

October 15th, 2019

Lakeville Lake Improvement Board Wayne Hodges 825 Cove Dr Leonard, MI 48367

Lakeville Lake

2019 Year End Report

It has been a pleasure managing Lakeville Lake this summer. Every year seems to bring a unique set of challenges and we welcome the opportunity to meet these challenges every single year. We hope that you feel that your lake was managed professionally, economically, and effectively.

In 2019, a more aggressive approach to controlling the Eurasian watermilfoil was used. We utilized a higher rate of the systemic herbicide triclopyr. Areas not treated with triclopyr were treated with diquat dibromide. Curly leaf pondweed was also treated with diquat as in years past. As for starry stonewort, we continued with the same treatment plan we have done before. We have had no complaints or issues with this treatment before, however it was observed that some treatment areas were not as affected as others during our last treatment for the starry stonewort. Lastly, no emergent vegetation (such as flowering rush or purple loosestrife) was treated, due to only a few plants that looked dead already were discovered during the fall survey.

For our initial treatment we wanted to treat earlier in the year than in prior years. Therefore we treated on May 28th. We treated the Eurasian watermilfoil with higher rates of triclopyr in order to increase efficacy of the treatment. Both the hybrid species nature of the plant, and it's relatively low bed sizes, has made the plant difficult to treat systemically. During the fall survey, it was very noticeable that we had much greater control this year. This treatment also contained some starry stonewort and curly leaf milfoil treatment.

For the 2nd treatment, all three species of invasive plants were targeted again. In areas where we systemically treated the milfoil for the first treatment, curly leaf pondweed was still present (as we do not use diquat in the same area we use triclopyr). Starry stonewort was present as usual. For the Eurasian watermilfoil, we retreated the areas we used diquat in May. We also treated areas that were systemically treated with triclopyr. It is common for the plant to still be up and visible 4 weeks after treatment when using systemics. The systemic herbicide is now out of the waterbody, and into the plants roots, so we treat these plants to give them a last oomph to drop.

A similar treatment occurred for our last visit on August 5th, treating all three species where necessary.



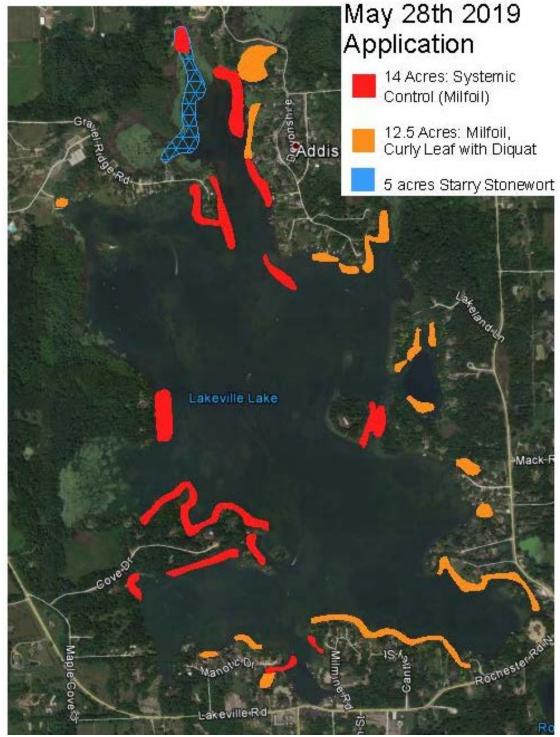
We were able to perform the AVAS survey on September 20th. While surveying, it was noted that much of the Eurasian watermilfoil that was treated was no longer present. Native milfoil and other native pondweeds were growing it its place.

Below is a summary of the services performed in 2019:

Date	Service Performed	Figure #	Target Invasive Species	Treatment Type
May 14 th	Spring		Starry Stonewort	Survey and Water Samples
	Survey		Curly Leaf Pondweed Eurasian Watermilfoil	
May 28 th	Lake Treatment	1	Eurasian Watermilfoil	Systemic Triclopyr & Diquat
	rreatment		Curly Leaf Pondweed Starry Stonewort	Diquat Dibromide CuSO4 + Hydrothol 191
June 24 th	Lake	2	Starry Stonewort	CuSO4 + Hydrothol 191
	Treatment		Eurasian Watermilfoil	Diquat Dibromide
			Curly Leaf Pondweed	Diquat Dibromide
August 5 th	Lake	3	Eurasian Watermilfoil	Diquat Dibromide
	Treatment		Starry Stonewort	CuSO4 + Hydrothol 191
September 20 th	Lake Survey		All Aquatic Vegetation	AVAS Survey and Water Samples



May 28th Treatment



(Figure 1)



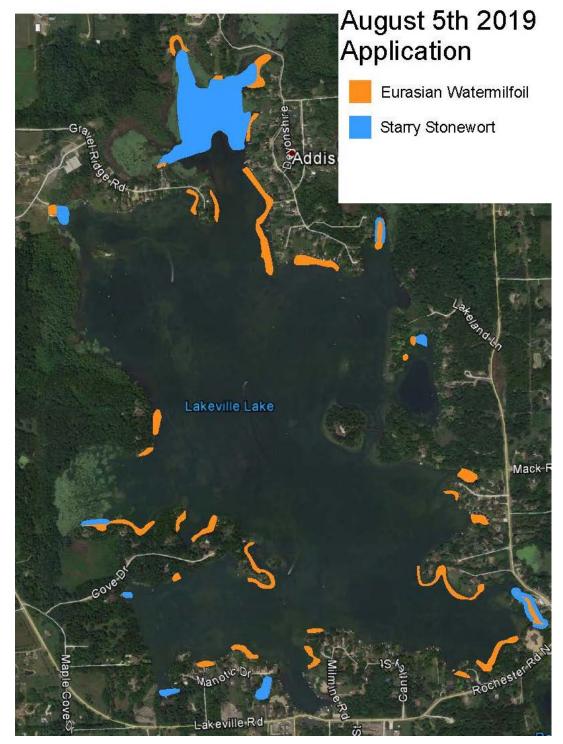
June 24th Treatment



(Figure 2)



August 5th Treatment



(Figure 3)



AVAS Survey

A comprehensive vegetation survey called an Aquatic Vegetation Assessment Survey (AVAS), was performed on Lakeville Lake at the end of the year on September 20th. During this survey, the lake is divided into evenly spaced sections. Inside each section, we document every type of aquatic vegetation found and determine its density inside of that section. Compiling all of these sections into a summary page, we determine a complete set of plant species found within Lakeville Lake and its approximate abundance.

There are 3 different sets of pages. The first is the summary page which gives you the lake wide plant coverage shown as an approximate percentage in column 11. Next is the lake map showing the numerous AVAS sections. The last set of pages are the density pages. Using the map and the density pages together you can determine what plant species exist in each section of the lake.

Looking through all of the pages will look very confusing if you do not understand what the numbers and letters mean. Each plant species has a 'code number'. You can see this on the summary and density pages on the left side. There are 4 different density categories:

- A = found, or <2% of the area
- B = sparse (2% 20%)
- C = common (20% 60%)
- D = dense (60% 100%)

When surveying the lake, we take the plant species number and pair it with a density rating for each AVAS section. We then compile the totals and the results are generated. The results are on the next couple of pages.



3088 Hottis Rd. Hale, MI 48739 Hale: 989.728.2200

Clare: 989.386.0600

Fax: 989.516.5900

LAKE NAME- Lakeville Lake

COUNTY- Oakland

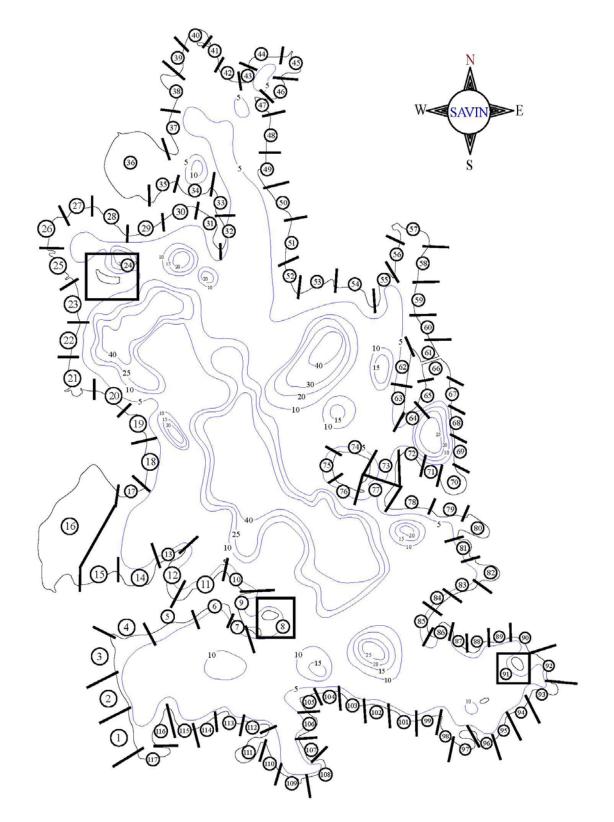
SURVEY DATE: 9/16/19

Stand	lard Aquatic Vegetatio	on S	um	mar	y Sl	hee	et		SURV	EY BY:	Savin L	ake Ser	vices		
		Total	numł	er of l	VAS		Calculation	n.e			Sum of Previous	Total Number	Quotient of Column 9		
					Catago		Catagory	Catagory	Catagory	Catagory	Four	of	divided by		
		A	B	<u> </u>	D	2	Ax1	B x10	C x 40	D x 80	Columns	AVAS's	Column 10	<u> </u>	
Code	Plant Name		~	×.	~		1111	20.000						Code	Plant Name
No		1	2	3	4		5	6	7	8	9	10	11	No	
1	Eurasian milfoil	27	28	7			27	280	280	0	587	117	5.0	1	Eurasian milfoil
2	Curly leaf pondweed	1					1	0	0	0	1	117	0.0	2	Curly leaf pondweed
3	Chara	11	49	22	6		11	490	880	480	1861	117	15.9	3	Chara
4	Thinleaf pondweed	16	8				16	80	0	0	96	117	0.8	4	Thinleaf pondweed
5	Flatstem pondweed						0	0	0	0	0	117	0.0	5	Flatstem pondweed
~	D 11' 1 1		┡									117	0.0	<i>.</i>	D 11: 1 1
6	Robbins pondweed	-	-		_		0	0	0	0	0	117 117	0.0	6 7	Robbins pondweed
8	Variable pondweed Whitestem pondweed	22	66	7			22	660	280	0	962	117	8.2	8	Variable pondweed Whitestem pondweed
9	Richardsons pondweed	22	00	/			0	000	0	0	0	117	0.0	9	Richardsons pondweed
10	Illinois pondweed	10	6				10	60	0	0	70	117	0.6	10	Illinois pondweed
	Ferran een	1	Ť						- ·				0.0		Person Person even
11	Large leaf pondweed	\vdash					0	0	0	0	0	117	0.0	11	Large leaf pondweed
12	American pondweed						0	0	0	0	0	117	0.0	10.11.01	American pondweed
13	Floating leaf pondweed	14	22	4			14	220	160	0	394	117	3.4	13	Floating leaf pondweed
14	Water stargrass						0	0	0	0	0	117	0.0	14	Water stargrass
15	Wild Celery	6	51	14			6	510	560	0	1076	117	9.2	15	Wild Celery
16	Sagitteria						0	0	0	0	0	117	0.0	16	Sagitteria
17	Northern milfoil	13	25	6	2		13	250	240	160	663	117	5.7	17	Northern milfoil
18	M. verticillatum						0	0	0	0	0	117	0.0	18	M. verticillatum
19	M. herterophyllum						0	0	0	0	0	117	0.0	19	M. herterophyllum
20	Coontail	5	6	1	_		5	60	40	0	105	117	0.9	20	Coontail
21	Elodea	1	-	-			1	0	0	0	1	117	0.0	21	Elodea
22	Utricularia spp.	14	23	\vdash			14	230	0	0	244	117	2.1	21	Utricularia spp.
23	Bladderwort-mini	14	45	⊢			0	0	0	0	0	117	0.0	23	Bladderwort-mini
24	Buttercup	\vdash	⊢	\vdash			0	0	0	0	0	117	0.0	24	Buttercup
25	Najas spp.	21	29	11			21	290	440	0	751	117	6.4	25	Najas spp.
		-	-												and the second sec
26	Brittle naiad						0	0	0	0	0	117	0.0	26	Brittle naiad
27	Sago pondweed	23	21	2			23	210	80	0	313	117	2.7	27	Sago pondweed
28							0	0	0	0	0	117	0.0	28	
29							0	0	0	0	0	117	0.0	29	
30	Nymphaea	15	47	15	16		15	470	600	1280	2365	117	20.2	30	Nymphea
	1 The 1 March	L_	L							_					
31	Nuphar		-	-			0	0	0	0	0	117	0.0	31	Nuphar
32	Brasenia	2	-	-			2	0	0	0	2	117	0.0	32	Brasenia
33 34	Lemna minor Spirodella	-	3			\vdash	0	30	0	0	30	117 117	0.0		Lemna minor Spirodella
35	Watermeal	+	1,2	-			0	0	0	0	0	117	0.5		Watermeal
55	a a a a a a a a a a a a a a a a a a a	\vdash	-				~		0	~		117	0.0	55	ti atternitear
36	Arrowhead	\vdash	2		\vdash		0	20	0	0	20	117	0.2	36	Arrowhead
37	Pickerelweed	\vdash	1~				0	0	0	0	0	117	0.0		Pickerelweed
38	Arrow Arum						0	0	0	0	0	117	0.0		Arrow Arum
39	Cattails	4	10	10	11		4	100	400	880	1384	117	11.8	39	Cattails
40	Bulrushes	3	5	1			3	50	40	0	93	117	0.8	40	Bulrushes
41	Iris						0	0	0	0	0	117	0.0		Iris
	Swamp Loosestrife						0	0	0	0	0	117	0.0		Swamp Loosestrife
	Purple Loosestrife						0	0	0	0	0	117	0.0		Purple Loosestrife
	Starry Stonwort	6	_	7	15		6	180	280	1200	1666	117	14.2		Starry Stonewort
45	Phragmites		1				0	10	0	0	10	117	0.1	45	Spiny Naiad



3088 Hottis Rd. Hale, MI 48739 Hale: 989.728.2200 Clare: 989.386.0600

Fax: 989.516.5900





Lake Name: Lakeville Lake

County: Oakland Surveyor Name: Matt Novotny

Survey Date: September 16th, 2019

Sta	ndard Aquatic Vegetat	lion	Ass	essn	ient	Site	e Sp	ecie	s De	ensit	ty Sheet							<u> </u>	⊢
			- V-					1.1.2	Lunt				1/-						
Code No.	Plant Name	NO.	A	getati NO. 3						Code No.	Plant Name						NO.		
1	Eurasian watermilfoil	В	A	В	A	A	С	В	В	1	Eurasian watermilfoil	В	С	В	A	A	A	A	t
2	Curly leaf pondweed									2	Curly leaf pondweed	_							L
3	Chara	В	С	В	D	B	В		В	3	Chara	С	В	B	С	В	D	С	Ľ
4	Thin leaf pondweed			<u> </u>		A				4	Thin leaf pondweed			A	_			<u> </u>	╞
5	Flat stem pondweed			-			_			5	Flat stem pondweed		_				_	<u> </u>	╞
6	Robbins pondweed			-						6	Robbins pondweed				-			-	┼
7	Variable pondweed			\vdash						7	Variable pondweed	-	-		-			-	t
8	White stem pondweed	A	A	В	В	С	A	В	В	8	White stem pondweed	В	В	С	В	В	В	В	t
9	Richardsons pondweed		**	-		-				9	Richardsons pondweed			-	-	-		~	t
10	Illinois pondweed			A						10	Illinois pondweed								t
	1																		t
11	Large leaf pondweed									11	Large leaf pondweed								Г
12	American pondweed									12	American pondweed								Γ
	Floating leaf pondweed						В	С	В		Floating leaf pondweed		В		Α				
14	Water stargrass									14	Water stargrass								
15	Wild Celery	В	В	В	В		В	В	С	15	Wild Celery	С	В	C	В		В	В	ļ
												_							L
	Arrowhead (submergent	_								-		<u> </u>			_				ļ
17	Native milfoil	В								17	Native milfoil							A	Ļ
	Whorled watermilfoil			<u> </u>							Whorled watermilfoil				_				ł
19	Various leaf watermilfoi	1		-						19	Various leaf watermilfoil							<u> </u>	ł
20	Coontail			-						20	Coontail		_		_		Α	-	ł
21	Elodea			-						21	Elodea	-	-		-			-	╀
22	Bladderwort		_	-	_			_		-	Bladderwort			-	-	-	A	В	ł
	Bladderwort (mini)									_	Bladderwort (mini)				-		-		t
	Buttercup			\vdash						_	Buttercup								t
25	Najas spp.	С	В	В	В	В	В	В	В	25		В	A	A	-	Α		-	t
_											5 11	-							t
26	Brittle naiad									26	Brittle naiad								T
27	Sago pondweed	Α	Α	A	В	Α	В	В		27	Sago pondweed	В					Α	Α	T
28										28									Γ
29										29									Γ
30	White waterlily	В	В	В	С	В	В	A		30	White waterlily	С		A	В		В	В	ļ
31	Yellow waterlily			-						31	Yellow waterlily				-				ł
32	Watershield									32	Watershield			A	A				t
33	Small duckweed									33	Small duckweed								T
34	Great duckweed									34	Great duckweed								Γ
35	Watermeal									35	Watermeal								ļ
36	Arrowhead									36	Arrowhead							-	ł
	Pickerelweed										Pickerelweed				-			-	t
	Arrow arum									38	Arrow arum								t
	Cattail										Cattail			Α					ţ
40	Bulrush									40	Bulrush								I
																			Į
	Iris									_	Iris								ļ
	Swamp Loosestrife										Swamp Loosestrife								ļ
	Purple Loosestrife	-									Purple Loosestrife							-	ļ
	Starry Stonewort	В									Starry Stonewort							В	ļ
45	Phragmites									45	Phragmites								

Sheet Number 1 of 8



Lake Name: Lakeville Lake

County: Oakland Surveyor Name: Matt Novotny

Survey Date: September 16th, 2019

Sta	ndard Aquatic Vegetat	ion	Ass	essn	ent	Site	e Sp	ecie	s De	nsit	y Sheet								
		auat	10 1/0	getati	-		nont l	Vite N	umb			aunt	ic Ve;	aatati	-		nont i	lite N	Tur
Code No.	Plant Name			NO.					NO. 24		Plant Name		NO. 26						
1	Eurasian watermilfoil		В	В	С	В		_		1	Eurasian watermilfoil	-	A		_		_	В	1
2	Curly leaf pondweed									2	Curly leaf pondweed		A						F
3	Chara	С		A	С	С	С	В	С	3	Chara	D	С	В	D	С	D	С	
4	Thin leaf pondweed									4	Thin leaf pondweed							A	F
5	Flat stem pondweed									5	Flat stem pondweed								Ē
6	Robbins pondweed					-	_			6	Robbins pondweed								╞
7	Variable pondweed	-		-	-	-		-		7	Variable pondweed	-	-	-			-		┝
8	White stem pondweed	В	В	В		-		A	В	8	White stem pondweed	A	A		В	A	В	-	t
9	Richardsons pondweed	5	D	5	-	-		Α	D	9	Richardsons pondweed	A	Λ	_	D	A	D		⊢
	Illinois pondweed	В			-	-	-			10	Illinois pondweed	-		_		_		-	⊢
10	minois pondweed	Б				-		-		10	Timois pondweed		_						ł
_	Large leaf pondweed										Large leaf pondweed								Ī
	American pondweed										American pondweed								L
13	Floating leaf pondweed	Α	A	В	В	В		В	Α		Floating leaf pondweed					В			
14	Water stargrass										Water stargrass								
15	Wild Celery		A	B	В	_				15	Wild Celery					A	В	В	Ļ
16	Arrowhead (submergent))		-	-	-		_		16	Arrowhead (submergent)	-	-	-			-	-	┝
	Native milfoil	A	С	D	D	В		-			Native milfoil	-	В	-	A	A	В	В	t
18	Whorled watermilfoil				~	-				2.2	Whorled watermilfoil	-		-					t
19	Various leaf watermilfoi	1			_	-				19	Various leaf watermilfoil	-		_	-	_	-		t
20	Coontail	Ē			-					20	Coontail	-		_					t
																			Γ
21	Elodea				Α					21	Elodea								Γ
22	Bladderwort										Bladderwort		В	А	А		В		Γ
23	Bladderwort (mini)									23	Bladderwort (mini)								
24	Buttercup									24	Buttercup								
25	Najas spp.	A	A		В					25	Najas spp.		A				В	В	-
26	Brittle naiad	-		-	-	-	-			26	Brittle naiad	<u> </u>		-			-		┝
27	Sago pondweed		A	A	В	В				27		-					-		t
28	- age period to				-	-				28	- Bo Printing	-		_	-	_	-	-	t
29					-	-		-		29		-		_			_		t
30	White waterlily	В	В	В	С	С	A	В	С		White waterlily	D	D	D	В	В	В	В	
21	V -11									21	X -11								Ļ
31	Yellow waterlily Watershield				_	-					Yellow waterlily Watershield	_						-	╞
	Small duckweed		-	-	_	-		_			Small duckweed	_					_	_	┝
	Great duckweed	_			_	-	-				Great duckweed	_		_	_		_	-	╞
_	Watermeal					-					Watermeal								t
																			t
	Arrowhead										Arrowhead					В		В	ļ
	Pickerelweed										Pickerelweed								Ļ
	Arrow arum				-	F	F	F	F		Arrow arum		E	F	F	F			Ļ
	Cattail Bulrush	В			_	D C	В	В	В		Cattail Bulrush	D	D	D	В	В		В	+
40	15 (41 (45))	D			-					40	Duilusii	-		-			\vdash		┝
41	Iris									41	Iris								t
42	Swamp Loosestrife									42	Swamp Loosestrife								Γ
	Purple Loosestrife										Purple Loosestrife								t
	Starry Stonwort										Starry Stonewort	В	D	С	Α			Α	Ī
_	Phragmites										Phragmites								T

Sheet Number 2 of 8



Lake Name: Lakeville Lake

County: Oakland Surveyor Name: Matt Novotny

Survey Date: September 16th, 2019

																			Г
		quati	ic Ve	getati	on As	sessi	nent :	Site N	umb			quati	ic Ve	getati	on As	sessr	nent S	Site N	Nur
Code No.	Plant Name	NO. 33	NO. 34	NO. 35	NO. 36	NO. 37	NO. 38	NO. 39	NO. 40	Code No.	Plant Name	NO. 41	NO. 42	NO. 43	NO. 44	NO. 45	NO. 46	NO. 47	
1	Eurasian watermilfoil									1	Eurasian watermilfoil							-	F
2	Curly leaf pondweed									2	Curly leaf pondweed								t
_	Chara	С	-	A						3	Chara	А		В		-			t
4	Thin leaf pondweed									4	Thin leaf pondweed								t
_	Flat stem pondweed									5	Flat stem pondweed								t
																			t
6	Robbins pondweed									6	Robbins pondweed								t
7	Variable pondweed									7	Variable pondweed								T
8	White stem pondweed	В							В	8	White stem pondweed		В	В	В	В	В	В	t
9	Richardsons pondweed									9	Richardsons pondweed								t
10	Illinois pondweed									10	Illinois pondweed								t
																			t
11	Large leaf pondweed									11	Large leaf pondweed								t
12	American pondweed									12	American pondweed								t
13	Floating leaf pondweed									13	Floating leaf pondweed								t
_	Water stargrass										Water stargrass								t
15	Wild Celery	В								15	Wild Celery								t
																			t
16	Arrowhead (submergent)								16	Arrowhead (submergent))							1
_	Native milfoil	В							A		Native milfoil	В	A	В	С	С	С	В	t
18	Whorled watermilfoil									18	Whorled watermilfoil								1
19	Various leaf watermilfoi	1								19	Various leaf watermilfoi	l							t
20	Coontail									20	Coontail	_			В	В	В		t
						_										-	-		t
21	Elodea					_			_	21	Elodea								t
_	Bladderwort		В	В		В	В	В	В	_	Bladderwort	В	В	В	В	В		В	t
_	Bladderwort (mini)		-			_				_	Bladderwort (mini)			-				_	t
-	Buttercup									-	Buttercup								t
_	Najas spp.		-							_	Najas spp.								t
	rojas opp.										rigas opp								t
26	Brittle naiad									26	Brittle naiad								t
	Sago pondweed					_			Α	27	Sago pondweed								t
28	euge penanteu	_	-		-	_	-			28	euge penanteu		-	-		-	-		t
29						-	-			29				-		-			t
_	White waterlily	В	С	С	D	D	D	D	С		White waterlily	D	D	С	D	D	С	D	t
	mile milenily			~	2			2	0	20	Thinke Watering	2	2				-		t
31	Yellow waterlily		-			-				31	Yellow waterlily								t
_	Watershield					-	-		_	_	Watershield			-					t
_	Small duckweed					_				_	Small duckweed								t
_	Great duckweed		В			_			_		Great duckweed						-		t
_	Watermeal									_	Watermeal								t
	W dtofffiour					_			_	20				-		-		<u> </u>	t
36	Arrowhead		-			-			-	36	Arrowhead								t
	Pickerelweed		-								Pickerelweed			-			\vdash		t
_	Arrow arum		-			_			_	-	Arrow arum							-	╉
_	Cattail	A	С	В	D	D	D	D	С		Cattail	D	С	C	D	D	в	В	t
	Bulrush	B	-	Б	D	D	0	D	0		Bulrush	D	C	-	0		D	D	$\frac{1}{1}$
-10	Duitusii	D	-			-	-			40	15 tuli USII		-	-		-	-	-	$\frac{1}{1}$
11	Iris									11	Iris							-	┦
-											Swamp Loosestrife			-					l
	Swamp Loosestrife		-			_			_					-		-		-	
	Purple Loosestrife		P	P	P	P	P	P	C		Purple Loosestrife	P	F	G	P	F		E	
	Starry Stonewort	А	D	D	D	D	D	D	С		Starry Stonewort	D	D	C	В	В		D	ļ
45 I	Phragmites		B							45	Phragmites								

Sheet Number 3 of 8



Lake Name: Lakeville Lake

County: Oakland Surveyor Name: Matt Novotny

Survey Date: September 16th, 2019

	ndard Aquatic Vegetat	1011	ASS	essn	rent	510	, sp	ecie	s De	IISIL	y sneet								┝
-		anat	ic Ve	petati	on A	sess	nent :	Site N	Jumb			ouati	ic Ve	petati	on As	sess	nent s	Site N	1 Ju
Code No.	Flant Name		NO. 50							Code No.	Plant Name						NO. 62		
1	Eurasian watermilfoil	А			A	A	A			1	Eurasian watermilfoil						A	В	Ŧ
2	Curly leaf pondweed									2	Curly leaf pondweed		-			-			t
3	Chara	в	В	С	В	В	В	A		3	Chara		-			В			ł
4	Thin leaf pondweed	Б	D	-	D	D	A	A		4	Thin leaf pondweed					D	В		ł
5	-	-	-		_	-	Α	-		4	Flat stem pondweed					_	D		╀
5	Flat stem pondweed	-	-			_		-		3	Fiat stem pondweed		_			-			ł
6	Robbins pondweed	-								6	Robbins pondweed								t
7	Variable pondweed	-								7	Variable pondweed		-			-			t
8	White stem pondweed	A	В	В	В	A	С	A		8			-	A		A	A	A	t
9	Richardsons pondweed			-	-		-			9	Richardsons pondweed		-						t
	Illinois pondweed	-			_	В	В	-			Illinois pondweed		-			-			t
10	minors pondweed	-			_	Б	Б			10	minois pondweed		-			-			t
11	Large leaf pondweed	_								11	Large leaf pondweed					-			t
_	American pondweed										American pondweed								t
13	Floating leaf pondweed	-			A	В					Floating leaf pondweed					В	В	С	t
14	Water stargrass	_				-		-			Water stargrass		-	-		-	-		t
15	Wild Celery	С	С	С	_	В	В	В			Wild Celery					В	В	A	t
15	mild Colory	~	0	0		5	D	D		1.5	Thu colory					5	D	A	t
16	Arrowhead (submergent))								16	Arrowhead (submergent)					-			t
17	Native milfoil	В	в	С	В	В	С		В		Native milfoil		A	В	В				t
18	Whorled watermilfoil	-	-		-	-			-		Whorled watermilfoil			-	~	-			t
19	Various leaf watermilfoi	1								19	Various leaf watermilfoil		_			-			t
20	Coontail							-			Coontail	С	В	Α		-			t
20												-	2						t
21	Elodea	_								21	Elodea								t
22	Bladderwort	В	A	A		A		В	В	22	Bladderwort	В	В	В					t
23	Bladderwort (mini)	-								23	Bladderwort (mini)								t
24	Buttercup	_									Buttercup					-			t
25	Najas spp.	В	A			A	С	В	A		Najas spp.					A	В	В	t
	- cjus opp	-					-	-			- of the off for						-		t
26	Brittle naiad	_								26	Brittle naiad								t
27	Sago pondweed	Α		В		Α		С	В	27	Sago pondweed	В					В	В	t
28										28									T
29										29									t
30	White waterlily	В	Α	В	Α	Α		В	В	30	White waterlily	D	D	С		С	С	В	T
																			Ι
31	Yellow waterlily										Yellow waterlily								
32	Watershield									32	Watershield								
33	Small duckweed									33	Small duckweed								ſ
34	Great duckweed									34	Great duckweed								T
35	Watermeal									35	Watermeal								Ī
																			ſ
_	Arrowhead										Arrowhead								ļ
37	Pickerelweed									-	Pickerelweed								ļ
_	Arrow arum	_									Arrow arum								ļ
39	Cattail										Cattail	С	С			С			1
40	Bulrush		Α							40	Bulrush								ļ
	¥ 11.										* *								ļ
	Iris	_									Iris		_						ļ
	Swamp Loosestrife										Swamp Loosestrife								ļ
	Purple Loosestrife										Purple Loosestrife								ļ
44	Starry Stonewort	В	A					D	D		Starry Stonwort	D	D	С	В				ļ
45	Phragmites									45	Phragmites								ſ

Sheet Number 4 of 8



Lake Name: Lakeville Lake

County: Oakland Surveyor Name: Matt Novotny

Survey Date: September 16th, 2019

Stal	ndard Aquatic Vegetat	ion	ASS		rent	Site	spe	loies	De	nsit	y Sheet	-		-	-	-	-		+
		anat	ic Vo	cetot:	on A		nent	Site 2	mak			munt	ie Ve	Center:	00.4		nent	lite	In
Code No.	Plant Name	NO.	ic Ve NO. 66					Site N NO. 71	NO. 72	Code No.	Plant Name	NO. 73		<u>.</u>	on A NO. 76		nent \$ NO. 78	NO.	
1	Eurasian watermilfoil								В	1	Eurasian watermilfoil	С	В	С	С	С	A		1
2	Curly leaf pondweed									2	Curly leaf pondweed								Γ
3	Chara	С	В		В	D	В	В	Α	3	Chara	В				В		С	(
4	Thin leaf pondweed	Α			Α	В			Α	4	Thin leaf pondweed	Α		Α	Α	В			Г
5	Flat stem pondweed									5	Flat stem pondweed								F
											-								F
6	Robbins pondweed									6	Robbins pondweed								T
7	Variable pondweed									7	Variable pondweed								
8	White stem pondweed	В	В	В	В	В	В	В	В	8	White stem pondweed	В	В	В	В	В	В	Α	T
9	Richardsons pondweed									9	Richardsons pondweed								Г
10	Illinois pondweed	Α								10	Illinois pondweed		Α		В			В	t
																			F
11	Large leaf pondweed									11	Large leaf pondweed								F
12	American pondweed									12	American pondweed								t
	Floating leaf pondweed			A			A	A	В		Floating leaf pondweed	В	В	C	С	В	A		t
14	Water stargrass									14	Water stargrass								T
	Wild Celery								В	15	Wild Celery	В	Α	В		В	С	В	1
	,										,								t
16	Arrowhead (submergent)									16	Arrowhead (submergent)								t
	Native milfoil	В						В			Native milfoil		В	-		В	-		İ.
18	Whorled watermilfoil		-							18	Whorled watermilfoil	-			-	-			f
19	Various leaf watermilfoil									19	Various leaf watermilfoil								t
	Coontail										Coontail						A		t,
-																			F
21	Elodea									21	Elodea								+
_	Bladderwort				-		A	A	A		Bladderwort				-	-			h
	Bladderwort (mini)										Bladderwort (mini)						-		t
24	Buttercup		\vdash							24	Buttercup			-	-	-			+
-	Najas spp.			A					A	_	Najas spp.	В		-	-	В	A	Α	t,
	rujuo opp.		-		-		-	-		20	rujus opp.	-			-	2			ť
26	Brittle naiad				-					26	Brittle naiad			-	-				⊢
27	Sago pondweed				A	A				27	Sago pondweed	A	A			A	В		⊢
28	bugo ponunceu		\vdash	-			-	-	_	28	bugo pondiroca				-		-	-	t
29			-		-		-	-		29		-			-	-			⊢
	White waterlily	В	В	В	В	В	С	В	Α		White waterlily	В	В		-	В	A	В	1
50	White Watering	10	-	2	10		~			50	White Watering		10	-	-	D		5	ť
31	Yellow waterlily				-		-			31	Yellow waterlily								⊢
	Watershield		-		-		-				Watershield			-	-	-			⊢
_	Small duckweed		-		-		-	-			Small duckweed	-		-	-	-		-	⊢
	Great duckweed				-		-				Great duckweed				-	-			┝
	Watermeal			-							Watermeal								⊢
55	waterinear		\vdash	-	-			-		55	waterinear	-		-	-				┝
36	Arrowhead									36	Arrowhead								⊢
	Pickerelweed			-			-				Pickerelweed			-			-	-	┝
_	Arrow arum		\vdash							_	Arrow arum			-					┝
	Cattail	-	C	A	-		С	-			Cattail	-	-		-	-			\vdash
	Bulrush		10	A			C				Bulrush								+
40	Bullusti		-	-	-	-		-		40	Bullusii	-		-	-		-		┝
41	Teria						-				Iria	-		-	-	-	-		╞
	Iris Swamp Laggestrife		-		_			-			Iris Swamp Laggastrifa	-		-	-	_		_	⊢
	Swamp Loosestrife		-		-						Swamp Loosestrife	-		-	-		-		┝
	Purple Loosestrife	C	-	P			P	-			Purple Loosestrife	-		-	-	P			1
-	Starry Stonewort	С	В	В			В	A			Starry Stonewort					В			1
45	Phragmites									45	Phragmites								

Sheet Number 5 of 8



Lake Name: Lakeville Lake

County: Oakland Surveyor Name: Matt Novotny

Survey Date: September 16th, 2019

Sta	ndard Aquatic Vegetat	ion	ASS	essn	ient	510	s op	ecie	s De	nsit	y Sneet								-
_		anat	10.12	ant of	an 1			Nie Y	hurst	_		auret	0.12	a atat'	-			Mer 1	L
Code No.	Plant Name	NO. 81	ic Ve NO. 82	NO.	NO.		NO. 86			Code No.	Plant Name	quat NO. 89		NO.			NO. 94		
1	Eurasian watermilfoil				В	В	A	В		1	Eurasian watermilfoil						A	В	
2	Curly leaf pondweed			-		-				2	Curly leaf pondweed	-							F
3	Chara	С	В	A	В	В	В	A	Α	3	Chara	-		С	В	В		В	
4	Thin leaf pondweed	A	B	6.6.		A	B	B	**	4	Thin leaf pondweed	_	-			A			Ľ
5	Flat stem pondweed		10					12		5	Flat stem pondweed		-	-	-				ť
5	That stern peridweed						_			5	That stern polidweed	_							⊢
6	Robbins pondweed						-			6	Robbins pondweed	_	-	-	-				⊢
7	Variable pondweed			-			-				Variable pondweed	-		-	-				┝
8	White stem pondweed	В		В	В	В		В	В		White stem pondweed	A	В	В	В	В	В	С	
9	Richardsons pondweed	D		Б	D	Б	_	D	Б	9	Richardsons pondweed	Α	Б	Б	Б	Б	Б	C	-
	•				A.					-	•		_	В			-		⊢
10	Illinois pondweed	Α		-	A		A	A		10	Illinois pondweed		-	Б	-		A	-	⊢
11	Lorga last nondward			-			-			11	Lorga loof pondwood	_	-	<u> </u>				_	⊢
	Large leaf pondweed American pondweed						_				Large leaf pondweed		_	<u> </u>	_				⊢
		D				D			D		American pondweed			D					⊢
_	Floating leaf pondweed	В		_		В	_		В	_	Floating leaf pondweed	_		В					⊢
14	Water stargrass	D	0	D	D		D	0	D		Water stargrass	D	D	D	0	0	D	D	1
15	Wild Celery	В	С	В	В		В	С	В	15	Wild Celery	В	В	B	С	С	В	В	1
14	1 1 1 1						-			14	1 1/1				_				╞
	Arrowhead (submergent))									Arrowhead (submergent)			-	_			_	L
17	Native milfoil		A								Native milfoil		A	B			В		1
18	Whorled watermilfoil										Whorled watermilfoil	_							
19	Various leaf watermilfoi	1								19	Various leaf watermilfoi								
20	Coontail									20	Coontail								-
21	Elodea									21	Elodea								F
22	Bladderwort									22	Bladderwort								Γ
23	Bladderwort (mini)									23	Bladderwort (mini)								
24	Buttercup									24	Buttercup								
25	Najas spp.	В		A	В		С			25	Najas spp.	В		В	В		Α	В	
26	Brittle naiad			_			-			26	Brittle naiad	_	-		-			_	┝
27	Sago pondweed	В	В	A	A		C	В		_	Sago pondweed								1
28	ougo penantota	2	2				~	2		28	ouge penanoou	_	-	-					-
29										29		_		-					⊢
30	White waterlily						-		В		White waterlily	В	Α	C	В	В			1
50	white watering			-			-		D	50	white watering	D	A	C	D	D		-	1
	Yellow waterlily										Yellow waterlily								
32	Watershield										Watershield				_				
33	Small duckweed										Small duckweed								
	Great duckweed										Great duckweed								
35	Watermeal									35	Watermeal								-
36	Arrowhead									36	Arrowhead								+
	Pickerelweed										Pickerelweed							-	F
	Arrow arum									38	Arrow arum								Γ
	Cattail										Cattail								F
	Bulrush								А		Bulrush								
41	Tuío									41	Y.C.								Ĺ
	Iris Second La constricto			-							Ins Second Lagrantifi	_	_					_	-
	Swamp Loosestrife			-			-				Swamp Loosestrife	_		<u> </u>	-				⊢
	Purple Loosestrife										Purple Loosestrife	0	P	P	-	P			⊢
	Starry Stonewort										Starry Stonewort	С	В	В	В	В			-
45	Phragmites									45	Phragmites								

Sheet Number 6 of 8



Lake Name: Lakeville Lake

County: Oakland Surveyor Name: Matt Novotny

Survey Date: September 16th, 2019

	ndard Aquatic Vegetati		1926	ssiil		Site	ope	CICS	Der	isity	Sheet					-		
_		anat	ic Ve	getati	on A	seco	nent '	Site N	umb			quati	c Ve	zetati	on A	seset	nent S	Site N
Code	Plant Name	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.		Plant Name	NO.	NO.	NO.	NO.	NO.	NO.	NO.
No.		97	98	99	100	101	102	103	104	No.		105	106	107	108	109	110	111
1	Eurasian watermilfoil	А	Α	A	Α	А		Α	В	1	Eurasian watermilfoil	В	В		В		В	Α
2	Curly leaf pondweed									2	Curly leaf pondweed							
	Chara	В	В	В	В	В	Α	В	Α	3	Chara	С	В	В	В	В	С	А
_	Thin leaf pondweed									4	Thin leaf pondweed		В		В			Α
5	Flat stem pondweed									5	Flat stem pondweed							
6	Dabhing nandward			_						6	Dabhina nandersad	_						
	Robbins pondweed Variable pondweed			-		-	<u> </u>			6 7	Robbins pondweed Variable pondweed	_						
	White stem pondweed	A	A	С	С	С	В	В	В		White stem pondweed	В	A	В	В	В	A	A
	Richardsons pondweed	A	A	0	C	C	Б	Б	Б	9	Richardsons pondweed	Б	A	Б	Б	Б	A	A
_	Illinois pondweed			-		-	-			-	Illinois pondweed		_		A			
10	minors pondweed		-	-		-	-			10	minors pondweed	_			Λ			_
11	Large leaf pondweed			-			-			11	Large leaf pondweed	-						-
	American pondweed										American pondweed							
_	Floating leaf pondweed			В	A	Α	A				Floating leaf pondweed	A						
_	Water stargrass									14	Water stargrass							
15	Wild Celery	В	В		В	В	В	В	Α	15	Wild Celery		В		В	С	В	В
16	Arrowhead (submergent)									16	Arrowhead (submergent)							
17	Native milfoil	Α	А							17	Native milfoil							
18	Whorled watermilfoil									18	Whorled watermilfoil							
19	Various leaf watermilfoil									19	Various leaf watermilfoil							
20	Coontail	В	В							20	Coontail							
	Elodea	_		_		_				21	Elodea							
_	Bladderwort	Α	A								Bladderwort							
-	Bladderwort (mini)									_	Bladderwort (mini)							
-	Buttercup	a	0	D		-	-			24			0			D	D	D
25	Najas spp.	С	С	В	A	A	A			25	Najas spp.	_	С			В	В	В
26	Brittle naiad			-		-	<u> </u>			26	Brittle naiad	_				_		
20	Sago pondweed			-		-	-			20	Sago pondweed				В	В	В	A
28	Sago pondweed					-				28	Sago ponuweeu	-	-		Б	Б	D	л
29										29								
	White waterlily	Α	Α		A	Α		Α		30	White waterlily		В	В	В	В		В
	,										,		_			_		
31	Yellow waterlily									31	Yellow waterlily							-
32	Watershield									32	Watershield							
33	Small duckweed									33	Small duckweed							
34	Great duckweed	В	В							34	Great duckweed							
35	Watermeal									35	Watermeal							
	Arrowhead										Arrowhead							
_	Pickerelweed										Pickerelweed							
	Arrow arum										Arrow arum							
	Cattail						-				Cattail				В			_
40	Bulrush	В	В							40	Bulrush					В		
41	Inia			-						43	Turing							
	Iris Saman Lagasstrife					_	_				Iris Samuel a sectifi							
	Swamp Loosestrife			-		-					Swamp Loosestrife				\vdash			
45	Purple Loosestrife Starry Stonewort			-		-	<u> </u>				Purple Loosestrife Starry Stonewort				\vdash			P
4.4										21/1	LNUTV NIONEWOIT							B

Sheet Number 7 of 8



Lake Name: Lakeville Lake

County: Oakland Surveyor Name: Matt Novotny

Survey Date: September 19th, 2019

Sta	ndard Aquatic Vegetat	ion	Ass	essm	ent	Site	Spe	cies	Der	nsity	/ Sheet			_					\vdash
									Les 1				11					1.1. 7	L
Code	and sizes		ic Ve NO.								an line						NO.		
No.	Plant Name	113	114	115	116	117	118	119	120	No.	Plant Name	121	122	123	124	125	126	127	128
	P 1 10 1	D				D								_				_	
1	Eurasian watermilfoil	В	В	A	B	В			_	1	Eurasian watermilfoil			_		_	_	_	-
2	Curly leaf pondweed Chara	В	в	В	В	В		_		2	Curly leaf pondweed Chara			-		_		-	-
4	Thin leaf pondweed	D	Б	D	A	Б				4	Thin leaf pondweed			-				-	-
5	Flat stem pondweed		-		A	-				5	Flat stem pondweed			-				-	-
-	The stem pondweed		-		-			-		-	r at stem pondweed			-		-			-
6	Robbins pondweed									6	Robbins pondweed			-		-			
7	Variable pondweed									7	Variable pondweed			_		-			
8	White stem pondweed	В	В	В	В					8	White stem pondweed			_					
9	Richardsons pondweed									9	Richardsons pondweed								
10	Illinois pondweed									10	Illinois pondweed								
11	Large leaf pondweed									11	Large leaf pondweed								
12	American pondweed									12	American pondweed								
13	Floating leaf pondweed		В	В						13	Floating leaf pondweed								
14	Water stargrass									14	Water stargrass								
15	Wild Celery	С	В	В	С	В				15	Wild Celery								
	Arrowhead (submergent)									_	Arrowhead (submergent)								
17	Native milfoil										Native milfoil								
18	Whorled watermilfoil										Whorled watermilfoil								
19	Various leaf watermilfoil										Various leaf watermilfoil								
20	Coontail									20	Coontail								
										_						_			
	Elodea									21	Elodea			_					⊢
	Bladderwort		A		_					_	Bladderwort			_		_			-
	Bladderwort (mini)		-								Bladderwort (mini)			_				_	-
	Buttercup				-					-	Buttercup			_				_	<u> </u>
25	Najas spp.	С	С	С	С	A				25	Najas spp.			_		-		-	-
26	Drittle noisd		-							26	Daittle agind			_		_		-	-
26		Δ.	A	D	В					1.000	Brittle naiad			-				-	-
27 28	Sago pondweed	A	A	В	D					28	Sago pondweed			_				-	-
29			-		-			-		29				-		_		-	-
	White waterlily	-	-	В	В	В		_			White waterlily			-		_		-	-
50	white watering		-		D					50	white watering			-		-			-
31	Yellow waterlily							-		31	Yellow waterlily			-					
32	Watershield		\vdash							_	Watershield			_					
33	Small duckweed										Small duckweed								
	Great duckweed									-	Great duckweed			_					
	Watermeal										Watermeal					-			
36	Arrowhead									36	Arrowhead								
37	Pickerelweed									37	Pickerelweed								
38	Arrow arum									38	Arrow arum								
39	Cattail					Α				39	Cattail								
40	Bulrush									40	Bulrush								
41	Iris									41	Iris								
42	Swamp Loosestrife									42	Swamp Loosestrife								
43	Purple Loosestrife									43	Purple Loosestrife								
	Starry Stonewort					В					Starry Stonewort								
45	Phragmites									45	Phragmites								

Sheet Number 8 of 8



Water Quality

During certain periods of the year, Michigan lakes have poorer water quality than the rest of the year. The water quality sampling in this study is designed to look at two of those poor water quality periods each year. One in the early spring when phosphorus, which may be released from the bottom sediments, is distributed throughout the water column by spring mixing and a second in late summer when the water is warmest, and the lake is stratified (if it stratifies). During most of the remainder of the year, the water quality is better. Thus, if the lake gets high marks for water quality during early spring and late summer, it probably has good water quality all year long.

Lakeville Lake had water samples taken on May 14th, 2019 and September 17th, 2019. Water samples were taken from sites 1, 2, and 3 for water quality testing (refer to Figure 4). Nine parameters were analyzed from the water samples at these three sites for this report. These nine are generally considered most important to a waterbody's quality. Additionally, the trophic state index is calculated based on chlorophyll α , total phosphorus, and secchi disk values. This index is used to generalize the biological productivity of a waterbody. The 3 main trophic states for a lake are oligotrophic (low productivity), mesotrophic (medium productivity), and eutrophic (high productivity). A complete lake profile for temperature and dissolved oxygen only was taken from site 4, which is the deepest part of the lake. The results are shown below.

(At time of this report being made, Late Summer Chlorophyll a values were not available)



Date: 5/14/19					
Site Number:	1	2	3	Average	Grade
Chlorophyll α (ug/L)	0.27	0.27	0.27	0.27	А
Total Phosphorus (ug/L)	<8	<8	9	<8	А
Nitrate-N	<130	<130	<130	<130	А
Alkalinity (mg/L)	190	200	240	210	А
рН	8.35	8.17	8.32	8.28	В
Conductivity (umho/cm)	530	530	520	527	В
Secchi Disk Depth (meters)	5.18	6.25	N/A	5.7	В
Surface Temp (ºC)	12.3	12.4	12.1	12.3	А
Surface D.O. (mg/L)	10.3	10.27	10.93	10.50	Α
TSI	Value		Trophic State		
Secchi Disk	34.9		Oligotrophic		
Chlorophyll α	17.8		Oligotrophic		
Total Phosphorus	34.1		Oligotrophic		

Date: 9/17/19					
Site Number:	1	2	3	Average	Grade
Chlorophyll α (ug/L)	N/A	N/A	N/A	N/A	N/A
Total Phosphorus (ug/L)	11	<8	9	~9	А
Nitrate-N	<130	<130	<130	<130	А
Alkalinity (mg/L)	160	170	180	170	А
рН	8.37	8.31	8.09	8.26	В
Conductivity (umho/cm)	460	470	480	470	В
Secchi Disk Depth (meters)	4.11	4.42	N/A	4.3	С
Surface Temp (ºC)	21.8	21.5	21.5	21.6	А
Surface D.O. (mg/L)	9.58	9.44	12.48	10.50	В
			Trophic		
TSI	Value		State		
Secchi Disk	39.1		Oligotrophic		
Chlorophyll α	N/A		N/A		
Total Phosphorus	35.8		Oligotrophic		





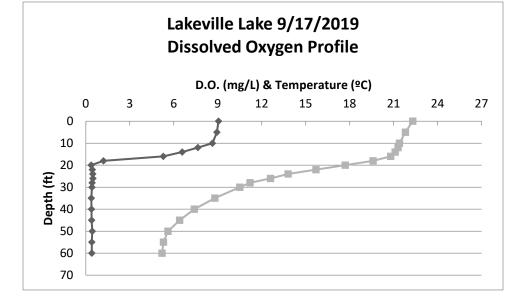
(Figure 4: Sampling locations for water quality)



3088 Hottis Rd. Hale, MI 48739 Hale: 989.728.2200



Fax: 989.516.5900



Temp (ºC)	D.O. (mg/L)	Depth (ft)	
22.3	9.05	0	
21.8	8.94	5	
21.4	8.64	10	
21.3	7.64	12	
21.1	6.57	14	
20.8	5.29	16	
19.6	1.2	18	
17.7	0.36	20	
15.7	0.44	22	
13.8	0.47	24	
12.6	0.48	26	
11.2	0.43	28	
10.5	0.42	30	
8.8	0.38	35	
7.4	0.39	40	
6.4	0.4	45	
5.6	0.44	50	
5.3	0.41	55	
5.2	0.41	60	

Dissolved oxygen is the parameter most often selected by lake water quality scientists as being important. Besides providing oxygen for aquatic organisms, in natural lakes dissolved oxygen is involved in phenomena such as phosphorus precipitation and release from the lake bottom sediments and decomposition of organic material in the lake. Some experts like to see some dissolved oxygen in the bottom water of a lake, even if it is almost zero. This is because as long as

there is some dissolved oxygen in the water, phosphorus precipitated by iron to the bottom sediments will remain there. Once a lake runs out of dissolved oxygen, iron comes back into solution and releases the phosphorus back into the water.

Overall, Lakeville Lake's water quality data looks great. A thermocline developed from 16 to 30 feet. Only the summer's secchi disk readings are slightly poor, which is consistent with past years. The lake contains hard water with a moderate amount of dissolved material. Nutrients are low in value as well. The overall spring grade is an A, whereas the summer grade is a B due to the secchi values.

Monitoring of Lakeville Lake's water quality should be continued in future years to determine trends in the analysis and to be proactive in the health of the lake.



Conclusions

In 2019 the curly leaf pondweed was addressed and controlled during the first treatment where triclopyr was not utilized. The remaining curly leaf pondweed was then treated during our second application. Starry stonewort treatments maintained their similarity in areas around the lake, most notably the northern part of the lake near the inlet from Upper Lakeville Lake. A few other bays around the lake were treated once or twice this year as well as needed. Over the last couple of years, new patches of starry stonewort were found and treated at the public launch and around the small island (with the small bridge) in the south east corner of the lake.

We followed through with increase the rate of systemic herbicide used for the Eurasian watermilfoil. Later summer survey suggests the treatment was much more effective. This was needed due to the narrow band that the milfoil beds exhibit. Since we cannot treat water that milfoil does not exist, we are limited to only applying over those narrow bands. This fact, coupled with a highly recreational lake and also sees high wind/wave action, and that the milfoil had hybridized, created efficacy issues with normal treatment rates. Thus, a higher rate was needed.

Looking to 2020, we will maintain our treatment strategy toward curly leaf pondweed, starry stonewort, and emergent vegetation. We will continue in coordination between the mechanical harvesting operation and herbicide applications, however this area does need to improve. The necessity (or lack of) starry stonewort applications will be looked at as well in coordination with board members; as there is some concern of the benefit of these treatments.

Also in 2020 for the Eurasian watermilfoil treatment, we will be using a new product and not triclopyr. This product is new to the market and called ProcellaCOR. It is fast acting, so water movement won't be a factor. It actively targets the plants, so narrow banding won't be an issue. And there is no 120 day irrigation restriction; as well as no water well location restriction. So all of the issues and inconveniences we've encountered before are fixed with this product. The manufacturer will even guarantee the treatment if it is larger than 10 acres.

Please keep in mind that we are a fully integrated lakes management company offering solutions including but not limited to mechanical harvesting, herbicide control, dredging, bio-augmentation, and aeration. Savin Lake Services also offers a complete range of water quality testing, depth contour mapping, individual property solutions, and even aquatic plant density reporting.

We look forward to working with the Lakeville Lake Improvement Board next year.

Sincerely,

Novotnu

Matthew Novotny Regional Lakes Manager