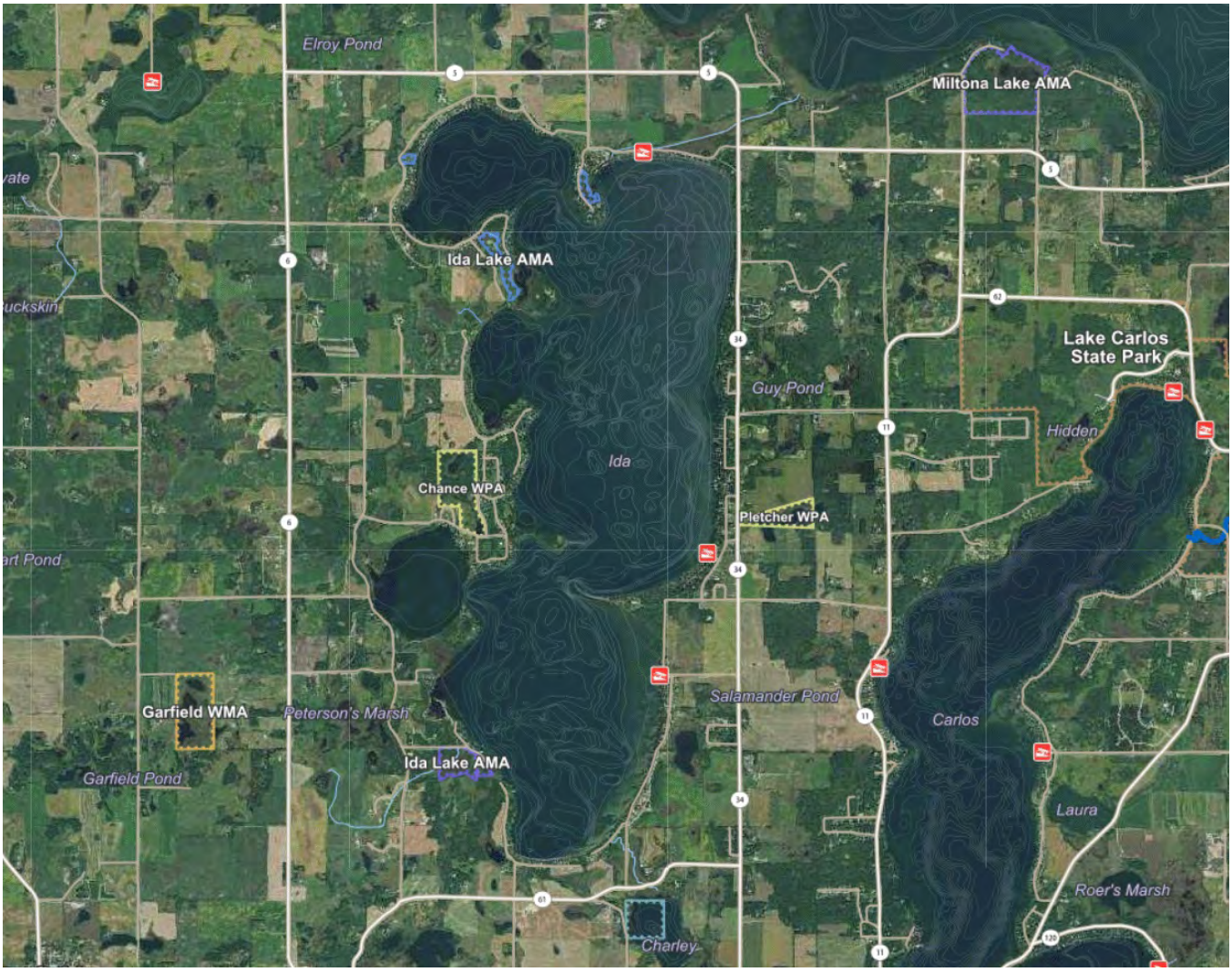

Lake Ida (4,431 acres), Douglas County, MN

Lake Ida, Douglas County: 2019 Aquatic Vegetation and AIS Surveys

Point Intercept Survey, Meander Survey, and Public Access Survey:
July 16, 2019

Prepared for:
Douglas County Land and Resource Management
Alexandria, MN

Prepared by:
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Jo Stuckert
Connor McComas
Blue Water Science
St. Paul, MN 55116

February 5, 2020

Lake Ida, Douglas County:
2019 Aquatic Vegetation and AIS Surveys

Summary

On July 16, 2019, a summer point intercept survey was combined with a meander survey and a public access survey on the 4,431 acre Lake Ida, Douglas County. Plant growth was found to a depth of 21 feet and aquatic plants were estimated to cover 2,068 acres or 47% of Lake Ida. The most common submerged aquatic plant was chara. Chara was observed at 120 sites (54% of the sites out to 21 feet deep). The aquatic plant community in 2019 had 22 species of submerged aquatic plants. This is a good plant diversity condition for a lake in this North Central Hardwood Forest ecoregion setting. The number of individual plant species observed at sample points ranged from 1 to 7 with an average of 2.5 species/point (Figure S1).

Zebra mussels which were first observed in 2013, were found attached to aquatic plants at 153 survey sites. Zebra mussel distribution in Lake Ida was estimated at 1,490 acres (34% of the lake area)(Figure S1).

No starry stonewort or other unknown AIS were found in the nearshore meander survey or in the intensive meander survey conducted at public access. Curlyleaf pondweed, an aquatic invasive plant species, was found at 15 sample sites.

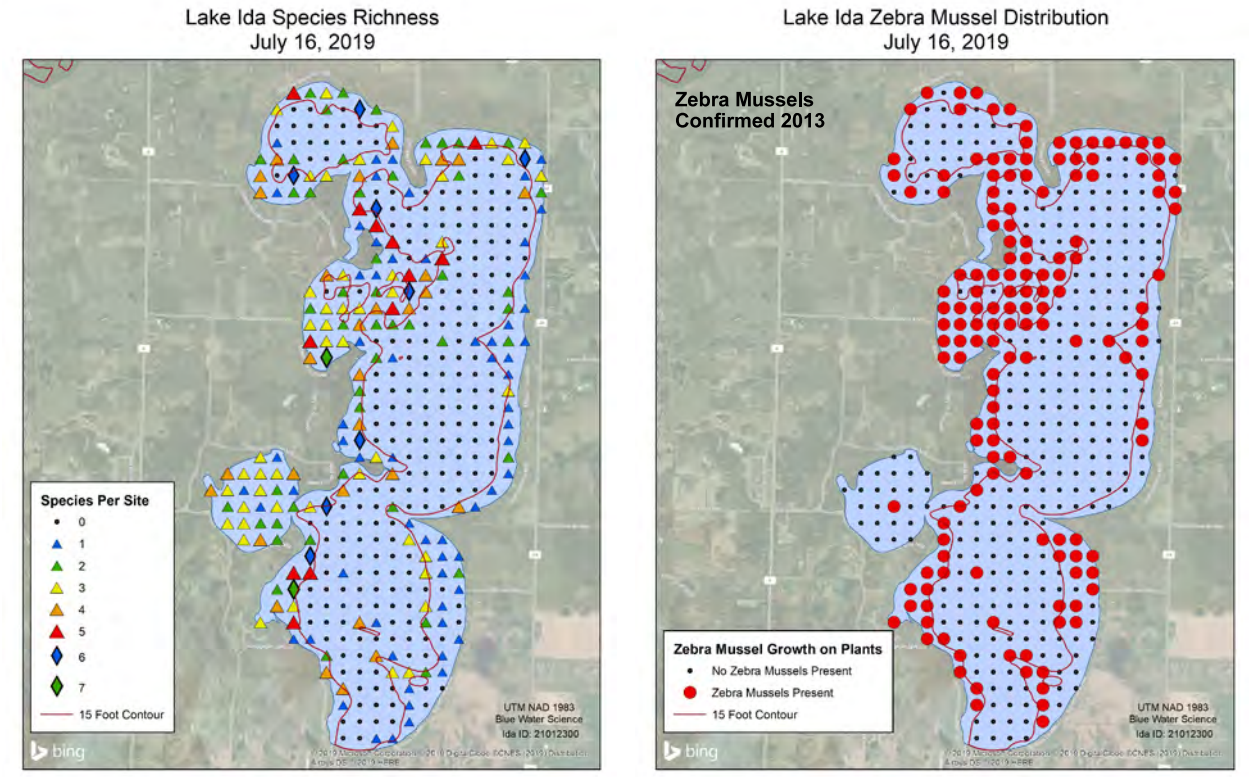


Figure S1. [left] Aquatic plant species richness for each sample site for Lake Ida on July 16, 2019. [right] Zebra mussel distribution for August 2019 was based on observations of zebra mussels attached to aquatic plants collected during the point intercept survey.

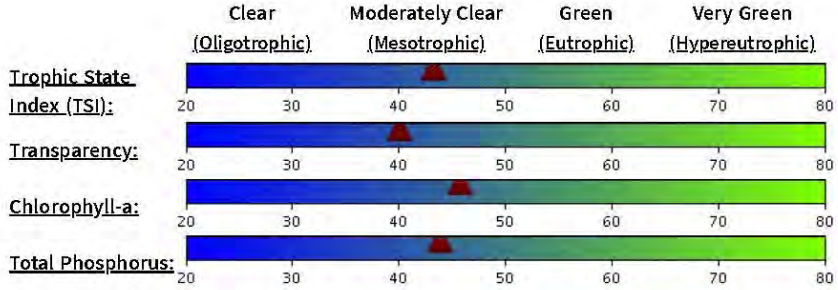
Table S1. Lake Ida aquatic plant occurrences and densities for the July 16, 2019 survey based on 224 sites in the plant growth zone, out to 21 feet of water depth for Lake Ida. Density ratings are 1-3 with 1 being low and 3 being most dense.

	All Stations (n=224)		
	Occurrence	% Occur	Density
Emergent			
Bulrush (*Scirpus sp*)	11	5	1.1
Floatingleaf			
Duckweed (Lemna sp)	1	1	1.0
Spatterdock (*Nuphar variegata*)	2	1	2.0
Submergents			
Coontail (*Ceratophyllum demersum*)	67	30	1.2
Elodea (*Elodea canadensis*)	16	7	1.1
Water stargrass (*Heteranthera dubia*)	1	1	1.0
Northern watermilfoil (*Myriophyllum sibiricum*)	53	24	1.0
Naiads (*Najas sp*)	35	16	1.2
Naiads - spiny (*Najas sp*)	3	1	1.0
Nitella (*Nitella sp*)	3	1	1.0
Curlyleaf pondweed (*Potomageton crispus*)	15	7	1.0
Fries pondweed (*P. Friesii*)	28	13	1.0
Viable pondweed (*P. gramineus*)	2	1	1.0
Illinois pondweed (*P. illinoensis*)	27	12	1.0
Floatingleaf pondweed (*P. natans*)	1	1	1.0
Whitestem pondweed (*P. praelongus*)	26	12	1.0
Claspingleaf pondweed (*P. Richardsonii*)	3	1	1.0
Pondweed (*Potamogeton sp*)	2	1	1.0
Stringy pondweed (*P. sp*)	7	3	1.0
Flatstem pondweed (*P. zosteriformis*)	30	13	1.0
Sago pondweed (*Stuckenia pectinata*)	15	7	1.0
Bladderwort (*Utricularia sp*)	57	25	1.0
Water celery (*Vallisneria americana*)	27	12	1.0
Plant-Like Algae			
Chara (shallow water) (*Chara spp*)	117	52	1.4
Chara (deep water) (*Chara spp*)	5	2	1.0
Number of submerged species	22		

Curlyleaf pondweed, an invasive species, was found in Lake Ida.

Northern watermilfoil, a native plant species, is often mistaken for Eurasian watermilfoil, an invasive aquatic plant species.

Water Quality Summary and Transparency for Lake Ida

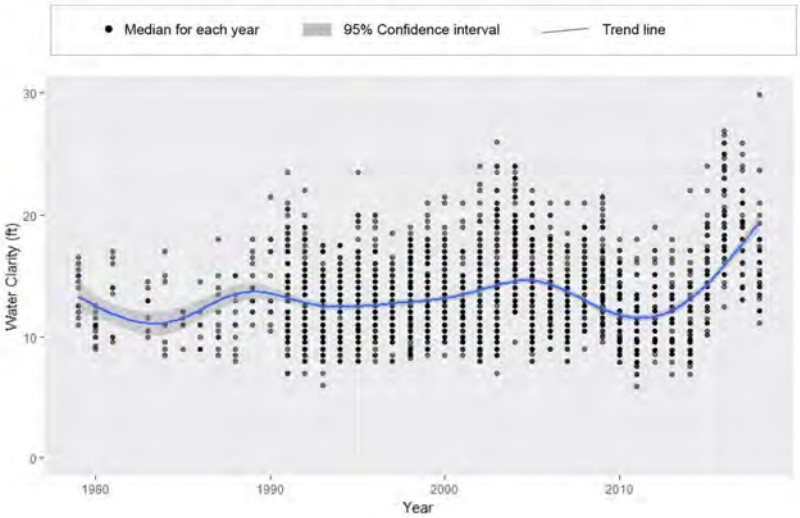


Overall Trophic State Index for This Lake: 43

Parameter	10-Year average of all summer samples	Parameter TSI	Expected TSI range for lakes in same ecoregion	Number of samples
Transparency (meters)	4	40	43 - 54	447
Chlorophyll-a (parts per billion)	5	46	46 - 61	81
Total Phosphorus (parts per billion)	16	44	49 - 61	81

Lake Transparency Trend

Trend analysis result: For years 1979 to 2018 there is evidence of improving water clarity at this lake, of approximately 0.5 feet per decade. For the most recent year of the analysis, median water clarity was 2.62 feet higher than the watershed median.



Source: TSI and Secchi Transparency from MnDNR LakeFinder

The **Trophic State Index** (TSI) is a number that summarizes a lake's overall nutrient richness. Nutrient richness ranges from clear lakes, low in nutrients (oligotrophic), to green lakes, with very high nutrient levels (hypereutrophic). The chart to the left shows the overall TSI rating for this lake (top bar), followed by TSI ratings for the individual parameters that contribute to nutrient richness. The TSI calculations are based on data collected between June and September 2008 to 2017.

Conclusions

Lake Ida has above average water quality. Although zebra mussel filtering activity has increased water clarity in the last few years, the abundance of a diverse native aquatic plant population will help sustain good water quality in the long term. The increase in water clarity may have resulted in an increase in plant abundance, but this heavier plant growth typically lasts for a few years and then growth becomes less dense. Also, as the zebra mussel population declines in the future, clarity will decrease and this will also limit the heavy plant growth. Still it is the presence of native aquatic plants that currently cover an estimated 47% of the lake area that will help reduce open water phosphorus and yield good lake clarity. Native plants are important for the lake.

Lake Ida, Douglas County:
2019 Aquatic Vegetation and AIS Surveys

Lake ID: 21-012300
Size: 4,431 acres
Littoral area: 1,751 acres
Maximum depth: 106 feet

Introduction

Lake Ida is located within Douglas County. An aquatic plant point intercept survey was combined with a nearshore meandering survey in 2019 with the objectives to characterize the aquatic plant community and to identify any new aquatic invasive species (AIS). Aquatic plant surveys also aid in characterizing distribution of native plants which help to sustain good water quality. As a general rule, if plant coverage is 40% or greater of the lake area, good water clarity is likely present. That was one parameter of many to be determined with the plant survey effort.

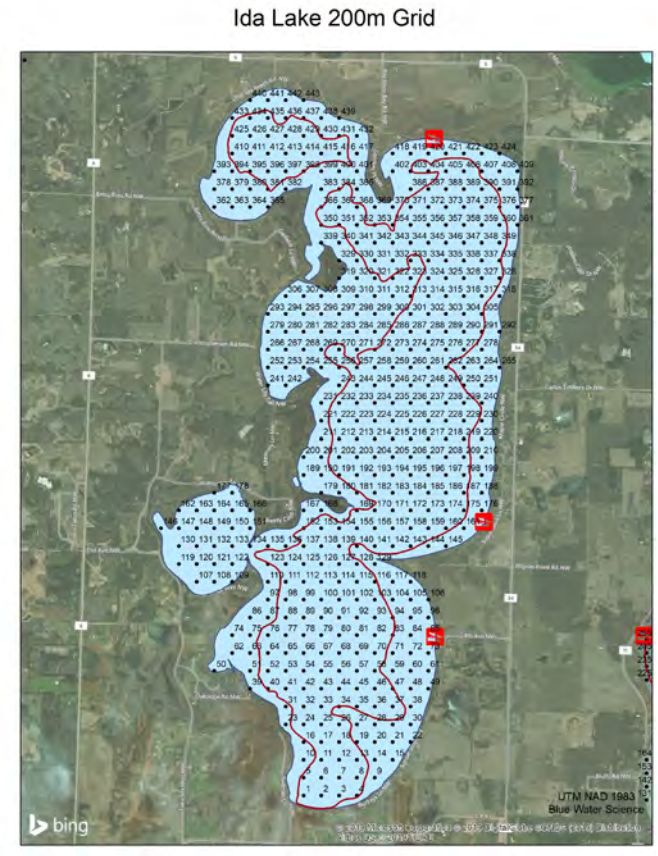


Figure 1. Sample locations for the point intercept aquatic plant survey based on 200 meter spacing, 15 foot contour line, and public accesses.

Methods - Aquatic Plant Surveys

Point Intercept Survey: An aquatic plant survey of Lake Ida using a point intercept sampling method was conducted by Blue Water Science on July 16, 2019. A map and sampling grid were prepared by Blue Water Science and a consisted of a total of 443 points that were distributed throughout the lake. Points were spaced 200 meters apart. Each point represented about 9.8 acres. At each sample point, plants were sampled with a rake sampler. In water less than 15 feet, a fixed-head rake sampler on a telescoping pole was used. In water deeper than 15 feet, a double-ended rake sampler on a rope was tossed into the lake to sample plants. Plants were sampled to depth of 19 feet. A plant density rating was assigned to each plant species on a scale from 1 to 3 (Figure 2). A density of a “1" indicated sparse growth and a “3" rating indicated heavy plant growth (Figure 2).

Nearshore Meander Survey: A meandering survey consists of using a meandering path around the nearshore area of the entire lake. Visual inspection along with plant sampling was conducted. At each sample point, plants were sampled with a rake sampler. A plant density rating was assigned to each plant species on a scale from 1 to 3 (Figure 2). A density of a “1" indicated sparse growth and “3" indicated heavy plant growth. Only invasive species were recorded in the nearshore meander survey.

Public Access Meander Survey: At each of the 3 public accesses, an intensive meander survey was conducted. A minimum of 50 points per access were collected to search for aquatic invasive species (AIS) in general and for starry stonewort in particular.

Figure 2. Aquatic plant density ratings from 1 to 3.

Figure 3. Two different rake samplers used during the Lake Ida surveys.
[left] Fixed head sampler.
[right] Double headed throw rake.

Point Intercept Survey -- July 16, 2019

The submerged aquatic plants were common in Lake Ida for the July 2019 point intercept plant survey. Chara was the dominant plant in Lake Ida. Also bladderwort and coontail were common. A total of 22 submerged aquatic plants, 2 floatingleaf plant, and 1 emergent plant were found (Table 1 and Figure 4).

A summary of plant density and occurrence for individual species is shown in Table 1.

Table 1. Lake Ida aquatic plant occurrences and densities for the July 16, 2019 survey based on 224 sites in the plant growth zone, out to 21 feet of water depth for Lake Ida. Density ratings are 1-3 with 1 being low and 3 being most dense.

	All Stations (n=224)		
	Occurrence	% Occur	Density
Emergent			
Bulrush (*Scirpus sp*)	11	5	1.1
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Plant-Like Algae			
Chara (shallow water) (*Chara spp*)	117	52	1.4
Chara (deep water) (*Chara spp*)	5	2	1.0
Number of submerged species	22		

Aquatic Plant Maps for Lake Ida

The number of aquatic plant species found at a sample point is referred to as species richness. The species richness in Lake Ida for each sample site is shown in Figure 4. The number of plant species at a sample point ranged from 1 to 7 with an average of 2.5 species per sample point. This is a good species richness. Additional aquatic plant maps for individual plant species showing abundance and distribution are shown on the 2 next pages. Overall, aquatic plant growth in Lake Ida is mostly light to moderate.

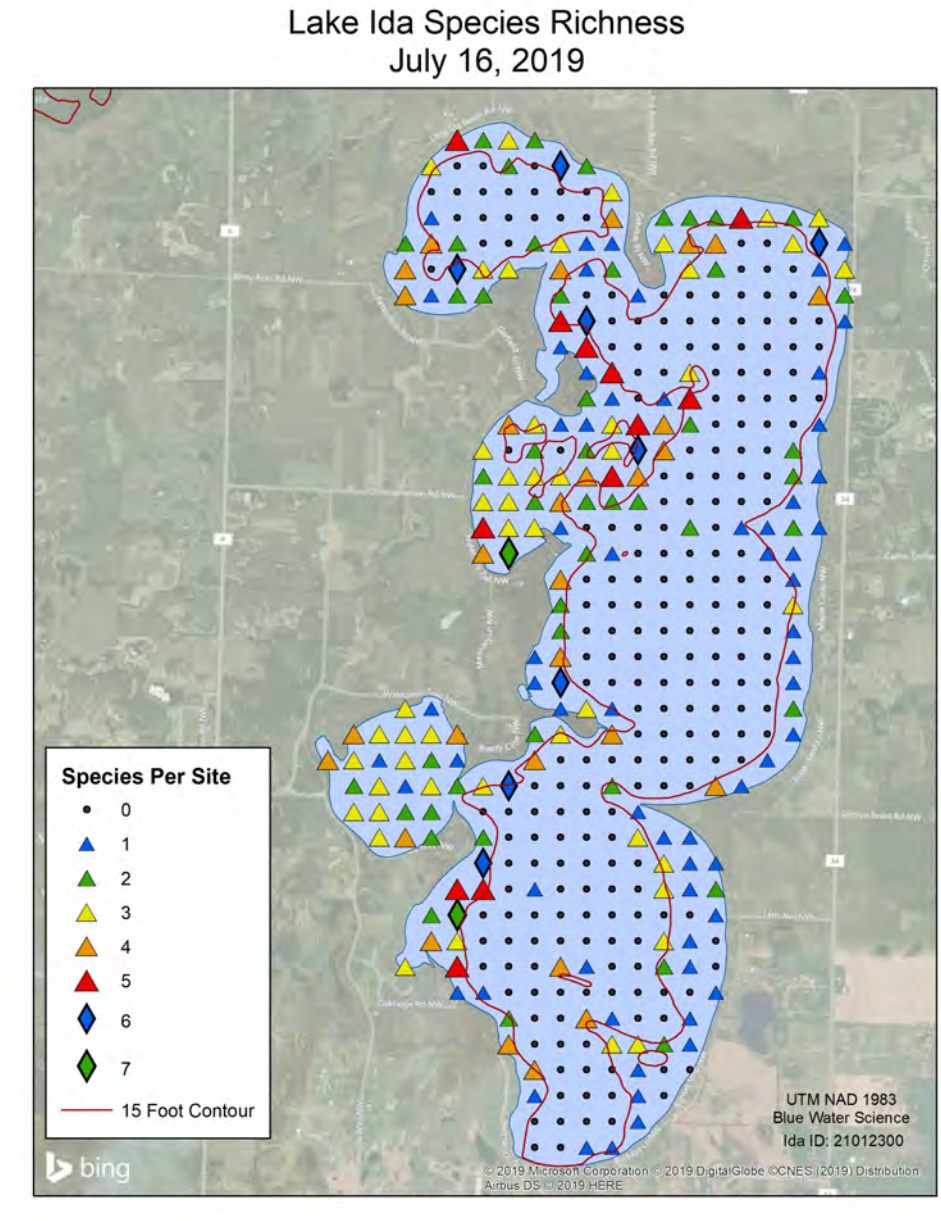
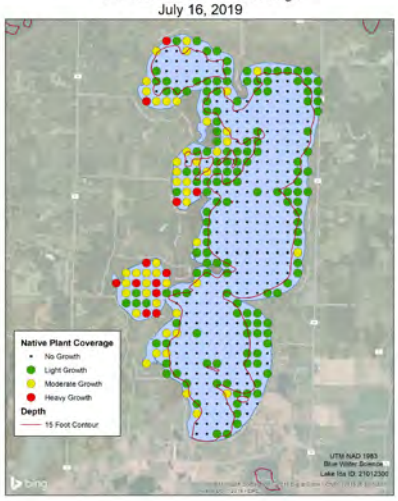


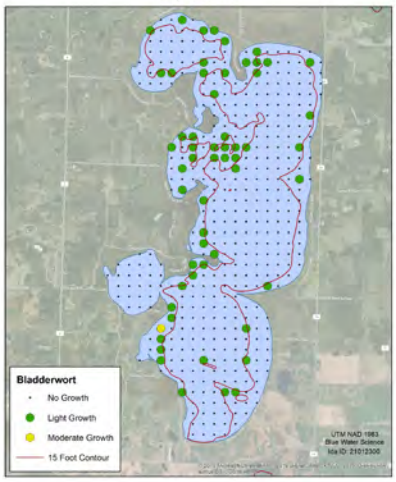
Figure 4. The number of aquatic plant species found at a sample point.

Aquatic Plant Abundance and Distribution

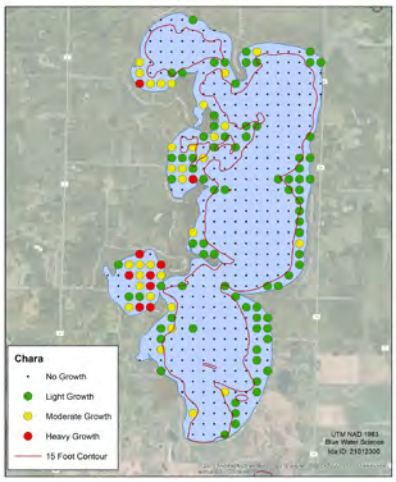
Ida Lake Native Plant Coverage
July 16, 2019



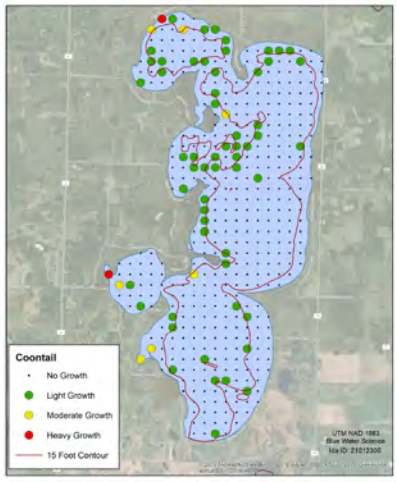
Lake Ida Badderwort
July 16, 2019



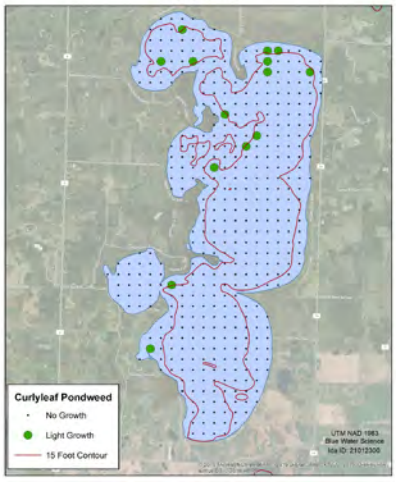
Lake Ida Chara
July 16, 2019



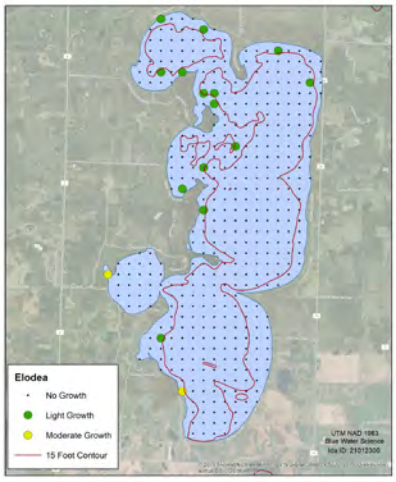
Lake Ida Coontail
July 16, 2019



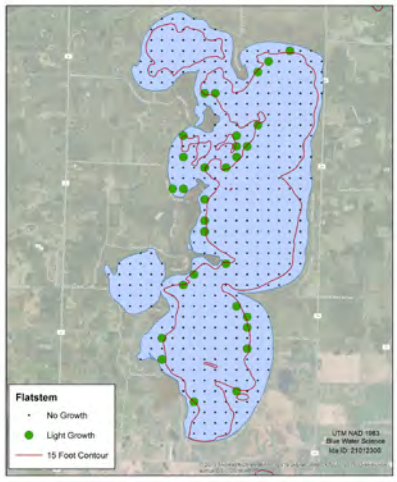
Lake Ida Culyleaf Pondweed
July 16, 2019



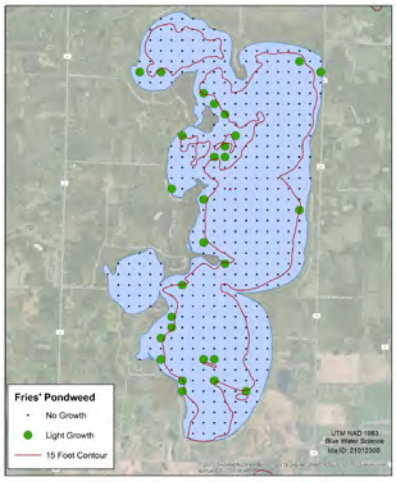
Lake Ida Elodea
July 16, 2019



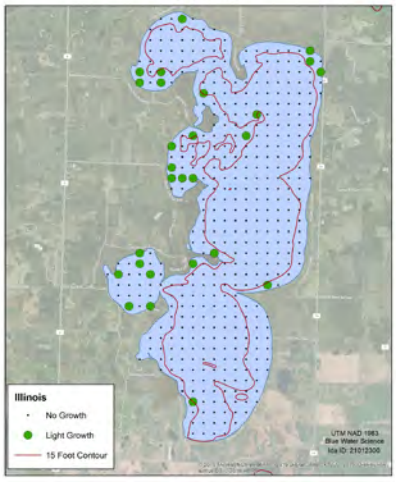
Lake Ida Flatstem Pondweed
July 16, 2019



Lake Ida Fries' Pondweed
July 16, 2019

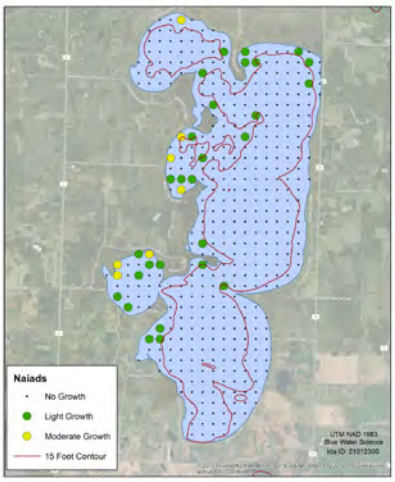


Lake Ida Illinois Pondweed
July 16, 2019

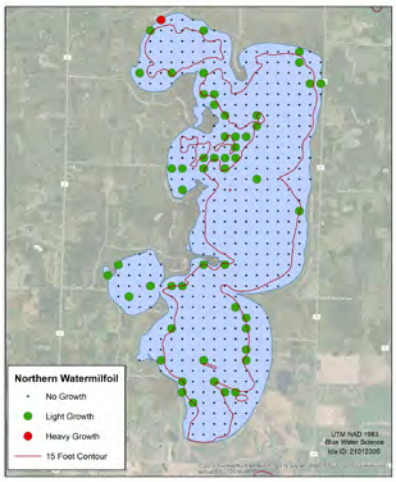


Aquatic Plant Abundance and Distribution

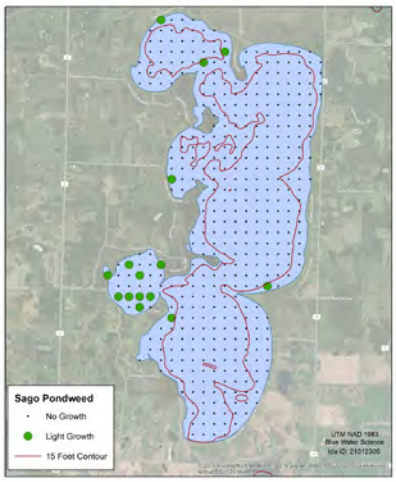
Lake Ida Naiads
July 16, 2019



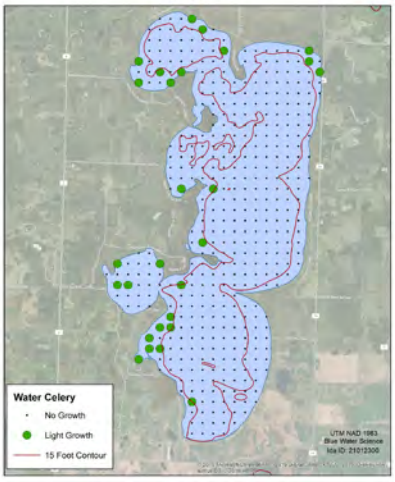
Lake Ida Northern Watermilfoil
July 16, 2019



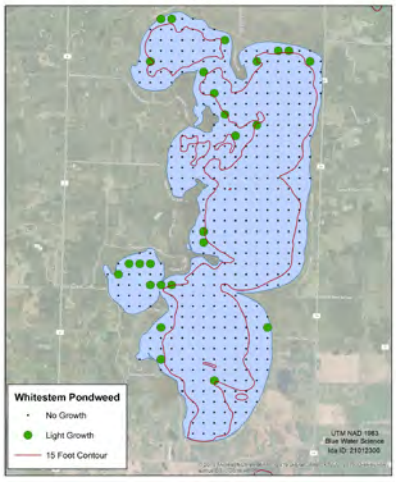
Lake Ida Sago Pondweed
July 16, 2019



Lake Ida Water Celery
July 16, 2019



Lake Ida Whitestem Pondweed
July 16, 2019



Lake Ida Point Intercept Survey Statistics

A summary of plant statistics from the point intercept survey is shown in Tables 2 and 3 and Figure 5. Plants were observed in depths up to 21 feet and a total of 224 points were sampled in that depth zone. However, 95% of plant occurrences were recorded from 3 to 19 feet representing 213 points (Table 2).

The aquatic plant coverage of Lake Ida was estimated at 2,068 acres or 47% of the lake area. Since plant coverage exceeds the 40% coverage criterium for good water clarity, Ida is predicted to have good clarity in the future.

Table 2. Lake Ida aquatic plant statistics (using MnDNR format).

Total # Points Sampled (0-21 feet)	224
Depth Range of Vegetation	3-21 ft
Maximum Depth of Growth (95%) in feet	19
# Points in Max Depth Range (out to 16 feet deep)	213
# Points in Littoral Zone (0-15 feet)	180
% Points w/ Native Submersed Taxa	96
Mean Native Submersed Taxa/Point	2.5
Mean Density of Native Submersed Taxa	1.1
# Submersed Native Taxa	22

Table 3. Aquatic plants sampled by depth.

Depth (feet)	Number of Sites Sampled at that Depth	Percent Occurrence of Plants at that Depth
0	0	0
1	1	0
2	0	0
3	3	33
4	22	95
5	22	91
6	28	100
7	18	94
8	12	100
9	17	100
10	10	100
11	12	100
12	15	47
13	7	100
14	7	100
15	6	83
16	14	100
17	5	100
18	8	100
19	6	83
20	9	67
21	2	50
All sites	224	

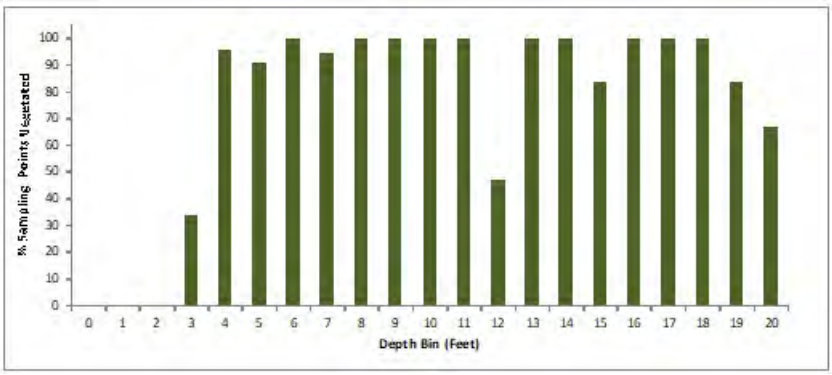


Figure 5. Growth depth of plant colonization out to 20 feet. One site with plants was found at 21 feet (not shown on graph).

Representative Aquatic Plants in Lake Ida

A total of 22 submerged aquatic plant species were observed in the Lake Ida aquatic plant surveys. Representative aquatic plant conditions and species are in Figure 6.

View of pelicans on Lake Ida.

Emergent plants in Lake Ida.

Curlyleaf pondweed, an invasive species, was found in Lake Ida at 15 sites.

Northern watermilfoil, a native species, is sometimes confused as Eurasian watermilfoil, an invasive species currently not found in Lake Ida.

A mix of aquatic plants on a sample rake.

Zebra mussels were found in Lake Ida.

Figure 6. Representative aquatic plants and conditions in Lake Ida in 2019.

Aquatic Invasive Species Search

Zebra mussels were confirmed in Lake Ida in 2013. Curlyleaf pondweed was the only other aquatic invasive species observed in Lake Ida in 2019 in the point intercept survey or in the nearshore meandering survey. Results for all points sampled in both surveys are shown in Figure 7.

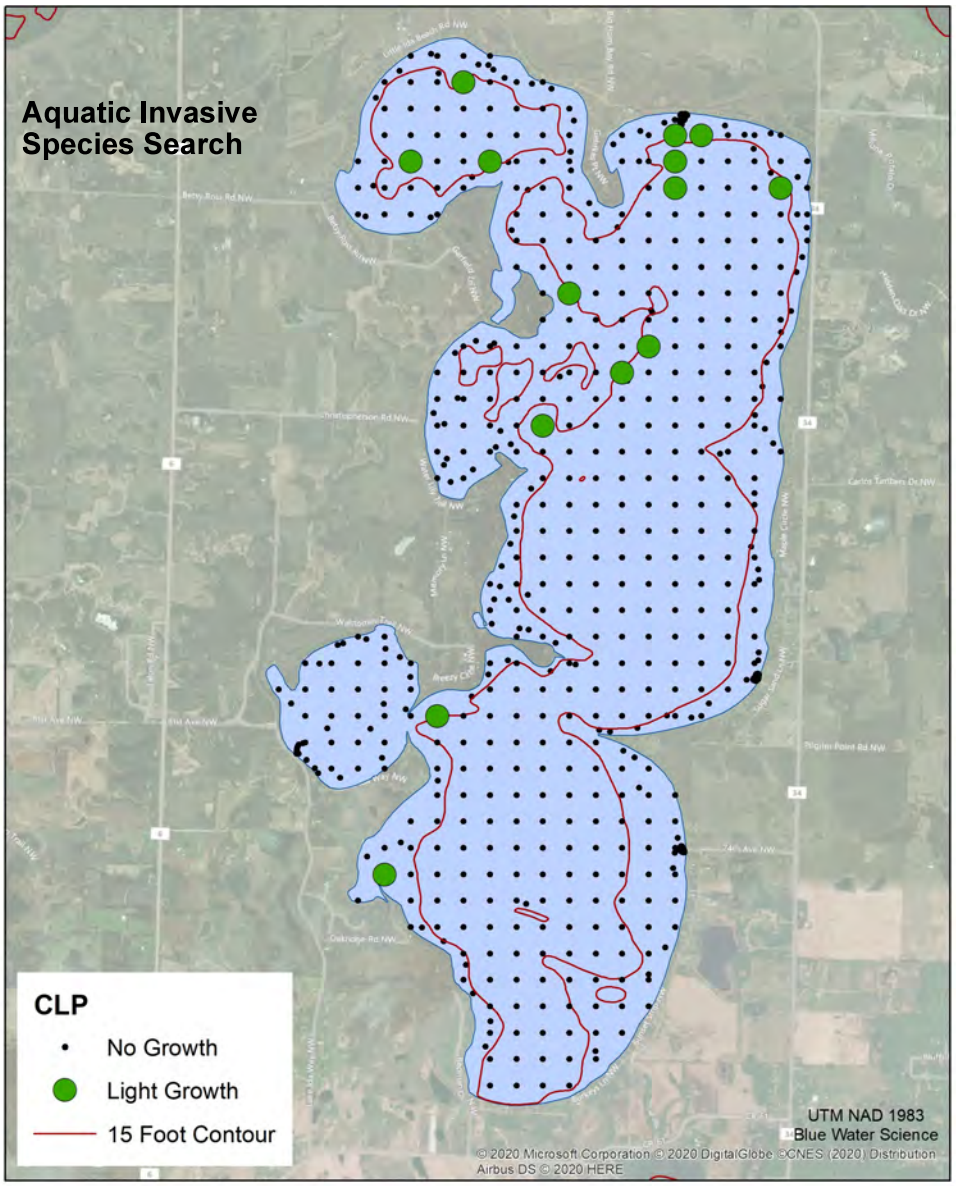


Figure 7. Sample sites for the nearshore meander survey have been combined with sample sites from the point intercept survey. Curlyleaf pondweed was the only aquatic plant invasive species found.

Public Access Meander Survey

At the public accesses on Lake Ida, an additional 177 meander points were sampled (North Access = 66 sites, Pilgrim Access = 56 sites, and Highlands (SE) Access = 55 sites)(Figure 8). The objective was to look for AIS in general and starry stonewort in particular. No starry stonewort or any other AIS was found in the surveys at the public access.

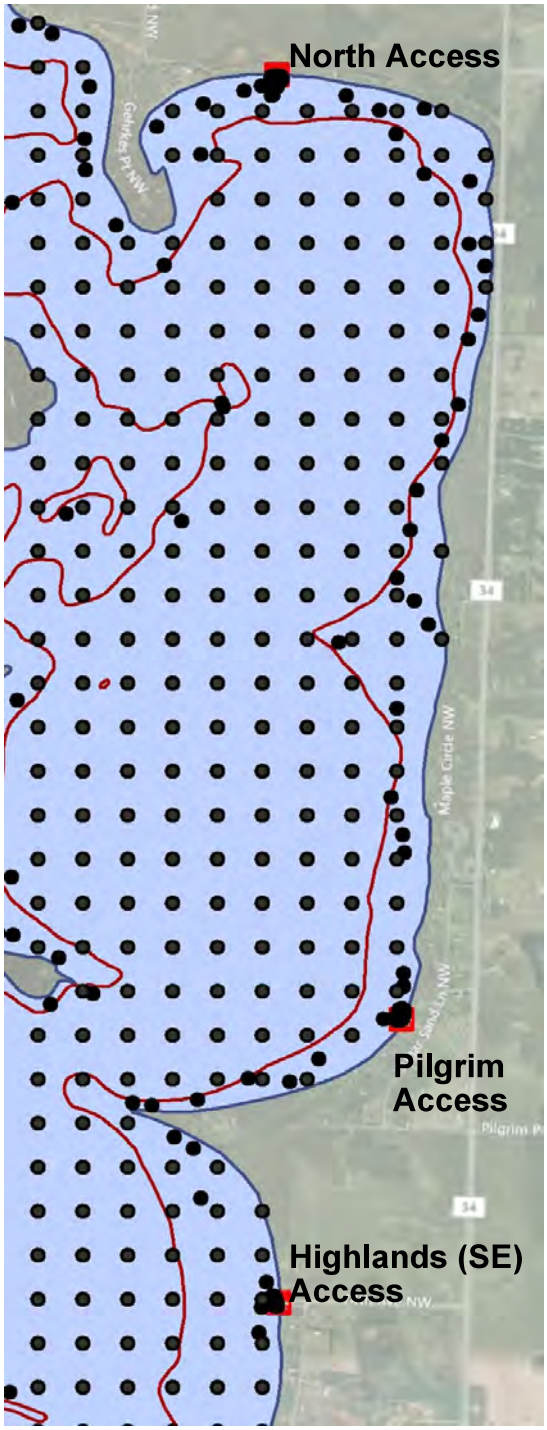


Figure 8. Sample points for the public access AIS surveys.

Zebra Mussel Distribution in Lake Ida

During the aquatic plant point intercept survey, the presence of zebra mussels attached to plants was noted. A map of zebra mussel distribution was prepared and is shown in Figure 9. Zebra mussels were found at 152 survey sites and are estimated to cover 1,490 acres or 34% of the lake area in Lake Ida. Zebra mussels were found to a depth of 21 feet.

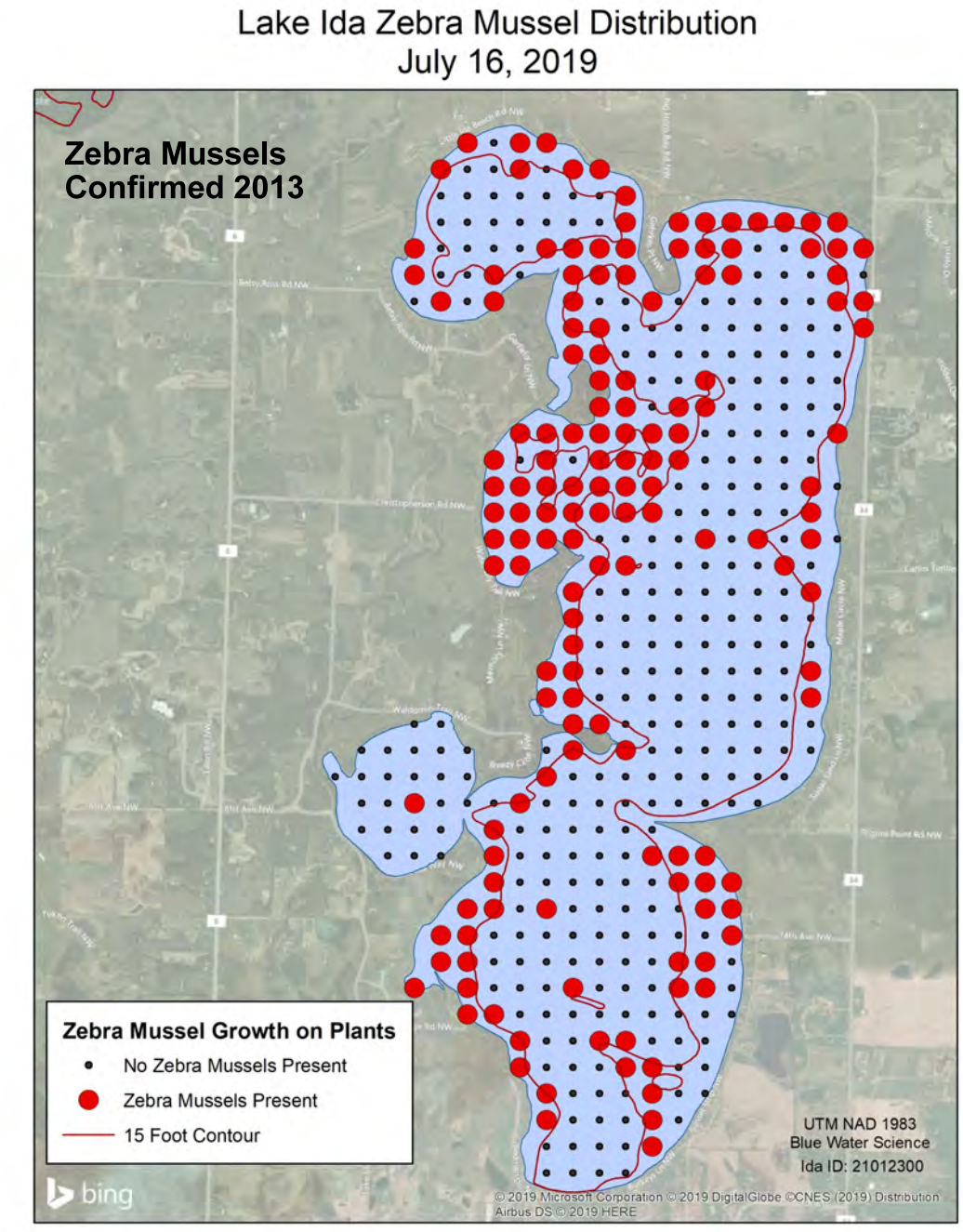
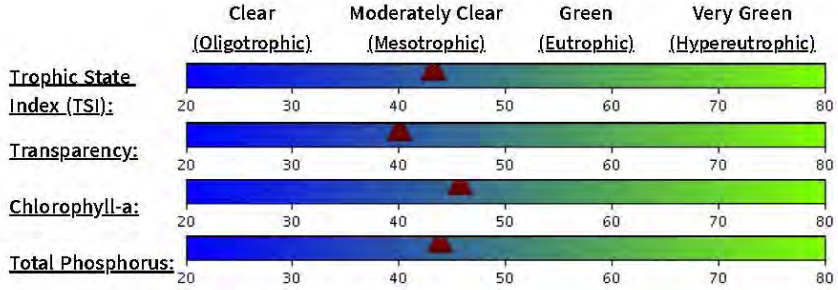


Figure 9. Zebra mussel distribution for July 2019 was based on observations of zebra mussels attached to aquatic plants collected during the point intercept survey.

Water Quality Summary and Transparency for Lake Ida



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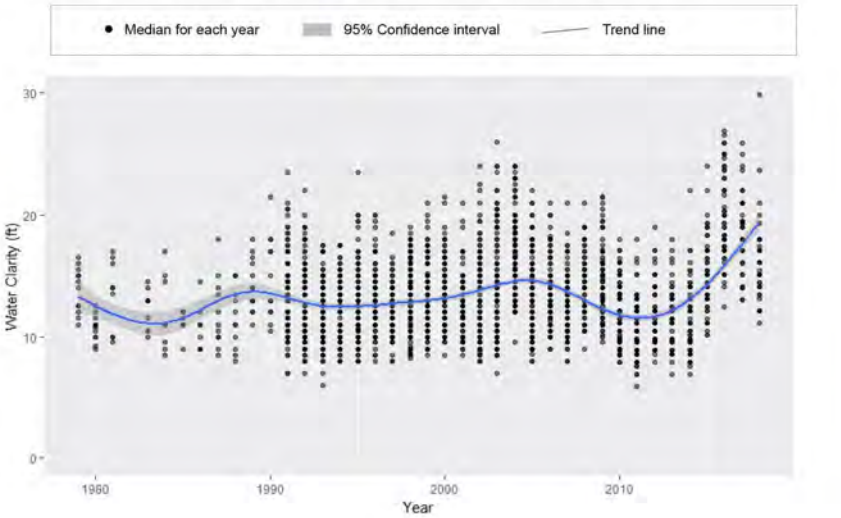

Source: TSI and Secchi Transparency from MnDNR LakeFinder

Conclusions

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APPENDIX

Individual Site Data for the Point Intercept Survey for Lake Ida

Ida Lake 200m Grid

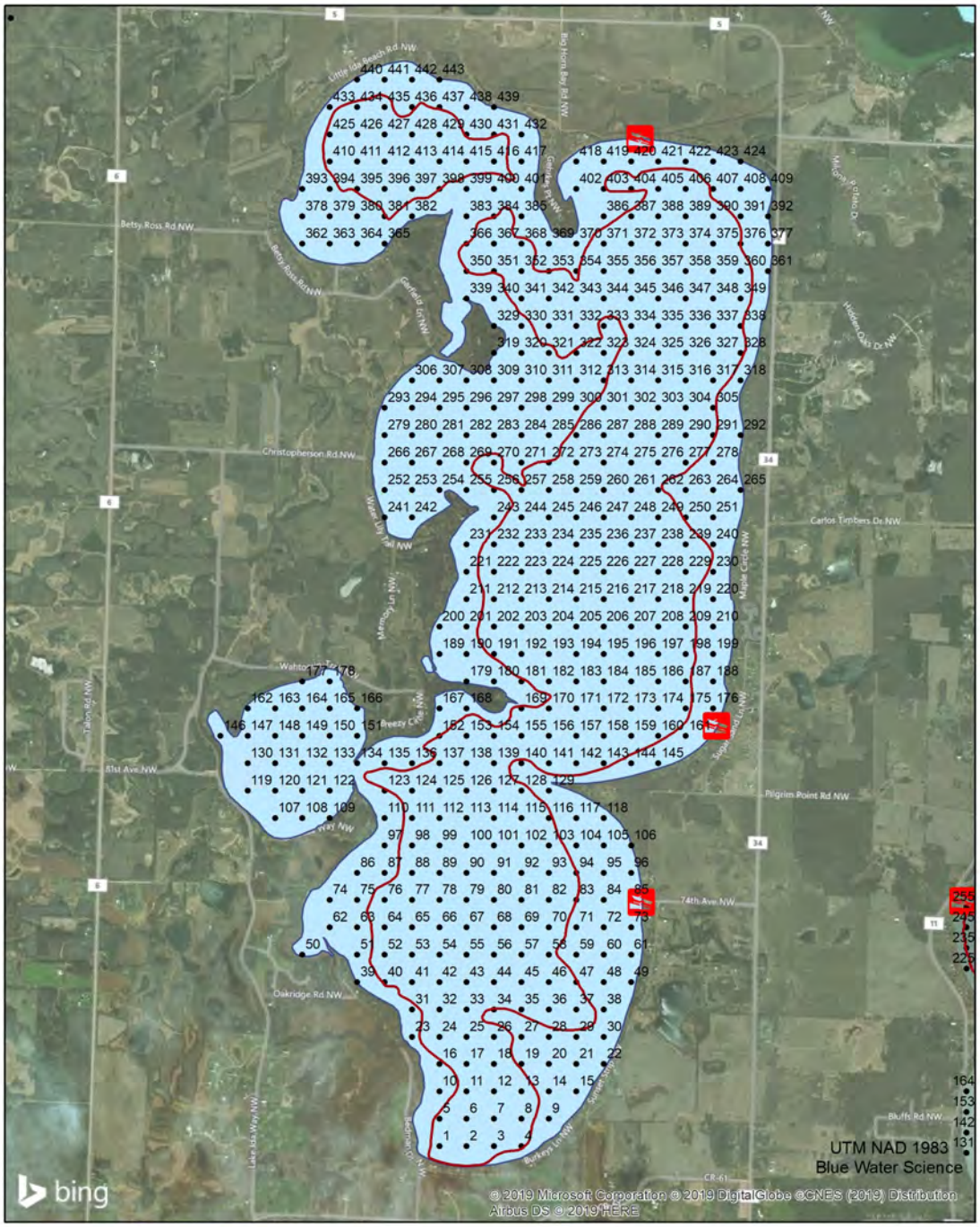

Table A1. Individual site data for July 16, 2019. Numbers indicate plant density.

Site	Depth (ft)	Bulrush	Duck-weed	Spatter-doc	Bladder wort	Chara - 1	Chara - 2	Clasp-ingleaf	Coontail	CLP	Elodea	Flatstem	Floating-leaf	Fries	Illinois	Naiad	Naiad - spiny	Nitella	NWM	P. sp	Sago	Stringy	Variable	Water celery	Water star-grass	White-stem	FA	No Plants	ZM found
1	23																											1	
2	43																											1	
3	19								1																				
4	4					1																							
5	26																											1	
9	5					1																							1
10	7					2																							1
14	5					1																							1
15	5																											1	
16	14											1			1				1					1					1
19	15																											1	
20	12					1																							1
21	7																											1	
22	3																											1	
23	16				1						2			1					1										1
27	11				1	2													1										1
28	13				1							1							1										1
29	16								1					1															
30	5					1																							
31	15													1					1										1
34	13								1					1					1							1			1
35	20								1																				1
36	24																											1	
38	7					1																							
39	6					1																							1
40	20								1																				1
44	37																											1	
48	5																											1	
49	4					1																							
50	4	1		1					2															1					1
51	10				1							1		1					1							1			1
55	16				1				1					1					1										1
56	17													1															
59	14				1														1										1
60	7					1																							1
61	4																											1	
62	4		1						2	1														1					1
63	8				1	2																		1					1
71	14								1			1							1										1
72	7					1																							1
73	3																											1	
74	7															1								1					1
75	10				1	1	1				1	1		1		1													1
84	22																											1	
85	4					1																							1
86	9				2	1										1								1		1			1
87	13					2			1					1					1					1					1
89	7					1																							1
94	18				1							1							1										
95	7					1																							1
96	4					1																				1			1
97	12				1		1		1					1							1			1					1
104	14								1			1							1										1
105	7					1																							1
106	3					1																							1
107	5					2									1	1													
108	5					3			1								1				1								
109	4					3									1														
110	7				1	2																							1
116	18								1			1							1										1
117	9					1																							1
118	5					1																							1
119	6															1	1				1								
120	6					1													1		1								
121	9					1															1								
122	7					2															1								
123	26																											1	1
129	6					1																							
130	6								2															1					
131	6								1								1							1					
132	9					2																							1
133	7					3													1							1			
134	8					1																				1			
135	18									1									1							1			
136	13				1	1						1		1					1					1					1
140	4					1										1													
141	32																											1	
142	30																											1	
143	22																											1	
144	10				1	1									1						1								
145	4					1																							
146	4								3		2								1		1								
147	4														1	2										1			
148	6					3																							
149	8					2										1					1								
150	6					3									1														
151	5					2																							
152	15				1				2			1										1							1
160	44																											1	
161	6					1																							
162	5					1										2			1					1					
163	6					2															1					1			
164	6					2									1											1			
165	5					2										1										1			
166	4					3										1					1			1					
167	11				1										1														
168	11				1											1			1										1
169	10								1			1		1					1										1
170	46																											1	
176	5					1																							
177	4					3									1	1													
178	6															2													
179	5	2				1																							1
180	6	1			1	1									1														1
181	18								1																				
187	20																											1	
188	6					1														1									
189	5					1																							1
190	12				1	1								1		1								1		1			1
191	38																											1	
198	47																											1	
199	8					2																							1
200	7					2																							1
201	15				1				1			1														1			1
210	8					1																							1
211	15								1			1																	1

Site	Depth (ft)	Bulrush	Duck-weed	Spatter-doc	Bladder wort	Chara - 1	Chara - 2	Clasp-ingleaf	Coontail	CLP	Elodea	Flatstem	Floatin g-leaf	Fries	Illinois	Naiad	Naiad - spiny	Nitella	NWM	P. sp	Sago	Stringy	Variable	Water celery	Water star-grass	White-stem	FA	No Plants	ZM found
219	25																											1	
220	9					1																							
221	16								1		1																		1
230	17						1							1					1										
231	12				1				1			1		1															1
232	27																											1	
240	9					1																							1
241	4			3								1	1	1															1
242	7				1				1		1	1				2			1					1					1
243	12					1																		1					1
244	20						1																						1
250	10					1																							1
251	7					1																							
252	5					1		1							1	1					1								1
253	5					2									1	1													1
254	6					3									1	1													1
255	9					1																							1
256	27																											1	
257	35																											1	
258	58																											1	
259	50																											1	
260	16								1										1										1
262	12					1																							1
263	9					1																							
264	8	1			1	1																							1
265	6					1																							
266	5					2									1				1										1
267	9				1	2													1										1
268	16					1			1																				1
269	15								1		1	1							1										1
270	19								1	1																			1
271	8											1							1										1
272	16				1				1																				1
273	30																											1	
274	22																											1	
278	11					1																							1
279	6	1				1										2													1
280	14					1			1			1																	1
281	17				1	1			1																				1
282	8					2										1			1										1
283	12				1				1					1					1										1
284	12				1			1						1					1			1							1
285	14				1				1			1							1										1
286	38																											1	
291	21					1	1																						1
292	6					1																							
293	5				1	2									1														1
294	19																											1	
295	10				1	2																							1
296	23																											1	
297	8				1	1																							1
298	12				1				1					1															1
299	13				1	1			1		1	1							1										1
300	12				1				1	1		1																	1
305	18				1				1																				
306	9				1							1		1		2													1
307	9				1										1	1													1
308	5					1																							1
309	5					2																							1
310	11				1	1													1										1
311	12								1			1		1					1							1			1
312	11					1									1	1			1										1
313	20								1	1																			
318	10					1																							1
319	4					1																	1						1
320	6					2																							1
321	25																											1	
322	10					1																							1
323	16					1			1			1							1							1			1
328	1																											1	
329	4	1				1																							1
330	13								2	1				1					1							1			1
333	10														1	1			1										1
338	17				1																								
339	4	1				2																							1
340	11								1		1			1		1			1										1
341	25																											1	
349	46																											1	
350	9										1	1		1	1				1										1
351	12				1				1		1	1							1							1			1
353	27																											1	
354	20																											1	
361	8																			1									1
362	6					3			1						1									1					
363	8	1				2																							1
364	6					2									1														
365	5					2																		1					1
366	20																	1				1							1
369	6					1																							1
371	32																											1	
376	16										1					1			1						1				1
376	19								1	1								1				1							1
377	7																		1			1							1
378	9					2								1	1				1										1
379	20																											1	
380	9				1				1		1			1	1									1					
381	9				1	1													1										1
382	6					1					1													1					
383	10				1											1			1							1			1
384	18								1																				1
385	6				1	2																							1
386	17				1				1			1																	1
387	20									1								1											1
391	16									1																			1
392	6													1	1									1					
393	6	1				2																		1					1
394	11							1	1														1			1			
395	19								1	1																			
398	18								1	1																			1
399	12				1				1												1								1
400	7					1																							1
401	4					1																							1
402	6	1			1	1										1													1
403	9				1	1										1										1			1
404	16				1				1	1		1																	1
405	23																											1	
407	16								1					1					1										1
408	12				1	1									1	1								1		1			1
409	5					1																							1

Site	Depth (ft)	Bulrush	Duck-weed	Spatter-doc	Bladder wort	Chara - 1	Chara - 2	Clasp-ingleaf	Coontail	CLP	Elodea	Flatstem	Floating-leaf	Fries	Illinois	Naiad	Naiad - spiny	Nitella	NWM	P. sp	Sago	Stringy	Variable	Water celery	Water star-grass	White-stem	FA	No Plants	ZM found
410	19								1																				
417	11								1							1					1			1					1
418	4	1				1										1													1
419	8				1	2																							1
420	16								1	1																			1
421	16								1	1	1											1				1			1
422	18								1			1														1			1
423	11															1			1										1
424	6					1									1									1					1
425	21																											1	
430	22																											1	
431	23																											1	
432	11				1				1																	1			1
433	13				1				2										1										1
435	34																											1	
436	14								2	1																			1
437	23																											1	
438	11				1				1		1								1			1		1					1
439	4				1				1																		1		1
440	9								3		1								3		1					1			1
441	12								1																	1			
442	7				1										1	2													1
443	4					1																		1					1
Average		1.1	1.0	2.0	1.0	1.4	1.0	1.0	1.2	1.0	1.1	1.0	1.0	1.0	1.0	1.2	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		
Occur (224 sites sampled)		11	1	2	57	117	5	3	67	15	16	30	1	28	27	35	3	3	53	2	15	7	2	27	1	26	1	47	152
% occurrence		5	1	1	25	52	2	1	30	7	7	13	1	13	12	16	1	1	24	1	7	3	1	12	1	12	1		