



**Three-Year Lake Management Plan
Lake Lansing
Ingham County**

2019 through 2021

Prepared for:

Michigan Department of Environmental Quality – Aquatic Nuisance Control Program
Charter Township of Meridian
Lake Lansing Property Owners Association

Prepared by:

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Project No. 53260102



MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
AQUATIC NUISANCE CONTROL AND REMEDIAL ACTION UNIT

LAKE MANAGEMENT PLAN

Pursuant to Part 31, Water Resources Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA), and Part 33, Aquatic Nuisance Control, of the NREPA, and the administrative rules promulgated thereunder, a lake management plan is required as part of the application for a whole-lake chemical treatment to the waters described below for the control of nuisance aquatic vegetation.

WATERBODY NAME	COUNTY(IES)	TOWN(S)	RANGE(S)	SECTION(S)
Lake Lansing	Ingham	4N	1W	2, 3, 10 & 11

I. PHYSICAL CHARACTERISTICS OF THE WATERBODY:

LAKE SIZE (ACRES): **456**

MAXIMUM DEPTH (FEET): **35**

MEAN DEPTH (FEET): **8.7**

LAKE VOLUME (ACRE-FEET) – Include volume calculations as an attachment:

WHOLE LAKE = **3,972**

BASED ON 0-10 FEET DEPTH = **3,265**

SIZE OF LITTORAL ZONE (ACRES): **286**

SHORELINE LENGTH (FEET): **20,064**

SHORELINE DEVELOPMENT FACTOR: **1.3**

RETENTION TIME (DAYS): **927**

OUTLET FLOW RATE (CFS): **2.16** SOURCE: **MDEQ Hydrologic Studies Unit (Process No. 9632, December, 2018)**

- ✓ Location Map – include a map showing the location of the waterbody within the county(ies).
- ✓ Bathymetric Map – include a map of the waterbody indicating the depth contours at five foot intervals. The following attributes must be identified on the map: tributaries, outlets, inlets, public and private access sites, public land, critical fish spawning areas, wetlands, special habitats, parks, and water control structures. See guidance for instructions.
- ✓ Land Use Map – include a map of the waterbody indicating the land use of the surrounding area. The following categories shall be used to describe the land use on the map: high density residential, low density residential, commercial/industry, agricultural, parks, and undeveloped areas.

II. WATER QUALITY INFORMATION:

Provide the water quality parameter measurements on the data sheet provided (Appendix). These parameters are required, at a minimum. If there are additional data available or additional space is required, please attach additional pages. See guidance for specific collection requirements.

- ✓ Water Quality Sampling Map – include a map of the waterbody indicating the sampling sites used to collect the water quality parameters.

III. BIOLOGICAL CHARACTERISTICS OF THE WATERBODY:

Total higher aquatic plant surface coverage (%) = 66 (of total lake area based upon BioBase measurements)

- ✓ Aquatic Vegetation Map(s) and Data Analysis – include the results of an aquatic vegetation survey of the waterbody performed in August or September of the year prior to the proposed treatment. The survey and data analysis shall be performed according to DEQ's "Procedures for Aquatic Vegetation Surveys."

✓ Description of the Fish Community – include the source of the information and copies of any correspondence with fisheries biologists, anglers, natural resource groups, etc. Please attach the original comments as a separate sheet of paper.

Description of the Wildlife Community - include the source of the information and copies of any correspondence with wildlife or habitat biologists. Please attach the original comments as a separate sheet of paper.

Description of the Plant Community - include copies of any correspondence with the appropriate agencies. Please attach the original comments as a separate sheet of paper.

Description of Special Concern, Threatened, or Endangered Species - include copies of any correspondence with Michigan Natural Features Inventory. Please attach as a separate sheet of paper.

IV. NUISANCE CONDITIONS:

List the current aquatic nuisance condition(s) occurring in the waterbody:

Lake Lansing currently supports an abundant Eurasian milfoil (EWM) population throughout much of its littoral zone. The EWM infestation is impairing swimming, boating, fishing and other recreational activities. In portions of the lake, curly-leaf pondweed, *Elodea*, native pondweeds, wild celery, and starry stonewort also exist at nuisance levels.

Indicate the activities that are being impaired by the nuisance conditions:

✓ Swimming

✓ Boating

✓ Fishing

✓ Hunting

Other:

- ✓ Target Species Map – include a map of the waterbody indicating the current location(s) of each targeted nuisance species.

V. MANAGEMENT GOALS:

Indicate the appropriate management goals that are the desired outcome(s) of this program.

- Create/Maintain Swimming Areas
- Create/Protect Fish/Wildlife Habitat
- Improve Native Plant Diversity
- Protect Endangered/Threatened Species
- Create Areas for Recreational Use (boating, water skiing, fishing, etc.)
- Remove Exotic Plant Species
- Other:

Management Goal Maps – include map(s) indicating locations where each of the goals may be achieved through the proposed management activities.

VI. HISTORY OF WATERBODY MANAGEMENT:

Provide a written description of the management activities performed on the waterbody within the past ten years. Include mechanical, chemical, or biological control efforts, lake level manipulation, dredging, and fish stocking activities (including species stocked and stocking schedule).

VII. MANAGEMENT OPTIONS:

List all management options considered to achieve the goals established for this waterbody:

Option 1: Control of Eurasian milfoil with a whole-lake fluridone treatment.

Option 2: Control of EWM using selective, systemic herbicides such as 2,4-D, triclopyr, and ProcellaCOR, and possibly the contact herbicides diquat-dibromide and/or flumioxazin in near-shore areas where well-setback and/or irrigation restrictions may be a problem.

Option 3: Control of curly-leaf pondweed and nuisance growth of native plant species via select treatments with contact herbicides and mechanical harvesting.

Option 4: Control of nuisance growth of starry stonewort with a combination of mechanical harvesting, flumioxazin and algaecides in select areas of Lake Lansing.

Why was the proposed management option chosen over other options?

Control of EWM with a whole-lake fluridone treatment (Option 1) is proposed to be used in 2019. Low-dose fluridone treatments have been shown to be extremely effective in providing season-long control of EWM with minimal impacts to non-target species (Madsen et al. 2002; MESB 1999) and the aquatic environment (MESB 1999). Given the historical success of this management strategy on Lake Lansing in 2004, 2007, 2010, 2013 and 2016, a whole-lake fluridone application in accordance with the MDEQ's "6-bump-6" application protocol appears to be the most cost-

effective and environmentally sound option to control Eurasian milfoil on a lake-wide basis.

Control of EWM using selective, systemic herbicides such as 2,4-D, triclopyr, and ProcellaCOR, and possibly the contact herbicides diquat-dibromide and/or flumioxazin (Option 2) is proposed to help control the re-infestation of EWM in Lake Lansing in 2020 and 2021. In addition, control of curly-leaf pondweed and nuisance growth of native plant species via spot-treatments with contact herbicides would be used in 2020 and 2021, if warranted. In recent years, the macro-algae, starry stonewort, has expanded its range somewhat within the littoral zone of Lake Lansing. We propose using mechanical harvesting to remove excessive biomass and selective treatments using algaecides and/or flumioxazin (Option 4). The use of algaecides for filamentous algae would be limited to near-shore developed shorelines, if warranted.

References:

Madsen, J.D., K.D. Getsinger, R.M. Stewart, and C.S. Owens, 2002. Whole lake fluridone treatments for selective control of Eurasian milfoil: II. Impacts of submersed plant communities. Lake and Reservoir. Management. 18(3):191-200.

Michigan Environmental Science Board Sonar Investigation Panel. 1999. Evaluation of the use of Sonar® in Michigan.

VIII. VEGETATION MANAGEMENT PLAN:

Propose a three-year aquatic vegetation management plan that will be used to attain the management goals for this project by checking the appropriate box(es) below. Include a brief summary for each year of the plan that prioritizes and describes the management strategy. For example:

Year 2: 2006

1. Eurasian watermilfoil control – control any offshore reoccurrences of EWM using granular 2,4-D, reoccurrences within well isolation distances will be controlled using Renovate 3 (if budget allows) or Reward...

Year 1: 2019

	Fluridone	Algaecides/Contact Herbicides	Harvesting	Biological Control	Other
<i>Exotic Submerged Species</i>	√	√	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Macro-Algae</i>	<input type="checkbox"/>	√	√	<input type="checkbox"/>	<input type="checkbox"/>

Prioritize and provide a detailed description of your proposed treatment strategy:

A split-6-part-per-billion fluridone treatment in late April or early May. This seasonally-timed low-dose strategy should provide season-long control of Eurasian milfoil and curly-leaf pondweed.

Algaecides and harvesting, if necessary, would be used to target specific areas of Lake Lansing where nuisance growth of starry stonewort occur.

Year 2: 2020

	Systemic herbicides	Contact herbicides	Algaecides	Harvesting	Biological Control	Other
<i>Exotic Submerged Species</i>	√	√	<input type="checkbox"/>	√	<input type="checkbox"/>	<input type="checkbox"/>
<i>Native Submerged Species</i>	<input type="checkbox"/>	√	<input type="checkbox"/>	√	<input type="checkbox"/>	<input type="checkbox"/>
<i>Emergent Species</i>	<input type="checkbox"/>					
<i>Macro-Algae</i>	<input type="checkbox"/>	√	√	√	<input type="checkbox"/>	<input type="checkbox"/>

Prioritize and provide a detailed description of your proposed treatment strategy:

Control of Eurasian milfoil infestations using selective, systemic herbicides such as 2,4-D, triclopyr, and ProcellaCOR, and possibly the contact herbicide diquat-dibromide and/or flumioxazin in near-shore areas where well setback and/or irrigation restrictions may be a problem.

If warranted, control of curly-leaf pondweed, starry stonewort, and nuisance growth of native plant species via mechanical harvesting and/or select treatments with contact herbicides.

Algaecides and/or flumioxazin would be used to target specific areas of Lake Lansing where nuisance growth of starry stonewort occur.

VEGETATION MANAGEMENT PLAN (CONTINUED)

Year 3: 2021

	Systemic herbicides	Contact herbicides	Algaecides	Harvesting	Biological Control	Other
<i>Exotic Submerged Species</i>	√	√	<input type="checkbox"/>	√	<input type="checkbox"/>	<input type="checkbox"/>
<i>Native Submerged Species</i>	<input type="checkbox"/>	√	<input type="checkbox"/>	√	<input type="checkbox"/>	<input type="checkbox"/>
<i>Emergent Species</i>	<input type="checkbox"/>					
<i>Macro-Algae</i>	<input type="checkbox"/>	√	√	√	<input type="checkbox"/>	<input type="checkbox"/>

Prioritize and provide a detailed description of your proposed treatment strategy:

Control of Eurasian milfoil infestations using selective, systemic herbicides such as 2,4-D, triclopyr, and ProcellaCOR, and possibly the contact herbicide diquat-dibromide and/or flumioxazin in near-shore areas where well setback and/or irrigation restrictions may be a problem.

If warranted, control of curly-leaf pondweed, starry stonewort, and nuisance growth of native plant species via mechanical harvesting and/or select treatments with contact herbicides.

Algaecides and/or flumioxazin, if necessary, would be used to specifically target nuisance growth of starry stonewort.

√ Annual Vegetation Management Maps – include maps showing areas of management for each year. Be sure to compare the Management Goal Maps with the Annual Vegetation Management Maps to ensure that the proposed treatments are consistent with the management goals.

√ Fluridone Distribution Map – include a map of the waterbody indicating the proposed path of fluridone distribution in the lake.

√ Fluridone Calculations – include any calculations used to determine the amount of fluridone requested for use.

IX. MONITORING AND EVALUATION:

List the proposed monitoring activities to be performed on the waterbody during the 3 years of the management plan, include proposed date(s) of each activity. Be as specific as possible.

Proposed Activity:	Proposed Date(s)
√ Aquatic vegetation survey	<u>Periodic surveys to gauge treatment effects and detailed AVAS survey in late August or early September of 2019; Detailed AVAS survey in late August or early September of 2020. In addition, follow-up surveys would be conducted to gauge treatment effectiveness and to make management adjustments. Detailed AVAS survey in late August or early September of 2021. In addition, follow-up surveys would be conducted to gauge treatment effectiveness and to make management adjustments.</u>
√ Fluridone residue sampling	<u>Per MDEQ permit conditions</u>
√ EffecTEST™	<u>If necessary, based on treatment results - 2019</u>
<input type="checkbox"/> PlanTEST™	_____
√ Water quality sampling	<u>Spring/late-summer annually</u>
√ Fish surveys	<u>Per MDNR schedule for public access lakes</u>
√ Other: Information and Education	<u>Website articles and presentations</u>

Describe how the monitoring results will be used to evaluate the success of this program in achieving the stated management goals:

<u>Management Goals (from Section V.)</u>	How will you evaluate your success of this goal using the monitoring results?
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Create/Maintain Swimming Areas: **Selective removal of exotic species and limited removal of nuisance native pondweeds and lily pads to improve swimming conditions – monitor effectiveness and make adjustments based upon aquatic plant surveys.**

Create/Protect Fish/Wildlife Habitat: **Selective removal of exotic species to promote the re-vegetation of the littoral zone with native plants of varying architectural types (i.e., low-growing, mid- to full-depth, floating-leaved, and emergent) which will promote a more healthy and diverse fishery on Lake Lansing. Should remove all or nearly all of the EWM and curly-leaf pondweed in 2019 – plant surveys to monitor and manage re-growth of exotic plants in subsequent years.**

Improve Native Plant Diversity: **Removing exotic canopy-forming species such as EWM and curly-leaf pondweed should favor the re-establishment of native plants in the littoral zone. Should remove all or nearly all of the EWM and curly-leaf pondweed in 2019 – plant surveys to monitor and manage re-growth of exotic species in subsequent years.**



LAKE MANAGEMENT PLAN APPENDIX

WATER QUALITY DATA

Waterbody Name: Lake Lansing County: Ingham

Temperature and Dissolved Oxygen:		Date measured: August 16, 2012	
Depth measured (feet)	Temperature (°F)	Dissolved Oxygen (mg/L)	
1	74.4	8.8	
3	74.5	8.7	
6	73.9	8.6	
9	73.0	7.5	
12	72.6	7.0	
15	72.0	6.0	
18	69.8	4.8	
21	68.2	3.6	
24	59.6	1.2	
27	57.5	0.9	
30	56.4	0.3	
Transparency:			
Date measured:		Secchi Disk Transparency (feet)	
May 20, 2010		8.5	
June 2, 2010		11.5	
June 17, 2010		12.5	
July 5, 2010		10.0	
July 14, 2010		9.0	
July 28, 2010		8.5	
August 10, 2010		11.0	
August 27, 2010		9.0	
September 2, 2010		8.5	
September 12, 2010		9.5	
Total Phosphorus and Total Alkalinity:			
	Date measured	Total phosphorus (µg/L)	Total alkalinity (mg CaCO ₃ /L)
Surface sample at spring turnover	March 26, 2018	23	113
Deep sample	August 22, 2018	171	

**Lake Lansing
Meridian Township
Ingham County**

Volume Calculations

From CAD Calculations

Depth (feet)	Area of Contour (acres)	Volume (acre-feet)	
0	456	1999.47	50%
5	346.3	1265.75	32%
10	170.3	466.26	12%
15	33.7	128.06	3%
20	18.3	72.48	2%
25	11	39.52	1%
30	5.17		
Total		3971.53	100%

This reply is being sent via email only.

We have estimated the low flow discharges requested in your email of December 5, 2018 (Process No.9632), as follows:

Pine Lake Drain Tributary At Lake Lansing Outlet, NW ¼ of the SE ¼ of Section 03, T04N, R01W, Meridian Township, Ingham County, with a drainage area of 3.7 square miles. The monthly 50% exceedance, 95% exceedance, and mean flows in cubic feet per second are:

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
50%	0.9	1.1	2.7	2.2	1.1	0.5	0.2	0.1	0.1	0.1	0.5	1.1
95%	0.1	0.1	0.4	0.6	0.3	0.1	0	0	0	0	0.1	0.1
Mean	2.2	3.2	5.7	4.4	2.5	1.7	0.7	0.4	0.6	0.9	1.4	2.2

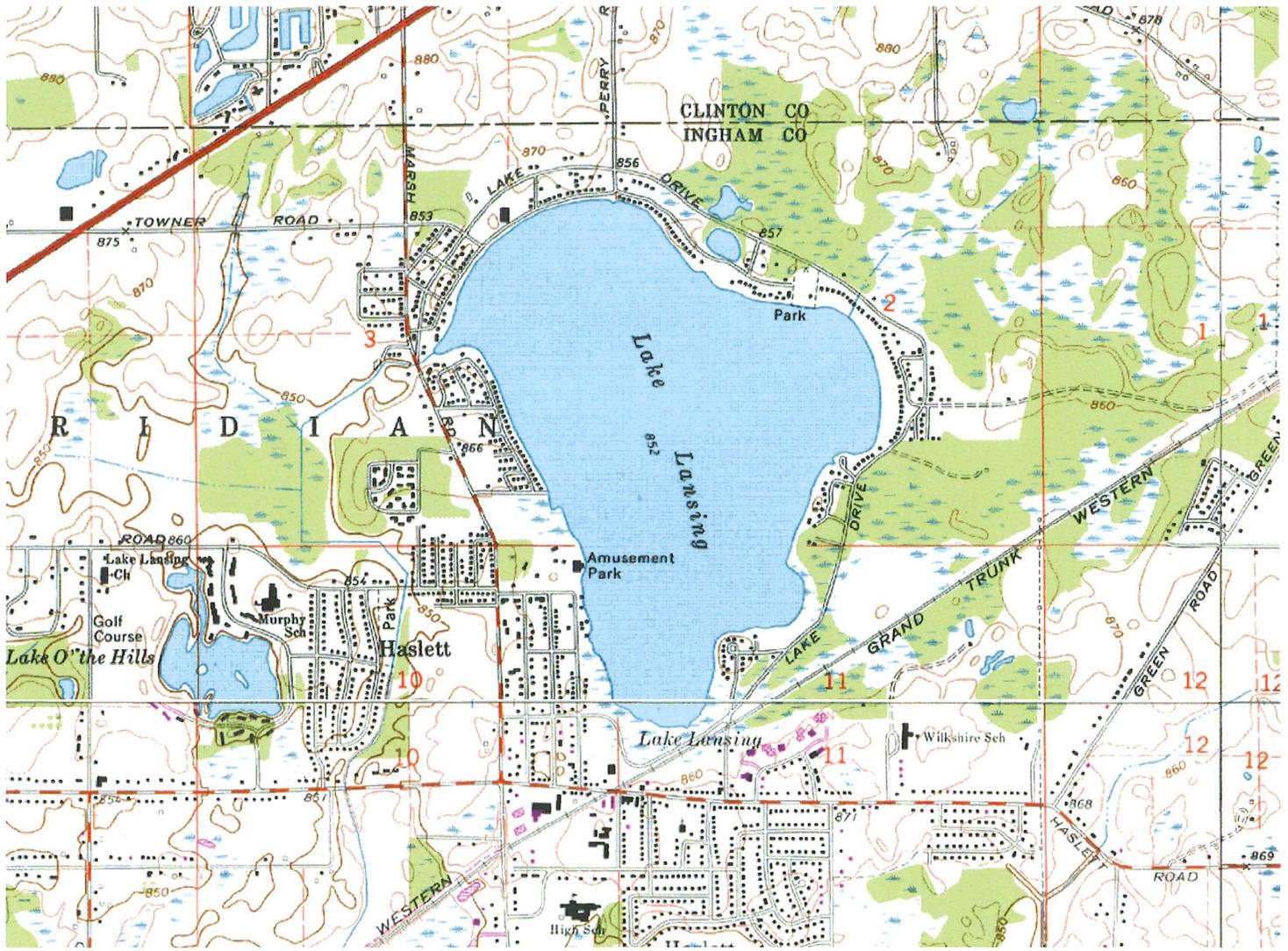
If you have any questions, please contact Mr. Marlio Lesmez, Water Resources Division, Hydrologic Studies Unit, at 517-284-5580, or by e-mail at: lesmezm@michigan.gov.

Sincerely,

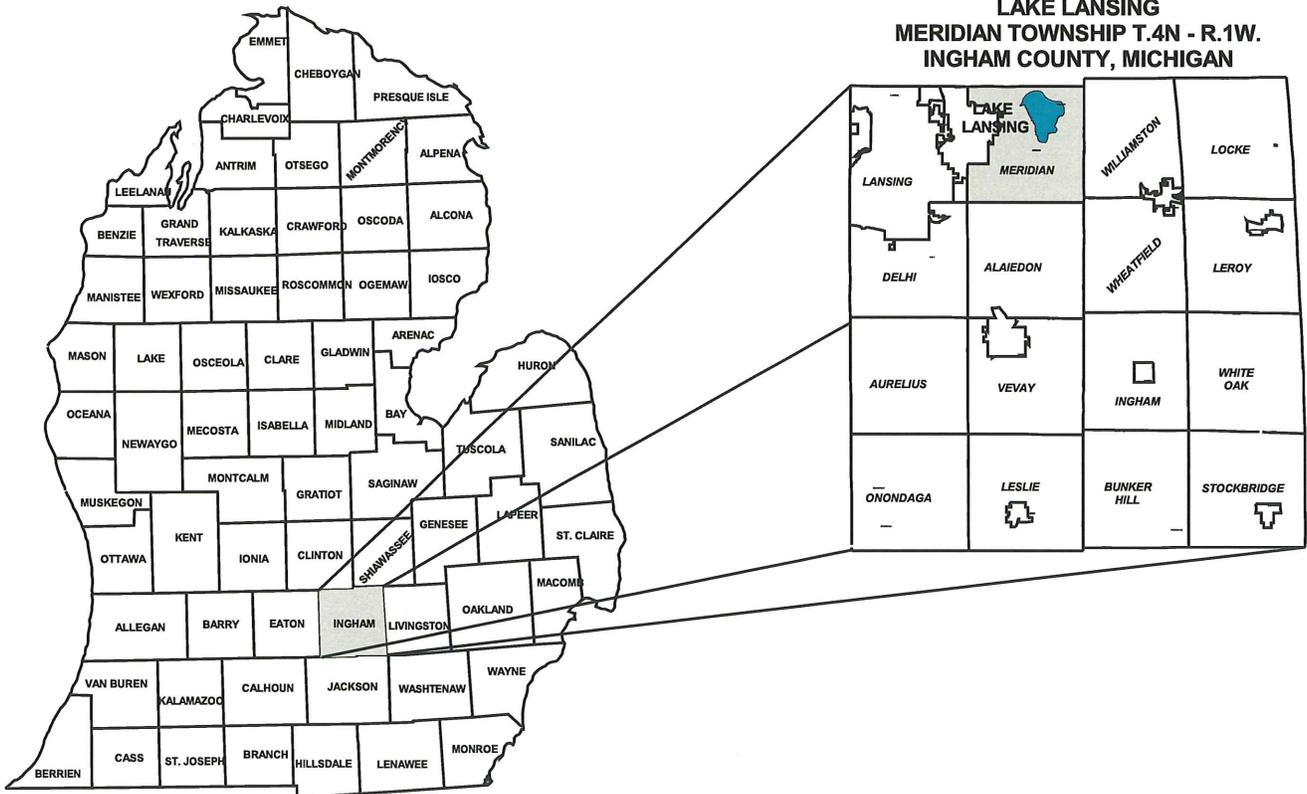
Mario Fusco, Jr., M.S., P.E., Supervisor
Hydrologic Studies and Dam Safety Unit
Water Resources Division
517-256-4458

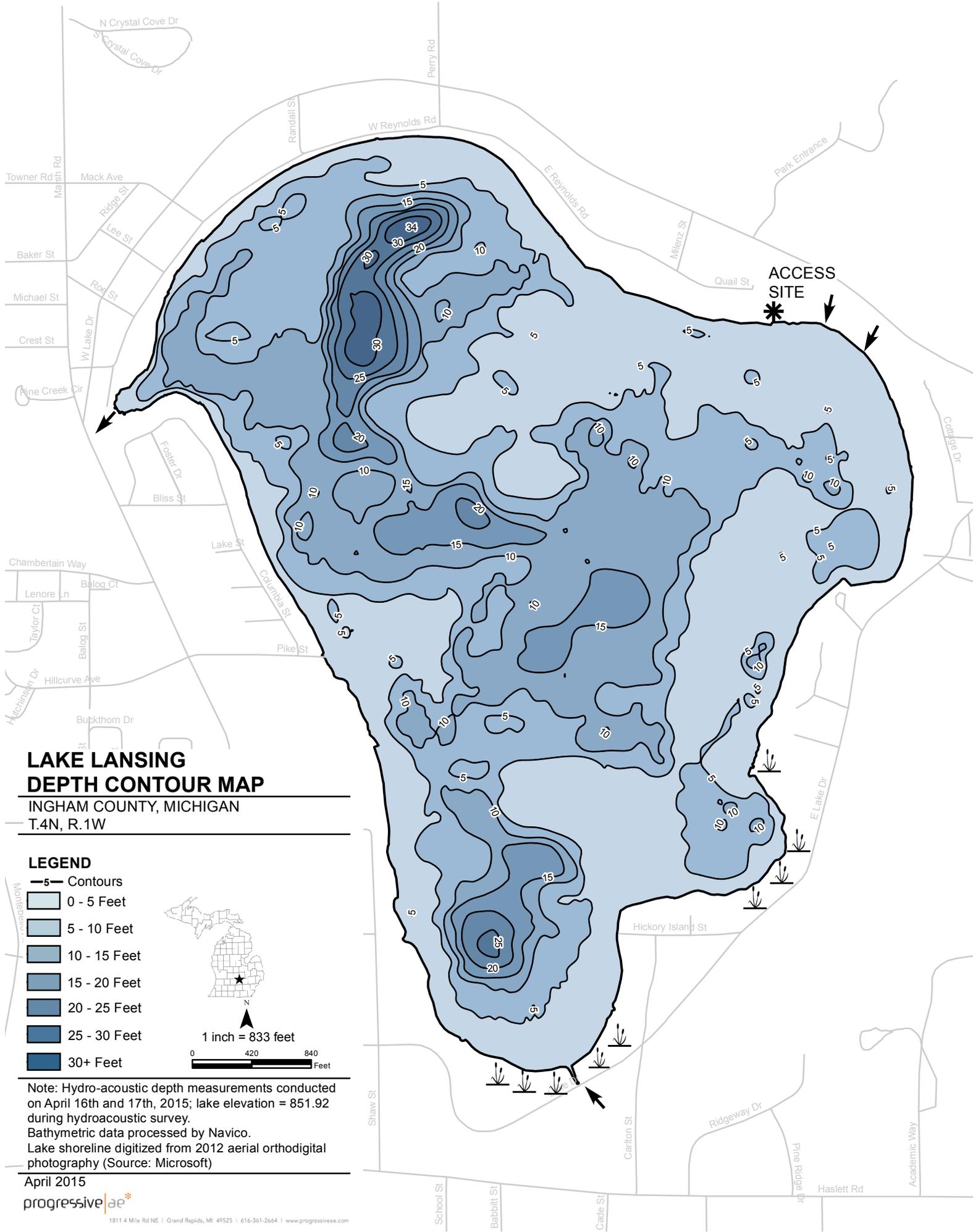
MWL

cc: , MDEQ (S-25-SW)



**LAKE LANSING
MERIDIAN TOWNSHIP T.4N - R.1W.
INGHAM COUNTY, MICHIGAN**

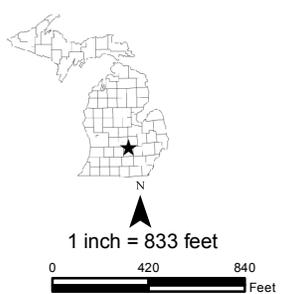




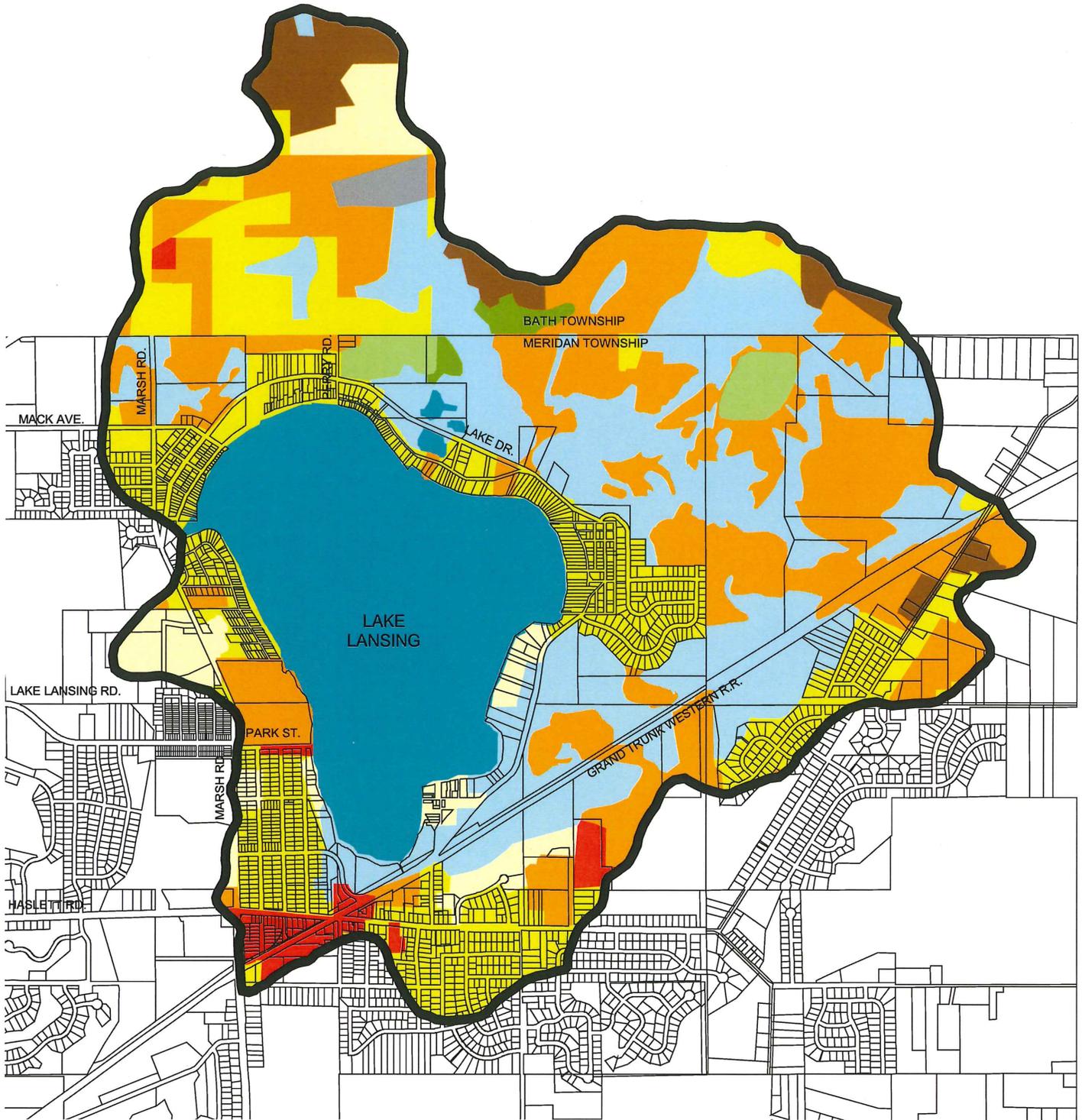
LAKE LANSING DEPTH CONTOUR MAP

INGHAM COUNTY, MICHIGAN
T.4N, R.1W

- LEGEND**
- 5— Contours
 - 0 - 5 Feet
 - 5 - 10 Feet
 - 10 - 15 Feet
 - 15 - 20 Feet
 - 20 - 25 Feet
 - 25 - 30 Feet
 - 30+ Feet



Note: Hydro-acoustic depth measurements conducted on April 16th and 17th, 2015; lake elevation = 851.92 during hydroacoustic survey.
Bathymetric data processed by Navico.
Lake shoreline digitized from 2012 aerial orthorectified photography (Source: Microsoft)



LAKE LANSING UPDATED WATERSHED LAND USE MAP

CHARTER TOWNSHIP OF MERIDIAN
LAKE LANSING PROPERTY OWNERS' ASSOCIATION

Source: Base and landuse map prepared by Michigan Resource Information System (MIRIS)

LAND USE

- High Density Residential
- Low Density Residential
- Commercial
- Industrial
- Open Field
- Agriculture
- Wetland
- Forested
- Water



NO SCALE

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LEGEND

- 5 DEPTH IN FEET
-  CURRENT AND HISTORIC DEEP BASIN SAMPLING LOCATIONS
-  STORM DRAIN LOCATIONS

**LAKE LANSING
WATER QUALITY SAMPLING MAP**

INGHAM COUNTY, MICHIGAN



NO SCALE

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2-14-01-0-16
 Grand Trunk Park 41225
 755-217-2441 (104)
 815-751-1465 (64)
 800-368-2262 (64)

Standard Aquatic Vegetation Summary Sheet

Lake Name: Lake Lansing
 County: Ingham
 Surveyor: Rick Buteyn, Connor Weber
 Total Number of AVAS Sites: 70
 Survey Date: 22-Aug-18

Code No	Plant Name	Occurrence per Density Category				Relative Density Calculations				Relative Density for Entire Littoral Zone		Code No	Plant Name
		A	B	C	D	A x 1	B x10	C x 40	D x 80	Sum	%		
1	Eurasian milfoil		19	40	7	0	190	1,600	560	2,350	33.6	1	<i>Myriophyllum spicatum</i>
2	Curly leaf pondweed					0	0	0	0	0	0.0	2	<i>Potamogeton crispus</i>
3	Chara		20			0	200	0	0	200	2.9	3	<i>Chara sp.</i>
4	Thinleaf pondweed		8			0	80	0	0	80	1.1	4	<i>Potamogeton sp.</i>
5	Flatstem pondweed		1			0	10	0	0	10	0.1	5	<i>Potamogeton zosteriformis</i>
6	Robbins pondweed					0	0	0	0	0	0.0	6	<i>Potamogeton robbinsii</i>
7	Variable pondweed					0	0	0	0	0	0.0	7	<i>Potamogeton gramineus</i>
8	Whitestem pondweed		3			0	30	0	0	30	0.4	8	<i>Potamogeton praelongus</i>
9	Richardsons pondweed		3			0	30	0	0	30	0.4	9	<i>Potamogeton richardsonii</i>
10	Illinois pondweed	1	10			1	100	0	0	101	1.4	10	<i>Potamogeton illinoensis</i>
11	Large leaf pondweed		22	16		0	220	640	0	860	12.3	11	<i>Potamogeton amplifolius</i>
12	American pondweed					0	0	0	0	0	0.0	12	<i>Potamogeton americanus</i>
13	Floating leaf pondweed			1	1	0	0	40	80	120	1.7	13	<i>Potamogeton natans</i>
14	Water stargrass	1				1	0	0	0	1	0.0	14	<i>Heteranthera dubia</i>
15	Wild celery		26	39		0	260	1,560	0	1,820	26.0	15	<i>Vallisneria americana</i>
16	Sagittaria					0	0	0	0	0	0.0	16	<i>Sagittaria sp.</i>
17	Northern milfoil					0	0	0	0	0	0.0	17	<i>Myriophyllum sibiricum</i>
18	M. verticillatum					0	0	0	0	0	0.0	18	<i>Myriophyllum verticillatum</i>
19	M. heterophyllum					0	0	0	0	0	0.0	19	<i>Myriophyllum heterophyllum</i>
20	Coontail	1	3			1	30	0	0	31	0.4	20	<i>Ceratophyllum demersum</i>
21	Elodea		21	7		0	210	280	0	490	7.0	21	<i>Elodea canadensis</i>
22	Utricularia spp.					0	0	0	0	0	0.0	22	<i>Utricularia vulgaris</i>
23	Bladderwort-mini					0	0	0	0	0	0.0	23	<i>Utricularia minor</i>
24	Buttercup					0	0	0	0	0	0.0	24	<i>Ranunculus sp.</i>
25	Najas flexilis		12			0	120	0	0	120	1.7	25	<i>Najas flexilis</i>
26	Brittle naiad					0	0	0	0	0	0.0	26	<i>Najas minor</i>
27	Sago pondweed		3	3		0	30	120	0	150	2.1	27	<i>Stuckenia pectinata</i>
28						0	0	0	0	0	0.0	28	
29						0	0	0	0	0	0.0	29	
30	Nymphaea		3			0	30	0	0	30	0.4	30	<i>Nymphaea odorata</i>
31	Nuphar		3	5		0	30	200	0	230	3.3	31	<i>Nuphar sp.</i>
32	Brasenia					0	0	0	0	0	0.0	32	<i>Brasenia schreberi</i>
33	Lemna minor					0	0	0	0	0	0.0	33	<i>Lemna minor</i>
34	Spirodella					0	0	0	0	0	0.0	34	<i>Spirodela polyrhiza</i>
35	Watermeal					0	0	0	0	0	0.0	35	<i>Wolffia punctata</i>
36	Arrowhead					0	0	0	0	0	0.0	36	<i>Sagittaria latifolia</i>
37	Pickeralweed			1		0	0	40	0	40	0.6	37	<i>Pontederia cordata</i>
38	Arrow arum					0	0	0	0	0	0.0	38	<i>Peltandra virginica</i>
39	Cattails		4	2	7	0	40	80	560	680	9.7	39	<i>Typha sp.</i>
40	Bulrushes					0	0	0	0	0	0.0	40	<i>Scirpus sp.</i>
41	Iris					0	0	0	0	0	0.0	41	<i>Iris sp.</i>
42	Swamp loosestrife		1			0	10	0	0	10	0.1	42	<i>Decodon verticillatus</i>
43	Purple loosestrife	2				2	0	0	0	2	0.0	43	<i>Lythrum salicaria</i>
44	Starry stonewort		10			0	100	0	0	100	1.4	44	<i>Nitellopsis obtusa</i>

Total: 106.9

Row #	Point #	Species and Density										Row #	Point #	Species and Density									
	#	1	2	3	4	5	6	7	8	9	10		#	1	2	3	4	5	6	7	8	9	10
1		3B										26		15C	3B	1B	11B	21C					
2		1C	15B	10B								27		3B	15B	21B							
3		3B	1C	10B	15B							28		1B	15B								
4		11B	25B	3B	1C	15B						29		1C	15B	21B	4B						
5		25B	3B	1B	11B							30		1C	15C	21B	25B	4B	39B				
6		1C	15C	11B								31		1C	15C	11C							
7		1B	15B	11B	21B							32		1C	15C	11C							
8		25B	15C	11B								33		1B	15B	21C							
9		1B	15C	11C	9B	25B	3B	21B				34		1C	11C	15C	21B						
10		15C	15B	21B	11C	1C						35		1C	21C	15C							
11		10B	11C	25B	9B	1C	15C	4B				36		1C	11B	21C	8B	30B					
12		15C	1C	11C	10B							37		1C	15C	11C	8B	4B					
13		1C	15C	25B	8B	11B						38		1C	39B	1C	15C	39C	10B				
14		1C	15C	11B	14A							39		1C	15B	43A	39D	31C	27B	21B	5B		
15		1D	15C	4B								40		1C	15B	27B	39D	43A	37C	31B	11C	21B	
16		1D	15C									41		1C	27B	11C	42B	15C	4B	21C			
17		1D	15B	20B	11B	44B						42		1C	27C	21C	15C	11B	10B	31C	39D		
18		1C	10B	9B	15C							43		1C	27C	15C	21C	11B	11C	31C	39D		
19		15C	1C	20B								44		1C	27C	15B	21B	31C	39B	11B			
20		15B	3B									45		1C	11B	13C	15B						
21		21B	11B	10B	1C	30B	15B	44B				46		13D	1B	31C	39B						
22		1C	30B	15C								47		39C	15B	11C	21B	1B					
23		15C	15B	1B	3B	25B						48		11C	1B	21B	15B	39B					
24		15C	1C	3B								49		11C	1B	21B	15B						
25		11B	1B	15B								50		15C	21B	1B							

Row #	Point #	Species and Density										Row #	Point #	Species and Density									
		1	2	3	4	5	6	7	8	9	10			1	2	3	4	5	6	7	8	9	10
51		1C	15C	2B	25B	3B	20A					76											
52		1C	15C	25B	3B							77											
53		1C	39D	31B	4B	11B	21B	15B				78											
54		1D	15B	39B								79											
55		31B	1C	39D	15C	10B						80											
56		1B	15C	1C								81											
57		15C	1B	11B								82											
58		15C	1B	1C								83											
59		1C	15B	10A	21B	1B	25B	3B				84											
60		1C	15C	11B	3B	25B	20B	21B				85											
61		1C	15C	21B	1B							86											
62		1C	15C	44B	11B	21B	3B					87											
63		1B	11B	44B	3B							88											
64		1B	15C	44B	3B							89											
65		1B	15B	44B	21B	3B						90											
66		15C	1B	44B								91											
67		1B	1C	15B	11B	10B	4B	44B				92											
68		1D	44B	15C								93											
69		1D	15B	44B	3B							94											
70		1D	15B	3B								95											
71												96											
72												97											
73												98											
74												99											
75												100											

● ● = 300 FOOT SPACING

LAKE LANSING INGHAM COUNTY, MICHIGAN AQUATIC PLANT SURVEY MAP 456 ACRES

Date: _____

Crew: _____

Weather: _____

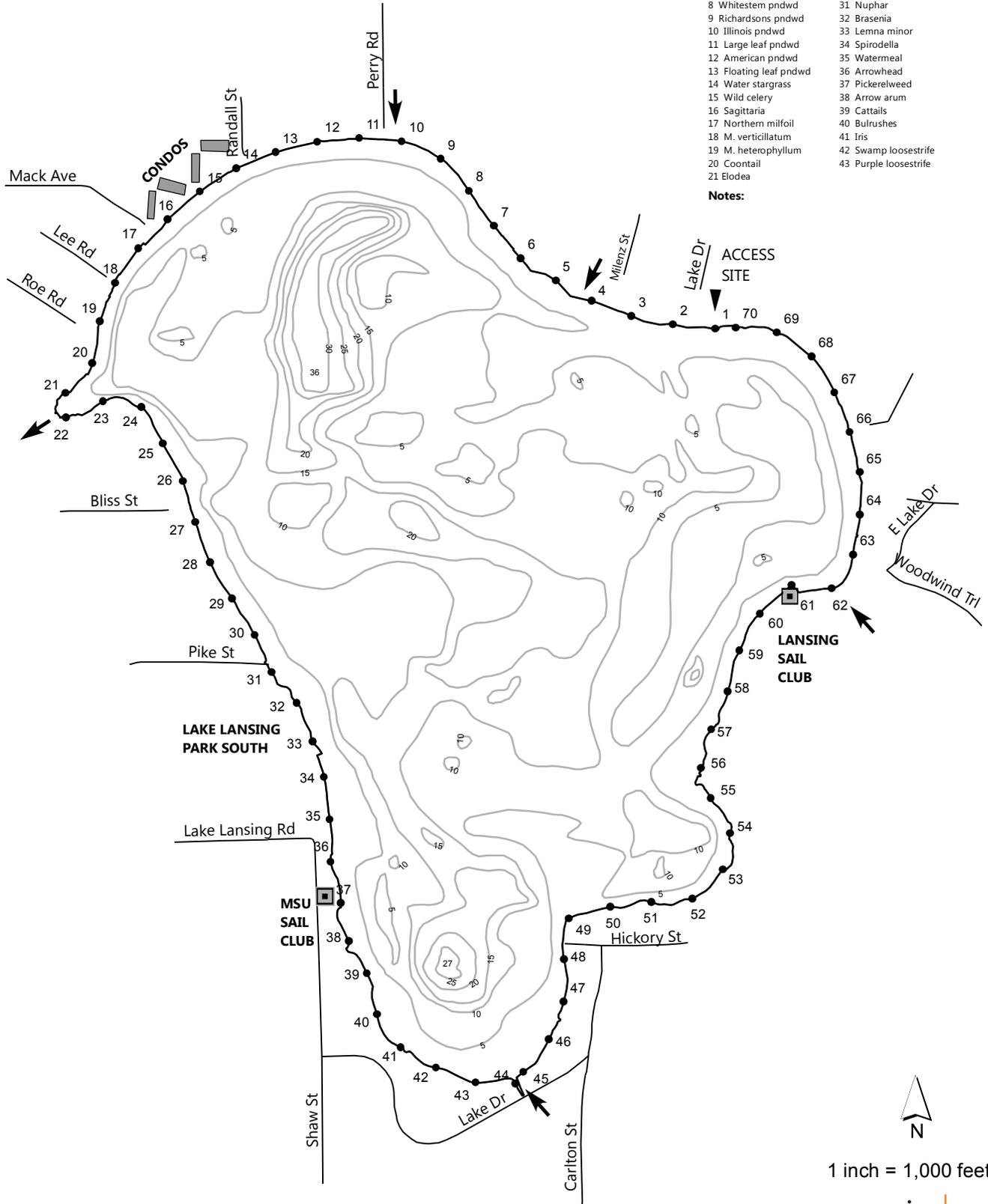
Plant Names

- | | |
|------------------------|-------------------------|
| 1 E. Milfoil | 22 Utricularia vulgaris |
| 2 Curly leaf pndwd | 23 Bladderwort-mini |
| 3 Chara | 24 Buttercup |
| 4 Thinleaf pndwd | 25 Naiad |
| 5 Flatstem pndwd | 26 Brittle naiad |
| 6 Robbins pndwd | 27 Sago pondweed |
| 7 Variable pndwd | 30 Nymphaea |
| 8 Whitestem pndwd | 31 Nuphar |
| 9 Richardsons pndwd | 32 Brasenia |
| 10 Illinois pndwd | 33 Lemna minor |
| 11 Large leaf pndwd | 34 Spirodella |
| 12 American pndwd | 35 Watermeal |
| 13 Floating leaf pndwd | 36 Arrowhead |
| 14 Water stargrass | 37 Pickerelweed |
| 15 Wild celery | 38 Arrow arum |
| 16 Sagittaria | 39 Cattails |
| 17 Northern milfoil | 40 Bulrushes |
| 18 M. verticillatum | 41 Iris |
| 19 M. heterophyllum | 42 Swamp loosestrife |
| 20 Coontail | 43 Purple loosestrife |

Density

- a Found
- b Sparse
- c Common
- d Dense

Notes:



1 inch = 1,000 feet

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Fish Stocking Database

Department of Natural Resources

County:

Ingham

Water Body:

Lake Lansing

Species:

All

Start Month:

January

Start Year:

1979

End Month:

January

End Year:

2018

Order By:

- Location
- Species
- Stock Date

Filter in any column.

County	Water Body	Sitename	Species	Date	Number	Operation	Avg. Length
Ingham	Lake Lansing LAKE LANSING (04N 01W 02)	LAKE LANSING	Tiger muskellunge	07/17/79	1,000	State Plant	5.43
Ingham	Lake Lansing LAKE LANSING (04N 01W 02)	LAKE LANSING	Tiger muskellunge	09/17/80	1,000	State Plant	8.94
Ingham	Lake Lansing LAKE LANSING (04N 01W 10)	LAKE LANSING	Tiger muskellunge	08/11/81	700	State Plant	6.5
Ingham	Lake Lansing LAKE LANSING (04N 01W 02)	LAKE LANSING	Tiger muskellunge	08/04/82	1,500	State Plant	5.98
Ingham	Lake Lansing LAKE LANSING (04N 01W 02)	LAKE LANSING	Tiger muskellunge	08/02/83	1,000	State Plant	6.85
Ingham	Lake Lansing LAKE LANSING (04N 01W 10)	LAKE LANSING	Channel catfish	09/07/88	4,500	State Plant	3.23
Ingham	Lake Lansing LAKE LANSING (04N 01W 10)	LAKE LANSING	Channel catfish	03/27/90	4,750	State Plant	3.35

Rows: 7



Master Angler Entries

Category	Species	County	Waterbody	Date/Time	Year	Weight (lbs)	Length (in)	Angler	Angler's City	Method	Bait
Catch and Release	CRAPPIE	Ingham	Lake Lansing	8/23/2018 6:30:00 PM	2018		14.13	JOSHUA LEN LARSEN	WILLIAMSTON	Baitcasting	Husky Jerk
Catch and Release	CRAPPIE	Ingham	Lake Lansing	4/21/2018 5:33:00 PM	2018		15.75	JASON RICHARD ALLEN	HASLETT	Trolling	Rapala
Catch and Keep	CRAPPIE	Ingham	Lake Lansing	2/17/2017 6:00:00 PM	2017		15.00	JOHN MICHAEL WALLACE	LANSING	Ice Fishing	Spoon
Catch and Keep	CRAPPIE	Ingham	Lake Lansing	5/13/2016 9:30:00 AM	2016		14.00	WILLIAM RONALD KORDENBROCK	WILLIAMSTON	Spincasting	Crank Bait
Catch and Release	SMALLMOUTH BASS	Ingham	Lake Lansing	10/6/2015 1:50:00 PM	2015		21.00	JOSEPH HINZ	EAST LANSING	Spincasting	Popper
Catch and Keep	CRAPPIE	Ingham	Lake Lansing	4/11/2015 5:00:00 PM	2015		16.00	JAY MICHAEL SHAFFER	BATH	Baitcasting	Jerkbait
Catch and Release	BLUEGILL	Ingham	Lake Lansing	12/30/2013 5:10:00 PM	2013		10.00	JOSHUA A HOSSINK	OKEMOS	Ice Fishing	Wax Worm/Jig
Catch and Release	BLUEGILL	Ingham	Lake Lansing	6/1/2013 2:00:00 PM	2013		10.75	JOSH HOSSINK	OKEMOS	Stillfishing	Worm
Catch and Release	GREEN SUNFISH	Ingham	Lake Lansing	5/21/2013 1:45:00 PM	2013		9.75	JOSH HOSSINK	OKEMOS	Spincasting	Mepps Spinner
Catch and Release	BLACK CRAPPIE	Ingham	Lake Lansing	2/27/2010 7:45:00 AM	2010		15.50	TALAN JAMES PARSONS	ST. JOHNS	Ice Fishing	WAX WORM
Catch and Release	CHANNEL CATFISH	Ingham	Lake Lansing	2/21/2010 3:30:00 PM	2010		28.63	JASON ANDREW PARSONS	SAINT JOHNS	Ice Fishing	Minnow
Catch and Release	CHANNEL CATFISH	Ingham	Lake Lansing	5/11/2008 4:00:00 PM	2008		37.75	DOUG PATTERSON	HASLETT	Stillfishing	Perch
Catch and Release	BLACK CRAPPIE	Ingham	Lake Lansing	8/28/1999 7:15:00 PM	1999		15.00	EDWIN JON KLOP	HASLETT	Baitcasting	Nightcrawler
Catch and Keep	CHANNEL CATFISH	Ingham	Lake Lansing	7/11/1999 9:45:00 AM	1999	10.38	29.50	GEORGE EDWARD HOLBROOK	LANSING	Stillfishing	Bluegill

[New Search](#)

Rick Buteyn

From: Rick Buteyn
Sent: Tuesday, January 8, 2019 3:45 PM
To: 'gundermanb@michigan.gov'
Cc: Pam Tynning; 'Lisa Huberty'; Steve Hanson
Subject: Lake Lansing, Ingham County

Mr. Gunderman: This email is to inform you that the Charter Township of Meridian is applying for a MDEQ – ANC permit for the use of low-dose fluridone in Lake Lansing (Sections 2, 3, 10 and 11 of Meridian Township; T4N; R1W) during the upcoming 2019 season. In light of this application, the MDEQ requires that a three-year lake management plan be prepared for this waterbody. As part of the plan, we are requesting any information that the MDNR-Fisheries Division may have regarding the status of the Lake Lansing fishery, specifically regarding any fish assemblage surveys, reports, correspondence, or other data collected by MDNR pertaining to Lake Lansing and its fishery. Please feel free to contact me if you have any questions regarding the information that we are requesting.

Thank you for your time.

Rick Buteyn
Field Scientist
office 616.447.3351
cell 708.476.6864
progressiveae.com

progressive|ae

Rick Buteyn

From: Fedewa, Chad (DNR) <FEDEWAC1@michigan.gov>
Sent: Tuesday, January 15, 2019 9:54 AM
To: Rick Buteyn
Cc: Pam Tyning; Steve Hanson; Huberty, Lisa (DEQ)
Subject: RE: Lake Lansing, Ingham County

Rick,

I am not aware of any recent occurrences of any threatened, endangered, or special concern species in that immediate vicinity that would be impacted by this work. Thanks for checking in.

Chad

Chad Fedewa, Wildlife Biologist
MI DNR Wildlife Division
Rose Lake Field Office
8903 E. Stoll Rd
East Lansing, MI 48823
517-641-4092

From: Rick Buteyn <buteynr@progressiveae.com>
Sent: Tuesday, January 8, 2019 3:38 PM
To: Fedewa, Chad (DNR) <FEDEWAC1@michigan.gov>
Cc: Pam Tyning <tyningp@progressiveae.com>; Steve Hanson <steveh@plmcorp.net>; Huberty, Lisa (DEQ) <HUBERTYL@michigan.gov>
Subject: Lake Lansing, Ingham County

Mr. Fedewa: This email is to inform you that the Charter Township of Meridian is applying for a MDEQ – ANC permit for the use of low-dose fluridone in Lake Lansing (Sections 2, 3, 10 and 11 of Meridian Township; T4N; R1W) during the upcoming 2019 season. In light of this application, the MDEQ requires that a three-year lake management plan be prepared for this waterbody. As part of the plan, we are requesting any information that the MDNR-Wildlife Division may have regarding the status of Lake Lansing's plant and wildlife communities, specifically regarding any special concern wildlife or plant species or habitats, surveys, reports, correspondence, or other data collected by MDNR pertaining to either Lake Lansing or its immediate vicinity. Please feel free to contact me if you have any questions regarding the information that we are requesting. Thank you for your time.

Rick Buteyn
Field Scientist
office 616.447.3351
cell 708.476.6864
progressiveae.com

progressive|ae

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Wetlands Map Viewer

Department of Environmental Quality



Type **Show on Map**

Na **Highlight**

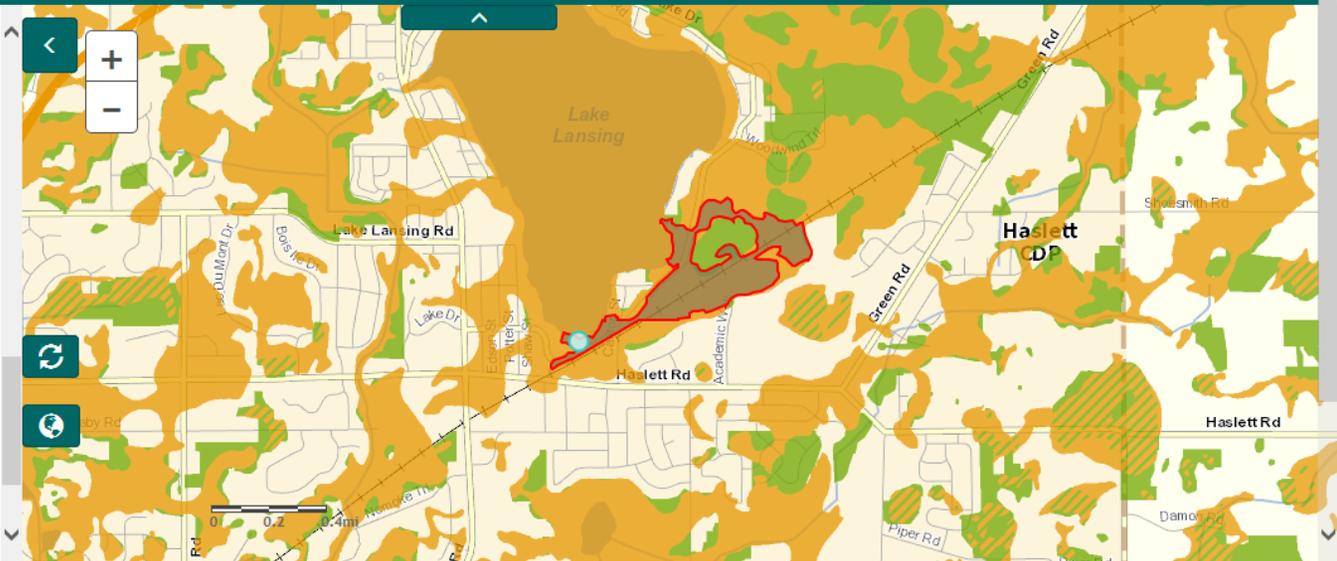
MIRIS 1978 Wetlands

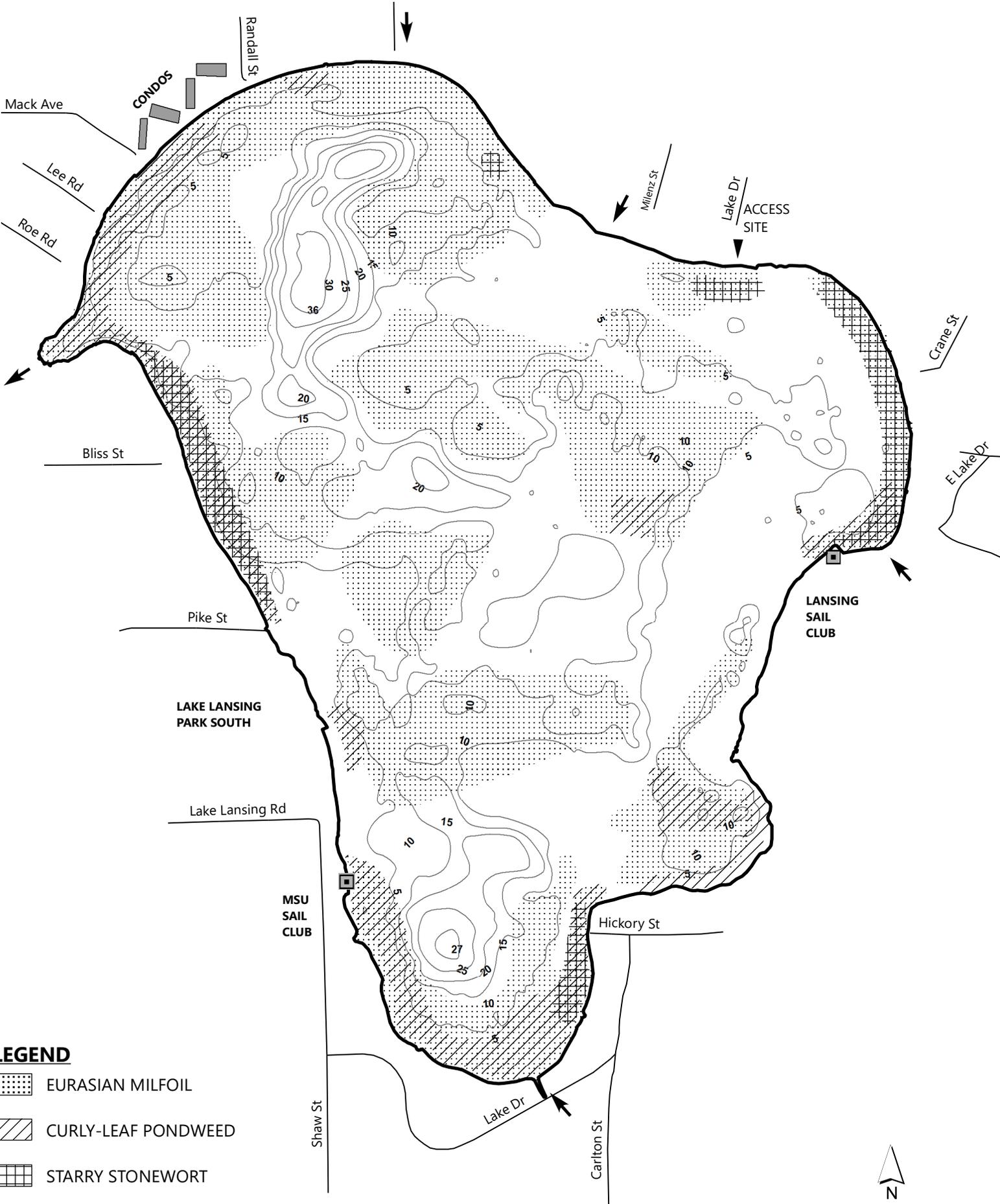
Type	Acres	Show on Map
Emergent Wetland	117.272 Acres	Highlight

NWI Data

Type	Acres	Show on Map
Emergent	79.061291	Highlight

<http://www.mcgi.state.mi.us/wetlands/index.html>





LEGEND

-  EURASIAN MILFOIL
-  CURLY-LEAF PONDWEED
-  STARRY STONEWORT



1 inch = 800 feet

LAKE LANSING
TARGETED SPECIES MAP
 INGHAM COUNTY, MICHIGAN



LEGEND

-  LOW GROWING (CHARA, WILD CELERY)
-  MID TO FULL DEPTH (PONDWEEDS)
-  EMERGENT & FLOATING LEAVED (CATTAILS, LILIES, BULRUSH)

**LAKE LANSING
MANAGEMENT GOAL MAP
INGHAM COUNTY, MICHIGAN**



NO SCALE

progressive|ae

301-4 Mile Rd.
Farmington Hills, MI 48334
313-964-2500 OFFICE
313-261-9818 FAX
www.progressiveae.com

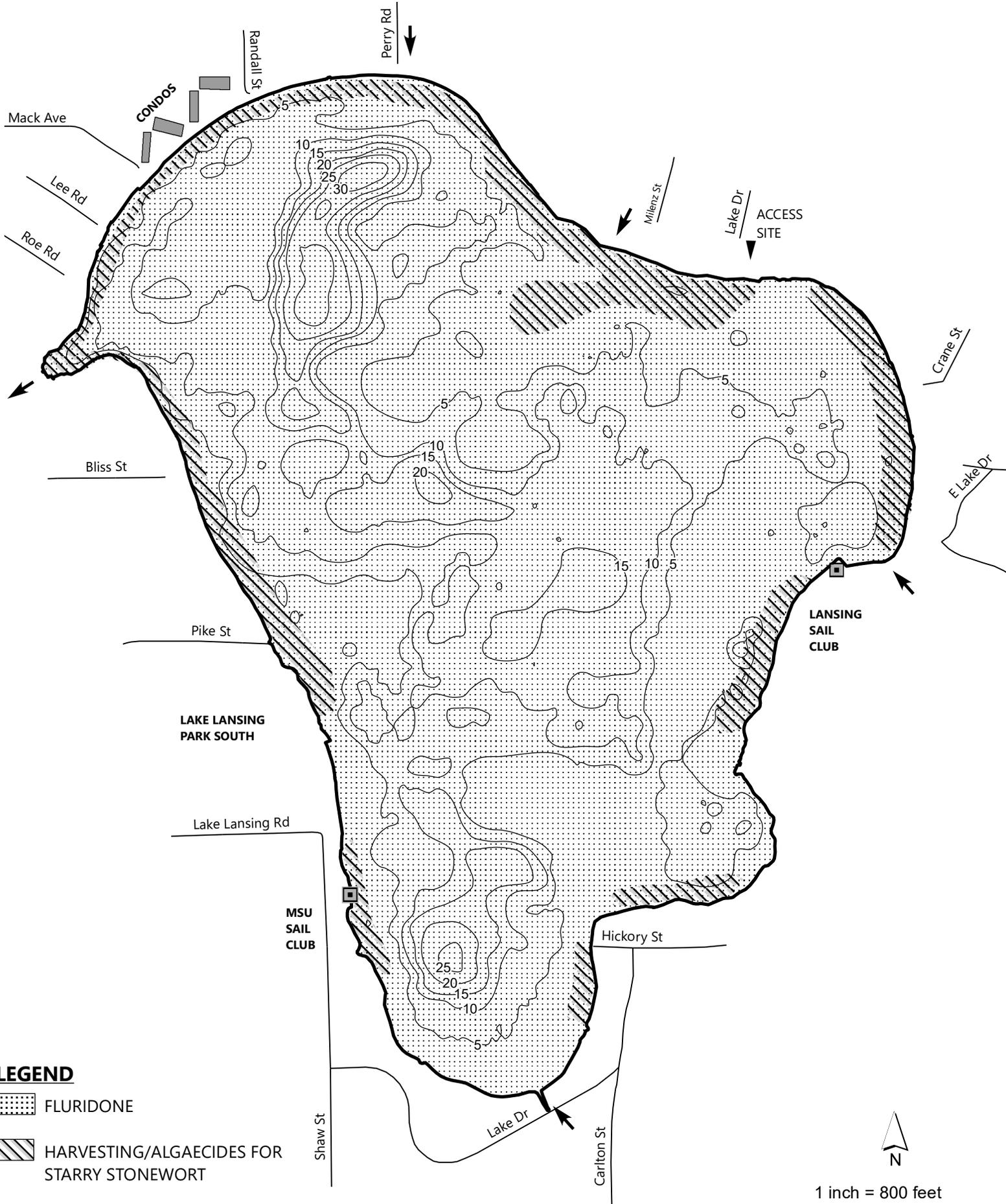
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Lake Lansing

History of Waterbody Management

The Lake Lansing Special Assessment District was formed in 1998 according to provisions established under the Township Improvements Act of 1954, as amended. Progressive Architecture Engineering Planning (now Progressive AE) was hired to conduct an updated feasibility study of the lake and has been the consultant to Lake Lansing project since 1998. The lake has legal levels of 851.72 feet between December 1 and February 28, 852.29 feet between March 1 to May 31, and 852.08 feet between June 1 and November 30, established by court order in 2003. The Lake Lansing level is controlled by a low-head dam (4.5-foot head) located at the northwest end of the lake. The dam has the capacity to draw down the lake to a level of 848.25 feet. Construction of a sanitary sewer around the lake was completed in the early 1960s which reduced nutrient inputs to the lake. Select areas of Lake Lansing were dredged in 1979. A complete history of documented fish stockings since 1980 is included in the attached MDNR fish stocking database. The following is a table listing plant control activities in the last ten years (2009 – 2018):

Year	Fluridone	Contact herbicides	Systemic herbicides	Mechanical harvesting
2009			102.5 acres	45 acres
2010	Split-6 ppb			37 acres
2011				108 acres
2012		106 acres	125 acres	65 acres
2013	Split-6 ppb			35 acres
2014		60 acres		96 acres
2015		3.5 acres	24.5 acres	107 acres
2016	Split-6 ppb		1 acre	82 acres
2017		22.5 acres	3 acres	42 acres
2018		35 acres	45.5 acres	49 acres



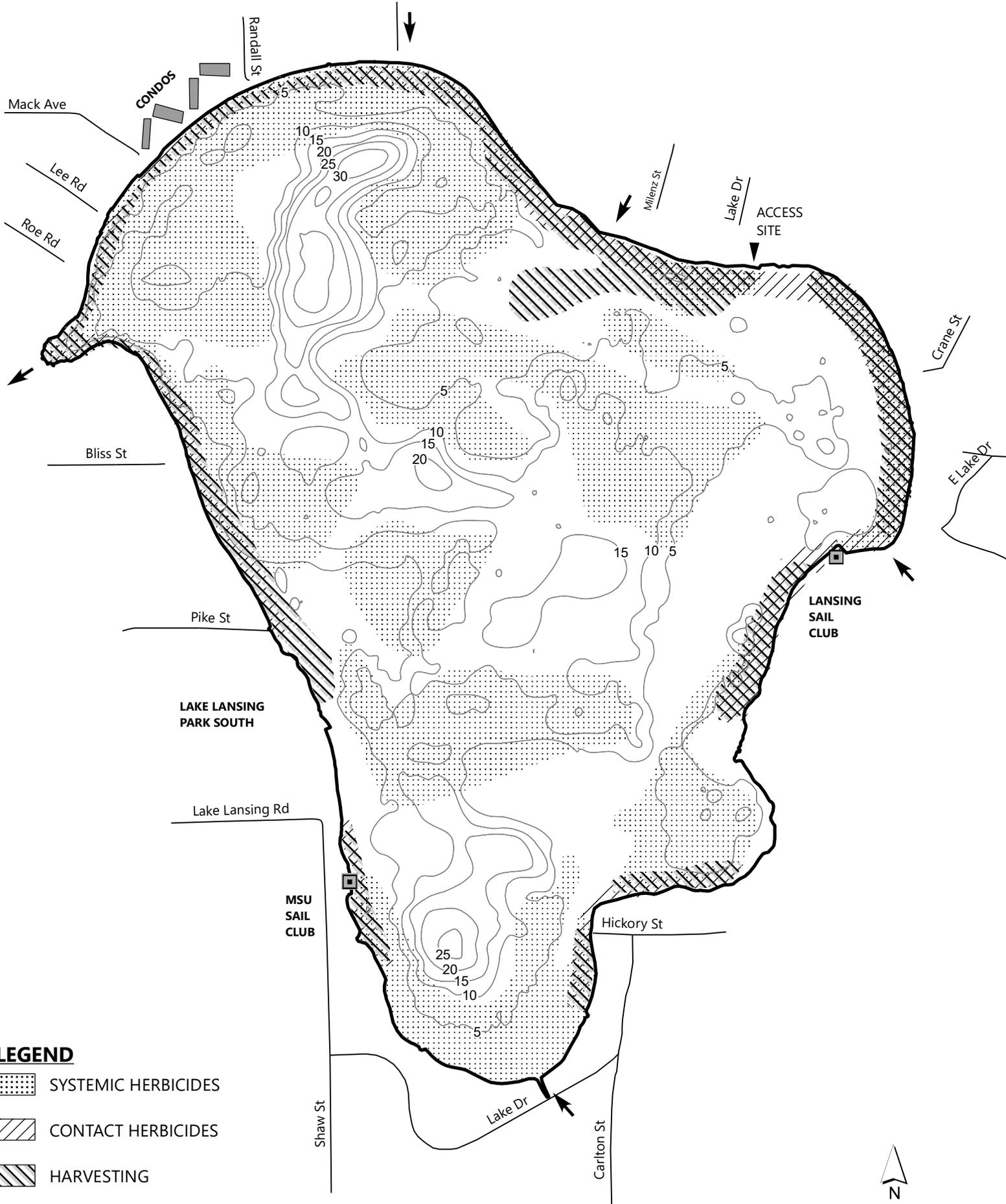
LEGEND

-  FLURIDONE
-  HARVESTING/ALGAECIDES FOR STARRY STONEWORT

**LAKE LANSING
2019 ANNUAL VEGETATION MANAGEMENT MAP**

INGHAM COUNTY, MICHIGAN

1 inch = 800 feet
progressive|ae



LEGEND

-  SYSTEMIC HERBICIDES
-  CONTACT HERBICIDES
-  HARVESTING

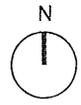
LAKE LANSING
2020 & 2021 ANNUAL VEGETATION MANAGEMENT MAP
 INGHAM COUNTY, MICHIGAN

1 inch = 800 feet
 progressive|ae



← APPROXIMATE BOAT PATH

DEPTH CONTOURS GIVEN IN FEET



1" = 800'

**LAKE LANSING
FLURIDONE DISTRIBUTION MAP
INGHAM COUNTY, MICHIGAN**

progressive 
1811 4 Mile Rd N.E., Grand Rapids, MI 49525
616 361 2664 OFFICE 616 361 1493 FAX
www.progressive.com

m:\gtoeri\h\lansing\annual\2001.dgn

Lake Lansing Volume Calculations for Determining Fluridone Dosage

Contour	Area	Volume for Upper 5 foot Strata	
0	456 Acres	1999.47 Acre-Feet	
5	346.3 Acres		
10	170.3 Acres		
		Donut Hole Volume (Area of 5 foot multiplied by 5 feet)	
		1731.50 Acre-Feet	
		Donut Volume (Total - Donut Hole)	Sonar Needed @ 6 ppb
		267.97 Acre-Feet	4.37 Quarts
		Volume for 5 to 10 foot Strata	
		1265.75 Acre-Feet	
		Total Donut Hole Volume (0-10 foot Strata)	
		2997.25 Acre-Feet	48.92 Quarts
			Total
			53.29 Quarts
			13.32 Gallons



LEGEND

3 RESIDUE SAMPLE SITE



NO SCALE

progressive|ae

**LAKE LANSING
FLURIDONE RESIDUE SAMPLING MAP
INGHAM COUNTY, MICHIGAN**

Scale: 1:4 Mile to 1/4
 Phone: (248) 341-4375
 Fax: (248) 250-0912
 Web: www.progressiveae.com

u:\gjesm\kiansng\maps.apr

**LAKE LANSING WATERSHED MANAGEMENT
SPECIAL ASSESSMENT DISTRICT (2018-2027)
RESOLUTION NO. 5**

At a regular meeting of the Township Board of the Charter Township of Meridian, Ingham County, Michigan, held in the Meridian Township Municipal Building, 5151 Marsh Road, Okemos, Michigan, 48864-1198, Phone (517) 853-4000, on Tuesday, October 17, 2017, at 6:00 p.m., local time.

PRESENT: Supervisor Styka, Clerk Dreyfus, Treasurer Brixie, Trustees, Jackson, Opsommer, Deschaine, and Sundland

ABSENT: None

The following resolution was offered by Treasurer Dreyfus and supported by Trustee Deschaine.

WHEREAS, pursuant to due notice to all record owners or parties in interest in, this Board did meet on Tuesday, October 3, 2017, at 6:00 p.m. at the Meridian Township Municipal Building, in the Township of Meridian for the purpose of reviewing the special assessment roll and hearing any objections thereto for the Lake Lansing Watershed Management Special Assessment District (2018-2027); and

WHEREAS, at the time and place designated for said meeting, the meeting was duly called to order and the Supervisor announced the opening of the hearing for objections to the special assessment roll prepared by the Township Supervisor and on file with the Township Clerk, said roll assessing the cost of the Lake Lansing Watershed Management Special Assessment District (2018-2027) against benefiting properties; and

WHEREAS, objections were heard or filed in writing with the Township Clerk; and

WHEREAS, the Township Board desires to confirm the special assessment roll.

NOW, THEREFORE, BE IT RESOLVED by the Township Board of the Charter Township of Meridian, Ingham County, Michigan, as follows:

1. The Township Board does hereby determine that said special assessments are in proportion to the benefits to be derived from said project. Tier 1 - 2 benefits, Tier 2 - 1 benefit, and Lake Lansing Sailing Club - 7 benefits.
2. The Township Board does hereby designate the special assessment project as "Lake Lansing Watershed Management Special Assessment District (2018-2027)".
3. Said special assessment roll shall be designated as "Lake Lansing Watershed Management Special Assessment District Special Assessment Roll (2018-2027)" and the district against which it is assessed shall be designated "Lake Lansing Watershed Management Special Assessment District (2018-2027)". The Lake Lansing Watershed Management Special Assessment District Special Assessment Roll (2018-2027) in the final amount of \$900,000 (\$90,000 per year for a period of ten years) as prepared and reported to the Township Board by the Supervisor, a copy of which is attached hereto, is hereby adopted and confirmed and the Township Clerk is hereby directed to endorse thereon this date of confirmation.

10-17-17
90

4. That the special assessment roll shall equal \$90,000 every year, and since governmental entities cannot be assessed, the annual said special assessment roll shall be reduced by the annual total contributions received from Charter Township of Meridian, Ingham County, and any other contributor. If governmental monies are not received before April 1 of each year, the assessments shall be according to the Lake Lansing Watershed Management Special Assessment District Special Assessment Roll (2018-2027).
5. That the special assessment roll shall be divided into ten annual installments, the first such installment to be due on July 1, 2018, and the following installments to be due on July 1 of the nine succeeding years thereafter. If any installment is not paid when due then the same shall be deemed to be delinquent and there shall be collected thereon, a penalty at the rate of 1% for each month or fraction thereof that the same remains unpaid before being reported for reassessment upon the Township roll. In the event the Township Board determines it in the best interest of the district and the Township at large to issue bonds pledging the receipts of said special assessment roll and the full faith and credit of the Township, then and in that event, the interest on the unpaid installments shall be adjusted to not more than 1% greater than the average interest rate at which the bonds were sold.
6. Any of the unpaid balance due on the special assessment roll may be paid in full at any time, together with interest due to said payment date.
7. The assessments made in said special assessment roll are hereby ordered and directed to be collected. The Township Clerk shall deliver said special assessment roll to the Township Treasurer with the proper warrant attached, commanding the Treasurer to collect the assessments therein in accordance with the direction of the Township Board with respect thereto, and the Treasurer is authorized and directed to collect the amounts assessed as they become due pursuant to the terms of this resolution and the provisions of the applicable statutes of the State of Michigan.

YEAS: Supervisor Styka, Clerk Dreyfus, Treasurer Brixie, Trustees, Jackson, Opsommer, Deschainé, and Sundland

NAYS: None

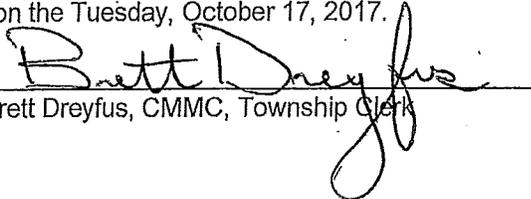
Resolution declared adopted.

STATE OF MICHIGAN)

) ss.

COUNTY OF INGHAM)

I, the undersigned, the duly qualified and acting Clerk of the Charter Township of Meridian, Ingham County, Michigan, **DO HEREBY CERTIFY** that the foregoing is a true and complete copy of the proceedings taken by the Township Board at a regular meeting held on the Tuesday, October 17, 2017.


Brett Dreyfus, CMMC, Township Clerk

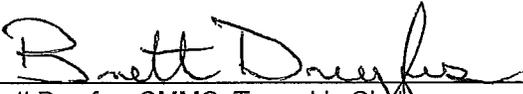
WARRANT

STATE OF MICHIGAN)

)
COUNTY OF INGHAM)

TO THE TOWNSHIP TREASURER
OF THE CHARTER TOWNSHIP
OF MERIDIAN,
INGHAM COUNTY, MICHIGAN

Attached hereto is the Lake Lansing Watershed Management Special Assessment District Special Assessment Roll (2018-2027), and you are hereby commanded in accordance with Act No. 188 of the Michigan Public Acts of 1954, as amended, and in accordance with the directions of the Township Board in respect thereto, to collect the assessments in said roll, and on the first day of September following the date when any such assessments or any part thereof have become due to submit to the Township Board a sworn statement setting forth the names of the persons delinquent, if known, a description of the parcels of lands upon which there are delinquent assessments and the amount of such delinquency, including accrued interest and penalties computed to September 1 of such year.


Brett Dreyfus, CMMC, Township Clerk

DATED: 10-19-17