0.75	1.00	---	---	---	---	---	---	---	---	---	---	---	---
Frie's pondweed	2.99	1.00	---	---	---	---	---	---	---	---	---	---	---	---
Variable pondweed	2.99	1.00	1.04	1.00	---	---	---	---	0.51	1	0.78	1.00	0.78	1.00
Illinois pondweed	2.99	1.25	---	---	0.25	1.00	---	---	0.51	1	---	---	---	---
Floating-leaf pondweed	---	---	---	---	---	---	---	---	---	---	0.26	1.00	---	---
White-stem pondweed	0.75	1.00	5.19	1.10	10.41	1.00	2.54	1.00	32.25	1.01	12.14	1.00	11.69	1.00
Small pondweed	5.22	1.00	0.26	1.00	---	---	---	---	---	---	---	---	---	---
Clasping-leaf pondweed	26.12	1.03	28.83	1.10	3.55	1.00	22.08	1.09	6.6	1	20.16	1.01	6.49	1.00
Fern pondweed	93.28	1.75	15.58	1.10	12.69	1.12	2.28	1.00	---	---	---	---	0.52	1.00
Flat-stem pondweed	29.1	1.10	9.61	1.10	2.03	1.00	---	---	2.54	1	4.65	1.06	4.42	1.00
Stiff water crowfoot	6.72	1.00	14.14	1.00	1.52	1.00	1.02	1.00	0.25	1	0.26	1.00	0.52	1.00
Grass-leaved arrowhead	0.75	1.00	---	---	---	---	---	---	---	---	---	---	---	---
Arrowhead species	0.75	1.00	0.26	1.00	0.51	1.00	---	---	1.02	1.25	0.78	1.00	1.04	1.00
Hard-stem bulrush	0.75	1.00	0.26	1.00	---	---	0.25	1.00	0.25	1	---	---	0.26	1.00
Bur-reed species	---	---	---	---	---	---	---	---	---	---	0.26	1.00	---	---
Floating-leaved bur-reed	0.75	1.00	---	---	---	---	---	---	---	---	---	---	---	---
Narrow-leaved bur-reed	---	---	---	---	0.25	1.00	0.25	1.00	0.51	1	0.78	1.00	0.52	1.00
Large duckweed	---	---	0.52	1.00	---	---	---	---	---	---	---	---	---	---
Wild celery	18.66	1.24	33.51	1.10	13.71	1.00	9.64	1.00	14.47	1	17.83	1.04	12.73	1.00

* - F.o.O = Frequency of Occurrence

** - Data from the 2008 CLP survey is used for CLP only

Table 3: Statistical Significance of Specie between Sampling Events, Musky Bay - Lac Courte Oreilles, Sawyer County, Wisconsin.

	2015 v 2014			2015 v 2013			2015 v 2012			2015 v 2011			2015 v 2010			2015 v 2007		
Specie	**+ / -**	**P-Value**	**significance**	**+ / -**	**P-value**	**significance**	**+ / -**	**P-value**	**significance**	**+ / -**	**P-value**	**significance**	**+ / -**	**P-value**	**significance**	**+ / -**	**P-value**	**significance**
Curly-leaf pondweed	↓	0.562959	n.s.	↓	**1.3E-10**	***	↓	0.5629587	n.s.	↓	0.316079105	n.s.	↓	**1.22478E-22**	***	↓	**1.53254E-34**	***
Filamentous algae	no change	#DIV/0!	#DIV/0!	no change	#DIV/0!	#DIV/0!	no change	#DIV/0!	#DIV/0!	↓	**0.013937554**	*	no change	#DIV/0!	#DIV/0!	↓	**0.0001169**	***
Water marigold	↑	**0.0109**	*	↑	**2.6E-05**	***	↑	**0.02093**	*	↓	0.292369057	n.s.	↓	**0.00360433**	**	↑	0.164525129	n.s.
Coontail	↓	4.66E-06	***	↓	0.0026312	**	↑	**0.00493**	**	↓	1.55449E-11	***	↓	**1.18571E-18**	***	↓	**0.000235906**	***
Chara	↑	**6.5E-13**	***	↑	**1.4E-15**	***	↑	**3.4E-20**	***	↑	**1.10083E-19**	***	↑	**3.56855E-27**	***	↑	**2.92392E-10**	***
Needle spikerush	↑	0.401469	n.s.	↑	**0.01894**	*	↑	0.1289664	n.s.	no change	1	n.s.	↑	0.128966389	n.s.	↑	0.096487031	n.s.
Elodea	↓	7.95E-09	***	↓	**4.8E-09**	***	↓	**7.7E-13**	***	↓	9.51806E-19	***	↓	**1.19767E-17**	***	↓	**2.63756E-10**	***
Water horsetail	↑	0.317003	n.s.	↑	0.3170032	n.s.	↑	0.3170032	n.s.	↑	0.317003243	n.s.	↑	0.317003243	n.s.	↑	0.559398427	n.s.
Water stargrass	↑	**0.00091**	***	↑	**0.02537**	*	↑	**0.04612**	*	↑	**7.8822E-05**	***	↑	**1.77116E-05**	***	↑	**0.011818526**	*
Quillwort	no change	#DIV/0!	#DIV/0!	no change	#DIV/0!	#DIV/0!	no change	#DIV/0!	#DIV/0!	↓	0.317003243	n.s.	no change	#DIV/0!	#DIV/0!	↓	**0.002896887**	**
Small duckweed	no change	#DIV/0!	#DIV/0!	↓	0.3170032	n.s.	↓	0.0826775	n.s.	↓	0.317003243	n.s.	↓	0.317003243	n.s.	no change	#DIV/0!	#DIV/0!
Forked duckweed	↓	0.244588	n.s.	↑	0.7042019	n.s.	↑	0.4124311	n.s.	no change	1	n.s.	↑	0.178329084	n.s.	↑	0.241676048	n.s.
Watermoss	no change	#DIV/0!	#DIV/0!	no change	#DIV/0!	#DIV/0!	↓	0.0826775	n.s.	no change	#DIV/0!	#DIV/0!	no change	#DIV/0!	#DIV/0!	no change	#DIV/0!	#DIV/0!
Northern water-milfoil	↓	0.747115	n.s.	↓	0.3454711	n.s.	↑	**8.2E-08**	***	↑	**3.00546E-05**	***	↑	0.078483765	n.s.	↑	0.309190707	n.s.
Dwarf water-milfoil	↑	0.562959	n.s.	↑	0.5629587	n.s.	no change	1	n.s.	no change	1	n.s.	no change	1	n.s.	↓	0.256015873	n.s.
Slender naiad	↑	0.442728	n.s.	↑	**0.0005**	***	↑	**3.7E-07**	***	↑	**1.69788E-06**	***	↑	**1.69788E-06**	***	↑	0.066897233	n.s.
Spatterdock	↓	0.477255	n.s.	↓	0.4772555	n.s.	↑	0.6536919	n.s.	↓	0.704201886	n.s.	↑	0.316079105	n.s.	↓	0.450331428	n.s.
White water lily	↓	0.330196	n.s.	↓	**0.00333**	**	↓	0.8627186	n.s.	↑	0.858847599	n.s.	↑	**0.004035086**	**	↓	0.936395973	n.s.
Pickerelweed	no change	1	n.s.	no change	1	n.s.	↓	0.5629587	n.s.	no change	1	n.s.	↑	0.317003243	n.s.	↓	0.422758509	n.s.
Large-leaf pondweed	↓	0.192418	n.s.	↓	**0.01497**	*	↑	0.4772555	n.s.	↑	**0.024884175**	*	↓	**0.023512905**	*	↓	**5.87855E-14**	***
Leafy pondweed	no change	#DIV/0!	#DIV/0!	no change	#DIV/0!	#DIV/0!	no change	#DIV/0!	#DIV/0!	no change	#DIV/0!	#DIV/0!	no change	#DIV/0!	#DIV/0!	↓	0.08609691	n.s.
Frie's pondweed	no change	#DIV/0!	#DIV/0!	no change	#DIV/0!	#DIV/0!	no change	#DIV/0!	#DIV/0!	no change	#DIV/0!	#DIV/0!	no change	#DIV/0!	#DIV/0!	↓	**0.000576312**	***
Variable pondweed	no change	1	n.s.	↑	0.6536919	n.s.	↑	0.0826775	n.s.	↑	0.082677538	n.s.	↓	0.704201886	n.s.	↓	0.051884437	n.s.
Illinois pondweed	no change	#DIV/0!	#DIV/0!	↓	0.1567721	n.s.	no change	#DIV/0!	#DIV/0!	↓	0.317003243	n.s.	no change	#DIV/0!	#DIV/0!	↓	**0.0001169**	***
Floating-leaf pondweed	↓	0.317003	n.s.	no change	#DIV/0!	#DIV/0!	no change	#DIV/0!	#DIV/0!	no change	#DIV/0!	#DIV/0!	no change	#DIV/0!	#DIV/0!	no change	#DIV/0!	#DIV/0!
White-stem pondweed	↓	0.824417	n.s.	↓	**1.9E-13**	***	↑	**9.9E-07**	***	↑	0.647679276	n.s.	↑	**0.001206843**	**	↑	**0.003644774**	**
Small pondweed	no change	#DIV/0!	#DIV/0!	no change	#DIV/0!	#DIV/0!	no change	#DIV/0!	#DIV/0!	no change	#DIV/0!	#DIV/0!	↓	0.317003243	n.s.	↓	**4.38645E-08**	***
Clasping-leaf pondweed	↓	**2.1E-08**	***	↓	0.8848752	n.s.	↓	2.529E-10	***	↑	0.070811315	n.s.	↓	**5.18201E-16**	***	↓	**2.36142E-16**	***
Fern pondweed	↑	0.156772	n.s.	↑	0.1567721	n.s.	↓	0.0335477	*	↓	**5.67677E-12**	***	↓	**1.66596E-14**	***	↓	**1.43E-105**	***
Flat-stem pondweed	↓	0.862719	n.s.	↑	0.1704247	n.s.	↑	**3.1E-05**	***	↑	0.067361988	n.s.	↓	**0.004802454**	**	↓	**2.10993E-18**	***
Stiff water crowfoot	↑	0.562959	n.s.	↑	0.5629587	n.s.	↓	0.4124311	n.s.	↓	0.155186724	n.s.	↓	**4.68607E-16**	***	↓	**1.38049E-05**	***
Grass-leaved arrowhead	no change	#DIV/0!	#DIV/0!	no change	#DIV/0!	#DIV/0!	no change	#DIV/0!	#DIV/0!	no change	#DIV/0!	#DIV/0!	no change	#DIV/0!	#DIV/0!	↓	**0.01511549**	*
Arrowhead species	↑	0.178329	n.s.	no change	1	n.s.	↑	**0.04495**	*	↑	0.412431095	n.s.	↑	0.178329084	n.s.	↑	0.781246063	n.s.
Hard-stem bulrush	↑	0.317003	n.s.	no change	1	n.s.	no change	1	n.s.	no change	1	n.s.	no change	1	n.s.	↓	0.422758509	n.s.
Bur-reed species	↓	0.317003	n.s.	no change	#DIV/0!	#DIV/0!	no change	#DIV/0!	#DIV/0!	no change	#DIV/0!	#DIV/0!	no change	#DIV/0!	#DIV/0!	no change	#DIV/0!	#DIV/0!
Floating-leaved bur-reed	no change	#DIV/0!	#DIV/0!	no change	#DIV/0!	#DIV/0!	no change	#DIV/0!	#DIV/0!	no change	#DIV/0!	#DIV/0!	no change	#DIV/0!	#DIV/0!	↓	**0.01511549**	*
Narrow-leaved bur-reed	↑	0.562959	n.s.	no change	1	n.s.	↑	0.5629587	n.s.	↑	0.156772087	n.s.	↑	0.156772087	n.s.	↑	0.408627867	n.s.
Large duckweed	no change	#DIV/0!	#DIV/0!	no change	#DIV/0!	#DIV/0!	no change	#DIV/0!	#DIV/0!	no change	#DIV/0!	#DIV/0!	↓	0.156772087	n.s.	no change	#DIV/0!	#DIV/0!
Wild celery	↓	**0.04586**	*	↓	0.4035862	n.s.	↑	0.2111659	n.s.	↓	0.597216329	n.s.	↓	**9.41371E-12**	***	↓	**0.000379411**	***

*, **, *** - Levels of significance.

n.s. - Change not significant

--- - Specie was not sampled in both comparison years

Table 5: Frequency of Occurrence of Aquatic Plant Species by Year, Stucky Bay - Lac Courte Oreilles, Sawyer County, Wisconsin.

	2010 Survey		2011 Survey		2012 Survey		2013 Survey		2014 Survey		2015 Survey	
Specie	**% F.o.O.***	**Avg. Density**	**% F.o.O.***	**Avg. Density**	**% F.o.O.***	**Avg. Density**	**% F.o.O.***	**Avg. Density**	**% F.o.O.***	**Avg. Density**	**% F.o.O.***	**Avg. Density**
Curly-leaf pondweed	**6.25**	**1.00**	**3.13**	**1.00**	**12.5**	**1.00**	**9.38**	**1.00**	**---**	**---**	**9.68**	**1.00**
Water marigold	6.25	1.00	9.38	1.00	---	---	12.5	1.00	---	---	16.13	1.00
Coontail	50	1.06	53.13	1.12	31.25	1.00	43.75	1.00	53.13	1.00	54.84	1.00
Muskgrass	---	---	9.38	1.00	6.25	1.00	3.13	1.00	15.63	1.00	6.45	1.00
Elodea	71.88	1.00	46.88	1.00	37.5	1.00	40.63	1.15	43.75	1.00	38.71	1.00
Water star-grass	3.13	1.00	3.13	1.00	3.13	1.00	3.13	1.00	3.13	1.00	12.9	1.00
Small duckweed	---	---	---	---	---	---	3.13	1.00	---	---	---	---
Forked duckweed	---	---	3.13	1.00	---	---	---	---	---	---	---	---
Common watermoss	---	---	3.13	1.00	---	---	---	---	---	---	---	---
Northern water-milfoil	28.13	1.00	9.38	1.00	12.5	1.00	---	---	9.38	1.33	25.81	1.13
Slender naiad	15.63	1.00	---	---	---	---	3.13	1.00	15.63	1.00	3.23	1.00
Spatterdock	6.25	1.00	6.25	1.00	6.25	1.00	9.38	1.00	12.5	1.00	9.68	11.67
White water lily	9.38	1.00	12.5	1.00	15.63	1.00	21.88	1.00	21.88	1.00	16.13	1.00
Pickerelweed	3.13	1.00	3.13	1.00	---	---	3.13	1.00	---	---	---	---
Large-leaf pondweed	25	1.00	---	---	---	---	---	---	3.13	1.00	---	---
Variable pondweed	3.13	1.00	---	---	---	---	---	---	---	---	---	---
Illinois pondweed	---	---	3.13	1.00	---	---	18.75	1.00	3.13	1.00	6.45	1.00
Floating-leaf pondweed	9.38	1.00	3.13	1.00	---	---	6.25	1.00	3.13	1.00	6.45	1.00
White-stem pondweed	6.25	1.00	6.25	1.00	3.13	1.00	15.63	1.20	28.13	1.00	16.13	1.20
Small pondweed	25	1.00	3.13	1.00	---	---	---	---	---	---	3.23	1.00
Clasping-leaf pondweed	28.13	1.00	43.75	1.00	46.88	1.00	21.88	1.00	15.53	1.00	22.58	1.00
Fern pondweed	75	1.63	81.25	1.58	68.75	1.14	53.13	1.00	50	1.19	58.06	1.06
Flat-stem pondweed	50	1.06	31.25	1.00	---	---	21.88	1.00	3.13	1.00	32.26	1.00
Stiff water crowfoot	9.38	1.00	3.13	1.00	3.13	1.00	---	---	---	---	12.9	1.00
Arrowhead species	---	---	---	---	---	---	6.25	1.00	---	---	---	---
Large duckweed	---	---	---	---	---	---	3.13	1.00	3.13	1.00	6.45	1.00
Wild celery	40.63	1.00	25	1.00	6.25	1.00	40.63	1.00	50	1.00	6.45	1.00

* - F.o.O = Frequency of Occurrence

Table 6: Statistical Significance of Specie between Sampling Events, Stukey Bay - Lac Courte Oreilles, Sawyer County, Wisconsin.

	2015 vs 2014			2015 vs 2013			2015 vs 2012			2015 vs 2011			2015 vs 2010		
Specie	**+ / -**	**P-Value**	**significance**	**+ / -**	**P-Value**	**significance**	**+ / -**	**P-Value**	**significance**	**+ / -**	**P-Value**	**significance**	**+ / -**	**P-Value**	**significance**
Curly-leaf pondweed	↑	0.076041	n.s.	no change	1	n.s.	↓	0.688787592	n.s.	↑	0.301699582	n.s.	↑	0.641374408	n.s.
Water marigold	↑	**0.01986**	*	↑	0.719166283	n.s.	↑	**0.019864892**	*	↑	0.449691798	n.s.	↑	0.229556214	n.s.
Coontail	no change	1	n.s.	↑	0.453034014	n.s.	↑	0.076434141	n.s.	no change	1	n.s.	↑	0.802492879	n.s.
Muskgrass	↓	0.229556	n.s.	↑	0.554267836	n.s.	no change	1	n.s.	↓	0.641374408	n.s.	↑	0.150762775	n.s.
Elodea	↓	0.610733	n.s.	↓	0.797792512	n.s.	no change	1	n.s.	↓	0.447657331	n.s.	↓	**0.00574194**	**
Water star-grass	↑	0.162313	n.s.	↑	0.162313149	n.s.	↑	0.162313149	n.s.	↑	0.162313149	n.s.	↑	0.162313149	n.s.
Small duckweed	---	---	---	↓	0.313499946	n.s.	---	---	---	---	---	---	---	---	---
Forked duckweed	---	---	---	---	---	---	---	---	---	↓	0.313499946	n.s.	---	---	---
Common watermoss	---	---	---	---	---	---	---	---	---	↓	0.313499946	n.s.	---	---	---
Northern water-milfoil	↑	0.097594	n.s.	↑	**0.002496909**	**	↑	0.200184804	n.s.	↑	0.097594155	n.s.	↓	0.77716177	n.s.
Slender naiad	↓	0.086276	n.s.	no change	1	n.s.	↑	0.313499946	n.s.	↑	0.313499946	n.s.	↓	0.08627557	n.s.
Spatterdock	↓	0.688788	n.s.	no change	1	n.s.	↑	0.641374408	n.s.	↑	0.641374408	n.s.	↑	0.641374408	n.s.
White water lily	↓	0.521839	n.s.	↓	0.52183939	n.s.	no change	1	n.s.	↑	0.719166283	n.s.	↑	0.449691798	n.s.
Pickerelweed	---	---	---	↓	0.313499946	n.s.	---	---	---	↓	0.313499946	n.s.	↓	0.313499946	n.s.
Large-leaf pondweed	↓	0.3135	n.s.	---	---	---	---	---	---	---	---	---	↓	0.002496909	**
Variable pondweed	---	---	---	---	---	---	---	---	---	---	---	---	↓	0.313499946	n.s.
Illinois pondweed	↑	0.554268	n.s.	↓	0.130570018	n.s.	↑	0.150762775	n.s.	↑	0.554267836	n.s.	↑	0.150762775	n.s.
Floating-leaf pondweed	↑	0.554268	n.s.	no change	1	n.s.	↑	0.150762775	n.s.	↑	0.554267836	n.s.	↓	0.641374408	n.s.
White-stem pondweed	↓	0.226476	n.s.	no change	1	n.s.	↑	0.08627557	n.s.	↑	0.229556214	n.s.	↑	0.229556214	n.s.
Small pondweed	↑	0.3135	n.s.	↑	0.313499946	n.s.	↑	0.313499946	n.s.	no change	1	n.s.	↓	0.011835452	*
Clasping-leaf pondweed	↑	0.521839	n.s.	no change	1	n.s.	↓	**0.035252553**	*	↓	0.062383054	n.s.	↓	0.563702862	n.s.
Fern pondweed	↑	0.616386	n.s.	↑	0.801732213	n.s.	↓	0.301699582	n.s.	↓	**0.03097143**	*	↓	0.114316776	n.s.
Flat-stem pondweed	↑	**0.00286**	**	↑	0.395848482	n.s.	↑	**0.00057604**	***	no change	1	n.s.	↓	0.126740266	n.s.
Stiff water crowfoot	↑	**0.03887**	*	↑	**0.038867104**	*	↑	0.162313149	n.s.	↑	0.162313149	n.s.	↑	0.688787592	n.s.
Arrowhead species	---	---	---	↓	0.150762775	n.s.	---	---	---	---	---	---	---	---	---
Large duckweed	↑	0.554268	n.s.	↑	0.554267836	n.s.	↑	0.150762775	n.s.	↑	0.150762775	n.s.	↑	0.150762775	n.s.
wild celery	↓	**9.9E-05**	***	↓	**0.001170681**	**	no change	1	n.s.	↓	**0.0388671**	*	↓	**0.00117068**	**

*, **, *** - Levels of significance.

n.s. - Change not significant

--- - Specie was not sampled in both comparison years

Table 8: Frequency of Occurrence of Aquatic Plant Species by Year,Barbertown Bay - Lac Courte Oreilles, Sawyer County, Wisconsin.

	2011 Survey		2012 Survey		2013 Survey		2014 Survey		2015 Survey	
Specie	**% F.o.O.***	**Avg. Density**	**% F.o.O.***	**Avg. Density**	**% F.o.O.***	**Avg. Density**	**% F.o.O.***	**Avg. Density**	**% F.o.O.***	**Avg. Density**
Curly-leaf pondweed	**30.3**	**1.10**	**27.27**	**1.11**	**10.64**	**1.00**	**6.52**	**1.00**	**4.35**	**1.00**
Filamentous algae	15.15	1.00	---	---	---	---	---	---	---	---
Water marigold	---	---	---	---	---	---	2.17	1.00	2.17	1.00
Watersheild	6.06	1.00	6.06	1.00	6.38	1.00	2.17	1.00	2.17	1.00
Coontail	54.55	1.00	33.33	1.09	63.83	1.13	54.35	1.08	54.35	1.00
Muskgrass	12.12	1.00	6.06	1.00	6.38	1.00	19.57	1.00	15.22	1.00
Needle spikerush	---	---	---	---	---	---	4.35	1.00	6.52	1.00
Creeping spikerush	---	---	---	---	---	---	---	---	2.17	1.00
Common waterweed	51.52	1.00	48.48	1.00	10.43	1.00	28.26	1.00	39.96	1.00
Water star-grass	12.12	1.25	18.18	1.33	12.77	1.00	6.52	1.00	23.91	1.00
Brown-fruited rush	6.06	1.00	---	---	---	---	---	---	---	---
Small duckweed	3.03	1.00	---	---	---	---	---	---	---	---
Forked duckweed	---	---	3.03	1.00	2.13	1.00	8.7	1.00	2.17	1.00
Common watermoss	6.06	1.00	---	---	---	---	---	---	---	---
Northern water-milfoil	30.3	1.10	15.15	1.00	34.04	1.13	26.09	1.08	39.13	1.17
Dwarf water-milfoil	---	---	---	---	4.26	1.00	6.52	1.00	2.17	1.00
Bushy pondweed	12.12	1.00	6.06	1.00	4.26	1.00	10.87	1.00	6.52	1.00
Spatterdock	6.06	1.00	12.12	1.00	8.51	1.00	8.7	1.00	8.7	1.00
White water lily	15.15	1.00	18.18	1.00	14.89	1.00	10.87	1.00	10.87	1.00
Pickerelweed	---	---	---	---	---	---	---	---	4.35	1.00
Large-leaf pondweed	3.03	1.00	---	---	4.26	1.00	4.35	1.00	4.35	1.00
Ribbon-leaf pondweed	---	---	---	---	---	---	2.17	1.00	---	---
Variable pondweed	6.06	1.00	3.03	1.00	2.13	1.00	6.52	1.00	4.35	1.00
Illinois pondweed	6.06	1.00	3.03	1.00	6.38	1.00	4.35	1.00	2.17	1.00
Floating-leaf pondweed	15.15	1.00	---	---	---	---	2.17	1.00	---	---
Small pondweed	3.03	1.00	---	---	---	---	---	---	---	---
White-stem pondweed	---	---	6.06	1.00	4.26	1.00	8.7	1.00	10.87	1.00
Clasping-leaf pondweed	15.15	1.00	15.15	1.00	36.17	1.00	8.7	1.00	10.87	1.00
Fern pondweed	39.39	1.62	33.33	1.18	19.15	1.11	17.39	1.25	2.17	1.00
Flat-stem pondweed	30.3	1.00	9.09	1.00	42.55	1.00	41.3	1.00	32.61	1.00
Stiff water crowfoot	24.24	1.00	18.18	1.33	4.26	1.00	8.7	1.00	8.7	1.00
Arrowhead species	---	---	---	---	4.26	1.00	2.17	1.00	2.17	1.00
Hard-stem bulrush	6.06	1.00	3.03	1.00	2.13	1.00	2.17	1.00	2.17	1.00
Water bulrush	---	---	---	---	---	---	4.35	1.00	2.17	1.00
Common bur-reed	---	---	---	---	2.13	1.00	---	---	---	---
Bur-reed species	3.03	1.00	---	---	---	---	---	---	---	---
Wild celery	6.06	1.00	3.03	1.00	12.77	1.00	13.04	1.00	13.04	1.00

* - F.o.O = Frequency of Occurrence

Table 9: Statistical Significance of Specie between Sampling Events, Barbertown Bay - Lac Courte Oreilles, Sawyer County, Wisconsin.

	2015 vs 2014			2015 vs 2013			2015 vs 2012			2015 vs 2011		
Specie	**+ / -**	**P-Value**	**significance**	**+ / -**	**P-Value**	**significance**	**+ / -**	**P-Value**	**significance**	**+ / -**	**P-Value**	**significance**
Curly-leaf pondweed	↓	0.645800395	n.s.	↓	0.238546574	n.s.	↓	**0.003250757**	**	↓	**0.001318149**	**
Filamentous algae	---	---	---	---	---	---	---	---	---	↓	**0.005849925**	**
Water marigold	no change	1	n.s.	↑	0.314722586	n.s.	↑	0.399106946	n.s.	↑	0.399106946	n.s.
Watersheild	no change	1	n.s.	↓	0.557344845	n.s.	↓	0.362025059	n.s.	↓	0.362025059	n.s.
Coontail	no change	1	n.s.	↓	0.295240122	n.s.	↑	0.078820983	n.s.	↓	0.904823552	n.s.
Muskgrass	↓	0.583079804	n.s.	↑	0.180868155	n.s.	↑	0.218374621	n.s.	↑	0.722982294	n.s.
Needle spikerush	↑	0.645800395	n.s.	↑	0.078345162	n.s.	↑	0.139049195	n.s.	↑	0.139049195	n.s.
Creeping spikerush	↑	0.314722586	n.s.	↑	0.314722586	n.s.	↑	0.399106946	n.s.	↑	0.399106946	n.s.
Elodea	↑	0.376123623	n.s.	↓	0.671307396	n.s.	↓	0.270698895	n.s.	↓	0.171695199	n.s.
Water star-grass	↑	**0.020469207**	*	↑	0.180286164	n.s.	↑	0.574033962	n.s.	↑	0.203073762	n.s.
Brown-fruited rush	---	---	---	---	---	---	---	---	---	↓	0.087405335	n.s.
Small duckweed	---	---	---	---	---	---	---	---	---	↓	0.229772227	n.s.
Forked duckweed	↓	0.167952607	n.s.	no change	1	n.s.	↓	0.799056315	---	↑	0.399106946	n.s.
Common watermoss	---	---	---	---	---	---	---	---	---	↓	0.087405335	n.s.
Northern water-milfoil	↑	0.184312993	n.s.	↑	0.667692005	n.s.	↑	**0.024334133**	*	↑	0.460489944	n.s.
Dwarf water-milfoil	↓	0.30679006	n.s.	↓	0.557344845	n.s.	↑	0.399106946	n.s.	↑	0.399106946	n.s.
Bushy pondweed	↓	0.459746555	n.s.	↑	0.645800395	n.s.	↑	0.953238903	n.s.	↓	0.371232531	n.s.
Spatterdock	no change	1	n.s.	no change	1	n.s.	↓	0.596162687	n.s.	↑	0.682119285	n.s.
White water lily	no change	1	n.s.	↓	0.536474121	n.s.	↓	0.334793265	n.s.	↓	0.547919578	n.s.
Pickerelweed	↑	0.15285977	n.s.	↑	0.15285977	n.s.	↑	0.23009697	n.s.	↑	0.23009697	n.s.
Large-leaf pondweed	no change	1	n.s.	no change	1	n.s.	↑	0.23009697	n.s.	↑	0.776476339	n.s.
Ribbon-leaf pondweed	↓	0.314722586	n.s.	---	---	---	---	---	---	---	---	---
Variable pondweed	↓	0.645800395	n.s.	↑	0.557344845	n.s.	↑	0.776476339	n.s.	↓	0.715319954	n.s.
Illinois pondweed	↓	0.557344845	n.s.	↓	0.30679006	n.s.	↓	0.799056315	n.s.	↓	0.362025059	n.s.
Floating-leaf pondweed	↓	0.314722586	n.s.	---	---	---	---	---	---	↓	**0.005849925**	**
Small pondweed	---	---	---	---	---	---	---	---	---	↓	0.229772227	n.s.
White-stem pondweed	↑	0.725936125	n.s.	↑	0.238546574	n.s.	↑	0.47564513	n.s.	↑	0.052975843	n.s.
Clasping-leaf pondweed	↑	0.725936125	n.s.	↓	**0.003463861**	**	↓	0.547919578	n.s.	↓	0.547919578	n.s.
Fern pondweed	↓	**0.014137315**	*	↓	**0.007446808**	**	↓	**0.000119067**	***	↓	**1.57107E-05**	***
Flat-stem pondweed	↓	0.390541652	n.s.	↓	0.286072259	n.s.	↑	**0.016100245**	*	↑	0.878304802	n.s.
Stiff water crowfoot	no change	1	n.s.	↑	0.398740519	n.s.	↓	0.197884862	n.s.	↓	0.052389402	n.s.
Arrowhead sp.	no change	1	n.s.	↑	0.314722586	n.s.	↑	0.399106946	n.s.	↑	0.399106946	n.s.
Hard-stem bulrush	no change	1	n.s.	no change	1	n.s.	↓	0.799056315	n.s.	↓	0.362025059	n.s.
Water bulrush	no change	1	n.s.	↑	0.314722586	n.s.	↑	0.399106946	n.s.	↑	0.399106946	n.s.
Comon bur-reed	---	---	---	↓	0.314722586	n.s.	---	---	---	---	---	---
Bur-reed specie	---	---	---	---	---	---	---	---	---	↓	0.229772227	n.s.
wild celery	no change	1	n.s.	no change	1	n.s.	↑	0.129249037	n.s.	↑	0.325041882	n.s.

*, **, *** - Levels of significance.

n.s. - Change not significant

--- - Specie was not sampled in both comparison years

Table 11: Frequency of Occurrence of Aquatic Plant Species by Year, Little Lac Courte Oreilles

	2014 Survey		2015 Survey	
Species	**% F.o.O.***	**Avg. Density**	**% F.o.O.***	**Avg. Density**
Curly-leaf pondweed	**0.61**	**1.00**	**---**	**---**
Water marigold	4.24	1.00	2.98	1.00
Watersheild	---	---	2.32	1.00
Coontail	19.39	1.00	18.21	1.02
Muskgrass	12.12	1.00	17.22	1.00
Waterwort	---	---	0.33	1.00
Needle spikerush	5.45	1.00	6.29	1.00
Common waterweed	43.03	1.01	38.41	1.01
Water star-grass	3.03	1.00	3.64	1.00
Quillwort	---	---	0.66	1.00
Brown-fruited rush	---	---	1.32	1.00
Water lobelia	---	---	0.33	1.00
Northern water-milfoil	13.94	1.00	22.19	1.18
Dwarf water-milfoil	4.24	1.00	2.65	1.00
Slender naiad	---	---	20.53	1.00
Spatterdock	---	---	4.64	1.00
White water lily	4.24	1.00	4.64	1.00
Pickerelweed	---	---	0.66	1.00
Large-leaf pondweed	3.03	1.00	11.26	1.00
Variable pondweed	3.03	1.00	14.57	1.00
Illinois pondweed	---	---	4.64	1.00
Floating-leaf pondweed	---	---	0.33	1.00
White-stem pondweed	9.09	1.00	1.99	1.00
Small pondweed	---	---	8.28	1.00
Clasping-leaf pondweed	6.67	1.00	16.23	1.00
Fern pondweed	34.58	1.00	41.06	1.20
Stiff pondweed	---	---	0.33	1.00
Vasey's pondweed	---	---	1.32	1.25
Flat-stem pondweed	23.03	1.00	23.18	1.00
Stiff water crowfoot	0.61	1.00	2.65	1.00
Arrowhead species	---	---	2.98	1.00
Narrow-leaved bur-reed	---	---	0.33	1.00
Sago pondweed	---	---	0.66	1.00
Wild celery	---	---	18.21	1.00

* - F.o.O = Frequency of Occurrence

Appendix E

Figures

Aquatic Invasive Plant Area	
AREA ID	ACREAGE
	Curly Leaf Pondweed
A	0.50
B	1.23
C	2.55
D	0.50
E	0.50
F	17.02
G	2.51
H	0.50
TOTAL	25.32

Treatment Area	
AREA ID	ACREAGE
A	7.49
TOTAL	7.49

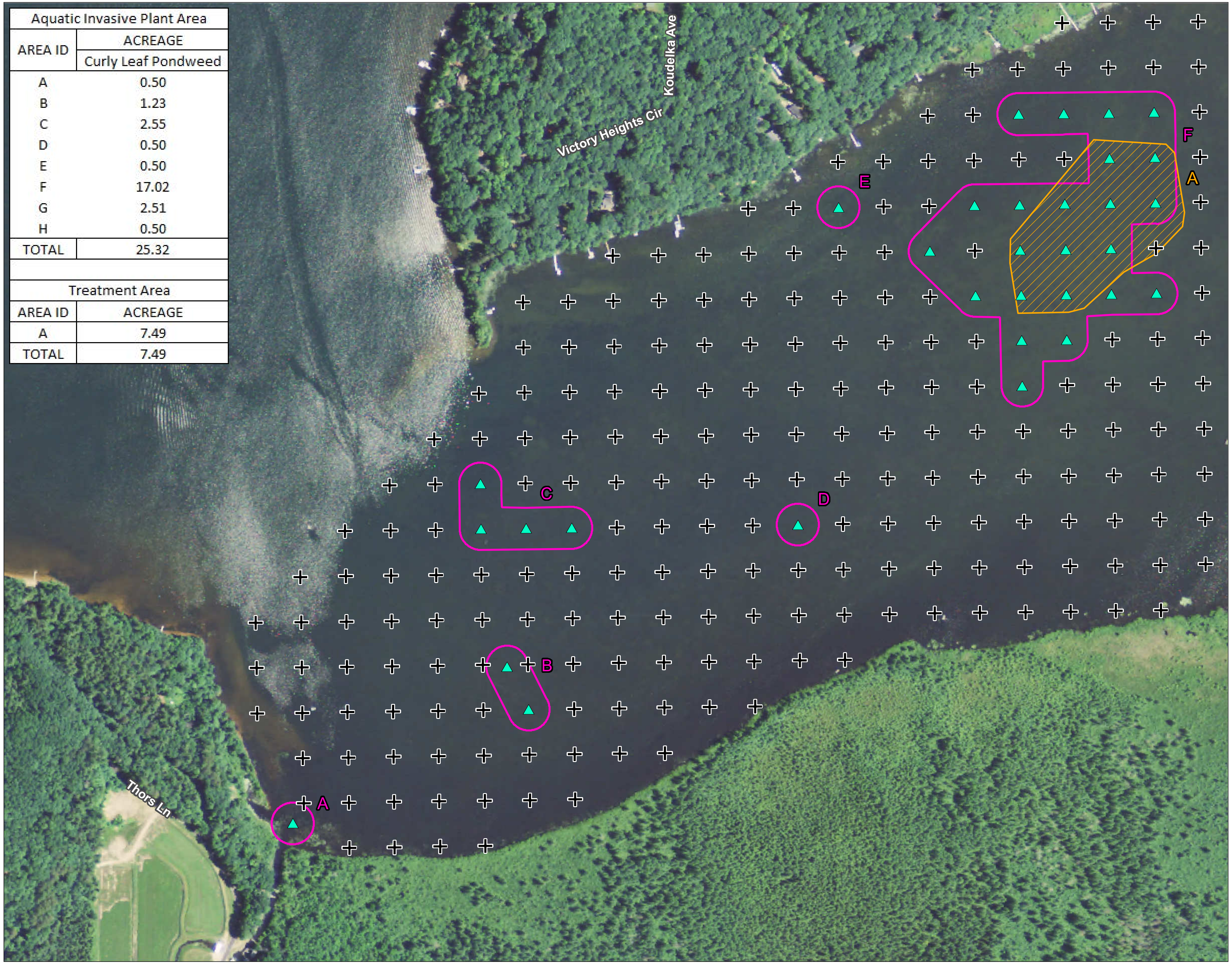


Figure No.
1

Title
Musky Bay 2015 Pre-Treatment Survey

Client/Project
Court Oreilles Lake Association, Inc.

Project Location
Sawyer Co.

193701708
Prepared by JD on 2015-05-22
Technical Review by AB on 2015-05-22
Independent Review by XXX on 2014-XX-XX

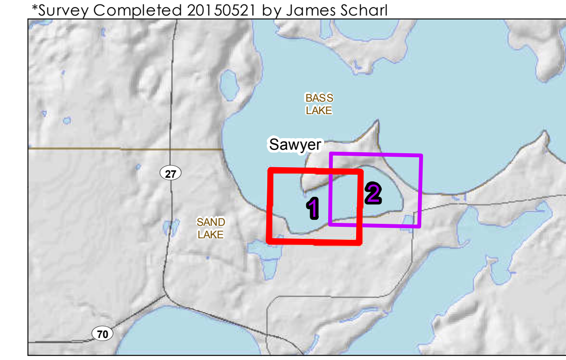
0 200 400 Feet
1:4,800 (At original document size of 11x17)

N

Legend
- GPS Sample Points*
- Curly-leaf Pondweed (Fullness Rating of 1)
- Aquatic Invasive Plant Area
- Treatment Area

Fullness Rating	Coverage	Description
1		Few plants. There are not enough plants to entirely cover the length of the rake head in a single layer.
2		There are enough plants to cover the length of the rake head in a single layer, but not enough to fully cover tines.
3		The rake is completely covered and tines are not visible.

*Survey Completed 20150521 by James Scharl



Notes
1. Coordinate System: NAD 1983 HARN WISCRS Sawyer County Feet
2. Data Sources Include: Stantec, WDNR, WDOT
3. Orthophotography: 2013 NAIP

Stantec

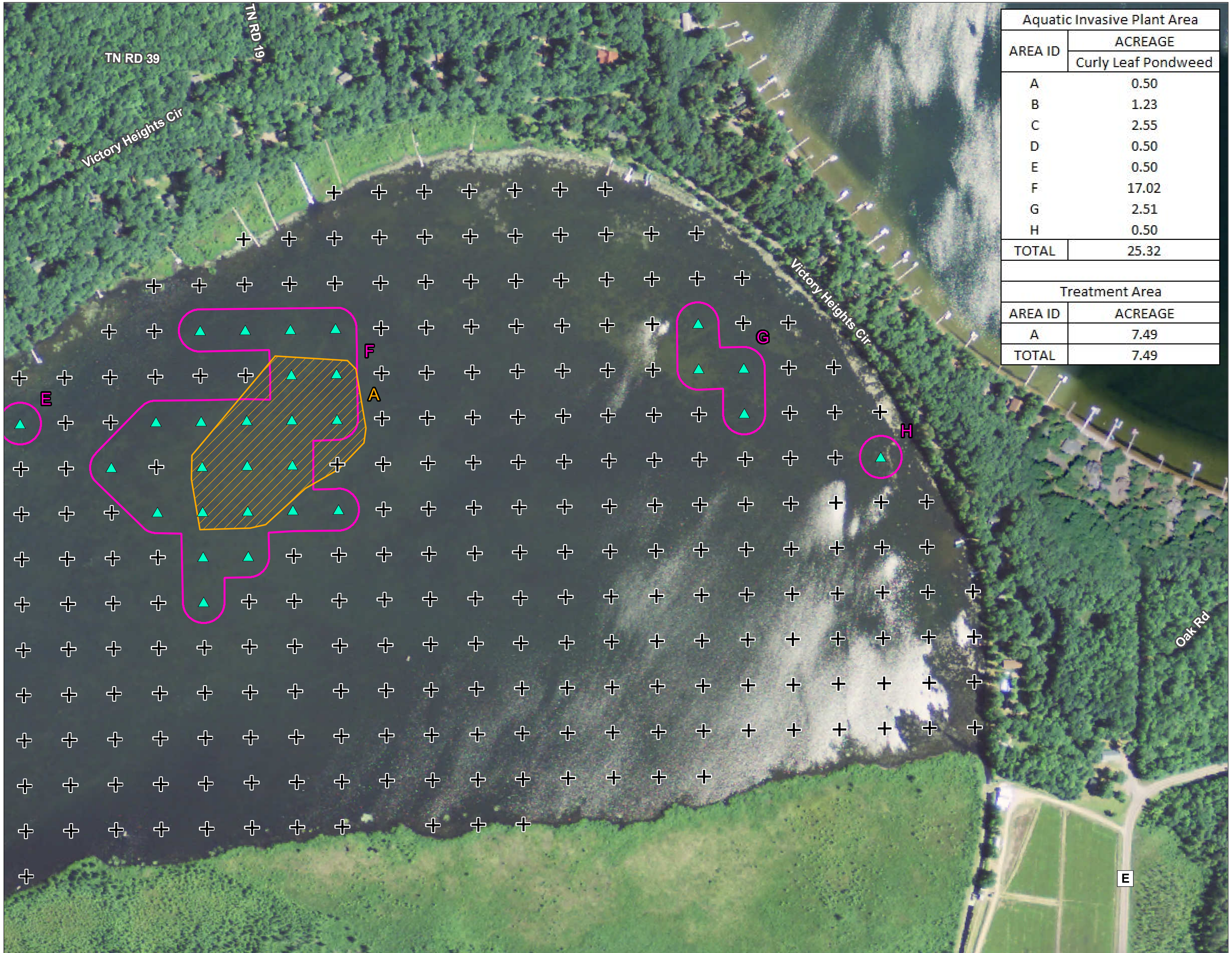
Figure No.
2

Title
Musky Bay
2015 Pre-Treatment Survey

Client/Project
Court Oreilles Lake Association, Inc.

Project Location
Sawyer Co.

193701708
Prepared by JD on 2015-05-22
Technical Review by AB on 2015-05-22
Independent Review by XXX on 2014-XX-XX



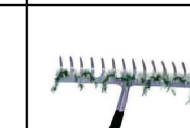
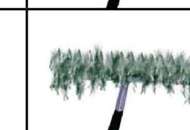
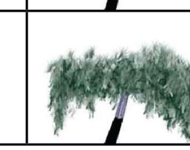
Aquatic Invasive Plant Area	
AREA ID	ACREAGE Curly Leaf Pondweed
A	0.50
B	1.23
C	2.55
D	0.50
E	0.50
F	17.02
G	2.51
H	0.50
TOTAL	25.32

Treatment Area	
AREA ID	ACREAGE
A	7.49
TOTAL	7.49

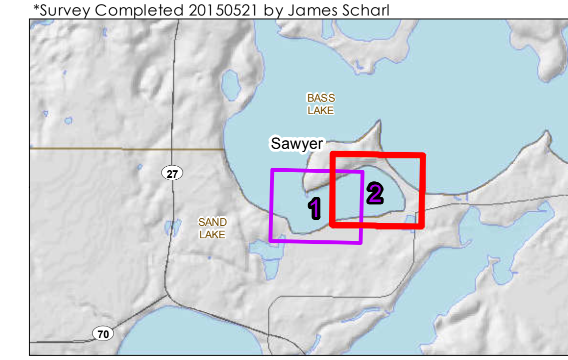
0 200 400 Feet
1:4,800 (At original document size of 11x17)

N

Legend
- GPS Sample Points*
- Curly-leaf Pondweed (Fullness Rating of 1)
- Aquatic Invasive Plant Area
- Treatment Area

Fullness Rating	Coverage	Description
1		Few plants. There are not enough plants to entirely cover the length of the rake head in a single layer.
2		There are enough plants to cover the length of the rake head in a single layer, but not enough to fully cover the tines.
3		The rake is completely covered and tines are not visible.

*Survey Completed 20150521 by James Scharl



Notes
1. Coordinate System: NAD 1983 HARN WISCRS Sawyer County Feet
2. Data Sources Include: Stantec, WDNR, WDOT
3. Orthophotography: 2013 NAIP

Stantec

Figure No.
3

Title
Stucky Bay
2015 Pre-Treatment Survey

Client/Project
Court Oreilles Lake Association, Inc.

Project Location
Sawyer Co.

193701708
Prepared by JD on 2014-05-22
Technical Review by AB on 2015-05-22
Independent Review by XXX on 2014-XX-XX

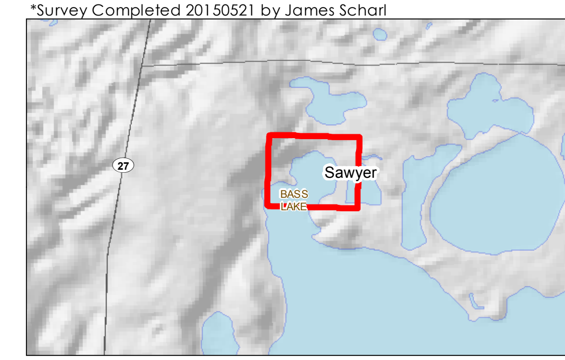
0 100 200 Feet
1:2,400 (At original document size of 11x17)

N

Legend
- GPS Sample Points*
- Curly-leaf Pondweed (Fullness Rating of 1)
- Treatment Area (0.50 ac)

Fullness Rating	Coverage	Description
1		Few plants. There are not enough plants to entirely cover the length of the rake head in a single layer.
2		There are enough plants to cover the length of the rake head in a single layer, but not enough to fully cover tines.
3		The rake is completely covered and tines are not visible.

*Survey Completed 20150521 by James Scharl



Notes
1. Coordinate System: NAD 1983 StatePlane Iowa North FIPS 1401 Feet
2. Data Sources Include: Stantec, WDNR, WDOT
3. Orthophotography: 2013 NAIP

Stantec

R:\gis\other_PCs\193701708_AIS_Muskey_Barbertown_Stukey\07_gis\mxds\2015\AIS_StuckyBay_PreTreatment_2015.mxd Revised: 2015-12-03 By: Ksoltau

Figure No.
4

Title
Barbertown Bay
2015 Pre-Treatment Survey

Client/Project
Court Oreilles Lake Association, Inc.

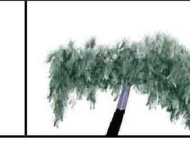
Project Location
Sawyer Co.

193701708
Prepared by JD on 2015-05-22
Technical Review by AB on 2015-05-22
Independent Review by XXX on 2015-XX-XX

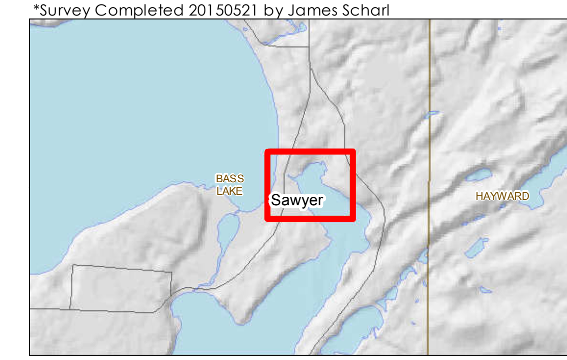
0 150 300 Feet
1:3,600 (At original document size of 11x17)

N

Legend
- GPS Sample Points*
- Curly-leaf Pondweed (Fullness Rating of 1)
- Treatment Area (1.00 ac)

Fullness Rating	Coverage	Description
1		Few plants. There are not enough plants to entirely cover the length of the rake head in a single layer.
2		There are enough plants to cover the length of the rake head in a single layer, but not enough to fully cover the tines.
3		The rake is completely covered and tines are not visible.

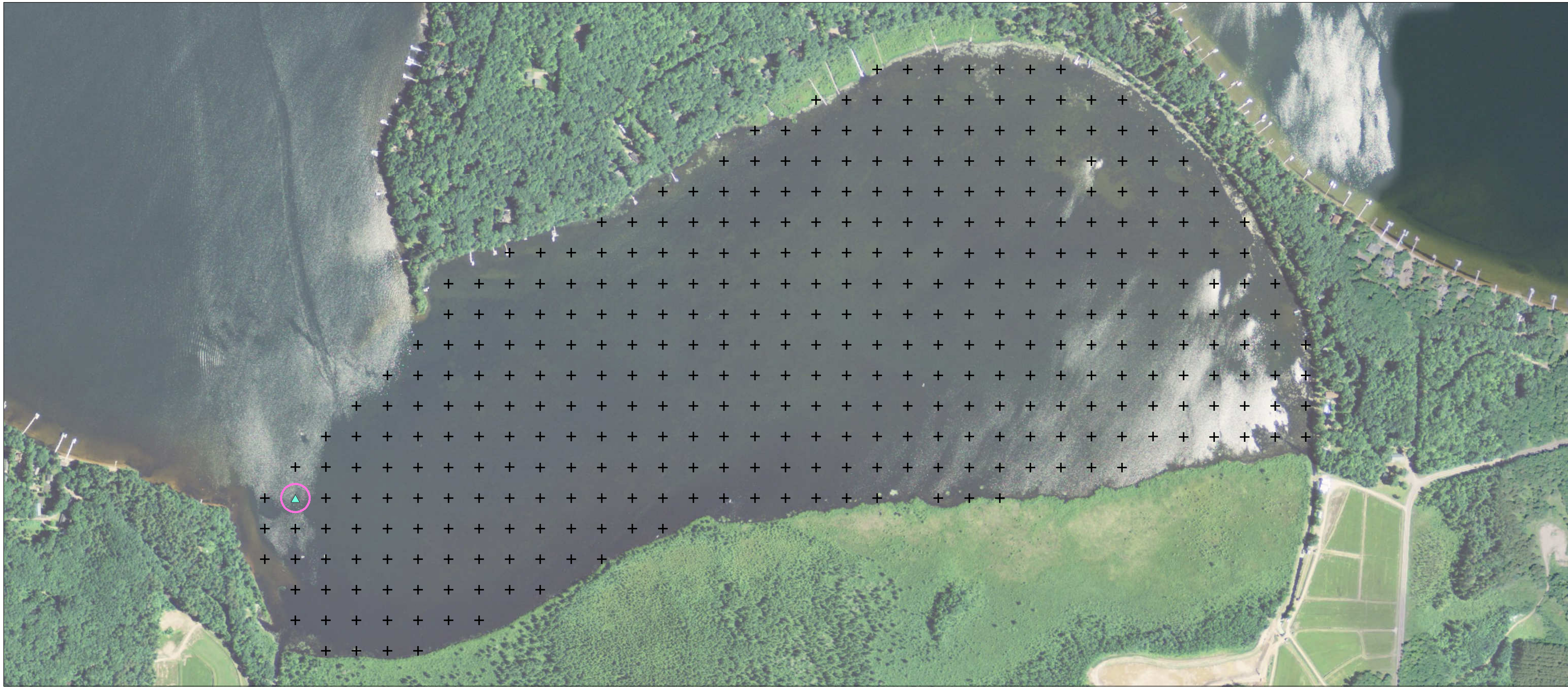
*Survey Completed 20150521 by James Scharl

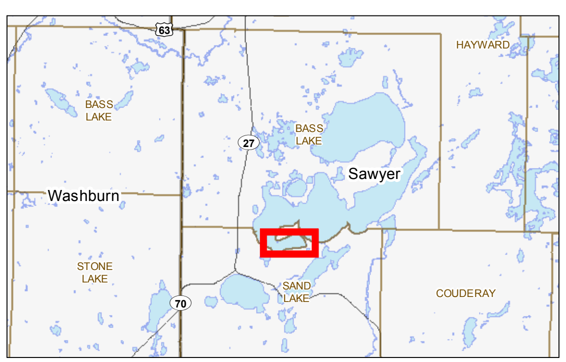


Notes
1. Coordinate System: NAD 1983 HARN WISCRS Sawyer County Feet
2. Data Sources Include: Stantec, WDNR, WDOT
3. Orthophotography: 2013 NAIP

Stantec

R:\gis\other PCs\193701708 AIS Muskey Barbertown Stukey\07_gis\mxds\2015\AIS Barbertown PreTreatment 2015.mxd Revised: 2015-12-03 By: Ksoltau





Legend

- + GPS Sample Points*
- ▲ Fullness Rating 1
- ○ Curly-leaf Pondweed Area (0.50 ac)

Fullness Rating	Coverage	Description
1		Few plants. There are not enough plants to entirely cover the length of the rake head in a single layer.
2		There are enough plants to cover the length of the rake head in a single layer, but not enough to fully cover tines.
3		The rake is completely covered and tines are not visible.

Notes

1. Coordinate System: NAD 1983 StatePlane Wisconsin North FIPS 4801 Feet
2. Data Sources Include:Stantec, WDNR, WDOT
3. Orthophotography: 2013 NAIP

*Survey conducted on 2015/06/29-30 by James Scharl & Chris Caplan

Figure No.
5

Title
2015 AIS Survey: Musky Bay Curly-leaf Pondweed

Client/Project
Court Oreilles Lake Association, Inc.

Project Location
Sawyer Co., Wi

193701708
Prepared by KAS on 2015-08-07
Technical Review by JD on 2015-08-07
Independent Review by MK on 2015-08-27

0 300 600 Feet
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N

Stantec

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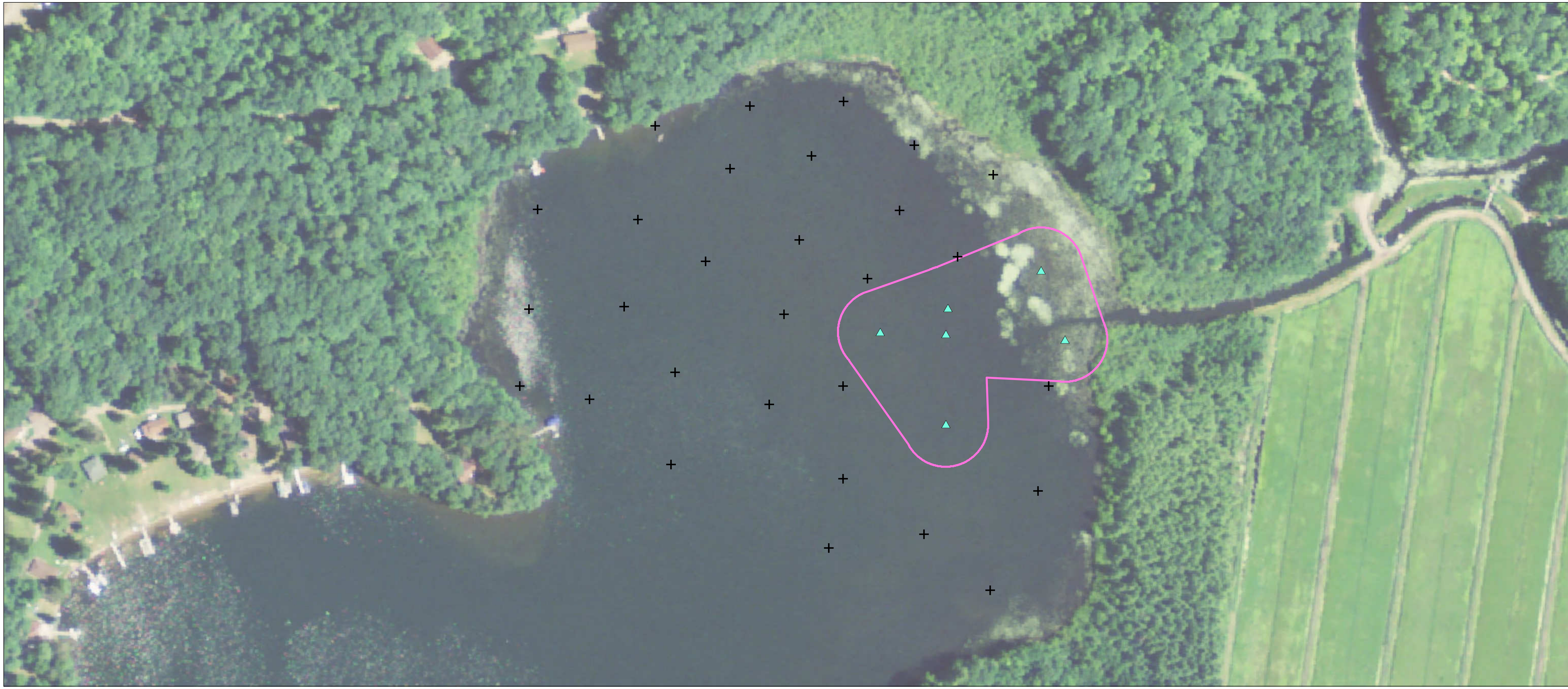
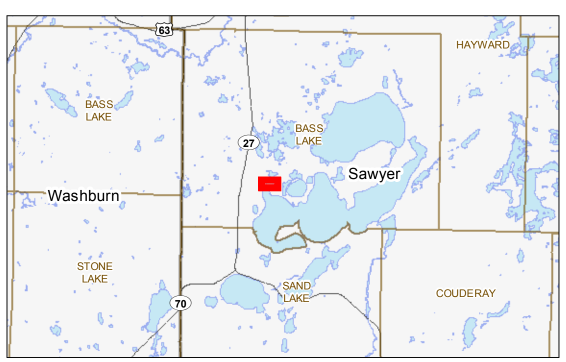




Notes

1. Coordinate System: NAD 1983 StatePlane Wisconsin North FIPS 4801 Feet
2. Data Sources Include:Stantec, WDNR, WDOT
3. Orthophotography: 2013 NAIP

Legend

- + GPS Sample Points*
- △ Fullness Rating 1
- ○ Curly-leaf Pondweed Area (3.39 ac)

*Survey conducted on 2015/07/01 by James Scharl & Chris Caplan

Fullness Rating	Coverage	Description
1		Few plants. There are not enough plants to entirely cover the length of the rake head in a single layer.
2		There are enough plants to cover the length of the rake head in a single layer, but not enough to fully cover tines.
3		The rake is completely covered and tines are not visible.

Figure No.
6

Title

2015 AIS Survey: Stucky Bay Curly-leaf Pondweed

Client/Project
Court Oreilles Lake Association, Inc.

Project Location
Sawyer Co., Wi

193701708
Prepared by KAS on 2015-08-07
Technical Review by JD on 2015-08-07
Independent Review by MK on 2015-08-27

0 100 200 Feet
1:2,400 (At original document size of 11x17)

N

Stantec

Notes

1. Coordinate System: NAD 1983 StatePlane Wisconsin North FIPS 4801 Feet
2. Data Sources Include:Stantec, WDNR, WDOT
3. Orthophotography: 2013 NAIP

Legend

- \+ GPS Sample Points*
- △ Fullness Rating 1
- ○ Curly-leaf Pondweed Area

Curly-leaf Pondweed Coverage (acreage)	
A	2.44
B	0.50
C	0.50
Total	**3.44**

*Survey conducted on 2015/07/01 by James Scharl & Chris Caplan

Fullness Rating	Coverage	Description
1		Few plants. There are not enough plants to entirely cover the length of the rake head in a single layer.
2		There are enough plants to cover the length of the rake head in a single layer, but not enough to fully cover tines.
3		The rake is completely covered and tines are not visible.

Figure No.
7

Title
2015 AIS Survey: Barbertown Bay Curly-leaf Pondweed

Client/Project
Court Oreilles Lake Association, Inc.

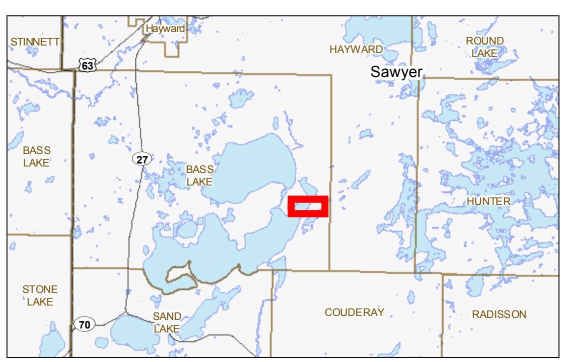
Project Location
Sawyer Co., Wi

193701708
Prepared by KAS on 2015-08-07
Technical Review by JD on 2015-08-07
Independent Review by MK on 2015-08-27

0 200 400 Feet
1:4,800 (At original document size of 11x17)

N

Stantec



Notes

1. Coordinate System: NAD 1983 StatePlane Wisconsin North FIPS 4801 Feet
2. Data Sources Include:Stantec, WDNR, WDOT
3. Orthophotography: 2013 NAIP

Legend

- + GPS Sample Points*
- △ Curly-leaf Pondweed (Fullness Rating 1)
- ○ Curly-leaf Pondweed Area

*Survey conducted on 2015/07/01 by James Scharl & Chris Caplan

Curly-leaf Pondweed Coverage (acreage)	
A	1.00
B	1.00
TOTAL	**2.00**

Fullness Rating	Coverage	Description
1		Few plants. There are not enough plants to entirely cover the length of the rake head in a single layer.
2		There are enough plants to cover the length of the rake head in a single layer, but not enough to fully cover tines.
3		The rake is completely covered and tines are not visible.

Figure No.
8

Title
2015 AIS Survey: Lac Courte Oreilles Curly-leaf Pondweed

Client/Project
Court Oreilles Lake Association, Inc.

Project Location
Sawyer Co., Wi

193701708
Prepared by KAS on 2015-08-07
Technical Review by JD on 2015-08-07
Independent Review by MK on 2015-08-27

0 200 400 Feet
1:4,800 (At original document size of 11x17)

N

Stantec

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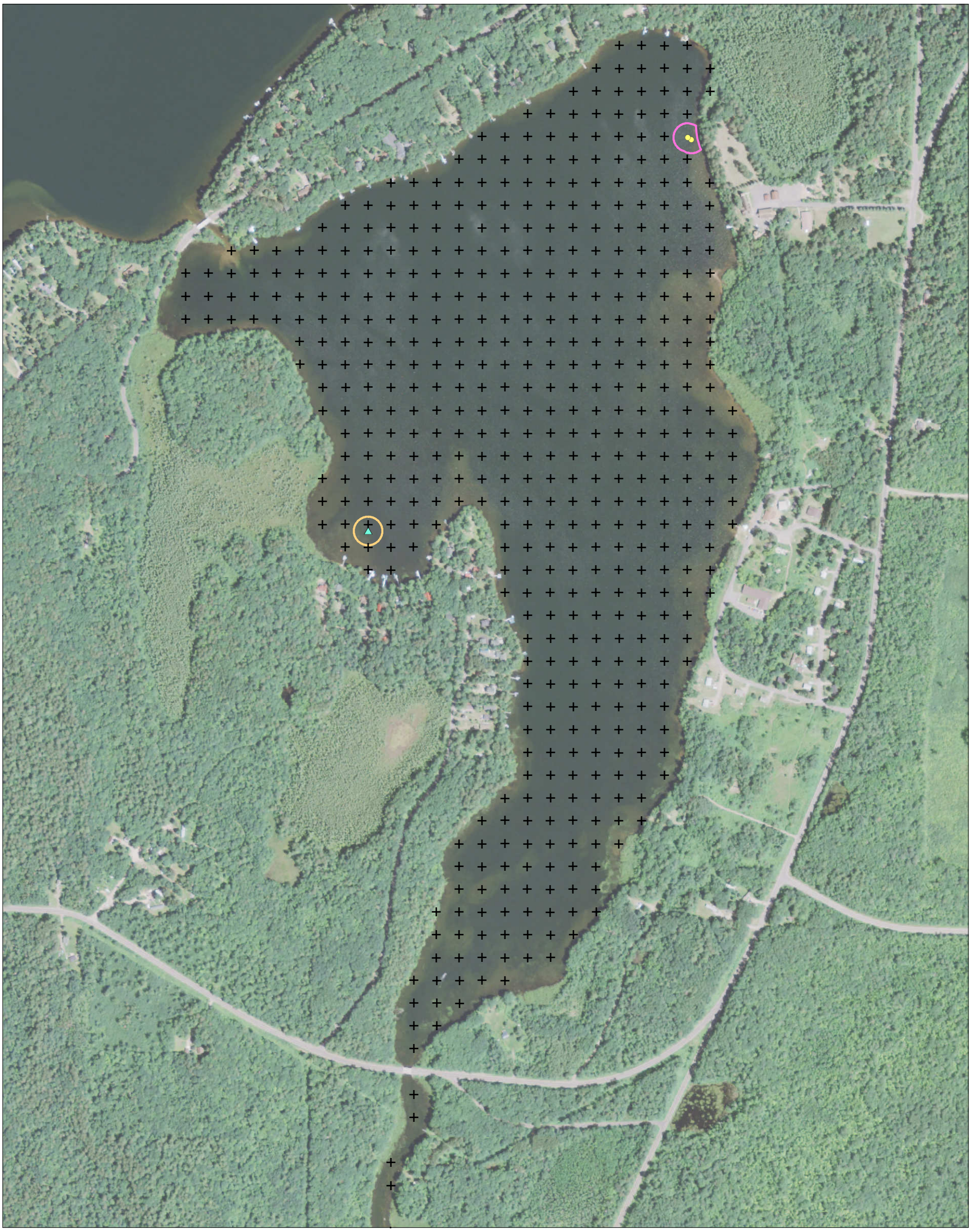
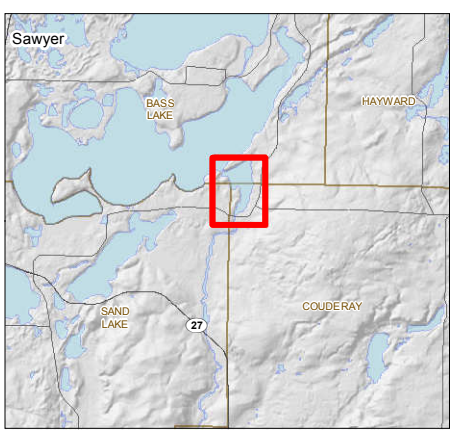


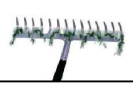
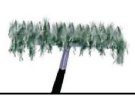
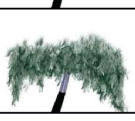


Notes

1. Coordinate System: NAD 1983 StatePlane Wisconsin North FIPS 4801 Feet
2. Data Sources Include: Stantec, WDOT, and WDNR
3. Orthophotography: 2013 NAIP

Legend

- \+ GPS Sample Points*
- Eurasian Water-Milfoil (Fullness Rating 1)
- Curly-leaf Pondweed (Fullness Rating 1)
- Curly-leaf Pondweed Area (0.50 ac)
- Eurasian Water-Milfoil Area (0.48 ac)

Fullness Rating	Coverage	Description
1		Few plants. There are not enough plants to entirely cover the length of the rake head in a single layer.
2		There are enough plants to cover the length of the rake head in a single layer, but not enough to fully cover tines.
3		The rake is completely covered and tines are not visible.

*Survey conducted on 2015/07/01 by James Scharl & Chris Caplan

Figure No.

9

Title

2015 AIS Survey
Little Lac Courte Oreilles

Client/Project

Court Oreilles Lake Association, Inc.

Project Location
Sawyer Co., Wi

193701708
Prepared by KAS on 2015-08-11
Technical Review by JD on 2015-08-11
Independent Review by MK on 2015-08-27

0 300 600 Feet

1:7,200 (At Original document size of 11x17)

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Stantec