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December 18, 2014

Courte Oreilles Lakes Association
Hayward, Wisconsin 54843

Reference: 2014 Aquatic Plant Management Report for Lac Courte Oreilles and Little Lac Courte Oreilles

Dear Courte Oreilles Lakes Association Members:

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 2014 and for the upcoming 2015 season.

PROJECT SUMMARY

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, to encourage growth of native aquatic plants that are out competed by CLP, to help improve the health of the lake ecosystem by restoring native habitat, and to improve the recreational and aesthetic value of the Lake. The report reviews existing and historical data for the Lake and activities that were conducted during 2013.

BACKGROUND

Lac Courte Oreilles is a 5139 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, an AIS, has been treated on the Lakes within the past few years.

2014 AQUATIC PLANT MANAGEMENT

COLA contracted Stantec for the 2014 chemical treatment of CLP. Stantec, on behalf of the COLA, was successfully issued a permit to chemically treat up to 33 acres of aquatic invasive species (CLP) based on 2013 post-treatment survey results for the 2014 season by the Wisconsin Department of Natural Resources (WDNR) as follows: 30 acres in Musky Bay, 1.5 acres in Barbertown Bay, and 1.5 acres in Stucky Bay. A copy of the permit is included in Attachment A.

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 a full point-intercept aquatic plant survey in Musky Bay, Stucky Bay, and Barbertown Bay in on June 2, 2014. CLP was present in all locations, with a large reduction in Musky Bay, down from 2013 post-treatment survey of 27.94 acres to 2 acres. Stucky Bay had 1.00 acres of CLP growth while Barbertown Bay was surveyed at 0.50 acres. Full results are found in the following sections.

Chemical treatment for CLP was completed on June 13, 2014. To ensure adequate herbicide contact and retention time, the Musky Bay treatment area polygons were increased to 3 acres for CLP growth, 1.0 acres in Barbertown Bay, and 1.5 acres in Stucky Bay for a total treatment area of 5.5 acres. In Musky Bay, liquid Aquathol-K® (active ingredient endothall) and granular Clearcast 2.7g® (active ingredient imazamox) and was applied at 2.0 parts per million (ppm) and 200 parts per billion (ppb), respectively, within areas of active CLP growth mapped during the 2014 pre-treatment survey. In order to reduce agricultural watering restrictions for cranberry farms from the treatment, a split approach was used within the remaining bays. Within areas of Stucky Bay proper, liquid Aquathol K was applied at 3.0 ppm, as there is no agricultural water use restriction. 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. In compliance with WDNR regulations, treatment records were completed and are included in Attachment B.

PRE & POST-TREATMENT FULL AQUATIC PLANT SURVEYS AND ANALYSIS

Prior to treatment, the aquatic plant community of all areas was surveyed on June 2, 2014 by Stantec, Inc. The survey was completed according to the point intercept sampling method described by Madsen (1999) and as outlined in the WDNR draft guidance entitled "Aquatic Plant Management in Wisconsin" (WDNR, 2005). This survey at all sample locations were repeated 34 days post-treatment on July 17 and 18, 2014.

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.

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** - 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** - average number of taxa per intercept point.
- **Mean intercept point native taxonomic richness** - average number of native taxa per intercept point.
- **Taxonomic frequency of occurrence within vegetated areas** - 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** - 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** - 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** - sum of the density values for a particular species divided by the number of sampling sites.

- **Simpson Diversity Index (SDI)** - 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), which 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.

AQUATIC PLANT ECOLOGY

Aquatic plants are vital to the health of a water body. Unfortunately, people all too often refer to rooted aquatic plants as "weeds" and ultimately wish to eradicate them. This type of attitude, and the misconceptions it breeds, must be overcome in order to properly manage a lake ecosystem. Rooted aquatic plants (macrophytes) are extremely important for the well-being of a lake community and possess many positive attributes. Despite their importance, aquatic macrophytes sometimes grow to nuisance levels that hamper recreational activities. This is especially prevalent in degraded ecosystems. The introduction of certain aquatic invasive species (AIS), such as CLP, often can exacerbate nuisance conditions, particularly when they successfully out-compete native vegetation and occupy large portions of a lake.

When "managing" aquatic plants, it is important to maintain a well-balanced, stable, and diverse aquatic plant community that contains high percentages of desirable native species. To be effective, aquatic plant management in most lakes must maintain a plant community that is robust, species rich, and diverse.

AQUATIC INVASIVE SPECIES

Aquatic Invasive Species (AIS) are aquatic plants and animals that have been introduced by human action to a location, area, or region where they did not previously exist. AIS often lack natural control mechanisms they may have had in their native ecosystem and may interfere with the native plant and animal interactions in their new "home". Some AIS have aggressive reproductive potential and contribute to a decline of a lake's ecology and interfere with recreational use of a lake. Common Wisconsin AIS include:

- Eurasian Watermilfoil
- Curly Leaf Pondweed
- Zebra Mussels
- Rusty Crayfish
- Spiny Water Flea
- Purple Loosestrife

PRE AND POST TREATMENT AQUATIC PLANT DATA ANALYSIS – MUSKY BAY

The pre-treatment survey was carried out June 2, 2012, and included sampling at the same 394 intercept points used for the 2014 post-treatment survey on July 17 & 18, 2014. 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 - 2014 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
F.o.o. at sites shallower than maximum depth of plants	100	99.22	95.69	94.67	96.45	96.9
Simpson Diversity Index	0.84	0.85	0.75	0.69	0.82	0.81
Avergage number of all species per site	3.58	3.14	2.13	1.63	2.31	2.28
Average number of all species per vegetated site	3.58	3.16	2.23	1.72	2.39	2.35
Average Number of native species per site	3.54	2.91	2.11	1.62	2.2	2.27
Average Number of native species per vegetated site	3.54	2.93	2.22	1.71	2.29	2.34
Species Richness	29	25	26	23	26	25
Community FQI	35.03	29.82	30.86	29.46	31.02	30.06
Average Coefficient of Conservatism	6.74	6.22	6.42	6.43	6.33	6.41

In 2014, Aquatic vegetation was detected at 96.9 percent (%) of photic zone intercept points. A diverse plant community was sampled during the 2014 post-treatment survey. The Simpson Diversity Index value of the community was 0.81, taxonomic richness was 25 species, and there was an average of 2.28 species identified at points that were within the photic zone and an average of 2.35 species present at points with vegetation present.

The most abundant aquatic plants identified during the 2014 aquatic plants survey were elodea (*Elodea canadensis*), coontail (*Ceratophyllum demersum*), and clasping-leaf pondweed (*Potamogeton richardsonii*). Elodea and coontail were also the two most common sampled during the 2012 & 2013 post-treatment surveys. Table 2 includes the abundance statistics for each species found during the surveys.

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	
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**
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
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
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
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
Needle spikerush	---	---	0.78	1.00	2.03	1.00	0.76	1.00	0.25	1	1.29	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
Water stargrass	---	---	---	---	0.25	1.00	2.03	1.00	1.78	1	0.78	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
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
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
Slender naiad	2.24	1.00	0.26	1.00	0.25	1.00	---	---	1.52	1.17	5.17	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
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
Pickerelweed	0.75	1.00	---	---	0.25	1.00	0.51	1.00	0.25	1	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
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
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
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
Fern pondweed	93.28	1.75	15.58	1.10	12.69	1.12	2.28	1.00	---	---	---	---
Flat-stem pondweed	29.1	1.10	9.61	1.10	2.03	1.00	---	---	2.54	1	4.65	1.06
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
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
Hard-stem bulrush	0.75	1.00	0.26	1.00	---	---	0.25	1.00	0.25	1	---	---
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
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

* - F.o.O = Frequency of Occurrence

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

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 2014 versus the 2007 full survey, 2010 pre-treatment, and 2011-2013 post-treatment surveys.

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

	2014 v 2013			2014 v 2012			2014 v 2011			2014 v 2010			2014 v 2007	
Specie	**+ / -**	**P-Value**	**significance**	**+ / -**	**P-value**	**significance**	**+ / -**	**P-value**	**significance**	**+ / -**	**P-value**	**significance**	**+ / -**	**P-value**	**significance**
Curly-leaf pondweed	↓	**5.4E-10**	***	no change	1	n.s.	↓	**0.65369**	n.s.	↓	**5.86271E-22**	***	↓	**1.71246E-33**	***
Filamentous algae	---	---	---	---	---	---	↓	0.0139376	*	---	---	---	↓	0.0001169	***
Water marigold	↑	**0.03299**	*	↓	0.79433	n.s.	↓	**0.00045**	***	↓	**2.42888E-07**	***	↓	0.7345858209	n.s.
Coontail	↑	0.112166	n.s.	↑	**2.8E-13**	***	↓	**0.02714**	*	↓	**1.35436E-05**	***	↓	0.74800509	n.s.
Chara	↑	0.343393	n.s.	↑	**0.01215**	*	↑	**0.01938**	*	↑	**1.04165E-06**	***	↑	**0.01490825**	*
Needle spikerush	↔	0.101162	n.s.	↔	0.4772555	n.s.	↔	0.4014694	n.s.	↔	0.47725545 8	n.s.	↔	0.190110012	n.s.
Elodea	↔	0.929269	n.s.	↔	0.1402428	n.s.	↓	**0.00095**	***	↔	**0.00283942 3**	**	↔	**0.00538056**	**
Water stargrass	↓	0.203013	n.s.	↓	0.1289664	n.s.	↔	0.3160791	n.s.	↑	0.08267753 8	n.s.	↔	0.311068205	n.s.
Quillwort	---	---	---	---	---	---	---	0.3170032	n.s.	---	---	---	↓	**0.00289688 7**	**
Small duckweed	↓	0.317003	n.s.	↓	0.0826775	n.s.	↓	0.3170032	n.s.	↓	0.31700324 3	n.s.	---	---	---
Forked duckweed	↑	0.128966	n.s.	↔	0.0561948	n.s.	↑	0.2445884	n.s.	↑	**0.01893676 5**	*	↑	0.096487031	n.s.
Watermoss	---	---	---	↔	0.0826775	n.s.	---	---	---	---	---	---	---	---	---
Northern water-milfoil	↓	0.534264	n.s.	↑	**1.7E-08**	***	↑	**7.8E-06**	***	↑	**0.03772518 3**	*	↔	0.218513693	n.s.
Dwarf water-milfoil	no change	1	n.s.	↑	0.5629587	n.s.	↑	0.5629587	n.s.	↑	0.56295870 2	n.s.	↔	0.099355231	n.s.
Slender naiad	↑	**0.00524**	**	↑	**5.9E-06**	***	↑	**2.6E-05**	***	↑	**2.63965E-05**	***	↔	0.164525129	n.s.
Spatterdock	no change	1	n.s.	↑	0.2547184	n.s.	↑	0.737434	n.s.	↑	0.10116206 4	n.s.	↔	0.845077697	n.s.
White water lily	↓	**0.04555**	*	↔	0.422546	n.s.	↑	0.2502637	n.s.	↑	**0.00019855 1**	***	↔	0.550583283	n.s.
Pickerelweed	no change	1	n.s.	↔	0.5629587	n.s.	no change	1	n.s.	↔	0.31700324 3	n.s.	↓	0.422758509	n.s.
Large-leaf pondweed	↓	0.231461	n.s.	↑	0.0502692	n.s.	↑	**0.00146**	**	↔	0.30951003 9	n.s.	↓	**9.25102E-11**	***
Leafy pondweed	---	---	---	---	---	---	---	---	---	---	---	---	↓	0.08609691	n.s.
Frie's pondweed	---	---	---	---	---	---	---	---	---	---	---	---	↓	**0.00057631 2**	***
Variable pondweed	↔	0.653692	n.s.	↑	0.0826775	n.s.	↔	0.0826775	n.s.	↓	0.704201886	n.s.	↓	0.051884437	n.s.
Illinois pondweed	↔	0.156772	n.s.	---	---	---	↔	0.3170032	n.s.	---	---	---	↓	**0.0001169**	***
Floating-leaf pondweed	+	0.317003	n.s.	↑	0.3170032	n.s.	↔	0.3170032	n.s.	↑	0.31700324 3	n.s.	↑	0.559398427	n.s.
White-stem pondweed	↓	**8.3E-13**	***	↑	**3.6E-07**	***	↔	0.4973813	n.s.	↔	**0.00056838 49**	***	↔	**0.002465061**	**
Small pondweed	---	---	---	---	---	---	---	---	---	↓	0.31700324 3	n.s.	↓	**4.38645E-08**	***
Clasping-leaf pondweed	↑	**4.4E-08**	***	↓	0.4307037	n.s.	↑	**1.2E-12**	***	↓	**0.00590215 7**	**	↓	**0.00060835 1**	***
Fern pondweed	---	---	---	↓	**0.00255**	**	↓	**2.7E-13**	***	↓	**7.70159E-16**	***	↓	**7.8374E-108**	***
Flat-stem pondweed	↑	0.123693	n.s.	↑	**1.8E-05**	***	↓	**0.04612**	*	↓	**0.00789943 3**	**	↓	**7.36242E-18**	***
Stiff water crowfoot	no change	1	n.s.	↓	0.1783291	n.s.	↓	0.0576602	n.s.	↓	**1.0256E-16**	***	↓	**2.12773E-06**	***
Grass-leaved arrowhead	↓	---	---	---	---	---	---	---	---	---	---	---	↓	**0.01511549**	*
Arrowhead species	↓	0.178329	n.s.	↑	0.3170032	n.s.	↓	0.5629587	n.s.	no change	1	n.s.	↓	0.422758509	n.s.
Hard-stem bulrush	↓	0.317003	n.s.	↑	0.3170032	n.s.	↓	0.3170032	n.s.	↓	0.31700324 3	n.s.	↓	0.08609691	n.s.
Bur-reed species	↓	0.317003	n.s.	↑	0.3170032	n.s.	↑	0.3170032	n.s.	↑	0.31700324 3	n.s.	↔	0.559398427	n.s.
Floating-leaved bur-reed	↓	---	---	---	---	---	---	---	---	---	---	---	↓	**0.01511549**	*
Narrow-leaved bur-reed	↓	0.562959	n.s.	no change	1	n.s.	↑	0.3170032	n.s.	↔	0.31700324 3	n.s.	↑	0.559398427	n.s.
Large duckweed	---	---	---	---	---	---	---	---	---	↔	0.15677208 7	n.s.	---	---	---
Wild celery	↑	0.243472	n.s.	↑	**0.00127**	**	---	---	n.s.	↓	**8.31477E-07**	***	↓	**0.04730178 9**	*

*, **, *** - 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, was successful across all years prior to 2013, which saw a mapped increase in CLP remaining after treatment within Musky Bay. From historically high levels in 2010 (90+ acres) to a 98.4% reduction after treatment in 2011, CLP was reduced drastically. These treatments were with a targeted baywide dose of approximately 700 PPB with the contact herbicide endothall as the active ingredient. The 2013 post-treatment survey showed CLP to be present at 27.94 acres (29 acres pre-treatment) resulting in an over-all reduction of 3.7%. However, most of the CLP present was outside of direct treatment areas, which saw a 76% reduction. Of the remaining CLP, a majority was visibly affected by the Clearcast® treatment showing symptoms of impact including; reduced or eliminated turion count, reduced turion size (if present), and a dense, compact growth. This impacted CLP did not successfully overwinter, as expected. After the 2014 pre-treatment survey, mapped CLP was reduced by 94.6% to 1.50 acres in Musky Bay as much of the standing CLP during the 2013 post-treatment survey did not reproduce.

After treatment, 1.50 remaining acres of CLP were mapped within Musky Bay. All of these areas, however, were outside of the 2014 treatment area, showing great success for 2014 management. All areas found remaining were small, single point locations of 0.5 acres.

Native species restoration and limiting non-target impact is an important goal of all AIS management. Though successful, CLP control within Musky Bay was not without impact to non-target native species, which peaked in 2012. 2013 saw rebound in numerous species and community indices which continued into 2014. Between 2014 and 2013 two species declined significantly (compared to three in 2013 from 2012). The following is a breakdown of these species with additional comments:

a. **White-stem pondweed** – Only down from 2013, but still increased from 2007 data. This species has varied across all years, increasing one year then decreasing the next, and appears to be inversely related to clasping-leaf pondweed abundance (when one decreases, the other increases and vice-versa).
b. **White water lily** – Down from a historical high in 2013, but still increased in abundance since 2007.

From 2007 to 2014, 13 species declined significantly from baseline levels. The following is a breakdown of these species not touched on above:

a. **Curly-leaf pondweed** –statistical decrease and at an all-time low. Definitely a result of all management action.
b. **Common waterweed** – Appears to be on a yearly downward trend that is likely due to treatments, but still dominant species. Slight increase from 2013.
c. **Quillwort** - This specie has a very limited area in Musky Bay where it can grow (shallow, sand bottom areas) and was only found in 2 spots in 2007, 0 in 2010, 1 in 2011, and 0 in 2012 - 2014. Was also reduced significantly in 2007 v 2010 with no large-scale treatment taking place.
d. 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.
e. **Frie's pondweed** – Frie's pondweed has never been prevalent in Musky Bay & wasn't found in any survey since 2007, including 2010 with no large-scale treatment taking place between the 2007 and 2010 surveys.
f. **Illinois Pondweed** – Has decreased significantly from 2007 to 2014 and was not found during the 2010 survey, before initial whole-bay treatment took place. It's presence in other areas of the lake is highly variable year to year.

g. **Small Pondweed** – This species decreased significantly from 2007 to 2010 without a large-scale treatment, but only decreased slightly (not significant) from 2010 to 2014 and was not found during the 2011-2014 surveys.
h. **Clasping-leaf pondweed** – Though it has decreased significantly from 2007 data, it has increased significantly from 2013 levels. Its presence is tied inversely to white-stem pondweed.
i. **Fern pondweed** – Significant decrease across all comparison years, especially 2007 to 2013 when no plants were found with none found again in 2014. 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.
j. **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.
k. **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 2014.
l. **Grass-leaved arrowhead** – This species has not been specifically identified since 2007. However, arrowhead species rosettes have been sampled each year since and are difficult to distinguish prior to maturation.
m. **Floating-leaf bur-reed** – Was only found at 1 point in 2007 and none in 2010 - 2014. It has a limited area where it can grow and is likely still present, just not at a sample point. Narrow-leaf bur-reed was found in 2014 and is a close relative.
n. **Wild celery** – This species was surveyed at all-time highs in 2010 and has since dropped significantly from 2007 & 2010 levels to current, 2014 levels. However, it has shown positive response in 2014, increasing significantly from 2012 and further nearing 2007 levels.

Upon reviewing all the above data, it is our belief that the main concern for species decrease should be focused on the following high value species with some of the most substantial decreases over the last four years; stiff-water crowfoot, flat-stem pondweed, and fern pondweed. In conjunction, the community as a whole was visibly affected from 2007 to 2012, but has rebounded slightly since 2013 and into 2014. Simpson diversity decreased from 2007 to 2012 and the average number of species per point dropped by 52% (3.58 to 1.72). In 2014, however, both indices increased with Simpson Diversity Index returning to near pre-treatment levels. Though the average number of species per point is still below 2007, it increased by 34% from 2012 levels. While from 2012 to 2013, nine species increased significantly – coontail, northern water-milfoil, slender naiad / bushy pondweed, white water lily, large-leaf pondweed, white-stem pondweed, flat-stem pondweed (not found in 2012), arrowhead species, and wild celery.

PRE AND POST TREATMENT AQUATIC PLANT DATA ANALYSIS – STUCKY BAY

CLP is also present in within Stucky Bay. The pre-treatment survey to map existing CLP was completed in 2014 during the same time as the Musky Bay survey and 1.0 acres of CLP was found within Stucky for treatment in 2014. Following treatment in 2014, a post-treatment survey was completed on July 14, 2014 (excluding the 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 2011-2014 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
F.o.o. at sites shallower than maximum depth of plants	100	100	84.38	96.88	100
Simpson Diversity Index	0.91	0.88	0.84	0.91	0.89
Avergage number of all species per site	4.72	3.59	2.53	3.41	3.34
Average number of all species per vegetated site	4.72	3.63	3	3.52	3.34
Average Number of native species per site	4.69	3.56	2.41	3.31	3.34
Average Number of native species per vegetated site	4.69	3.49	2.85	3.42	3.34
Species Richness	20	21	13	20	17
Community FQI	27.3	27.07	20.78	24.98	24.01
Average Coefficient of Conservatism	6.26	6.21	6	5.89	5.82

In 2014, Aquatic vegetation was detected at 100% of photic zone intercept points. A diverse plant community was sampled during the 2014 post-treatment survey. The Simpson Diversity Index value of the community was 0.89, taxonomic richness was 17 species, and there was an average of 3.34 species identified at survey locations. Though the total species and SDI found in 2014 are comparable to past surveys, the FQI fell slightly compared to historical data, but rose from the 2012 low and remained stable from 2013.

The most abundant aquatic plants identified during the 2014 aquatic plant survey were coontail, fern pondweed (*Potamogeton robbinsii*), wild celery (*Vallisneria americana*) and elodea, the same most-prevalent species as sampled in 2013. Table 5 includes the abundance statistics for each species found during the surveys.

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	
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	**6.25**	**1.00**	**3.13**	**1.00**	12.5	1.00	9.38	1.00	---	---
Water marigold	6.25	1.00	9.38	1.00	---	---	12.5	1.00	---	---
Coontail	50	1.06	53.13	1.12	31.25	1.00	43.75	1.00	53.13	1.00
Muskgrass	---	---	9.38	1.00	6.25	1.00	3.13	1.00	15.63	1.00
Elodea	71.88	1.00	46.88	1.00	37.5	1.00	40.63	1.15	43.75	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
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
Slender naiad	15.63	1.00	---	---	---	---	3.13	1.00	15.63	1.00
Spatterdock	6.25	1.00	6.25	1.00	6.25	1.00	9.38	1.00	12.5	1.00
White water lily	9.38	1.00	12.5	1.00	15.63	1.00	21.88	1.00	21.88	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
Floating-leaf pondweed	9.38	1.00	3.13	1.00	---	---	6.25	1.00	3.13	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
Small pondweed	25	1.00	3.13	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
Fern pondweed	75	1.63	81.25	1.58	68.75	1.14	53.13	1.00	50	1.19
Flat-stem pondweed	50	1.06	31.25	1.00	---	---	21.88	1.00	3.13	1.00
Stiff water crowfoot	9.38	1.00	3.13	1.00	3.13	1.00	---	---	---	---
Arrowhead species	---	---	---	---	---	---	6.25	1.00	---	---
Large duckweed	---	---	---	---	---	---	3.13	1.00	3.13	1.00
Wild celery	40.63	1.00	25	1.00	6.25	1.00	40.63	1.00	50	1.00

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. The following table displays statistical changes, if any, for each species sampled versus the 2010-2013 post-treatment surveys.

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

	2014 vs 2013			2014 vs 2012			2014 vs 2011			2014 vs 2010		
Specie	**+ / -**	**P-Value**	**significance**	**+ / -**	**P-Value**	**significance**	**+ / -**	**P-Value**	**significance**	**+ / -**	**P-Value**	**significance**
Curly-leaf pondweed	↓	0.076041	n.s.	↓	**0.038867104**	*	↓	0.313499946	n.s.	↓	0.150762775	n.s.
Water marigold	↓	**0.03887**	*	---	---	---	↓	0.076041476	n.s.	-	0.150762775	n.s.
Coontail	↑	0.453034	n.s.	↑	0.076434141	n.s.	no change	1	n.s.	↑	0.802492879	n.s.
Muskgrass	↑	0.086276	n.s.	↑	0.229556214	n.s.	↑	0.449691798	n.s.	↑	**0.019864892**	*
Elodea	↑	0.800184	n.s.	↑	0.610732731	n.s.	↓	0.801732213	n.s.	↓	**0.022727818**	*
Water star-grass	no change	1	n.s.	no change	1	n.s.	no change	1	n.s.	no change	1	n.s.
Small duckweed	↓	0.3135	n.s.	---	---	---	---	---	---	---	---	---
Forked duckweed	---	---	---	---	---	---	↓	0.313499946	n.s.	---	---	---
Common watermoss	---	---	---	---	---	---	↓	0.313499946	n.s.	---	---	---
Northern water-milfoil	↑	0.076041	n.s.	↓	0.688787592	n.s.	no change	1	n.s.	↓	0.054663936	n.s.
Slender naiad	↑	0.086276	n.s.	↑	**0.019864892**	*	↑	**0.019864892**	*	no change	1	n.s.
Spatterdock	↑	0.688788	n.s.	↑	0.391063648	n.s.	↑	0.391063648	n.s.	↑	0.391063648	n.s.
White water lily	no change	1	n.s.	↑	0.52183939	n.s.	↑	0.320233364	n.s.	↑	0.168493468	n.s.
Pickerelweed	↓	0.3135	n.s.	---	---	---	↓	0.313499946	n.s.	↓	**0.313499946**	n.s.
Large-leaf pondweed	↑	0.3135	n.s.	↑	0.313499946	n.s.	↑	0.313499946	n.s.	↓	**0.011835452**	*
Variable pondweed	---	---	---	---	---	---	---	---	---	↓	0.313499946	n.s.
Illinois pondweed	↓	**0.04523**	*	↑	0.313499946	n.s.	no change	1	n.s.	↑	0.313499946	n.s.
Floating-leaf pondweed	↓	0.554268	n.s.	↑	0.313499946	n.s.	no change	1	n.s.	↓	0.301699582	n.s.
White-stem pondweed	↑	0.226476	n.s.	↑	**0.005884992**	**	↑	**0.020379695**	*	↑	**0.020379695**	*
Small pondweed	---	---	---	---	---	---	↓	0.313499946	n.s.	↓	**0.002496909**	**
Clasping-leaf pondweed	↓	0.521839	n.s.	↓	**0.007000942**	**	↓	**0.013803065**	*	↓	0.226476066	n.s.
Fern pondweed	↓	0.802493	n.s.	↓	0.126740266	n.s.	↓	**0.008493215**	**	↓	**0.038867104**	*
Flat-stem pondweed	↓	**0.02334**	*	↑	0.313499946	n.s.	↓	**0.002864325**	**	↓	**2.18306E-05**	***
Stiff water crowfoot	---	---	---	↓	0.313499946	n.s.	↓	0.313499946	n.s.	↓	0.076041476	n.s.
Arrowhead species	↓	0.150763	n.s.	---	---	---	---	---	---	---	---	---
Large duckweed	no change	1	n.s.	↑	0.313499946	n.s.	↑	0.313499946	n.s.	↑	0.313499946	n.s.
wild celery	↑	0.451259	n.s.	↑	**9.9311E-05**	***	↑	**0.038867104**	*	↑	0.451258974	n.s.

Four species present in 2013 were not sampled in 2014. However, two species (pickerelweed and arrowhead species), though not directly sampled, were still present along the shoreline, just outside of the survey area. Water marigold was not present and declined significantly from 2013, but is not a cause for a concern due to a variable life cycle in previous surveys. Illinois and flat-stem pondweed also both declined from 2013, but again both have varied in density throughout all past surveys. Additionally, three species absent from 2013, but found in previous surveys, were again present within Stucky Bay.

Reduction of CLP is the main goal of the project and this species saw a decrease from 2013. New mapping of CLP found it extirpated from areas treated in 2014 with none remaining from pre-treatment areas. The agricultural channel for the connected cranberry bogs was not surveyed at this time.

PRE AND POST TREATMENT AQUATIC PLANT DATA ANALYSIS – BARBERTOWN BAY

CLP is also present in within Barbertown Bay. The pre-treatment survey to map existing CLP was completed in 2014 during the same time as the Musky Stucky Bay surveys and mapped 0.50 acres for treatment in 2014. Following this treatment, a post-treatment survey was completed on July 17, 2014 at the same 47 sample locations. The aquatic macrophyte community of Barbertown Bay was very diverse each year. Table 7 lists the aquatic plant community statistics during the 2011 - 2014 post-treatment aquatic plant surveys.

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

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

In 2014, Aquatic vegetation was detected at 95.6% of photic zone intercept points. A diverse plant community was again sampled during the 2014 post-treatment survey. The Simpson Diversity Index value of the community was 0.92, taxonomic richness was 28 species, and there was an average of 3.36 species identified at all sample points with vegetation. Total species in 2014 increased again from 2013 with the Simpson Diversity Index, FQI, and average coefficient of Conservatism increasing as well, indicating a diverse and stable ecosystem within the Bay.

The most abundant aquatic plants identified during the 2014 aquatic plants survey were the same three most prevalent as in 2013; coontail, flat-stem pondweed, and common waterweed. Table 8 includes the abundance statistics for each species found during the surveys.

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	
Specie	**% 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**
Filamentous algae	15.15	1.00	---	---	---	---	---	---
Water marigold	---	---	---	---	---	---	2.17	1.00
Watersheild	6.06	1.00	6.06	1.00	6.38	1.00	2.17	1.00
Coontail	54.55	1.00	33.33	1.09	63.83	1.13	54.35	1.08
Muskgrass	12.12	1.00	6.06	1.00	6.38	1.00	19.57	1.00
Needle spikerush	---	---	---	---	---	---	4.35	1.00
Elodea	51.52	1.00	48.48	1.00	10.43	1.00	28.26	1.00
Water star-grass	12.12	1.25	18.18	1.33	12.77	1.00	6.52	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
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
Dwarf water-milfoil	---	---	---	---	4.26	1.00	6.52	1.00
Bushy pondweed	12.12	1.00	6.06	1.00	4.26	1.00	10.87	1.00
Spatterdock	6.06	1.00	12.12	1.00	8.51	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
Large-leaf pondweed	3.03	1.00	---	---	4.26	1.00	4.35	1.00
Ribboon-leaf pondweed	---	---	---	---	---	---	2.17	1.00
Variable pondweed	6.06	1.00	3.03	1.00	2.13	1.00	6.52	1.00
Illinois pondweed	6.06	1.00	3.03	1.00	6.38	1.00	4.35	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
Clasping-leaf pondweed	15.15	1.00	15.15	1.00	36.17	1.00	8.7	1.00
Fern pondweed	39.39	1.62	33.33	1.18	19.15	1.11	17.39	1.25
Flat-stem pondweed	30.3	1.00	9.09	1.00	42.55	1.00	41.3	1.00
Stiff water crowfoot	24.24	1.00	18.18	1.33	4.26	1.00	8.7	1.00
Arrowhead species	---	---	---	---	4.26	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
Water bulrush	---	---	---	---	---	---	4.35	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

Comparison between years was done using the same statistical analysis as with Musky and Stucky Bays. The following table displays statistical changes, if any, for each species sampled versus the 2011-2013 post-treatment surveys.

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

	2014 vs 2013			2014 vs 2012			2014 vs 2011		
Specie	**+ / -**	**P-Value**	**significance**	**+ / -**	**P-Value**	**significance**	**+ / -**	**P-Value**	**significance**
Curly-leaf pondweed	↓	**0.459746555**	**n.s.**	↓	**0.009996236**	**	↓	**0.004303878**	**
Filamentous algae	---	---	---	---	---	---	↓	0.005849925	**
Water marigold	↑	0.314722586	n.s.	↑	0.399106946	n.s.	↑	0.399106946	n.s.
Watersheild	↓	0.557344845	n.s.	↓	0.362025059	n.s.	↓	0.362025059	n.s.
Coontail	↓	0.295240122	n.s.	↑	0.078820983	n.s.	↓	0.904823552	n.s.
Muskgrass	↑	0.063673281	n.s.	↑	0.094237602	n.s.	↑	0.401583618	n.s.
Needle spikerush	↑	0.15285977	n.s.	↑	0.23009697	n.s.	↑	0.23009697	n.s.
Elodea	↓	0.191551365	n.s.	↓	0.056459858	n.s.	↓	**0.030031284**	*
Water star-grass	↓	0.292978788	n.s.	↓	0.100146537	n.s.	↓	0.371232531	n.s.
Brown-fruited rush	---	---	---	---	---	---	↓	0.087405335	n.s.
Small duckweed	---	---	---	---	---	---	↓	0.229772227	n.s.
Forked duckweed	↑	0.167952607	n.s.	↑	0.318823314	n.s.	↑	0.085542058	n.s.
Common watermoss	---	---	---	---	---	---	↓	0.087405335	n.s.
Northern water-milfoil	↓	0.366983611	n.s.	↑	0.263865596	n.s.	↓	0.638008784	n.s.
Dwarf water-milfoil	↑	0.645800395	n.s.	↑	0.139049195	n.s.	↑	0.139049195	n.s.
Bushy pondweed	↑	0.238546574	n.s.	↑	0.47564513	n.s.	↓	0.836290235	n.s.
Spatterdock	no change	1	n.s.	↓	0.596162687	n.s.	↑	0.682119285	n.s.
White water lily	↓	0.536474121	n.s.	↓	0.334793265	n.s.	↓	0.547919578	n.s.
Large-leaf pondweed	no change	1	n.s.	↑	0.23009697	n.s.	↑	0.776476339	n.s.
Ribbon-leaf pondweed	↑	0.314722586	n.s.	↑	0.399106946	n.s.	↑	0.399106946	n.s.
Variable pondweed	↑	0.30679006	n.s.	↑	0.498191323	n.s.	↑	0.953238903	n.s.
Illinois pondweed	↓	0.645800395	n.s.	↑	0.776476339	n.s.	↓	0.715319954	n.s.
Floating-leaf pondweed	↑	0.314722586	n.s.	↑	0.399106946	n.s.	↓	**0.029465404**	*
Small pondweed	---	---	---	---	---	---	↓	0.229772227	n.s.
White-stem pondweed	↑	0.398740519	n.s.	↑	0.682119285	n.s.	↑	0.085542058	n.s.
Clasping-leaf pondweed	↓	0.001285879	**	↓	0.354761873	n.s.	↓	0.354761873	n.s.
Fern pondweed	↓	0.788718646	n.s.	↓	0.09145193	n.s.	↓	**0.025163021**	*
Flat-stem pondweed	↓	0.834183558	n.s.	↑	**0.00200197**	**	↑	0.353843497	n.s.
Stiff water crowfoot	↑	0.398740519	n.s.	↓	0.197884862	n.s.	↓	0.052389402	n.s.
Arrowhead species	↑	0.314722586	n.s.	↑	0.399106946	n.s.	↑	0.399106946	n.s.
Hard-stem bulrush	no change	1	n.s.	↓	0.799056315	n.s.	↓	0.362025059	n.s.
Water bulrush	↑	0.314722586	n.s.	↑	0.399106946	n.s.	↑	0.399106946	n.s.
Common bur-reed	↓	0.314722586	n.s.	---	---	---	---	---	---
Bur-reed species	---	---	---	---	---	---	↓	0.229772227	n.s.
Wild celery	no change	1	n.s.	↑	0.129249037	n.s.	↑	0.325041882	n.s.

All species present in 2013 were again sampled in 2014 except for common bur-reed. Additionally, five new species were sampled along with one being a historical species absent since 2011 (floating-leaf pondweed). Reduction of CLP is the main goal of the project and this species saw a decrease from 2013 to 2014, but an increase from 2014 pre-treatment levels. All new CLP mapped was outside of treatment areas.

LITTLE LAC COURTE OREILLES

Little Lac Courte Oreille is a 221 acre lake immediately downstream of Lac Courte Oreilles, connect by river. 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.

A full littoral zone survey was completed on Little LCO on June 3, 2014, the same time as the pre-treament surveys on LCO. Possible locations of CLP growth and their coordinates were forwarded to Stantec as areas to double check as well. Overall, 169 location were sampled. In areas indicated as potentially having CLP growth, extra samples and visuals were completed as to thoroughly survey the area.

Little LCO has a divers plant community with mostly sand bottom and large stretches of steep-dropping slopes, limiting habitat CLP. In total, one location of CLP totaling approximately 0.50 acres was surveyed and mapped (see figure). 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.

MANAGEMENT SUGGESTIONS

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 does not reach unmanageable levels. While the level of physical plant control experienced in 2013 was not what was initially desired, the pre and post-treatment surveys in the spring of 2014 told the real story of success from 2013 actions with Clearcast (imazamox). During post-treatment surveys in Musky Bay for 2013, there was standing CLP still present, only slightly reduced coverage-wise from that year's pre-treatment survey. However, many plants were visibly impacted with stunted or no turion development and irregular growth forms. Based on this, there was an expected carry-over impact into 2014 from reduced reproductive potential due to impacts.

This carry-over effect was noted during the 2014 pre-treatment survey when only 2.00 acres of CLP were mapped. This area was then treated with a mixture of both endothall and imazamox and successfully reduced, with no treated areas of CLP remaining in Musky Bay. Additionally, year-after native plant impacts from whole-bay treatments were significantly reduced with the use of Clearcast, as opposed to substantial non-target effects from large-scale endothall use. There are essentially two basic schools of thought regarding invasive species management; simplistically one is to control the invasive at all costs, the other is augment the native plant community as true control of the invasive plant will likely never be achieved and the best defense is a robust healthy plant native plant community. Our management approach here is to try and walk a line between both approaches in recommending the best overall long term management strategies.

For 2014 CLP growth was greatly reduced from pre-treatment levels with and overall positive trend with native plant numbers continuing to increase over previous years, in particular in Musky Bay which had seen a decline from past whole-bay management with endothall. 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. 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 2015 and beyond is highly recommended in conjunction with a post-treatment survey approximately 30 days after treatment to assess potential impacts to the surrounding plant community.

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 2015 spring pre-treatment survey;

Musky Bay – Based on 2014 success of mixed herbicide application, use of this process is recommended again for 2015. All CLP remaining post-treatment in 2014 was in small, isolated locations, similar but separate to that treated in 2014. A mixture of liquid endothall and imazamox applied at a ratio of approximately 2.0 ppm to 200ppb, respectively. Due to the large volume of surround 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 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 2015, 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 and Barbertown Bays, 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 to 200 ppb, respectively, with care taken to negate potential agricultural irrigation restrictions in Stucky Bay.

Should any new areas of active CLP growth be identified outside of past management areas; it is recommended to use endothall at max label rates to mapped areas.

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.

Additionally we recommend continued pre and post treatment surveys and mapping of both CLP and native species. Though CLP has been extensively reduced from historical levels, complete extirpation of these 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 2014 chemical treatment or with additional concerns.

Respectfully,
STANTEC CONSULTING SERVICES INC.

James T. Scharl
Staff Scientist/WI Licensed Applicator
Tel: (608) 839-1998 ext. 2026
Fax: (608) 839-1995
Email: james.scharl@stantec.com

Mark Kordus, Associate
Project Manager

Attachments

FIGURES

AREA ID	ACREAGE
	Curly Leaf Pondweed
A	2.00
TOTAL	2.00

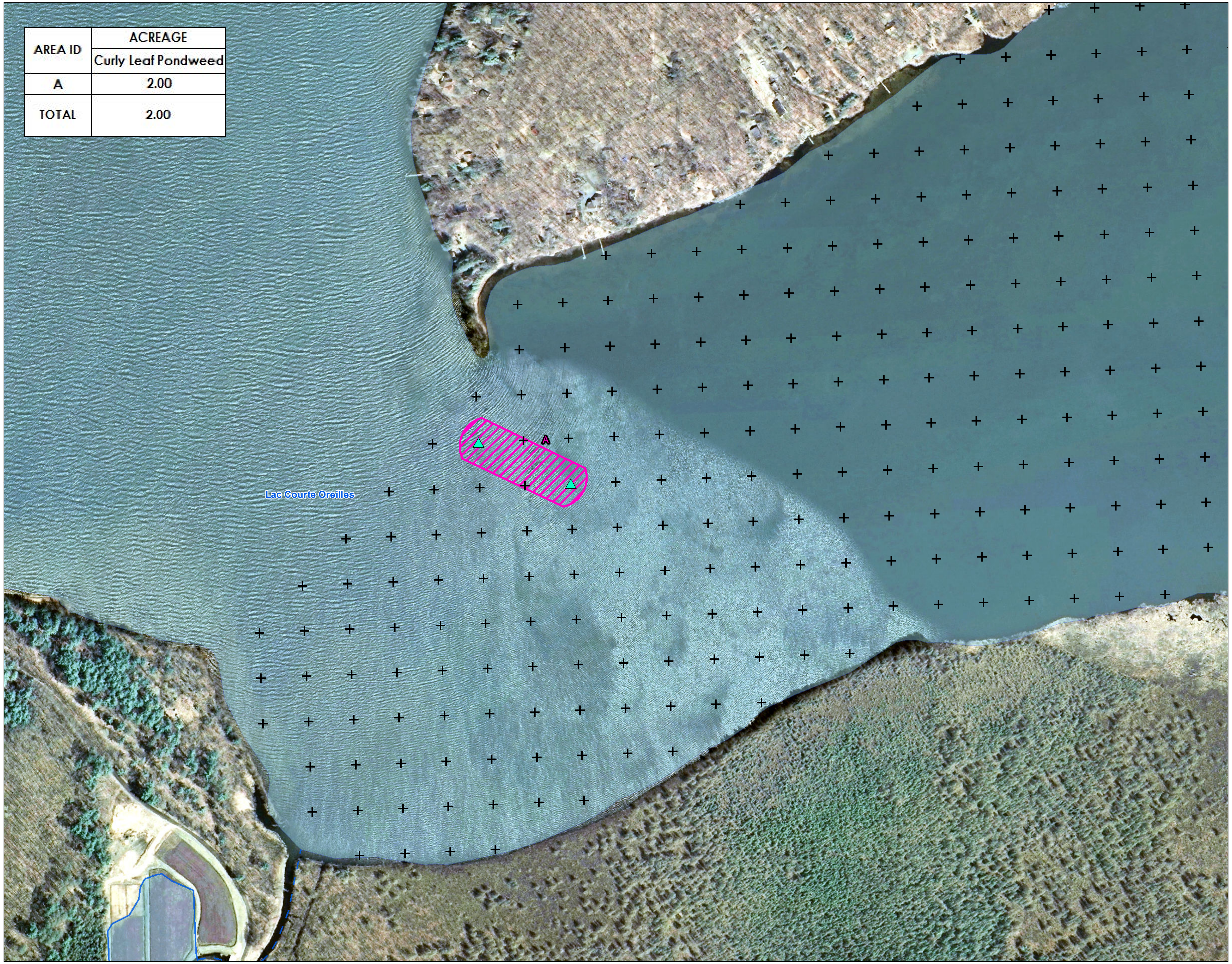


Figure No.
1

DRAFT

Title
Musky Bay
2014 Pre-Treatment Survey

Client/Project
Court Oreilles Lake Association, Inc.

Project Location
Sawyer Co.

193701708
Prepared by KAS on 2014-06-09
Technical Review by AB on 2014-06-09
Independent Review by XXX on 2014-XX-XX

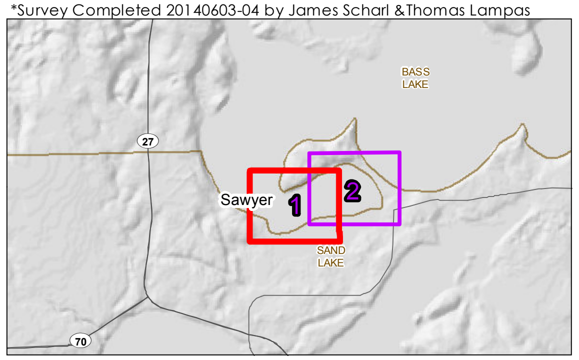
0 200 400 Feet
1:4,800 (At original document size of 11x17)

N

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

Fullness Rating	Coverage	Description
1		Only 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 20140603-04 by James Scharl &Thomas Lampas



Notes
1. Coordinate System: NAD 1983 StatePlane Iowa North FIPS 1401 Feet
2. Data Sources Include: Stantec and WDNR
3. Orthophotography: 2010 WROC

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AREA ID	ACREAGE
	CLP
A	0.50
B	0.50
C	0.50
TOTAL	1.50

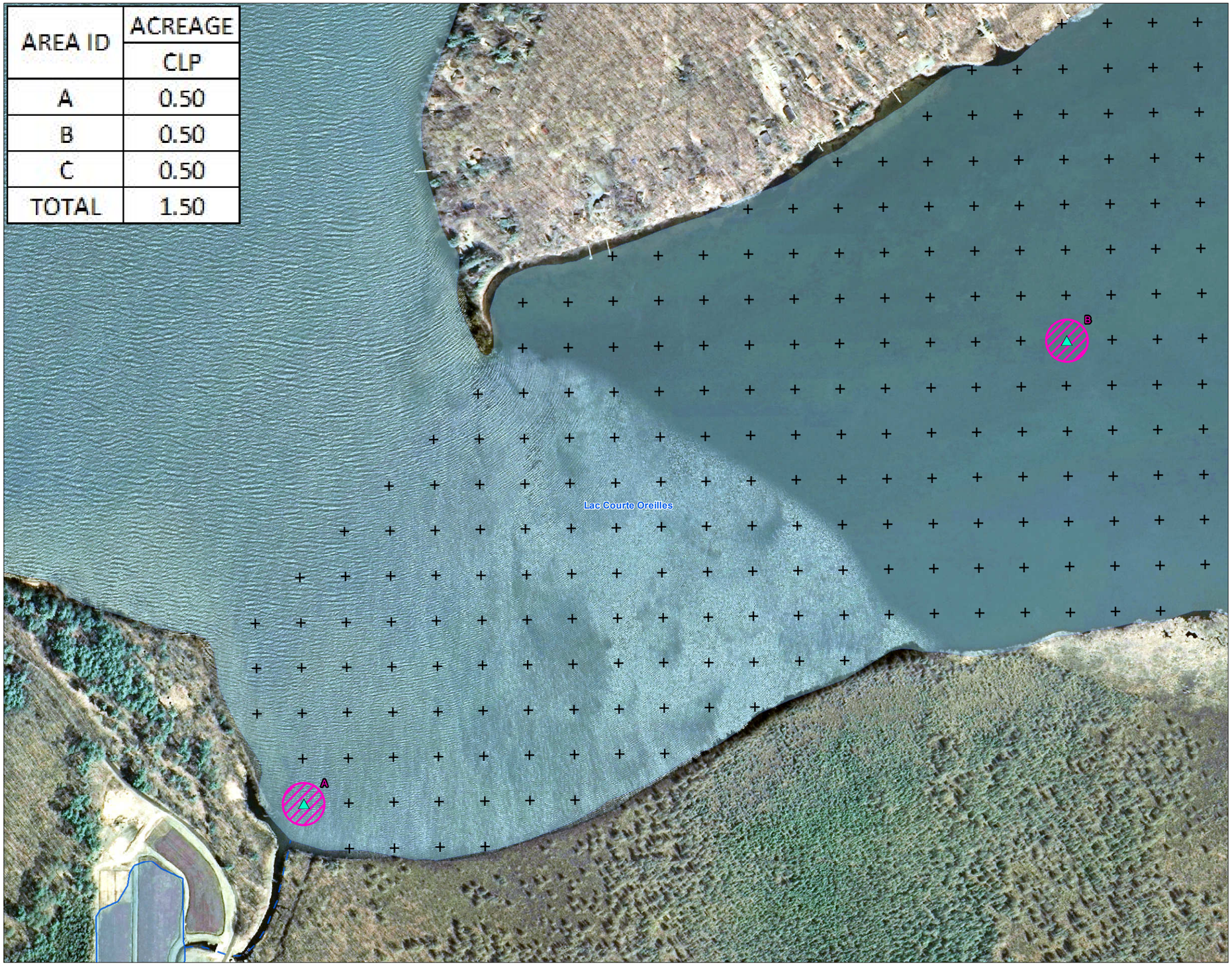


Figure No.
1

Title
Musky Bay
2014 Post-Treatment Survey

Client/Project
Court Oreilles Lake Association, Inc.
Lac Courte Oreilles

Project Location
Sawyer Co.

193701708
Prepared by JD on 2014-07-28
Technical Review by KS on 2014-07-31
Independent Review by MK on 2014-08-14

0 300 600 Feet
1:4,800 (At original document size of 11x17)

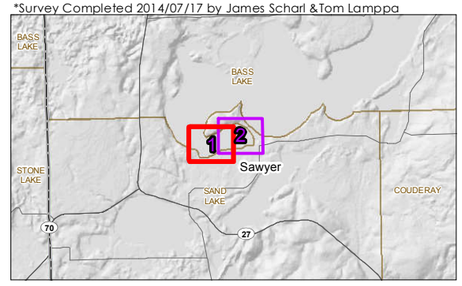
N

Legend

- \+ GPS Sample Points*
- Curly Leaf Pondweed (Fullness Rating of 1)
- Aquatic Invasive Plant Area

Fullness Rating	Coverage	Description
1		Only 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 2014/07/17 by James Scharl &Tom Lamppa



Notes
1. Coordinate System: NAD 1983 HARN WISCRS Sawyer County Feet
2. Data Sources Include: Stantec and WDNR
3. Orthophotography: 2010 WROC

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G:\Projects\PCs\193701708_AIS_Musky_Rotbarton_Stacey\07_gis\mxds\AIS_Musky_PostTreatment_2014.mxd Revised 2014-08-27 By: ushaneate

AREA ID	ACREAGE
	CLP
A	0.50
B	0.50
C	0.50
TOTAL	1.50

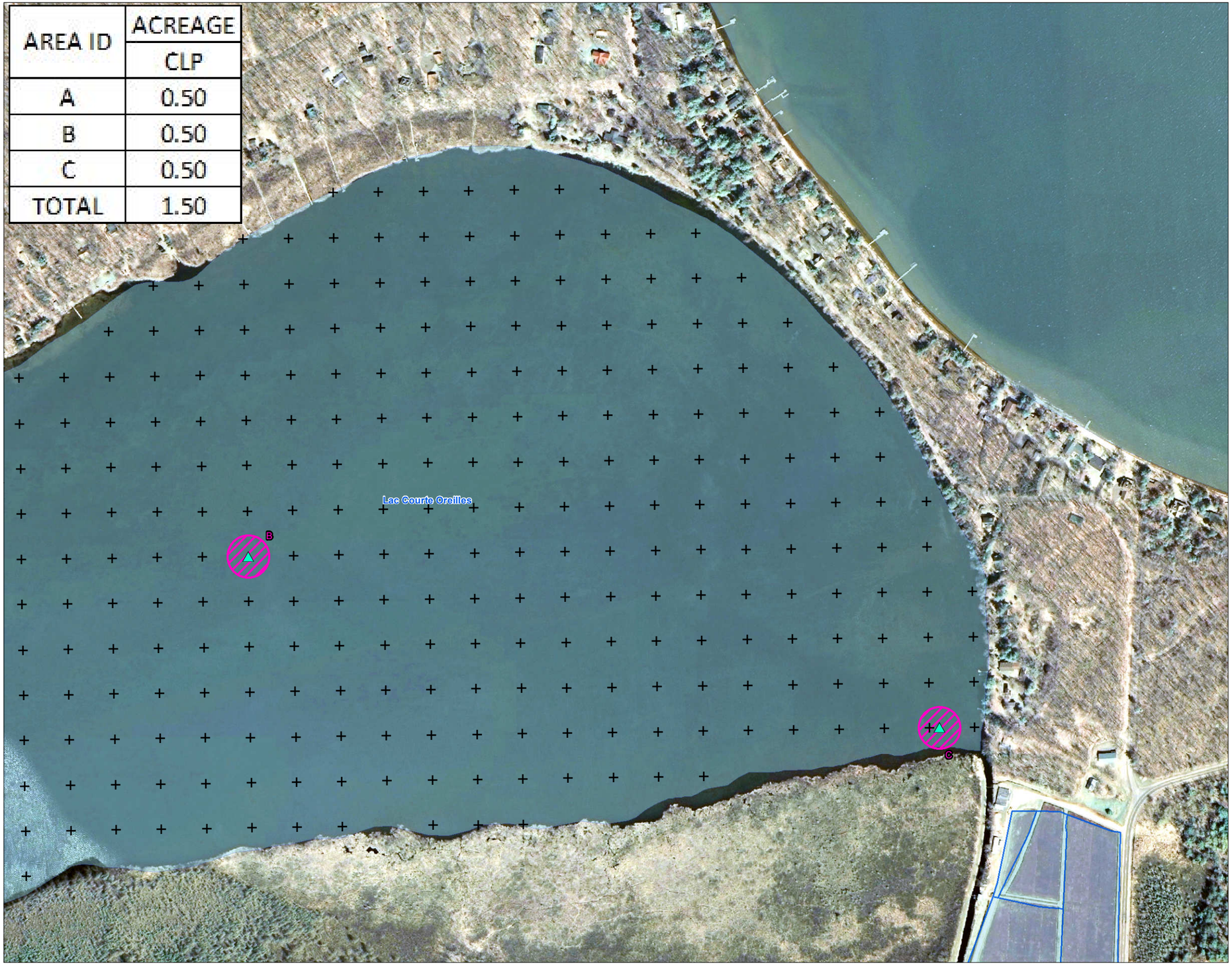


Figure No.
1

Title
Musky Bay
2014 Post-Treatment Survey

Client/Project
Court Oreilles Lake Association, Inc.
Lac Courte Oreilles

Project Location
Sawyer Co.

193701708
Prepared by JD on 2014-07-28
Technical Review by KS on 2014-07-31
Independent Review by MK on 2014-08-14

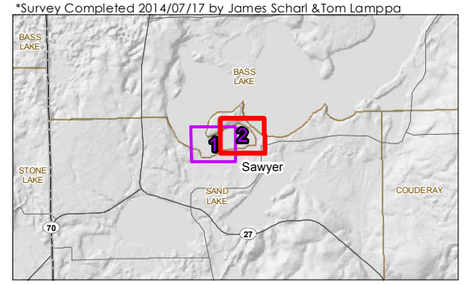
0 300 600 Feet
1:4,800 (At original document size of 11x17)

N

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

Fullness Rating	Coverage	Description
1		Only 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 2014/07/17 by James Scharl &Tom Lamppa



Notes
1. Coordinate System: NAD 1983 HARN WISCRS Sawyer County Feet
2. Data Sources Include: Stantec and WDNR
3. Orthophotography: 2010 WROC

Stantec

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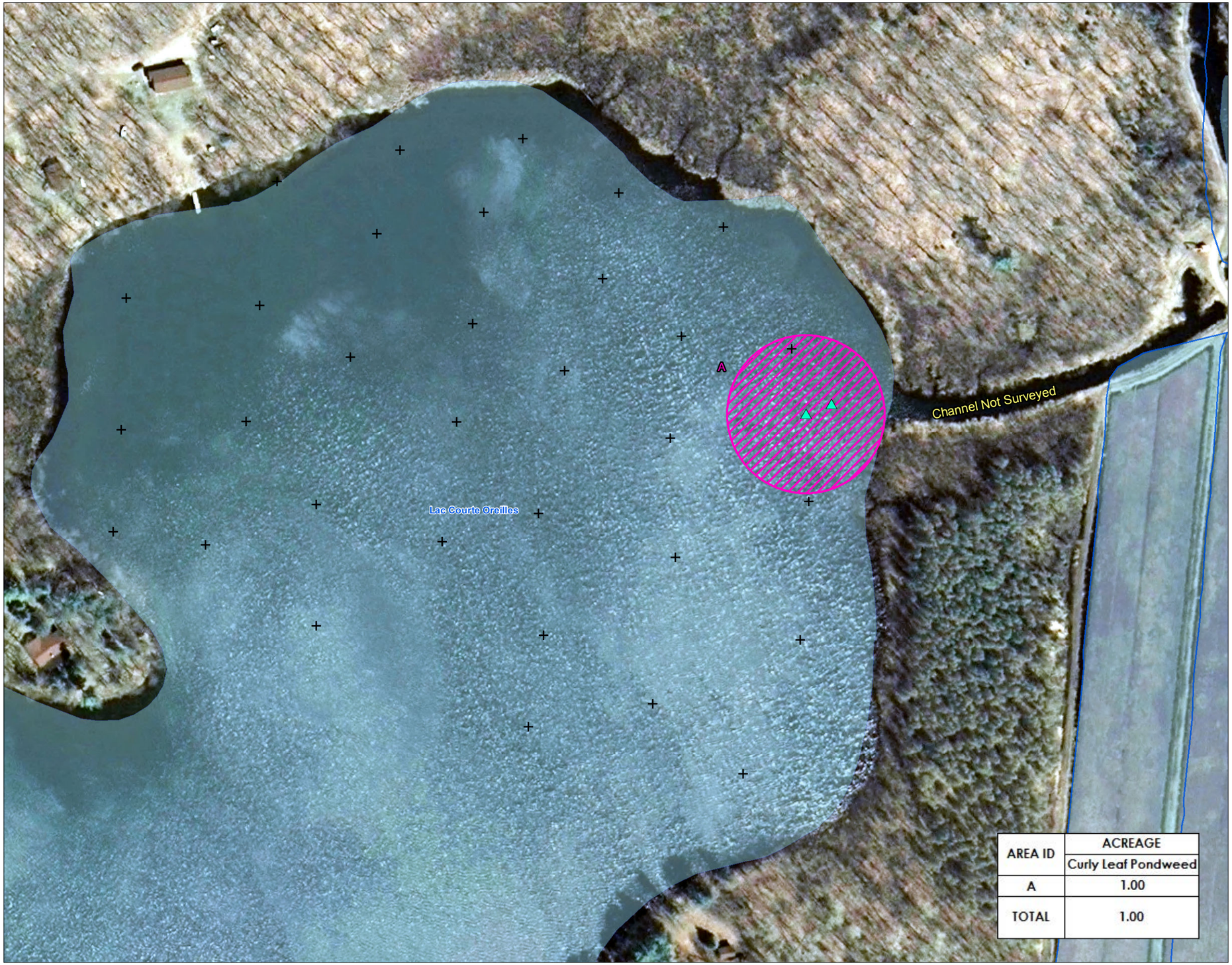
P:\GIS\Other_PCs\193701708_AIS_Musky_Bay\arcmaps\AIS_Musky_PostTreatment_2014.mxd Revised: 2014-08-22 By: cdecrans



AREA ID	ACREAGE
	Curly Leaf Pondweed
A	1.00
TOTAL	1.00

Figure No.
1

DRAFT

Title
Stucky Bay
2014 Pre-Treatment Survey

Client/Project
Court Oreilles Lake Association, Inc.

Project Location
Sawyer Co.

193701708
Prepared by KAS on 2014-06-09
Technical Review by AB on 2014-06-09
Independent Review by XXX on 2014-XX-XX

0 75 150 Feet

1:1,800 (At original document size of 11x17)

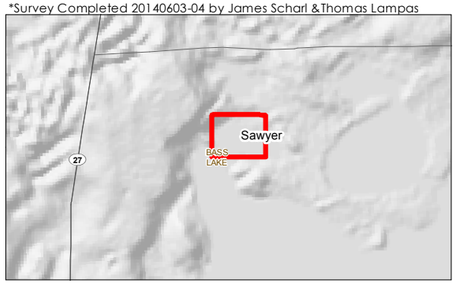
N

Legend

- GPS Sample Points*
- Curly Leaf Pondweed (Fullness Rating of 1 Only)
- Aquatic Invasive Plant Area

Fullness Rating	Coverage	Description
1		Only 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 20140603-04 by James Scharl &Thomas Lampas



Notes
1. Coordinate System: NAD 1983 StatePlane Iowa North FIPS 1401 Feet
2. Data Sources Include: Stantec and WDNR
3. Orthophotography: 2010 WROC

Stantec

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G:\active\tier_II\193701708_AIS_Mystery_Bottle\stucky_Stucky07_aismaps\AIS_Stucky_Pretreatment_2014.mxd Revised: 2014-06-10 By: kpalmer

Figure No.
1

Title
Stucky Bay
2014 Post-Treatment Survey

Client/Project
Court Oreilles Lake Association, Inc.
Lac Courte Oreilles

Project Location
Sawyer Co.

193701708
Prepared by JD on 2014-07-28
Technical Review by KS on 2014-07-31
Independent Review by MK on 2014-08-14

0 75 150 Feet

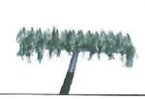
1:1,800 (At original document size of 11x17)

N

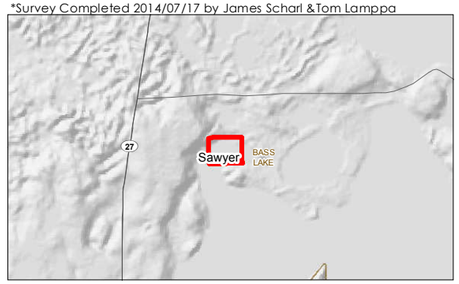
Legend

\+ GPS Sample Points*

No AIS Found

Fullness Rating	Coverage	Description
1		Only 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 2014/07/17 by James Scharl &Tom Lamppa



Notes
1. Coordinate System: NAD 1983 HARN WISCRS Sawyer County Feet
2. Data Sources Include: Stantec and WDNR
3. Orthophotography: 2010 WROC

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P:\GIS\Other_PCs\193701708_AIS_Mapping_Rafterstown_Sawyer\07_deliverables\AIS_Stucky_PostTreatment_2014.mxd Revised: 2014-08-22 By: jdelperdange

AREA ID	ACREAGE
	Curly Leaf Pondweed
A	0.50
TOTAL	0.50

Figure No.
1

DRAFT

Title
Barbertown Bay
2014 Pre-Treatment Survey

Client/Project
Court Oreilles Lake Association, Inc.

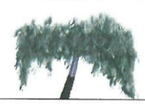
Project Location
Sawyer Co.

193701708
Prepared by KAS on 2014-06-09
Technical Review by AB on 2014-06-09
Independent Review by XXX on 2014-XX-XX

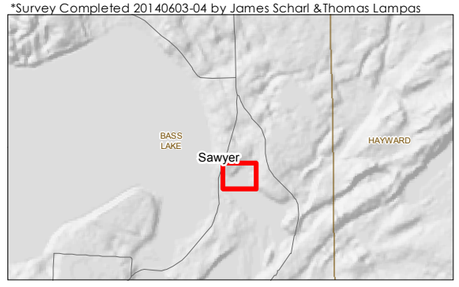
0 75 150 Feet
1:1,800 (At original document size of 11x17)

N

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

Fullness Rating	Coverage	Description
1		Only 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 20140603-04 by James Scharl &Thomas Lampas



Notes
1. Coordinate System: NAD 1983 StatePlane Iowa North FIPS 1401 Feet
2. Data Sources Include: Stantec and WDNR
3. Orthophotography: 2010 WROC

Stantec

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R:\GIS\Other_PCs\193701708 AIS Mystery Barbertown Sawyer\07 deliverables\AIS Barbertown PreTreatment 2014.mxd Revised: 2014-06-09 By: kseltzu

AREA ID	ACREAGE
	CLP
A	1.58
TOTAL	1.58

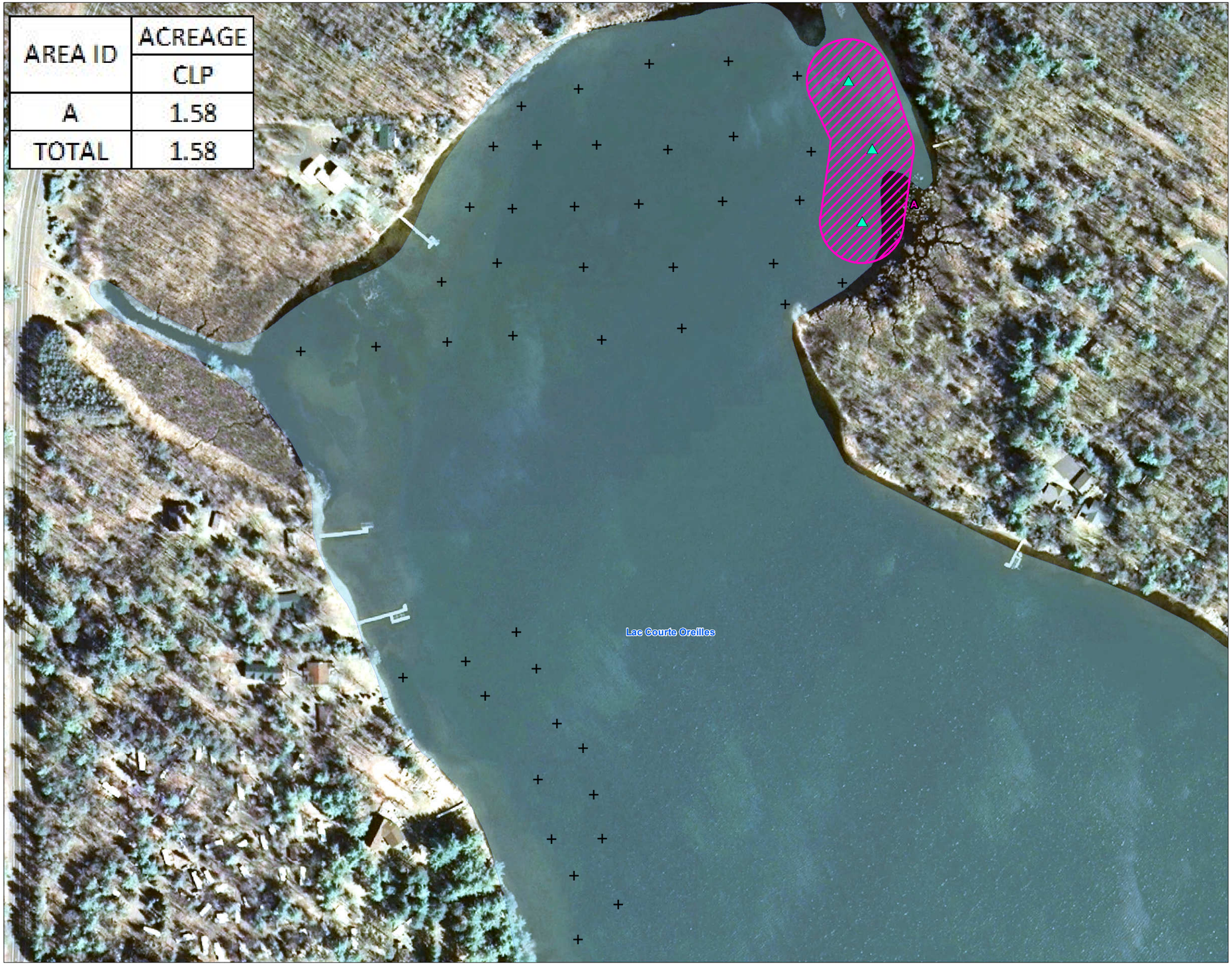


Figure No.
1

Title
Barbertown Bay
2014 Post-Treatment Survey

Client/Project
Court Oreilles Lake Association, Inc.
Lac Courte Oreilles

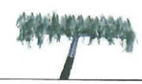
Project Location
Sawyer Co.

193701708
Prepared by JD on 2014-07-28
Technical Review by KS on 2014-07-31
Independent Review by MK on 2014-08-14

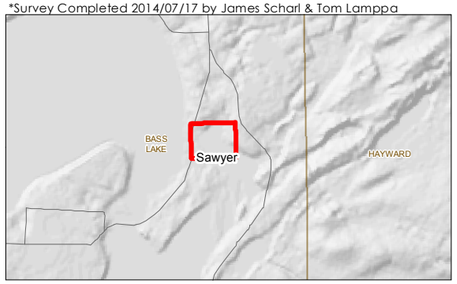
0 100 200 Feet
1:2,400 (At original document size of 11x17)

N

Legend
- \+ GPS Sample Points*
- Curly Leaf Pondweed (Fullness Rating of 1)
- Aquatic Invasive Plant Area

Fullness Rating	Coverage	Description
1		Only 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 2014/07/17 by James Scharl & Tom Lamppa



Notes
1. Coordinate System: NAD 1983 HARN WISCRS Sawyer County Feet
2. Data Sources Include: Stantec and WDNR
3. Orthophotography: 2010 WROC

Stantec

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G:\gis\other_PCs\193701708_AIS_Mulsky_Barbertown_Stukey\07_gis\mxds\AIS_Barbertown_PostTreatment_2014.mxd Revised: 2014-08-22 By: jdeserre

R:\gis\other PCs\193701708_AIS_Muskey_Barbertown_Stukey\07_gis\mxds\AIS_Little_LCO_InitialSurvey_2014.mxd Revised: 2015-01-06 By: tsoltau

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

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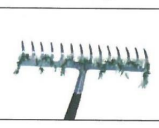
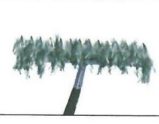
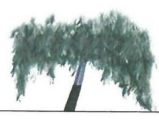
Legend

+ GPS Sample Points*

▲ Curly-leaf Pondweed (Rake Fullness 1)

Aquatic Invasive Plant Area (0.5 ac)

Fullness Rating	Coverage	Description
1		Only 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 on 2014/06/03 by James Scharl & Tom Lamppa

Figure No.
1

DRAFT

Title
2014 Initial AIS Survey
Little Lac Courte Oreilles Lake

Client/Project
Court Oreilles Lake Association, Inc.
Lac Courte Oreilles

Project Location
Sawyer Co.

193701708
Prepared by KAS on 2015-01-06
Technical Review by MP on 2015-01-06
Independent Review by XXX on 2015-XX-XX

0 300 600 Feet
1:7,200 (At Original document size of 11x17)

N

Stantec

ATTACHMENT A

WDNR CHEMICAL AQUATIC PLANT CONTROL 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 28, 2014

Permit # NO-2014-58-172

Lac Courte Oreilles Lakes Association
Kris Sivertson
P.O. Box 702
Hayward, WI 54582

Dear Mr. Sivertson:

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 33 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.
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. Any treatment performed on private property, including in any farm drainage ditches as defined in
8. s. 30.10(4)(c), Wis. Stats., connected to Lac Courte Oreilles, is authorized only with the prior written permission of the property owner. The property owner may specify his own restrictions regarding access and location of treatments.
9. Stukey Bay is a source of water when needed for irrigation at times for the cranberry operation of Jonjak Farms. Waters 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 50ppb. 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, 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. All equipment that comes in contact with infested waters, including but not limited to tracked vehicles, barges, boats, silt or turbidity curtain, hoses, sheet pile and pumps, shall be thoroughly disinfected. To the extent practicable, equipment and gear used on infested waters should not be used on other non-infested waters". Note: The most current decontamination protocols can be found at the following website http://dnr.wi.gov/ under the topic "Waterway and Wetland Permits".

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 28-2014

ATTACHMENT B

AQUATIC PLANT MANAGEMENT HERBICIDE TREATMENT RECORD

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-2014-58-172	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)
06/13/2014	6:45	9:30	17.22	15.56

Wind Speed (mph)	Wind Direction	Expected Duration of Chemical Residuals
0-5	WNW	14 days

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)

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 #
	Lamppa	Thomas	94231
	Last Name	First	Certification #

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

Sheet 2 of 2 Date: 06/19/2014

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 2.7g, EPA Reg No.: 241-439-67690		Herbicide Name:, EPA Reg No.:	
						Amount Applied	Concentration (mg/l = ppm)	Amount Applied	Concentration (mg/l = ppm)	Amount Applied	Concentration (mg/l = ppm)
Musky Bay	3	33	☐ Y			18.5	2.0 ppm	300	200 ppb		
Stucky Bay	1.5	33	☐ Y			11.25	3.0 ppm	---	---		
Barbertown Bay	1	33	☐ Y			5.25	2.0 ppm	100	250ppb		
TOTAL	5.5	33	☐ Y								
			☐ Y								
			☐ Y								
			☐ Y								
			☐ Y								
			☐ Y								
			☐ Y								
			☐ Y								
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			☐ Y								
			☐ Y								
			☐ Y								
			☐ Y								
			☐ Y								
					Totals	35		400			

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		☐	☐		
☒	☐	Curly-Leaf Pondweed		☐	☐	Illinois Pondweed		☐	☒	Robbins Pondweed		☐	☐		
☐	☐	Duckweed		☐	☐	Large-Leaf Pondweed		☐	☐	Sago Pondweed		☐	☐		
☐	☒	Elodea		☐	☒	Northern Milfoil		☐	☐	Watershield		☐	☐		
☐	☐	Eurasian/hybrid Milfoil		☐	☐	Phragmites		☐	☐	White Water Lily		☐	☐		