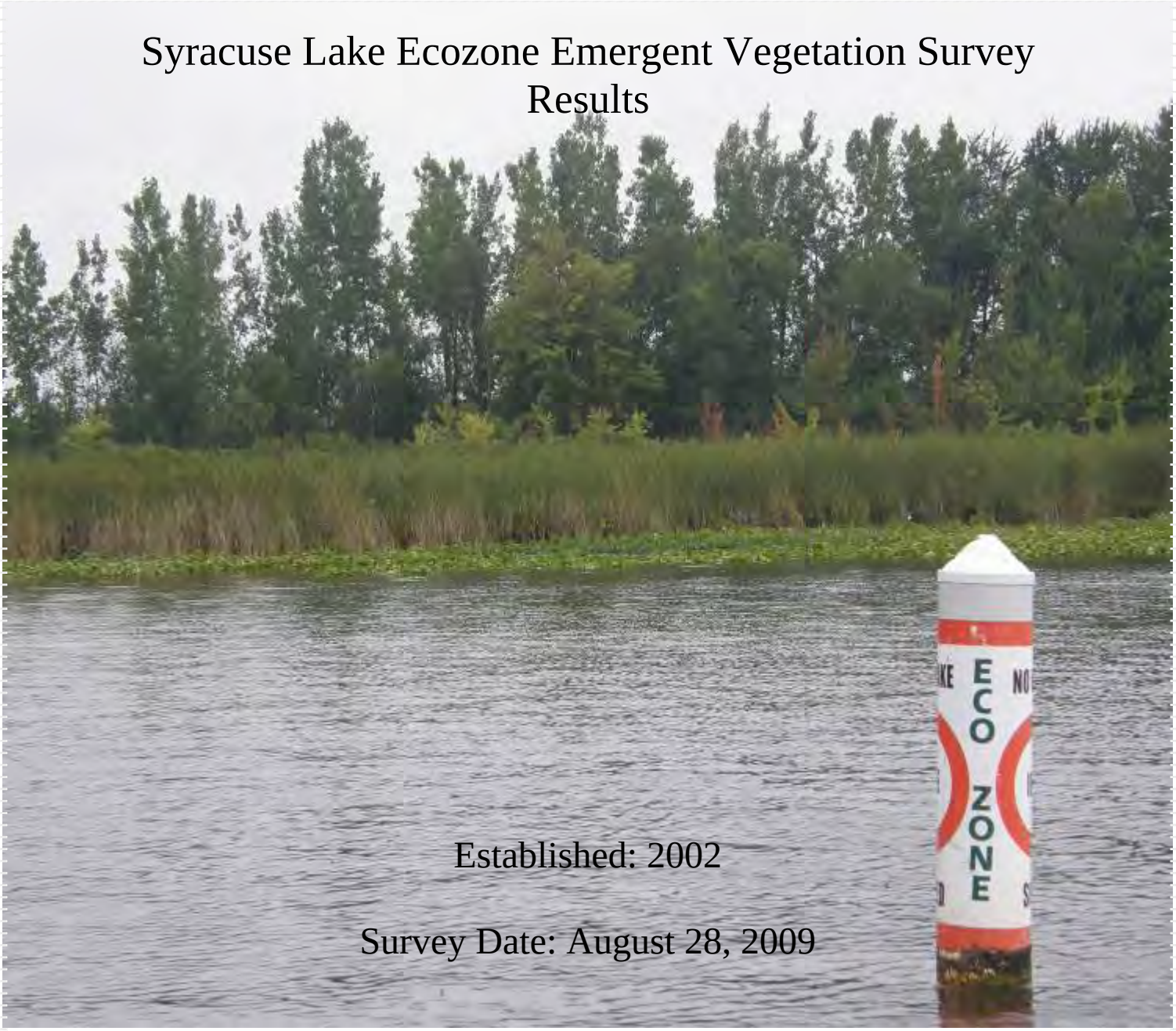
Syracuse Lake Ecozone Emergent Vegetation Survey Results



Established: 2002

Survey Date: August 28, 2009

Prepared for:

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March 1, 2010

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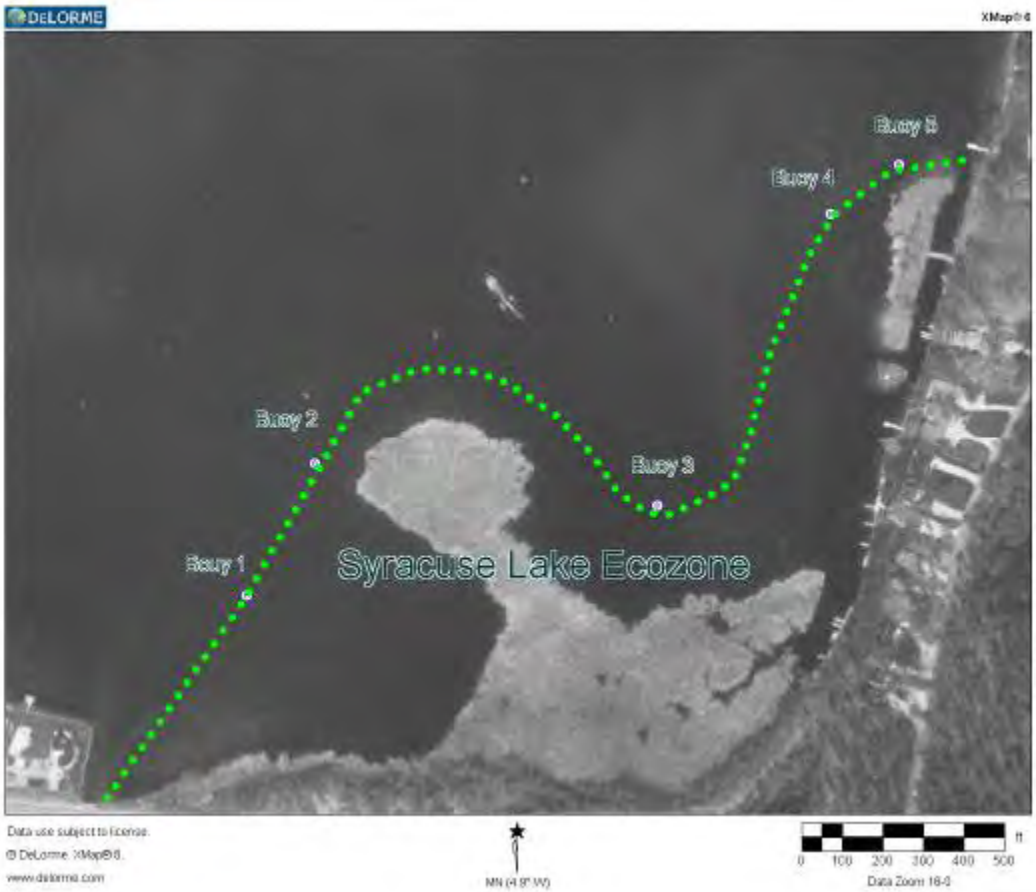
Overview

In 2002, an ecozone was established around emergent vegetation in the southeast corner of Syracuse Lake. This ecozone was established to protect shallow water emergent vegetation and the organisms that depend upon this vegetation for survival. An *ecozone* is an area that is set aside and protected from outside disturbance. In this particular case, the most detrimental disturbance to the emergent plant community in Syracuse Lake is from water turbulence and wave action caused by boating activities. This ecozone is bordered by a series of buoys, five of which have an "ecozone" label along with a with a "no wake" sign. The intention of these buoys and this ecozone is to prevent further damage to the Syracuse Lake emergent community. The buoys also warn boaters of shallow water and submersed stumps that are common in this area of Syracuse Lake and may pose a boating hazard. Figure 1 shows approximate boundaries of the ecozone in the southeast corner of Syracuse Lake as indicated by the ecozone buoys, which were marked with the GPS.

Figure 1: Syracuse Lake Ecozone Boundaries



The Syracuse and Wawasee water system is undoubtedly one of the most utilized bodies of water in Indiana. Throughout the summer, and especially on weekends, the boat ramps of these two lakes are at full capacity, and many boats are on the water. Over many years, wave action and turbulence caused by intense boating activities have had a

detrimental effect on emergent plant beds along the southeast shore of Syracuse Lake. The following two paragraphs are an excerpt from a flyer distributed by the IDNR Division of Fish and Wildlife. The flyer is entitled "Protection of Significant Aquatic Communities (Ecozones) in Indiana Lakes and Rivers". This excerpt explains in detail the initiation of ecozone projects on Syracuse Lake and Lake Wawasee, as well as providing information on the importance of wetland ecosystems.

Ecozones first established at Lake Wawasee and Syracuse Lake

"With the support of the local community, ecozones were first established in Lake Wawasee and Syracuse Lake in 2002 in accordance with IC 14-15-7-3 and in response to evidence indicating the need to do so. In 1996, Commonwealth Biomonitoring completed a DNR Lake and River Enhancement program-funded diagnostic study of Lake Wawasee and Syracuse Lake, along with their watershed. The study noted the importance of wetlands to the overall health of the entire ecosystem. The authors point out that, "The wetlands function as natural purification systems for water entering the lakes. They also function as habitats for diverse species of wildlife. The wetland areas, such as Conklin Bay, Johnson Bay, and Mud Lake, are vital to the health of a self-sustaining fishery. These areas presently function as very rich fi sh nursery areas. From the observations of researchers on this project, they are very rich in juvenile game fish numbers and species diversity. These areas should be preserved around the lake for a variety of reasons, including their NPS [nonpoint source] pollution buffering, habitat value, wave energy buffering, aesthetic and intrinsic values." Photos of Johnson Bay show limited development encroaching on wetland areas in 1951 and greater loss of vegetation along the lakeshore by the year 2000."

ECOZONES in Indiana

"Commonwealth noted in the diagnostic study that observations from a boat indicated the presence of boat propeller scars in shallow areas of Lake Wawasee, including Johnson Bay. The report also stated that, "In Johnson Bay, Conklin Bay, and the southeast portion of Syracuse Lake the wetlands obviously need to be protected from skiers skiing up to the edge of the emergent vegetation. The wave energy causes the wetland hummocks to bounce with waves violently, releasing sediments and associated nutrients from the wetland areas." The authors went on to say that, "Based on our visual observations made during the course of this [diagnostic study] project, Johnson Bay, Conklin Bay, Mud Lake, and the southeast portion of Syracuse Lake (also a boating hazard due to stumps and shallow water) are areas functioning as fish nurseries and should be protected as such for a self sustaining fishery. These major wetland areas should be designated as ecozones to protect the wetlands. In addition, deeper drafting boats, such as inboard/outboard cruisers, cause considerable disturbance (resuspension of sediments and nutrients) to the lake bottom due to the depth of the prop and the thrust needed to propel heavier hulls. These types of boats should be restricted from water less than five (5) feet deep." Other observers have also noted the effects of watercraft Induced waves on the wetland vegetation in Lake Wawasee and Syracuse Lake. There is considerable anecdotal evidence of clumps of cattails and associated plants being dislodged by wave action, then floating away from the marsh areas into the open water. It is also common to observe emergent and submersed plants from deeper water, uprooted by boating activity, suspended in the water column or floating on the surface. A general principle of ecology and conservation biology is that species diversity is frequently directly related to the size of protected areas. As the largest natural lake in Indiana with extensive intact wetlands, Lake Wawasee is a unique resource that merits significant protection. Spotted turtles, bald eagles, and other rare or endangered species that have been observed in the area are dependent upon the expansiveness of the wetlands. Relatively small, incremental losses of wetlands may not, individually, cause noticeable ecological changes, but the cumulative impact of innumerable small losses can be dramatic."

The Wawasee Area Conservancy Foundation (W.A.C.F.) is very active and has taken numerous measures to improve water quality in the Wawasee watershed. Included in these measures has been the purchase of many wetland areas in order to preserve them. The benefits of wetlands for filtration, wildlife habitat, and many other functions have been well documented, and the purchase of wetlands within this watershed will likely help foster good water quality. The W.A.C.F. owns significant wetland areas very near the Syracuse Lake ecozone. This should help protect this area of the lake from further development. Figure 2 and Figure 3 were created by the W.A.C.F. and are available on the WA.C.F. website. They show areas that have been purchased by the W.A.C.F. near the Syracuse Lake ecozone. These areas are outlined in green.

Figure 2: W.A.C.F. Wetland Ownership (www.wacf.com)

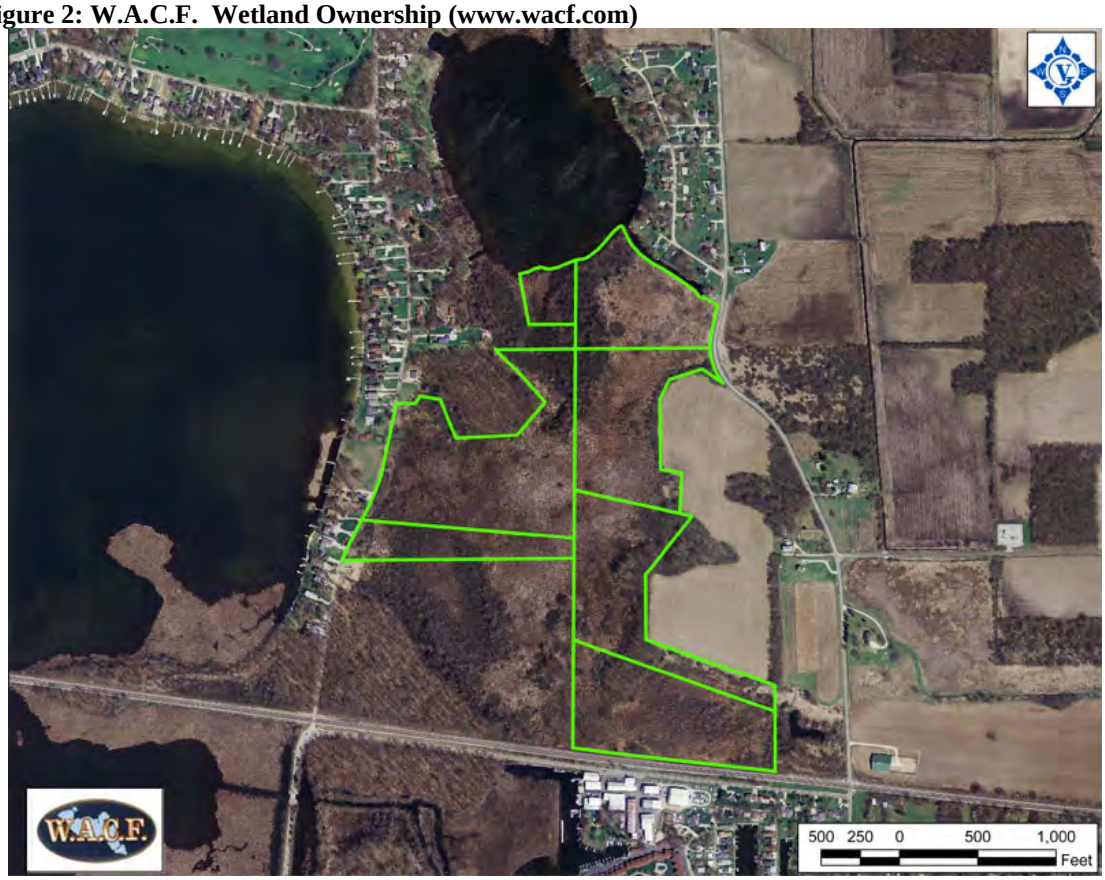


Figure 3: W.A.C.F. Wetland Ownership - Buck Island (www.wacf.com)

On August 28, 2009, Aquatic Weed Control conducted an emergent vegetation survey of the protected Syracuse Lake ecozone area. The purpose of this survey and this report is to provide a basis by which changes to the plant community in this area of the lake can be documented in some quantifiable way. This is the first year for emergent plant surveying in Syracuse Lake through the LARE program. Data provided in this report will serve as a baseline for future comparison. One of the most important functions in this survey was to mark the lakeward extent of the emergent beds in the ecozone with a GPS. This should provide a basis for determining if the establishment of the ecozone is allowing the emergent beds to expand in Syracuse Lake.

Emergent Survey Methods

Mapping of emergent vegetation in Syracuse Lake was completed using GPS waypoints, a rangefinder, GIS software (X-map), and visual observation. Only emergent plant beds within the Syracuse Lake ecozone zone were mapped.

A transect was taken perpendicular to shore at the linear beginning of each plant bed in relation to shore. Plants in contact with the boat on the lakeward edge of the bed were documented as a “1” on data sheets provided by the IDNR. Plants observed along the perpendicular transect but not in contact with the boat were documented as a “9” on the data sheets. A range finder was used to estimate the distance between the shoreline and the maximum lakeward extent of the emergent bed at each transect.

GPS coordinates were taken at the lakeward edge of the bed. Once measurements were recorded at the beginning of the bed, the boat was moved parallel to the shoreline along the lakeward edge of the bed. Whenever species composition changed significantly, another transect, measurement, and GPS coordinates were recorded. This process was repeated along the lakeward edge of the plant bed until the vegetation stopped or species composition changed enough to warrant a separate plant bed.

Many additional GPS coordinates were recorded to map irregularities in the lakeward edge of the plant beds, even though species composition had not changed significantly. For these points where composition did not change significantly, no transects were recorded.

Emergent Survey Results

In the August 28th survey, 10 separate, significant emergent plant beds were mapped in the Syracuse Lake ecozone ranging in size from 8, 628 square feet to 10.35 acres. The total combined acreage of these beds is an estimated 15.2 acres. Twelve major emergent species were documented in these beds. Table 1 is a species list for all emergent plants documented in the 2009 survey. Both common and scientific names are included for reference.

Table 1: Common and Scientific Names of Syracuse Lake Emergent Species

Common Name	Scientific Name
American Water Willow	*Justicia americana* (L.) Vahl
Cattails	*Typha sp.*
Spatterdock	*Nuphar luteum*
Yellow Pond Lily	*Nuphar advena*
White Water Lily	*Nymphaea odorata*
Pickeral Weed	*Pontederia cordata*
Purple loosestrife	*Lythrum salicaria*
Common Arrowhead	*Sagittaria latifolia*
Rose Mallow	*Hibiscus sp.*
American Pondweed	*Potamogeton nodosus*
Hard-stem Bulrush	*Scirpus acutus*
Arrow Arum	*Sagittaria cuneata*

Water Level

The water level of Syracuse Lake was recorded on the day the survey was conducted. This was done to ensure accurate future comparisons. Since most emergent plants are depth sensitive, changes in water level could affect plant bed size. Water level for Syracuse Lake was recorded in Syracuse Park just off of State Road 13. Water level at the time of this survey was 8.98 as seen in Figure 4. Legal or normal lake level is 858.87 feet above sea level, which is represented as 8.87 on this gauge. At the time of the emergent survey, Syracuse lake was about 1.3 inches above its established normal level.

Figure 4: Syracuse Water Level 8/28/2009

The emergent plant beds in the Syracuse Lake ecozone are outlined in Figure 5. These beds were made using GPS waypoints as well as a rangefinder to determine distances in areas where boat travel was not possible. GIS Software was used to estimate plant bed acreages. Emergent plant beds in Figure 5 are color coded according to the most dominant plant in each bed. It is important to note that multiple species are present in many beds and not just the dominant species.

Figure 5: Syracuse Lake Ecozone Emergent Beds

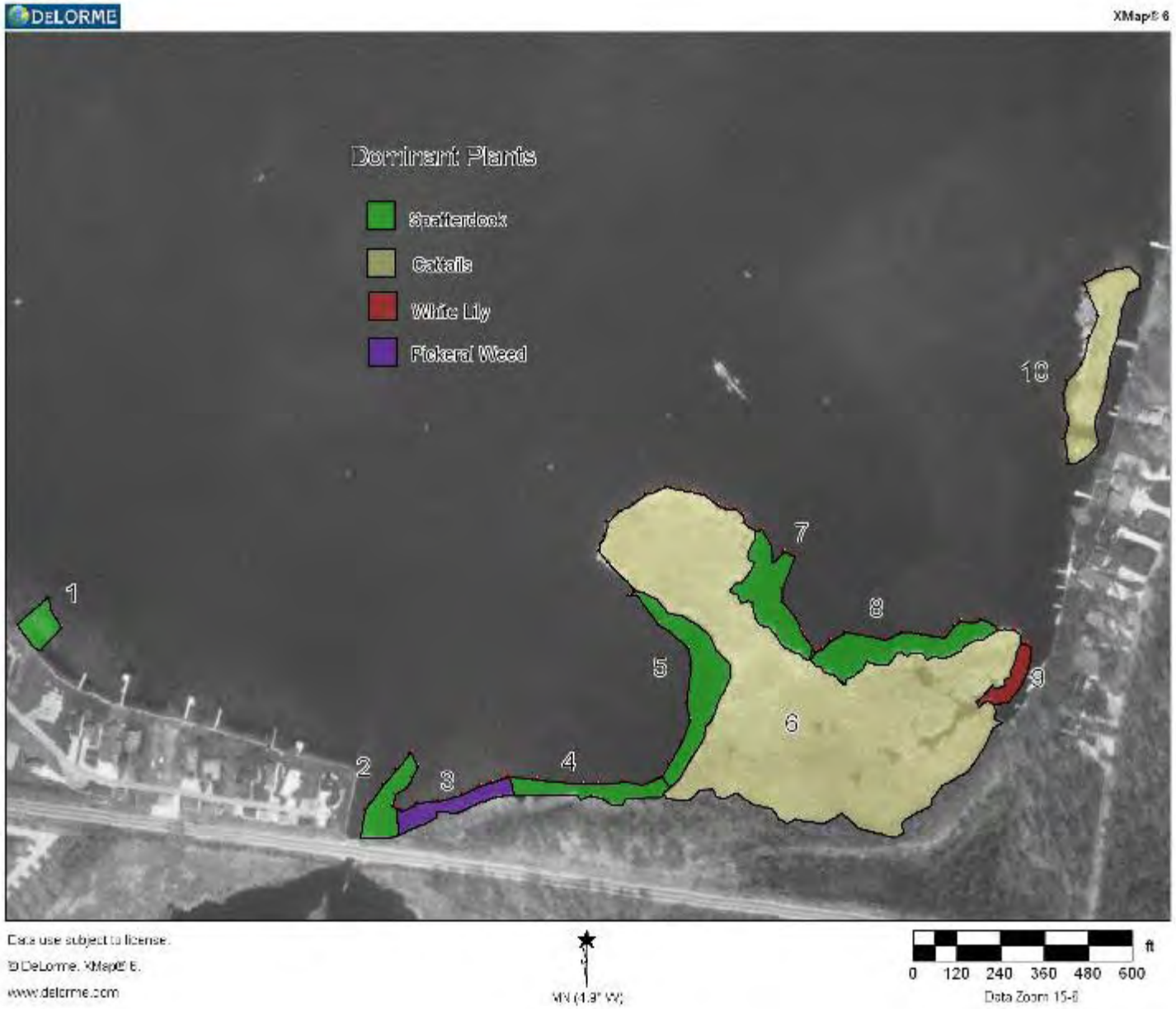


Table 2 Summarizes data collected during the 2009 emergent plant bed summary. Each row of the table describes a separate emergent plant bed. Bed size was estimated using GPS waypoints collected in the field, GIS software, and distances from the lakeward edge of each plant bed to shore measured with a range finder during the survey. Species occurrences were estimated using transect data, field observations, and photos taken of each plant bed.

Table 2: Emergent Plant Bed Statistics Summary

				Species Present/Percent Occurrence Estimate												
Bed #	**Size**	**Dominant Species**	**# of Species**	White Lily	Spatterdock	Cattail	Arrowhead	Arrow Arum	Water Willow	American P.W.	Bulrush	Pickeral Weed	Purple loosestrife	Rose Mallow	Arrow Arum	Yellow lily
1	8,979 ft^2	Spatterdock	3	10%	70%					20%						
2	15,641 ft^2	Spatterdock	5		80%	5%					5%	5%	5%			
3	14,736 ft^2	Pickeral weed	7		40%	3%	2%			5%	1%	45%	2%	2%		
4	17,619 ft^2	Spatterdock	4		70%	5%	10%			15%						
5	37,825 ft^2	Spatterdock	6		75%	5%			2%			5%	3%		10%	
6	10.35 ac	Cattails	3			95%							3%	2%		
7	30,549 ft^2	Spatterdock	5	3%	75%	10%			2%	10%						
8	34,095 ft^2	Spatterdock	8	5%	75%	5%			2%	5%		2%		3%		3%
9	8,628 ft^2	White Lilly	6	70%	10%	10%	5%						3%	2%		
10	1.03 ac	Cattails	8	5%	5%	75%	5%				3%	2%	3%	2%		

Emergent Plant Bed Descriptions

Bed: 1
Size: 8,979 square feet
Dominant Species: Spatterdock
Waypoints: 1-3
Number of species: 3
Description: This plant bed is located just wet of the established ecozone along the south shore of the lake but was included because of its close proximity to the ecozone. This sparse bed is composed of spatterdock, American pondweed, and white water lily. This is the only plant bed in the survey without a natural shoreline. It extends approximately 39 yards from shore.

Figure 6: Emergent Plant Bed 1

Bed: 2
Size: 15,641 square feet
Dominant Species: Spatterdock
Waypoints: 4 - 13
Number of species: 5
Description: This bed is adjacent to the channel between Lake Syracuse Lake and Lake Wawasee. Spatterdock dominates the lakeward edge of this bed, while pickerel weed, cattails, purple loosestrife, and bulrushes are present in the near shore areas. At its widest point, this bed extends 74 yards into the lake.

Figure 7: Emergent Bed 2

Bed: 3
Size: 17,619 square feet
Dominant Species: water willow
Waypoints: 14-22
Number of species: 8
Description: Bed 3 Diversity increases in this bed and separates it from bed 2. Pickerel weed and spatterdock are almost equally abundant. Cattails, American pondweed, purple loosestrife, rose mallow, bulrushes, and common arrowhead are also present in this bed.

Figure 8: Emergent Plant Bed 3

Bed: 4
Size: 17, 619 square feet
Dominant Species: Spatterdock
Waypoints: 23-30
Number of species: 4

This plant bed runs parallel to the railroad tracks on the south shore of the ecozone. Spatterdock is dominant in this bed. Both spatterdock and common arrowhead were present on the lakeward boundary of this bed. American pondweed was present throughout this bed, and cattails were present in the near shore area. Gaps within this plant bed may indicate that there is room for expansion in the future.

Figure 9: Emergent Plant Bed 4

Bed: 5
Size: 37,825 square feet
Dominant Species: Spatterdock
Waypoints: 31-40
Number of species: 6
Description: This bed is a sparse and patchy distribution of spatterdock and arrow arum. Spatterdock dominated the lakeward edge of this bed although arrow arum was found along the lakeward edge as well. Cattails, purple loosestrife, arrowhead, and water willow are more common near shore. At its widest point, this bed extends about 40 yards from the shoreline. This plant bed runs north along the west edge of the large peninsula in the ecozone.

Figure 10: Emergent Plant Bed 5

Bed: 6
Size: 10.35 acres
Dominant Species: cattails
Waypoints: 41-55
Number of species: 3
Description: This bed composes the long peninsula in the ecozone area of Syracuse Lake. Cattails are extremely dominant and extremely dense in this bed. Purple loosestrife was observed in moderate abundance, as well as rose mallow along the lakeward edge of the bed. GPS coordinates taken along the northwest edge of this bed indicate possible erosion along this shoreline since 2005 when aerial photos were taken. However because the difference is so small this cannot be know for certain because of the margin of error for GPS (3 meters).

Figure 11: Emergent Plant Bed 6

Bed: 7
Size: 30,549 square feet
Dominant Species: Spatterdock
Waypoints: 56-66
Number of species: 5

Description: This plant bed is dominated by spatterdock along the lakeward boundary of the bed. American pondweed, white lilies, cattails, and water willow are also present in this bed. There are some gaps in the spatterdock, which may fill in with the protection of the ecozone. This area is slightly protected from wind and wave action from the west by the peninsula in the ecozone. This would be one area that could definitely see expansion in future years. This bed currently extends 70 yards from the cattails of bed 6 in the wider areas.

Figure 12: Emergent Plant Bed 7

Bed: 8
Size: 34,095 square feet
Dominant Species: Spatterdock
Waypoints: 67-80
Number of species: 8

Description: This bed also dominated by spatterdock, but with increased diversity, separates it from emergent bed 7. Eight species were observed in this plant bed. On average, this bed extends about 12 to 13 yards from the cattails of bed 6. American pondweed is present throughout the spatterdock, and diversity increases in the near shore area. Water willow, rose mallow, cattails, white lilies, yellow lilies, and pickerel weed were all present in this bed.

Figure 13: Emergent Plant Bed 8

Bed: 9
Size: 8,628 square feet
Dominant Species: white water lily
Waypoints: 82-88
Number of species: 6
Description: This plant bed is located in the extreme southeast corner of Syracuse Lake. This is one of the few emergent plant beds where spatterdock is not dominant. It is possible that this is related to the amount of wind and wave protection that this plant bed receives because it is tucked away behind the large cattail bed in the ecozone. White lilies dominate this bed. Spatterdock, rose mallow, cattails, purple loosestrife, and common arrowhead were observed in this bed as well.

Figure 14: Emergent Plant Bed 9

Bed: 10
Size: 1.03 acres
Dominant Species: Cattails
Waypoints: 89-100
Number of species: 8

Description: Bed 10 is a small island at the east end of Syracuse Lake. Cattails are dominant although rose mallow, spatterdock, white lilies, pickerel weed, purple loosestrife, bulrushes, and common arrowhead were also observed. GPS coordinates taken along the west edge of this bed seem to indicate that some erosion may have taken place in this bed since 2005 when aerial photos of this island were taken. The west edge of this bed should be monitored closely in the future, especially since this bed is more vulnerable to natural wind and wave action than most other beds in the ecozone. District 3 biologist Jed Pearson indicated in comments on the AVMP draft this area has potential for a habitat improvement project. Jed stated that,

> "This site might provide an opportunity to test the placement of large boulders (>3 ft diameter) about 10-20 feet offshore to provide a breakwater to reduce wave energy and create a zone of less disturbance that could reduce erosion, create fish habitat, and provide conditions suitable for re-vegetation without posing a boating risk. This could serve as a potential Lake Habitat Project."

Figure 15: Emergent Plant Bed 10

Emergent Plant Community Discussion

As mentioned in the overview, this is the first year for emergent vegetation surveys of this nature on Syracuse Lake. There are no past results for comparison, but data from 2009 will be used as the baseline for future comparisons.

Total Beds and acreage

In 2009, 10 total emergent plant beds were mapped in Syracuse Lake. These emergent plant beds total an estimated 15.2 acres in Syracuse Lake. The largest plant bed (10.35 acres) was located on the large peninsula of the Syracuse Lake Ecozone and was dominated by cattails

Off-Shore Beds

The only offshore bed in this survey was the small island at the east end of the ecozone. This bed should be monitored closely in the future as it is very vulnerable to wave action. GPS coordinates taken on the west edge of the bed may indicate possible erosion since 2005 when aerial photos were taken. This bed is currently measured at 1.03 acres with cattails being dominant.

Near Shore Beds

Cattails accounted for more acreage in the ecozone than any other species at approximately 11.4 acres. Cattails were dominant in many near shore areas and were present in 9 of the 10 plant beds. Cattails were the dominant species in 2 plant beds. Spatterdock was the most common plant along the lakeward edge of most beds and was dominant in 6 of the 10 plant beds. Pickerel weed and white lilies were each dominant in one plant bed .

American Pondweed was not dominant in any emergent bed although it was commonly observed growing among patches of spatterdock on the lakeward edge of plant beds. American pondweed was present in 5 plant beds.

Purple loosestrife (an invasive species) was observed in 6 of the 10 plant beds. While purple loosestrife can take over plant beds and create a monoculture, cattails appear to be preventing purple loosestrife from taking over in many near shore areas.

Pickerel weed was found in 5 of 10 plant beds although its overall abundance tended to be low. The exception was plant bed 3, where pickerel weed was more dominant than spatterdock in many areas.

Species Richness

Of the 12 emergent plants recorded in this survey, only one (purple loosestrife) was invasive. More species richness was seen in the near shore areas. This is expected as water depth and wave action limits growth of many emergent plants. As many as 8 different emergent plant species were documented in some emergent beds. These beds may be interesting to watch over time as the ecozone is now protected by buoys. One might expect these beds to expand, become denser, or even more diverse if they are protected from wave action.

Conclusions

Two areas of concern may be the west edge of the island bed (bed 10) and the northwest tip of the peninsula in the ecozone (bed 6). These areas receive the most wave action of the beds in the ecozone, and it appears possible that some erosion may have occurred since 2005 based on aerial photos and GPS coordinates. Habitat improvement projects could potentially benefit these areas and protect them from erosion. District 3 biologist Jed Pearson offered the following comments on the area around bed #10.

> "This site might provide an opportunity to test the placement of large boulders (>3 ft diameter) about 10-20 feet offshore to provide a breakwater to reduce wave energy and create a zone of less disturbance that could reduce erosion, create fish habitat, and provide conditions suitable for re-vegetation without posing a boating risk. This could serve as a potential Lake Habitat Project."

Cattails were dominant in near shore areas and on the large peninsula in the middle of the ecozone. This will likely continue if the area remains protected, although the purple loosestrife population should be monitored as it may compete with cattails.

Spatterdock is by far the most dominant plant in water depths of more than one foot. Observations of water depth in the ecozone area would seem to indicate that there is enough unoccupied shallow water that spatterdock should be able to expand if it is protected. Besides wave action and turbulence, sediment composition may be a limiting factor to spatterdock growth as well.

Although the emergent survey protocol is very new (2008), it appears to adequately define the lakeward edges of the emergent beds and describe general species composition within those beds. Emergent plant composition appears typical of northern Indiana lakes. A major goal of the ecozone project will be to preserve the current plant beds and watch for future changes. Since this is the first emergent survey on Syracuse Lake, it is difficult to evaluate the state of the emergent community in the ecozone area. The 2009 survey can be used as the baseline for future comparison to determine changing conditions in the ecozone, especially in relation to plant bed size. The lakeward extent of each bed was mapped carefully with GPS, and any significant changes should be visible in future years.

Data Sheets

Aquatic Vegetation Random Sampling (Tier 2)

Waterbody Cover Sheet

Surveying Organization: Aquatic Weed Control

Contact Information: 574-533-2597

Waterbody Name: Syracuse Lake

Lake ID: 67r

County(s): Kosciusko

Date: 8-28-2008

Habitat Stratum: IL

Avg. Lake Depth (ft): 13 ft

Lake Level: 8.98

Crew Leader: Dave Keister

GPS Metadata

Datum: NAD83

Zone: 16

Accuracy: 30ft

Recorder: Dave Keister

Method: WMS Enabled GPS

Secchi Depth (ft): 15.3

Total # of Points Surveyed: —

Total # of Species: ~~#~~ 12 [illegible] Dec-09

Littoral Zone Size (acres): 124

- ☐ Measured
- ☐ Estimated

Littoral Zone Max. Depth (ft): 20ft

- ☐ Measured
- ☐ Estimate (historical Secchi)
- ☐ Estimated (current Secchi)

Notable Conditions: Emergent Beds – Syracuse Lake

Eca-2cm

Syracuse Lake Ecozone Emergent Beds

Water Level - 5.49 (Source Pol Dam)

Aquatic Plant Survey Form

Lake: Syracuse Lake					Secchi: 12.3										
County: Kosciusko					Max Plant Depth: 5.34										
Date: 8-28-09					Weather: Clear Rain										
Biologist: Dave Seidel					Comments: Emergent Survey - SE Ecozone area										
Units of Measure: yds			Rake score (1,3,5) observed(9), algae (p), emergent contact (1), emergent visual (9)												
	R/T		Use acronyms/codes for identified species, use V1, V2....for voucher specimens												
Site	S/E/C	Latitude	Longitude	Dep(est)	Dep/Wid	All	Pot	Nuc	Lati	Fili	Ceri	Ceth	Elod	Bacc	unk
1	S			pic 1	38 yds		1	9							
2		GPS	Points	—	32 yds		9	1	9						
							1								
3	S			pic 2	28 yds		1			9					
7				pic 3	24 yds		1								
10	E				24 yds		1			9	9	9	9		
12	S			pic 4	20 yds		1	9		9	9	1	9	9	
22	E				23 yds		1	9			9			9	
23				pic 5	25 yds		1	9			9			9	
30	E				15 yds		1	9						1	
31	S			pic 6	7 yds		1				9			9	
39					4 yds		1			9					9
40	E				3 yds		1				9				
49	S			pic 7	0 yds						1	9			
50	E			pic 8	0 yds						1	9			
54	S				4 yds		9		9		1				9
55					70 yds		1	9	9		9				
66	E			pic 9	20 yds				9		1				
69	S			pic 10	12 yds		9	9	9	9	1				
72				pic 11	11 yds		9		9		1				9
80				pic 12			9	1			1				
82	S			pic 14	70 yds	Fil	9		9		1	9		9	
96				pic 15	16 yds	Fil									
98	S			pic 16	18 yds				9	9	9				
110				pic 17	43 yds	Sc	1				9	9	9	9	
111					23				9			9			

Bottom - GPS Points

1 - Unit

Table 3: GPS Coordinates for Emergent Plant Bed Borders

41.422562	-85.73737	wpt001	bed #1 pic	41.42323	-85.7307	wpt051	
41.422454	-85.737344	wpt002		41.42321	-85.7306	wpt052	
41.422328	-85.737242	wpt003		41.42321	-85.7305	wpt053	
41.420974	-85.734218	wpt004	bed #2 pic	41.42316	-85.7305	wpt054	
41.421161	-85.734037	wpt005		41.4231	-85.7305	wpt055	bed #6 pic
41.421273	-85.733907	wpt006		41.42305	-85.7303	wpt056	
41.421395	-85.733771	wpt007	bed #2 pic	41.42295	-85.7302	wpt057	
41.421296	-85.733697	wpt008		41.42281	-85.7302	wpt058	
41.421296	-85.733697	wpt009		41.42289	-85.7301	wpt059	
41.421211	-85.733756	wpt010		41.42286	-85.7299	wpt060	
41.421139	-85.7338	wpt011		41.42262	-85.7301	wpt061	
41.421084	-85.733917	wpt012		41.42251	-85.7301	wpt062	
41.420996	-85.733955	wpt013		41.4224	-85.7299	wpt063	
41.420974	-85.733903	wpt014	bed #3 pic	41.4223	-85.7299	wpt064	
41.420956	-85.733859	wpt015		41.42226	-85.7299	wpt065	
41.421015	-85.733707	wpt016		41.4222	-85.7298	wpt066	bed #7 pic
41.421037	-85.733489	wpt017		41.42215	-85.7297	wpt067	
41.421087	-85.733245	wpt018		41.42217	-85.7297	wpt068	
41.421146	-85.733079	wpt019		41.42223	-85.7296	wpt069	
41.421174	-85.732959	wpt020		41.42229	-85.7294	wpt070	
41.421202	-85.732851	wpt021		41.42227	-85.7293	wpt071	
41.42121	-85.732801	wpt022		41.42223	-85.7291	wpt072	
41.421215	-85.732789	wpt023	Bed #4 pic	41.4223	-85.7289	wpt073	
41.421193	-85.732511	wpt024		41.42228	-85.7287	wpt074	
41.421169	-85.73223	wpt025		41.42225	-85.7285	wpt075	
41.421156	-85.732054	wpt026		41.42234	-85.7284	wpt076	
41.421157	-85.731912	wpt027		41.42238	-85.7283	wpt077	
41.421179	-85.731649	wpt028		41.42236	-85.7282	wpt078	
41.421152	-85.731478	wpt029		41.42239	-85.7281	wpt079	
41.421208	-85.73129	wpt030		41.42234	-85.728	wpt080	bed #8 pic
41.421215	-85.731271	wpt031	bed #5 pic	41.42231	-85.7278	wpt081	
41.421314	-85.731196	wpt032		41.4222	-85.7277	wpt082	bed #9 pic
41.421478	-85.731073	wpt033		41.42218	-85.7276	wpt083	
41.421636	-85.730992	wpt034		41.4221	-85.7276	wpt084	
41.421764	-85.731027	wpt035		41.42202	-85.7276	wpt085	
41.422054	-85.730978	wpt036		41.42192	-85.7277	wpt086	
41.422168	-85.73101	wpt037		41.42181	-85.7278	wpt087	
41.422346	-85.731307	wpt038		41.42177	-85.7278	wpt088	
41.422562	-85.731516	wpt039		41.42355	-85.7272	wpt089	
41.422561	-85.731598	wpt040		41.42373	-85.7273	wpt090	
41.422606	-85.731539	wpt041	bed #6 pic	41.42386	-85.7272	wpt091	
41.42281	-85.731808	wpt042		41.42395	-85.7273	wpt092	
41.42289	-85.731895	wpt043		41.42406	-85.7273	wpt093	
41.423006	-85.731838	wpt044		41.42417	-85.7272	wpt094	
41.423112	-85.731815	wpt045		41.42429	-85.7271	wpt095	
41.423194	-85.731701	wpt046		41.42448	-85.727	wpt096	
41.423319	-85.731427	wpt047		41.42465	-85.7269	wpt097	
41.423374	-85.73123	wpt048		41.42483	-85.727	wpt098	
41.423337	-85.730976	wpt049		41.42489	-85.7271	wpt099	bed #10 pic
41.423314	-85.730842	wpt050		41.42498	-85.7269	wpt100	