

AGENDA

WALLED LAKE LAKE IMPROVEMENT BOARD MEETING

February 12, 2019
2:00 PM

Novi Civic Center
45175 Ten Mile Road
Novi, Michigan 48375

- I. Call Meeting to Order
- II. Roll Call
- III. Public Comment
- IV. Approval of Minutes of September 12, 2018 meeting
- V. Treasurer's Report
 - a. Budget Amendment: 2018 Administrative/ Legal Line Item
 - b. Treasurer's Report: Q3 2018 and Q4 2018
 - c. 2018 Annual Financial Report
- VI. 2018 End of the Year and Water Quality Report from Savin Lake Services
- VII. Discussion of Geese Management
- VIII. Discussion of 2019 Treatment
- IX. Discussion of 2019 Budget
- X. Public Comment
- XI. Other Business
- XII. Adjournment

Please visit www.cityofnovi.org/lakeboard for additional information

**WALLED LAKE
LAKE IMPROVEMENT BOARD
MEETING MINUTES
September 12, 2018**

The meeting of the Lake Improvement Board for Walled Lake was held in the Council Conference Room at the Novi Civic Center at 45175 10 Mile Road on September 12, 2018. The meeting was called to order by Dave Galloway, Chairperson, at 2:05 P.M.

Present:

Hugh Crawford, Oakland County Board of Commissioners' Representative
Dave Galloway, Riparian Owner Representative (Chairperson)
Megan Mikus, City of Novi Representative (Secretary-Treasurer)
Karen Warren, Oakland County Water Resource Commissioner's Representative

Also, Present:

Victor Cardenas, City of Novi, Assistant City Manager
Mark Roberts, Attorney, Secrest Wardle
Jerry Anderson, Lakes Area Homeowners Association (LAHA), President
Efton (Paul) Barber, Savin Lake Services, Operations Manager
Chris Compton, Goose Busters

Absent:

Casey Ambrose, City of Walled Lake Representative

Public comment:

One Novi resident was present, Lori McLean of 1307 West Lake Drive, but she had no comments at that time.

**Moved by Crawford, Supported by Warren; CARRIED 4-0:
To approve the Minutes of May 17, 2018 meeting.**

Treasurer/ Member Mikus presented a revised version of the previously presented Treasurer's Report for the fourth quarter of 2017, the 2017 annual report, and the first quarter of 2018. After the May meeting, an outstanding invoice was realized and was applied in 2017. Treasurer/Member Mikus present Treasurer's report for the second quarter of 2018. Of the income received from the City of Novi, \$856.45 was from Novi delinquent taxes. The balance on hand as of June 30, 2018 was 201,157.96

**Moved by Crawford, Supported by Warren; CARRIED 4-0:
To approve the fourth quarter 2017 Treasurer's report; 2017 Annual Report, the first quarter 2018 Treasurer's report, and the second quarter 2018 Treasurer's Report.**

Member Mikus explained the statute requires the Board to certify delinquent assessments each year. The Board received a report from City of Novi, but did not receive one from the City of Walled Lake. Member Crawford asked why. Member Mikus mentioned in previous years the City of Walled Lake had been notified and not reported. Attorney Roberts recommended having the City of Walled Lake Representative follow up on the matter.

**Moved by Crawford, Supported by Ambrose; CARRIED 4-0:
To certify delinquent assessments received from the City of Novi.**

Goose Busters Presentation:

Chairperson Galloway had asked the President of the Lake Area Homeowner's Association (LAHA), Jerry Anderson and Chris Compton from Goose Busters to present to the Board about the work they do around Walled Lake. Chairperson Galloway presented that managing the geese population is important to maintaining the health of the lake as it prevents the spread of e-coli. LAHA President Jerry Anderson said for several years the Association has participated in the DNR's Goose Nest Destruction program; however, this permit limits the areas where they can access, which creates an imbalance. Anderson would like support from the Board to do an additional program of geese round up. Goose Buster Representative Chris Compton present the process: there is on-site round up in June, which provides geese free areas June, July and August. The cost for round up is \$350 for each set of 25 geese and \$150 for each additional set. Additionally, there is a permit fee of \$200 for geese round up. Member Warren asked where are the geese relocated. Goose Buster Representative Chris Compton said where the DNR dictates. Member Warren stated residents may have concerns over geese egg destructions and this type of service would be perpetual and it would take a long time before seeing a significant decrease. Goose Buster Representative Chris Compton said about 80% of adult geese and 0% of baby geese return the year after relocation. Novi Assistant City Manager Victor Cardenas said the City of Novi has supported the LAHA goose nest destruction for several years. Chairperson Galloway would like to include funding towards this type of activity in the 2019 budget.

No action was taken.

Budget amendment for additional treatment:

Efton (Paul) Barber presented the 2018 BioBase survey report, which was completed in September. In late spring, there are a large algae bloom due to the unusually warm weather. For the third treatment, instead of the anticipated ~15 acres of Eurasian watermilfoil that needs to be treated, ~60 acres of treatment is needed along with treatment of one acre of algae. It is estimated the cost for this treatment would be \$41,000. Member Mikus said there is insufficient funds allocated for treatments in the approved budget to do all of the treatment. A budget amendment of \$15,000 from the reserves would cover the expense.

**Moved by Mikus, Supported by Crawford; CARRIED 4-0:
To amend the budget of the treatment line item from \$80,000 to \$95,000, using \$15,000 from reserves.**

Public comment:

Novi resident Lori McLean said project has been occurring for about eight years and wanted to know the hard data on how the treatment has improved the lake quality. Chairperson Galloway said before treatment by the Board, it was difficult for boats to move around Walled Lake due to the weeds, and it had a sewer-like smell. It was noted by Efton (Paul) Barber of Savin Lake the number of acres needing to be treated went from 166 acres annually to around 60 acres annually. He said this shows the treatment is working.

ADJOURNMENT: There being was no further business to come before the Lake Improvement Board; the meeting was adjourned at 3:05 PM.

The Board next meeting was tentatively scheduled for February 12, 2019 at 2:00 PM

Megan Mikus, Secretary-Treasurer

DRAFT

**WALLED LAKE IMPROVEMENT BOARD
QUARTERLY TREASURER'S REPORT**

September 30, 2018

BALANCE ON HAND:	06/30/18	\$201,157.96
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INCOME	<u>Quarter</u>	<u>YTD</u>	<u>Budget</u>	<u>Variance</u>	<u>Notes</u>
Assessments (City of Novi)	\$ 612.54	\$ 41,213.55	\$42,014.79	(\$801.24)	1
Assessments (City of Walled Lake)	\$ -	\$ 25,421.39	\$25,421.00	\$0.39	2
TOTAL INCOME	\$ 612.54	\$ 66,634.94	\$ 67,435.79	(\$800.85)	
 EXPENSES					
Harvesting and Herbicide Treatments	\$ 22,581.45	\$ 52,160.30	\$95,000.00	(\$42,839.70)	
Lake Management Consultant	\$ -	\$ -	\$5,000.00	(\$5,000.00)	
Permit Fee	\$ -	\$ -	\$1,500.00	(\$1,500.00)	
Administrative & Legal	\$ 175.40	\$ 779.20	\$1,000.00	(\$220.80)	
Other	\$ 761.23	\$ 761.23	\$0.00	\$761.23	
TOTAL EXPENSES	\$ 23,518.08	\$ 52,939.50	\$ 88,050.00	(\$35,110.50)	

BALANCE ON HAND:	09/30/18	\$178,252.42
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Notes

- 1 Novi payment includes assessments paid to date to Novi
- 2 Walled Lake has paid the assessment in full

EXPENSE DETAIL

<u>Description</u>	<u>Invoice No.</u>	<u>Vendor</u>	<u>Amount</u>
Herbicide Treatment	4127	Savin Lake Services	\$ 18,931.45
Conference Reimbursement	20180809-171407	David Galloway	\$ 761.23
Herbicide Treatment	4185	Savin Lake Services, Inc.	\$ 3,650.00
Legal Fees through 8/31/2018	1345160	Secrest Wardle	\$ 175.40

Submitted by _____

Megan Mikus, Secretary/Treasurer
Walled Lake Improvement Board

**WALLED LAKE IMPROVEMENT BOARD
QUARTERLY TREASURER'S REPORT**

December 31, 2018

BALANCE ON HAND:		09/30/18	\$201,157.96			
INCOME		<u>Quarter</u>	<u>YTD</u>	<u>Budget</u>	<u>Variance</u>	<u>Notes</u>
Assessments (City of Novi)	\$	188.81	\$ 41,402.36	\$42,014.79	(\$612.43)	1
Assessments (City of Walled Lake)	\$	-	\$ 25,421.39	\$25,421.00	\$0.39	2
TOTAL INCOME	\$	188.81	\$ 66,823.75	\$ 67,435.79	(\$612.04)	
EXPENSES						
Harvesting and Herbicide Treatments	\$	33,851.57	\$ 86,011.87	\$95,000.00	(\$8,988.13)	
Lake Management Consultant	\$	-	-	\$5,000.00	(\$5,000.00)	
Permit Fee	\$	1,500.00	\$ 1,500.00	\$1,500.00	\$0.00	
Administrative & Legal	\$	357.40	\$ 1,136.60	\$1,000.00	\$136.60	
Other	\$	-	\$ 761.23	\$761.23	\$0.00	
TOTAL EXPENSES	\$	35,708.97	\$ 89,409.70	\$103,261.23	(\$13,851.53)	
BALANCE ON HAND:		12/31/18	\$178,454.44			

Notes

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- 2 Walled Lake has paid the assessment in full

EXPENSE DETAIL

<u>Description</u>	<u>Invoice No.</u>	<u>Vendor</u>	<u>Amount</u>
Herbicide Treatment	4221	Savin Lake Services, Inc.	\$ 33,851.57
MDEQ Permit (2019)	4283	Savin Lake Services, Inc.	\$ 1,500.00
* Legal Fees through 9/30/2018	1346975	Secrest Wardle	\$ 325.00
Legal Fees through 11/30/2018	1346975	Secrest Wardle	\$ 32.40

* Pending board approval

Submitted by _____
Megan Mikus, Secretary/Treasurer
Walled Lake Improvement Board

**WALLED LAKE IMPROVEMENT BOARD
2018 ANNUAL REPORT**

BALANCE ON HAND:	12/31/17	\$165,318.21
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INCOME	Annual Total	Notes
Assessments (City of Novi)	\$ 41,402.36	1
Assessments (City of Walled Lake)	\$ 25,421.39	2
TOTAL INCOME	\$ 66,823.75	

EXPENSES		
Harvesting and Herbicide Treatments	\$ 86,011.87	
Lake Management Consultant	\$ -	
Permit Fee	\$ 1,500.00	
Administrative & Legal	\$ 1,136.60	
Other	\$ 761.23	
TOTAL EXPENSES	\$ 89,409.70	

BALANCE ON HAND:	12/31/18	\$142,732.26
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Notes

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- 2 Walled Lake has paid the assessment in full

EXPENSE DETAIL FOR 2018

<u>Description</u>	<u>Invoice No.</u>	<u>Vendor</u>	<u>Amount</u>
Legal Fees through 12/31/2017	1324868	Secretst Wardle	\$ 31.80
Legal Fees through 3/31/2018	1333976	Secretst Wardle	\$ 169.00
Legal Fees through 4/30/2018	1336108	Secretst Wardle	\$ 78.00
Legal Fees through 5/31/2018	1339513	Secretst Wardle	\$ 325.00
Herbicide Treatment	4078	Savin Lake Services, Inc.	\$ 29,578.85
Herbicide Treatment	4127	Savin Lake Services, Inc.	\$ 18,931.45
Conference Reimbursement	20180809-171407	David Galloway	\$ 761.23
Herbicide Treatment	4185	Savin Lake Services, Inc.	\$ 3,650.00
Legal Fees through 8/31/2018	1345160	Secretst Wardle	\$ 175.40
Herbicide Treatment	4221	Savin Lake Services, Inc.	\$ 33,851.57
MDEQ Permit (2019)	4283	Savin Lake Services, Inc.	\$ 1,500.00
* Legal Fees through 9/30/2018	1346975	Secretst Wardle	\$ 325.00
Legal Fees through 11/30/2018	1346975	Secretst Wardle	\$ 32.40
TOTAL EXPENSES			\$ 89,409.70

* Pending board approval

Submitted by _____

Megan Mikus, Secretary/Treasurer
Walled Lake Improvement Board



3088 Hottis Rd. Hale, MI 48739 Hale: 989.728.2200 Clare: 989.386.0600 Fax: 989.516.5900

December 20, 2018

Walled Lake Improvement Board
Megan Mikus
Field Services Complex
26300 Lee BeGole Drive
Novi, MI 48375

Walled Lake Improvement Board:

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

As we say goodbye to 2018 and look forward to 2019, we are happy to give you a brief re-cap of the treatments that were performed on Walled Lake. This year, we treated Walled Lake (4) times as follows:

Treatment Date	Targeted Aquatic Weeds
6/11/18	Eurasian Watermilfoil, Large Leaf Pondweed, Claspig Leaf Pondweed, and Curly Leaf Pondweed
7/17/18	Eurasian Watermilfoil, Filamentous Algae, and Starry Stonewort
9/18/18	Eurasian Watermilfoil, Filamentous Algae, and Large Leaf Pondweed
10/25&26/18	Eurasian Watermilfoil

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 serving you in 2019. We plan to keep the same treatment plans for this year as we did this past year. Which is to treat only the non-native invasive plant communities, continue water quality, and monitor the natives plant communities to ensure they don't reach a nuisance level. If the natives become a nuisance Savin Lake Services recommends treating them with herbicides where approved by the DEQ. For the offshore areas not approved for herbicide use we recommend mechanical weed harvesting. We see no reason to deviate from the current treatment plan. We feel this plan is the most effective and efficient way to keep Walled Lake clean and desirable for use by the Walled Lake residents. Until then; if you have any questions, comments, or require additional information, feel free to contact us.

Sincerely,

Paul Barber
Regional Lakes Manager

Walled Lake 2018 Water Quality Report

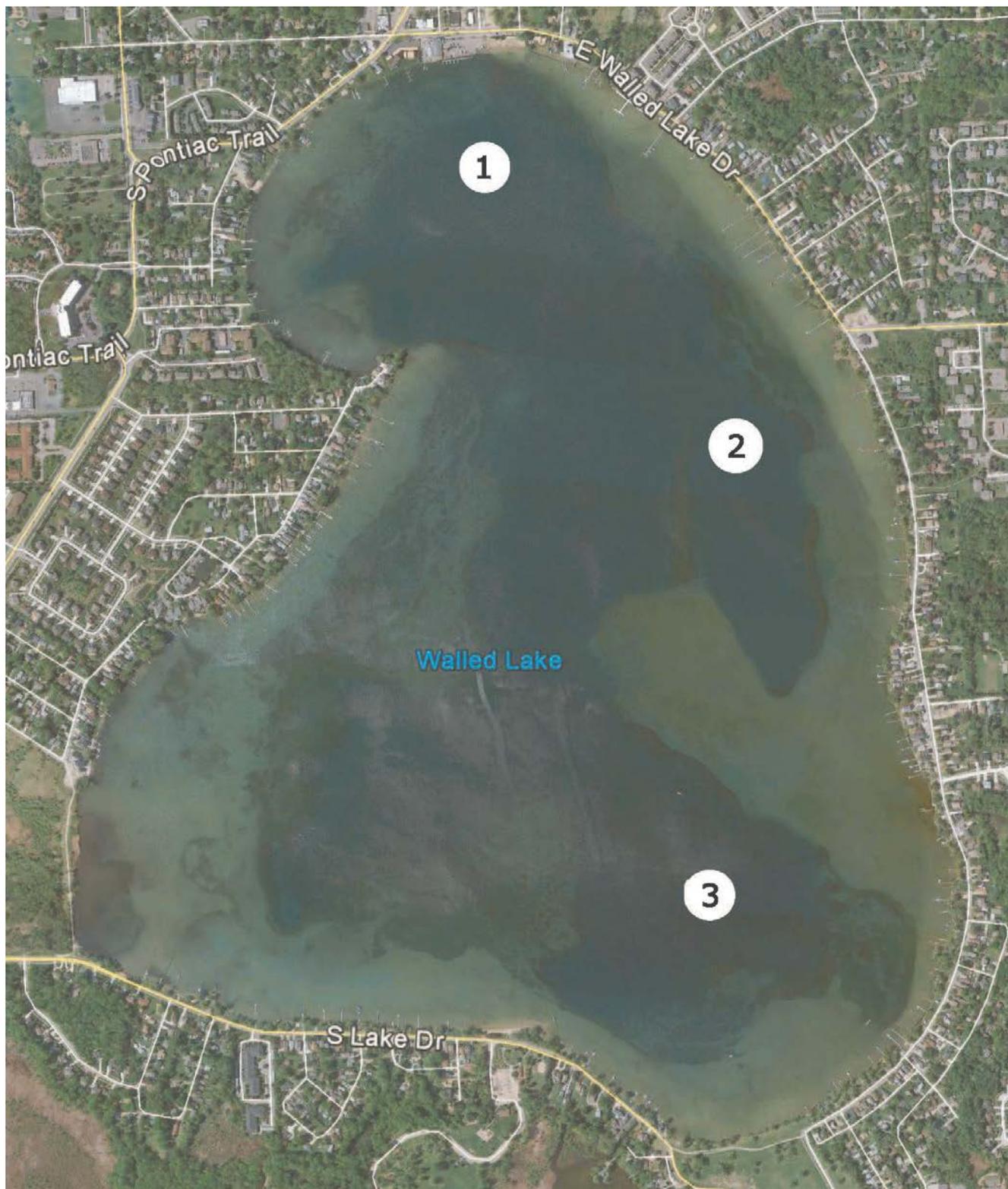
Summary:

Water Quality Testing was completed 2 times on Walled Lake in 2018 at 3 different locations around the lake. Of the parameters tested, Temperature, Dissolved Oxygen, Secchi Disk, and pH were sampled while on the lake. Chlorophyll α , Nitrate-N, Phosphorus, Alkalinity, and Conductivity were sampled by sending the water in sample bottles to an independent laboratory, White Water Associates located in Amasa, MI, where the analysis was ran.

A well known limnologist named Wally Fusilier developed a grading scale for various parameters of water quality. Data collected in 2018 is shown below and given a grade based on Fusilier's scale. Additionally, historical data and parameter descriptions are provided at the end of this report.

Because herbicide treatment of aquatic vegetation has occurred on Walled Lake, it should be noted that the application of herbicide no direct impact to the water quality of Walled Lake.

Overall in 2018 based on the analysis results, Walled Lake had a standard year. In both the spring and the fall Walled Lake had an average grade B for all 3 sites. The historically high conductivity did not change this year either. All of the values are constant with years past, nothing stands out as being unique this year. Walled Lake looks great.



(Walled Lake Sampling Sites)

2018 Results:

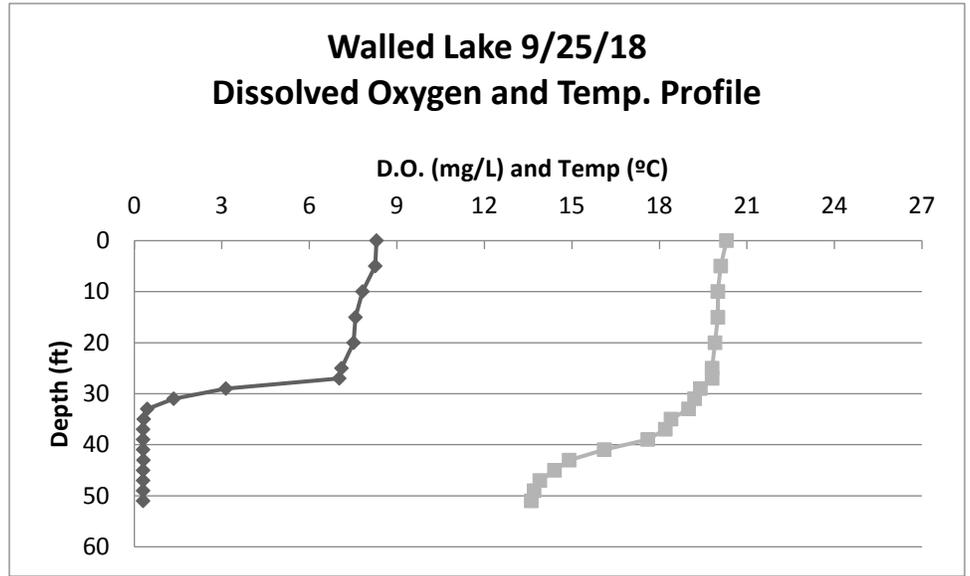
Date	6/11/2018			6/11/2018			6/11/2018			9/25/2018			9/25/2018			9/25/2018		
Station Number	1			2			3			1			2			3		
Temp (°C)	20.7	A		20.7	A		20.6	A		20.1	A		20.3	A		20.4	A	
Dissolved Oxygen (mg/L)	9.0			8.99			8.70			8.18			8.30			8.42		
Dissolved Oxygen (%saturation)	101.1	A		101.0	A		97.8	A		90.2	A		91.5	A		92.8	A	
Chlorophyll a (ug/L)	0.4	A		0.0	A		0.4	A		1.4	A		1.7	A		2.1	B	
Secchi Disk Depth (ft)	18.0	B		24.0	A		22.0	A		16.0	B		16.0	B		17.0	B	
Total Nitrate Nitrogen (ug/L)	<80	A																
Alkalinity (mg/L)	110.0	A		110	A		110	A		100	A		100	A		100	A	
pH	8.5	C		8.48	C		8.33	B		8.28	B		8.29	B		8.26	A	
Conductivity (umhos/cm)	1000.0	F		1000	F		1000	F		980	F		980	F		990	F	
Total Phosphorus (ug/L)	23.0	B		<8	A													
Overall Grade		B			B			B			B			B			B	

Scale:

Grade	Temp	Dissolved Oxygen	Chlorophyll α	Secchi Disk Depth	Total Nitrate Nitrogen	Alkalinity	pH	Conductivity	Total Phosphorus
A	0-26.5	85-115	0-2	>19	0-275	50-225	5.75-8.27	0-380	0-20
B	26.5-28.5	85-77; 115-122	2-3	19-16	275-360	50-35; 225-255	5.75-5.55; 8.27-8.47	380-590	20-28
C	28.5-30	77-69; 122-131	3-4	16-12	360-450	35-23; 255-280	5.55-5.33; 8.47-8.69	590-720	28-39
D	30-31.5	69-62; 131-140	4-5	12-9	450-540	23-17; 280-310	5.33-5.14; 8.69-8.88	720-800	39-46
F	>31.5	<62; >140	>5	<9	>540	<17; >310	<5.14; >8.88	>800	>46

Temp and D.O.:

Temp (°C)	D.O. (mg/L)	Depth (ft)
20.3	8.3	0
20.1	8.26	5
20.0	7.82	10
20.0	7.58	15
19.9	7.51	20
19.8	7.10	25
19.8	7.02	27
19.4	3.14	29
19.2	1.35	31
19.0	0.44	33
18.4	0.32	35
18.2	0.30	37
17.6	0.30	39
16.1	0.30	41
14.9	0.31	43
14.4	0.30	45
13.9	0.30	47
13.7	0.30	49
13.6	0.30	51

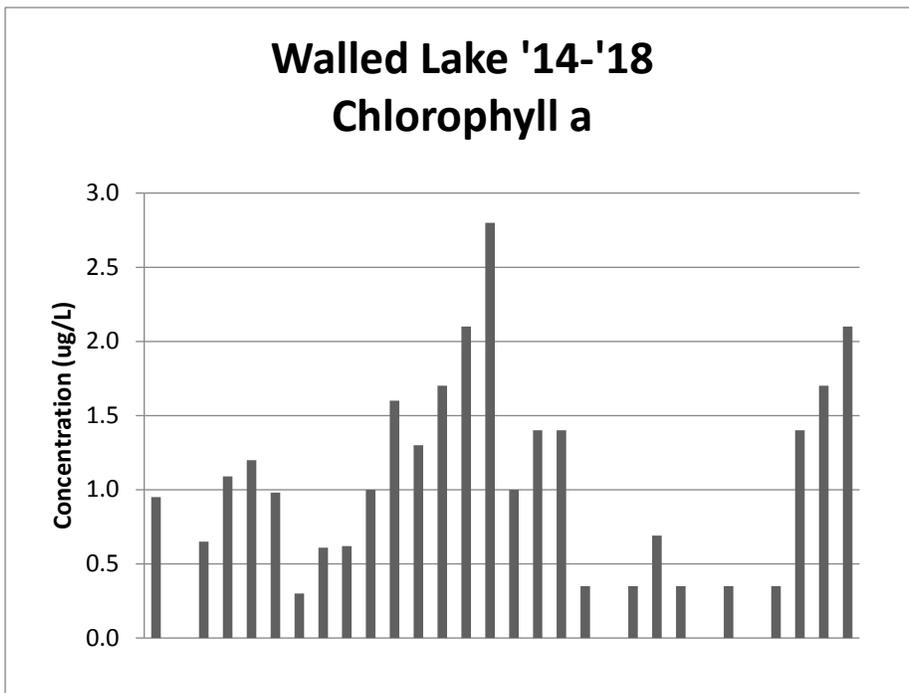
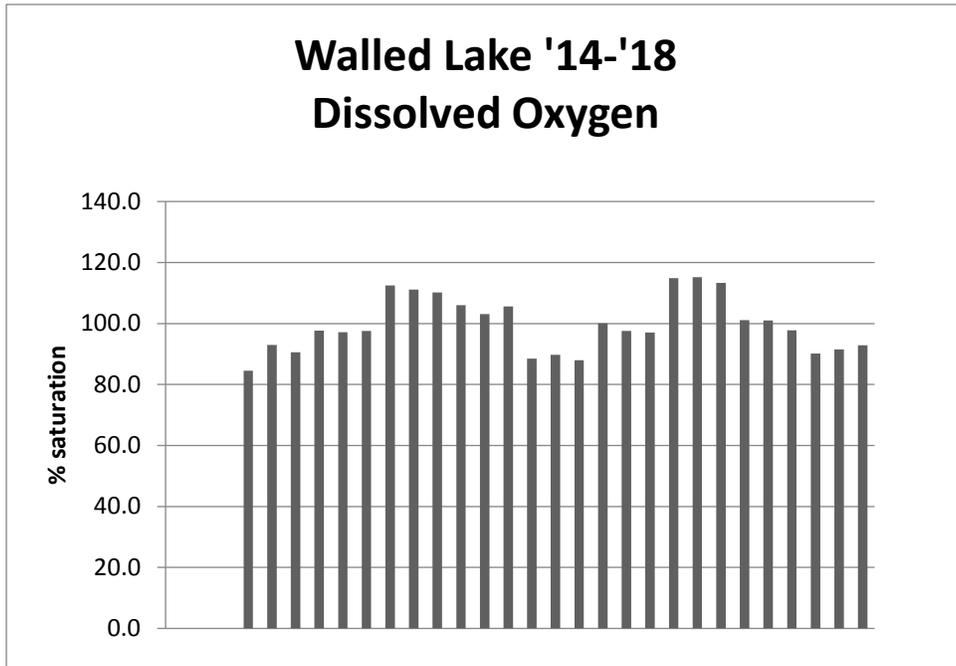


Matt Novotny

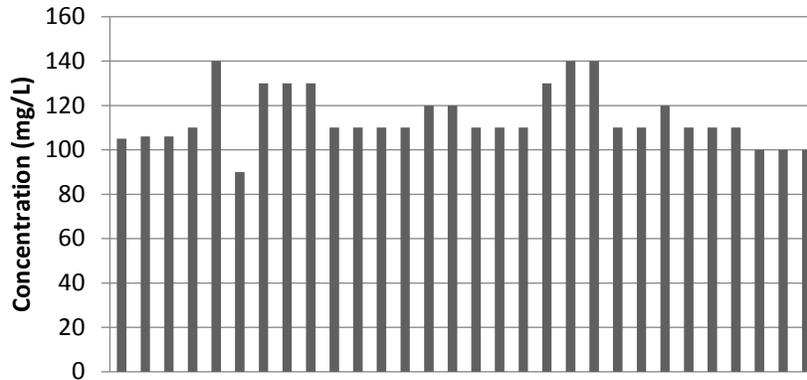
Matthew Novotny

Environmental Scientist

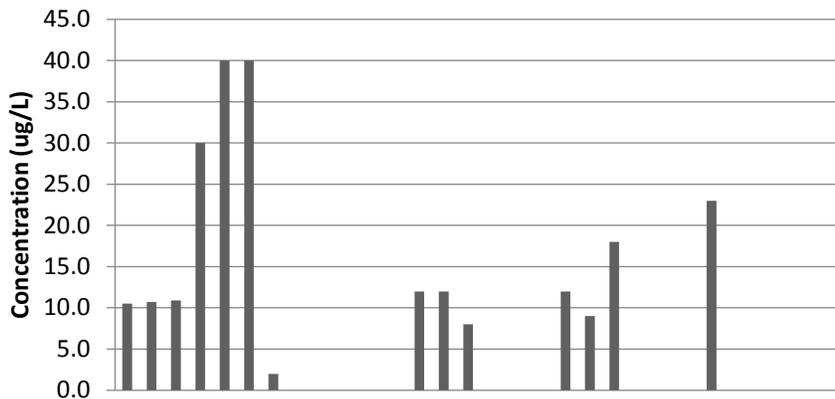
Historical Data:



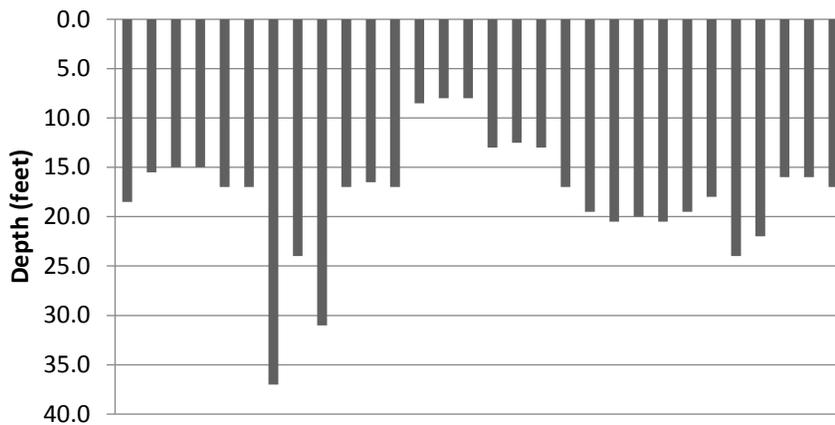
Walled Lake '14-'18 Alkalinity



Walled Lake '14-'18 Phosphorus



Walled Lake '14-'18 Secchi Disk Depth



Walled Lake Water Quality Data													
Date	Sample Station Number	Temperature (°C)	Dissolved Oxygen		Chlorophyll α (ug/L)	Secchi Disk Depth (ft)	Total Nitrate-N (ug/L)	Alkalinity (mg/L)	pH	Conductivity umhos per cm at 25 °C	Total Phosphorus (ug/L)	Grade	
			(mg/L)	Percent Saturation									
6/5/2014	1	22.8	N/A	N/A	1.0	18.5	3.4	105	8.63	954	10.5	B	
6/5/2014	2	22.2	N/A	N/A	N/A	15.5	3.7	106	8.61	960	10.7	B	
6/5/2014	3	22.1	N/A	N/A	0.7	15.0	3.2	106	8.60	962	10.9	B	
9/21/2014	1	17.7	7.99	84.6	1.1	15.0	<100	110	8.20	1100	30.0	B	
9/21/2014	2	17.5	8.78	92.9	1.2	17.0	<100	140	8.29	1120	40.0	B	
9/21/2014	3	17.3	8.74	90.6	1.0	17.0	<100	90	8.31	1120	40.0	B	
5/20/2015	1	17.9	9.23	97.7	0.3	37	<60	130	8.55	1100	2	B	
5/20/2015	2	17.7	9.18	97.1	0.61	24	<60	130	8.58	1100	<1	B	
5/20/2015	3	17.9	9.22	97.6	0.62	31	<60	130	8.62	1100	<1	B	
8/31/2015	1	24.5	9.5	112.5	1.0	17.0	<60	110.0	7.76	1000	<5	B	
8/31/2015	2	23.7	9.3	111.1	1.6	16.5	<60	110.0	7.79	1000	<5	B	
8/31/2015	3	23.4	9.4	110.2	1.3	17.0	<60	110.0	7.71	1100	<5	B	
5/17/2016	1	14.7	10.67	106.0	1.7	8.5	<60	110.0	8.66	1000	12.0	B	
5/17/2016	2	14.4	10.61	103.1	2.1	8.0	<60	120.0	8.62	1000	12.0	B	
5/17/2016	3	14.8	10.63	105.6	2.8	8.0	<60	120.0	8.52	1000	8.0	B	
9/29/2016	1	16.6	8.54	88.5	1	13.0	<60	110.0	8.13	1100.0	<9	B	
9/29/2016	2	16.6	8.66	89.7	1.4	12.5	<60	110.0	8.11	1100.0	<9	B	
9/29/2016	3	16.4	8.66	87.9	1.4	13.0	<60	110.0	8.11	1100.0	<9	B	
5/11/2017	1	14.1	10.30	100.1	0.35	17.0	110.0	130.0	8.18	1100.0	12.0	B	
5/11/2017	2	13.4	10.26	97.5	0.00	19.5	70.0	140.0	7.99	1100.0	9.0	A	
5/11/2017	3	13.0	10.21	97.1	0.35	20.5	100.0	140.0	7.98	1000.0	18.0	A	
9/21/2017	1	22.4	10.02	114.9	0.69	20.0	<60	110.0	8.47	1000.0	<8	B	
9/21/2017	2	22.8	9.86	115.2	0.35	20.5	<60	110.0	8.42	1000.0	<8	B	
9/21/2017	3	21.6	9.88	113.3	0.00	19.5	<60	120	8.47	1000	<8	B	
6/11/2018	1	20.7	9	101.1	0.35	18	<80	110	8.48	1000	23.0	B	
6/11/2018	2	20.7	8.99	101.0	0	24.0	<80	110	8.48	1000	<8	B	
6/11/2018	3	20.6	8.70	97.8	0.35	22.0	<80	110	8.33	1000	<8	B	
9/25/2018	1	20.1	8.18	90.2	1.4	16.0	<80	100	8.28	980	<8	B	
9/25/2018	2	20.3	8.3	91.5	1.7	16.0	<80	100	8.29	980	<8	B	
9/25/2018	3	20.4	8.42	92.8	2.1	17.0	<80	100	8.26	990	<8	B	

Parameter Descriptions:

TEMPERATURE AND DISSOLVED OXYGEN

Temperature exerts a wide variety of influences on most lakes, such as the separation of layers of water (stratification), solubility of gases, and biological activity.

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 to, and release from, the lake bottom sediments and decomposition of organic material in the lake.

Low dissolved oxygen concentrations (below 4 milligrams per liter) are generally insufficient to support fish life. In most Michigan lakes, there is no dissolved oxygen below the thermocline in late summer. 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 at the bottom of the lake, phosphorus precipitated by iron to the bottom sediments will remain there. Once a lake runs out of dissolved oxygen in the water at the bottom iron comes back into solution. When that happens, it releases the phosphorus back into the water. This can cause additional algae to grow when the lake mixes.

DISSOLVED OXYGEN, PERCENT SATURATION

Because the amount of dissolved oxygen a water can hold is temperature dependent with cold water holding more than warm water, dissolved oxygen saturation is often a better way to determine if oxygen supplies are adequate. The best is between 90 and 110 percent.

CHLOROPHYLL α

Chlorophyll α is used by lake scientists as a measure of the biological productivity of the water. Generally, the lower the chlorophyll α , the better. High concentrations of chlorophyll α are indicative of an algal bloom in the lake, an indication of poor lake water quality. The highest surface chlorophyll α concentration found by Wallace Fusilier (Water Quality Investigators, WQI) in a Michigan lake was 216 micrograms per liter. Best is below one microgram per liter.

SECCHI DISK TRANSPARENCY (originally Secchi's disk)

In 1865, Angelo Secchi, the Pope's astronomer in Rome, Italy devised a 20-centimeter (8 inch) white disk for studying the transparency of the water in the Mediterranean Sea. Later an American limnologist (lake scientist) named Whipple divided the disk into black and white quadrants which many are familiar with today.

The Secchi disk transparency is a lake test widely used and accepted by limnologists. The experts generally felt the greater the Secchi disk depth, the better quality the water. However, one Canadian scientist pointed out acid lakes have very deep Secchi disk readings. (Would you consider a very clear lake a good quality lake, even if it had no fish in it? It would be almost like a swimming pool.) Most lakes in southeast Michigan have Secchi disk transparencies of less than ten feet. On the other hand, Elizabeth Lake in Oakland County had 34 foot Secchi disk readings in summer 1996, evidently caused by a zebra mussel invasion a couple of years earlier.

Most limnology texts recommend the following: to take a Secchi disk transparency reading, lower the disk into the water on the shaded side of an anchored boat to a point where it disappears. Then raise it to a point where it's visible. The average of these two readings is the Secchi disk transparency depth.

Secchi disk measurements should be taken between 10 AM and 4 PM. Rough water will give slightly shallower readings than smooth water. Sunny days will give slightly deeper readings than cloudy days. However, roughness influences the visibility of the disk more than sunny or cloudy days.

TOTAL PHOSPHORUS

Although there are several forms of phosphorus found in lakes, the experts selected total phosphorus as being most important. This is probably because all forms of phosphorus can be converted to the other forms. Currently, most lake scientists feel phosphorus, which is measured in parts per billion (1 part per billion is one second in 31 years) or micrograms per liter ($\mu\text{g/L}$), is the one nutrient which might be controlled. If its addition to lake water could be limited, the lake

might not become covered with the algal communities so often found in eutrophic lakes.

Based on WQI's studies of many Michigan inland lakes, they've found many lakes were phosphorus limited in spring (so don't add phosphorus) and nitrate limited in summer (so don't add nitrogen).

10 parts per billion is considered a low concentration of phosphorus in a lake and 50 parts per billion is considered a high value in a lake by many limnologists.

NITRATE NITROGEN

Nitrate, also measured in the parts per billion range, has traditionally been considered by lake scientists to be a limiting nutrient. The experts felt any concentration below 200 parts per billion was excellent in terms of lake water quality. The highest value found by Fusilier was 48,000 parts per billion in an Ottawa County river which flowed into Lake Macatawa in Holland, Michigan

On the other hand, WQI has studied hundreds of Michigan inland lakes, and many times they find them nitrate limited (very low nitrate nitrogen concentrations), especially in summer.

WQI was finding many lakes have lower nitrate nitrogen concentrations in summer than in spring. This is probably due to two factors. First, plants and algae growing in lakes as water warms can remove nitrates from the water column. And second, bacterial denitrification (where nitrates are converted to nitrogen gas by bacteria) also occurs at a much faster rate in summer when the water is warmer.

Generally limnologists feel optimal nitrate nitrogen concentrations (which encourage maximum plant and algal growth) are about 10-20 times higher than phosphorus concentrations. The reason more nitrogen than phosphorus is needed is because nitrogen is one of the chemicals used in the production of plant proteins, while phosphorus is used in the transfer of energy, but is not used to create plant material. If the nitrate concentration is less than 10-20 times the phosphorus concentration, the lake is considered nitrogen limited. If the nitrate concentration is higher than 10-20 times the phosphorus concentration, the lake is considered phosphorus limited.

TOTAL ALKALINITY

Alkalinity is a measure of the ability of the water to absorb acids (or bases) without changing the hydrogen ion concentration (pH). It is, in effect, a chemical sponge. In most Michigan lakes, alkalinity is due to the presence of carbonates and bicarbonates which were introduced into the lake from ground water or streams which flow into the lake. In lower Michigan, acidification of most lakes should not be a problem because of the high alkalinity concentrations.

HYDROGEN ION CONCENTRATION (pH)

pH has traditionally been a measure of water quality. Today it is an excellent indicator of the effects of acid rain on lakes. About 99% of the rain events in southeastern Michigan are below a pH of 5.6 and are thus considered acid. However, there seems to be no lakes in southern Michigan which are being affected by acid rain. Most lakes have pH values between 7.5 and 9.0.

SPECIFIC CONDUCTIVITY

Conductivity, measured with a meter, detects the capacity of a water to conduct an electric current. More importantly however, it measures the amount of materials dissolved in the water, since only dissolved materials will permit an electric current to flow. Theoretically, pure water will not conduct an electric current. It is the perception of the experts that poor quality water has more dissolved materials than does good quality water

ENVIRONMENTAL Fact Sheet



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BB-53

2012

Canada Geese Facts and Management Options

Canada Geese are a common site around lakes, ponds and even golf courses. These birds often migrate in the fall, but isolated populations may reside year around. Nesting begins in March and April, usually along a water body's riparian zone. Geese can lay approximately three to six eggs in a clutch, and often abandon the nest within one to two days. The geese can live upwards of 24 years and can weigh approximately 12 pounds.



How Much Nutrient Loading Do Canada Geese Add To A Lake?

One goose can consume up to four pounds of grass per day, creating about three pounds of fecal matter daily. In large concentrations, this matter can contribute to excessive nutrient loading because fecal matter contains 76 percent carbon, 4.4 percent nitrogen, and 1.3 percent phosphorus. These nutrients can cause algal blooms and excessive plant growth in lakes.

How Can Canada Geese Affect Human Health?

When geese defecate near shore or in the water they create a health risk to humans. Their fecal material may contain the swimmers itch organism along with fecal bacteria. Swimmers itch is a temporary skin rash caused by a small parasite, however the rash does not require treatment. A larger concern are fecal bacteria, or *Escherichia coli* (*E. coli*), which are naturally occurring bacteria in the digestive tracts of warm-blooded animals. *E. coli*, when present in large amounts, may cause gastrointestinal problems such as nausea, vomiting and diarrhea. The presence of *E. coli* may also indicate the potential presence of other pathogenic organisms. *You should avoid contact and ingestion of water in areas frequented by geese.*

How Do I Make My Property Less Inviting To Canada Geese?

You can employ some lake protection tips such as leaving a buffered zone near the lake comprised of bushes, shrubs and vegetation. Grass is very attractive and geese tend to flock to it. If you already have a grassy shoreline or lawn it is best to keep the grass high (6"). Remove

accumulated nesting materials (sticks and shrubbery) prior to geese nesting, or remove the nest after geese have hatched and moved on (roughly two to three days after hatching). Remember however, before you tamper with the nests of Canada Geese a permit is required from the U.S. Fish and Wildlife Service.

How Else Can I Manage Canada Geese on My Property?



Create barriers between the grass and the water. The barrier can be as simple as a piece of string that they cannot step over or walk under.



Spray your lawn with methyl anthranilate; the chemical will give the grass an unpleasant taste making the grass undesirable to eat.



Install an overhead grid wire to prevent the geese from landing and nesting in that area.



Obstruct the view of the surrounding area. Geese need to identify if predators are approaching.



Use noise harassment. If the geese land on the lake/property every morning greet them with a loud noise. There are several different tools you can use to create the noise harassment: propane canons, starter pistols, air horns, and recorded predator noises. (Please warn your neighbors before employing these methods.)



Dogs may also deter geese from landing or roosting on your property. A barking dog guarding the property may be effective.



For the best results, employ two or more of the management strategies.

For more information on Canada Geese Management visit the following websites:

www.ppd.l.purdue.edu/ppdl/expert/Canada_Geese.html

www.canadagoosemanagement.com

www.canadageese.org/nlcontrol.html

For more information on swimmers itch refer to fact sheet WD-BB-2 [Swimmers Itch](#)

For more information on bacteria refer to fact sheet WD-BB-14 [Bacteria in Surface Waters](#)

How much poop can one Canada goose poop in one day? Read on ...

Keith Matheny, Detroit Free Press Published 6:00 a.m. ET Nov. 7, 2017 | Updated 3:48 p.m. ET Nov. 7, 2017

Canada geese are moving in to the most populated areas of Michigan. And their occasionally aggressive nature, and incredibly prodigious pooping, are causing conflicts



(Photo: Keith Matheny Detroit Free Press)

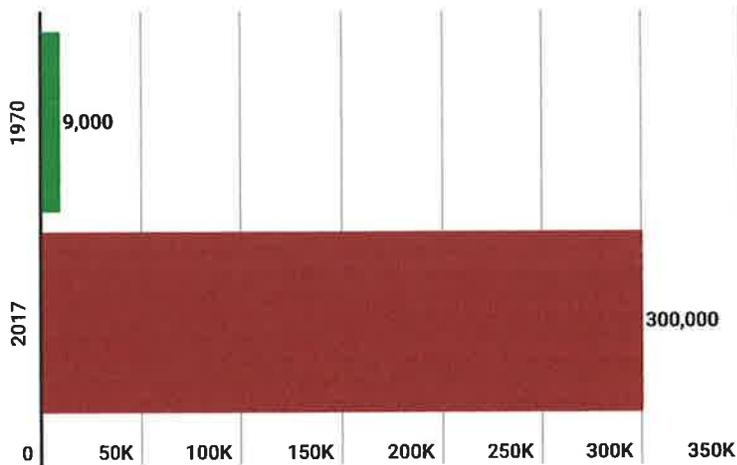
Canada geese are a big, unique-looking and some say downright pretty bird. But they likely won't be winning any popularity contests in Michigan anytime soon.

The messy birds tend to enjoy the same types of areas humans like to create for themselves — lush lawns, parks, beaches, golf courses and scenic mill ponds in the middle of small towns ([/story/news/local/michigan/2017/03/10/droppings-brighton-mill-pond/99010288/](https://story/news/local/michigan/2017/03/10/droppings-brighton-mill-pond/99010288/)).

And when they find a nice area, they like to stay. There, they eat, poop, swim, repeat. Then they make baby Canada geese to do more of the same.

Their growing numbers are causing increasing conflicts in Michigan, where they have gone from nearly extinct to an overpopulated nuisance, fouling waterways and leaving piles of green droppings everywhere you step.

Canada geese numbers exploding in Michigan:



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(<https://infogram.com/5bc79816-4f64-4713-8e4f-2043ec3b8204>)
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"You've got a lot of golf courses, a lot of cemeteries; anywhere you have well-manicured grass, that's where they are going to be," said Eric McGhee, a waterfowl hunter from Troy who represents southeast Michigan on the state's Citizen Waterfowl Advisory Committee. The group provides the DNR with feedback on existing and proposed waterfowl regulations and wetlands management issues.

More: [Bird droppings a 'disgusting' problem at Brighton mill pond \(/story/news/local/michigan/2017/03/10/droppings-brighton-mill-pond/99010288/\)](https://story/news/local/michigan/2017/03/10/droppings-brighton-mill-pond/99010288/)

"Why would a goose leave a golf course, where they can eat, and swim and have no predators, including people and coyotes?"

Canada goose numbers were so small in the 20th Century as a result of over-hunting that efforts were made to introduce the birds in Michigan. From a population of about 9,000 birds in 1970, the state is now home to more than 300,000 Canada geese — and 78% or more of those birds live in the more heavily populated southern part of the state, according to the Michigan Department of Natural Resources.

Canada goose complaints tend to fall into three categories, McGhee said.

Complaint category 1: Aggressive birds.

"People have them around their offices, and, especially in the springtime, when they are mating and laying eggs, that's when you get a lot of people saying they are being harassed by the geese," he said. "They're being chased by them; they're having to fight them off."

Complaint category 2: The pooping.

An adult Canada goose poops about 2 pounds, per bird, per day. And we're not talking little, dainty, chickadee poop here. It can contribute to beach closings like [those that occur with frequency on Lake St. Clair \(/story/news/2017/10/01/goose-gull-poop-lake-st-clair-water-woes-deq/604469001/\)](http://www.fox2now.com/story/news/2017/10/01/goose-gull-poop-lake-st-clair-water-woes-deq/604469001/) because of high E. coli bacteria concentrations in shoreline waters.

Brian Borbot of Grand Rapids has almost given up on using Riverside Park, a large park in the city along the Grand River that he has used and enjoyed almost all of his life. The reason, he said, is all of the Canada geese, and all of the land mines they are leaving behind.

"There are soccer fields and Little League fields down here that they feed on," he said. "Kids and adults play on these fields, and everywhere you look, it's flattened-out green piles. It's not good for the ponds there, and it's not good for the people.

"It's been going on for five or six years at least, and it's gotten progressively worse."

Complaint category 3: Impacts to farmers.

Canada geese love grain crops such as corn, wheat and soybeans. They'll double-dip on farmers' crops, eating the plants just as they emerge, then coming back when the corn, grain or bean is mature.

"They'll come and feast all day on your crops," McGhee said. "They'll eat a couple of acres of crop, go sleep it off, and come back the next day to do it again."

As the state of Michigan moves toward considering a [sandhill crane hunt \(/story/news/local/michigan/2017/10/18/michigan-sandhill-crane-hunt/777408001/\)](http://www.fox2now.com/story/news/local/michigan/2017/10/18/michigan-sandhill-crane-hunt/777408001/), some have asked why not hunt these ubiquitous Canada geese instead? We already do, McGhee said.

Michigan has an early hunting season for Canada geese that runs the entire month of September, and they can be hunted during general waterfowl hunting seasons from October into December. Canada goose-hunting is then extended to mid-February in certain management zones in southern Michigan.

The hunt doesn't seem to be as popular as duck hunting, however, McGhee said.

"We have such a long goose season," he said. "If I was to get two geese every time I went out, I'm going to have a freezer full of goose meat. It's easier with ducks; they're smaller — a pound, pound-and-a-half of meat. What am I going to do with 40 or 50 pounds of goose meat every year?"

The Canada geese are getting wise to this method of keeping their numbers down, anyway.

University of Illinois ornithologist Mike Ward researched why Canada geese, a migratory bird that typically heads south to warmer climates for the winter, were instead staying over the winter in more northern, urban areas than they had before.

"Twenty years ago, there wouldn't have been many geese over-wintering in southern Illinois, Michigan and northern Indiana. But they are now," he said. "While our winters are getting a little milder, they're not that much milder for a bird that has to eat grass."

Ward presumed the geese would fly to nearby agricultural fields during the day; then come back to roost in urban areas of Chicago. But, in tracking the birds, they weren't making those trips to farmers' fields outside the city in the fall and start of winter. That time period happens to be when Canada goose hunting season is going on throughout the Midwest.

"What we think is going on is, they are staying farther north and in urban areas to avoid hunters," he said.

One of the areas around Chicago where this is happening is near Midway Airport, presenting "real, potential problems with collisions" between birds and aircraft, Ward said. (<http://www.cnn.com/2016/08/11/us/udson-landing-archive-news-story/index.html>) Ask Chesley (Sully) Sullenberger (<http://www.cnn.com/2016/08/11/us/udson-landing-archive-news-story/index.html>) how problematic that can be.

(<http://www.cnn.com/2016/08/11/us/udson-landing-archive-news-story/index.html>) Sullenberger is the now-retired U.S. Airways pilot who safely landed his passenger jet in the waters of the Hudson River in Manhattan after the aircraft was disabled by a flock of Canada geese immediately after takeoff in 2009.

The urban geese are getting by through not moving around much, conserving energy, staying on roofs and railroad stockyards. Ward said. His research is now turning to the most effective ways to get them moving, expending energy, forcing them to head south or freeze.

"Airports will chase them around with remote-control cars, lasers," he said. "Our research going on right now is to see which harassment technique works best."

In areas of Michigan where Canada geese are particularly an issue, including Macomb, Oakland and Wayne counties, the DNR allows landowners to obtain free permits to destroy the birds' nests and eggs, encouraging their migration to less-populated northern areas.

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Chris Compton, 45, of Holy and founder of Goose Busters, a business that removes and relocates about 6,000 geese per year to less-populated areas, he said. Compton works with his 3-year-old border collie Ellee, Monday Nov. 6, 2017 at Fieldstone Golf Club in Auburn Hills. Ellee scares off the Canada geese from commercial, residential, governmental, school, church and other properties. (Photo: Mandi Wright, Detroit Free Press)

In June and July, Canada geese are molting, or shedding and replacing feathers, and cannot fly, making it a good time to gather birds and relocate them. Chris Compton's Holly-based Goose Busters business removes and relocates about 6,000 geese per year to less-populated areas, he said.

The DNR, however, states that relocation can be less than effective, unless the attractive habitat the geese are leaving is somehow modified, as they are instinctively drawn to previous breeding sites.

Compton also uses border collies to chase off Canada geese, making them less comfortable.

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Ellee (far left), a 3-year-old border collie, scares off the Canada geese from Fieldstone Golf Club in Auburn Hills on Monday Nov. 6, 2017. Elle works for Chris Compton's Holly-based Goose Busters business which removes and relocates geese. (Photo: Mandi Wright, Detroit Free Press)

"We're going out to close to 90 places a day now, keeping them off grounds for people — commercial businesses, residences, a couple of municipalities, some churches, schools."

McGhee sees a solution in getting more people into hunting.

"The waterfowl hunting sport is in decline now," he said. "If we could teach the younger hunters it's OK to go out and manage this problem, it would help. And it is a problem; despite the hunters, the bag limits and what the state is doing to harvest and conserve these birds."

Contact Keith Matheny: 313-222-5021 or kmatheny@freepress.com. Follow on Twitter @keithmatheny.

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CANADA GEESE DAMAGE MANAGEMENT

PUBLIC HEALTH ISSUES

Canada geese (*Branta canadensis*) are a modern success story for wildlife management. At one time, numbers of Canada geese were in serious decline. However, the actions of various wildlife agencies have brought their numbers in North America to an estimated 5,600,600 (U.S. Fish and Wildlife Service 2009).

Unfortunately, this dramatic increase in population has resulted in some negative consequences.

First, large numbers of geese leave large quantities of feces. A single goose can defecate every 20 minutes (Bowen and Valiela 2004) up to 1.5 pounds of feces each day (French and Parkhurst 2009). This problem is magnified when we realize that approximately 67% of those geese are non-migratory or resident geese (Dolbeer 2006). In other words, land and lakes frequently do not get a sustained rest from geese presence. If large numbers of geese congregate, one must wonder if there is a health risk related to the feces left on ground and in the water. French and Parkhurst (2009) note that "beaches and other public areas littered with accumulated goose feces have been closed due to the contamination or the threat of personal injury resulting from falls as people lose footing on the slippery material." So concerns regarding goose droppings are not simply speculative.



Many have raised concerns about the diseases found in the droppings of Canada geese. Photo Stephen M. Vantassel.

Research has shown that the excrement of geese contains a wide variety of pathogens capable of infecting humans. (Diseases transmitted from animals to humans are known as zoonotic diseases). Yet geese can also be a means of transmitting (vector) other diseases in ways unrelated to their defecation. As goose numbers continue to increase, concerns have been raised regarding the negative impact Canada geese may have on water quality and disease transmission (Fallacara et al. 2001).

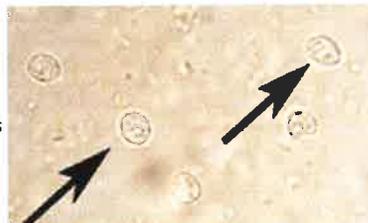
One of the significant challenges in surveying infectious diseases of Canada geese is distinguishing their having zoonotic diseases from the likelihood of their vectoring those diseases to humans (Bonner et al. 2004). As Smith et al. (1999) characterized the situation, "Transmission of disease or parasites from geese to humans has not been well documented, but the potential exists." This potential is in no small way related to the number of geese and their high mobility (Fallacara et al. 2001). In light of the gaps in our knowledge, we caution readers that presence of a disease does not necessarily translate into a threat to public health. Nevertheless, we advise caution as the research in this field continues to evolve.

Canada geese presence at parks and golf courses raised the question of the potential of disease transmission to humans via contact with goose droppings (Converse et al. 1999). The droppings of Canada geese have been found to carry a significant number of diseases, however, only a few are of significant concern to humans.

PARASITES

Cryptosporidium.

Cryptosporidium is a parasite that causes an enteric disease called cryptosporidiosis. As few as 30 oocysts are needed to cause infection (Kassa et al. 2004). While healthy people usually recover following a bout of diarrhea, the infection can endanger immune-compromised individuals, such as those suffering with AIDS ((Corso et al. 2003). Canada geese have been found to be carriers of cryptosporidium (Kassa et al. 2004) but not in all surveys (Fallacara et al. 2001). However, the genotypes of the human-borne infections and the geese's



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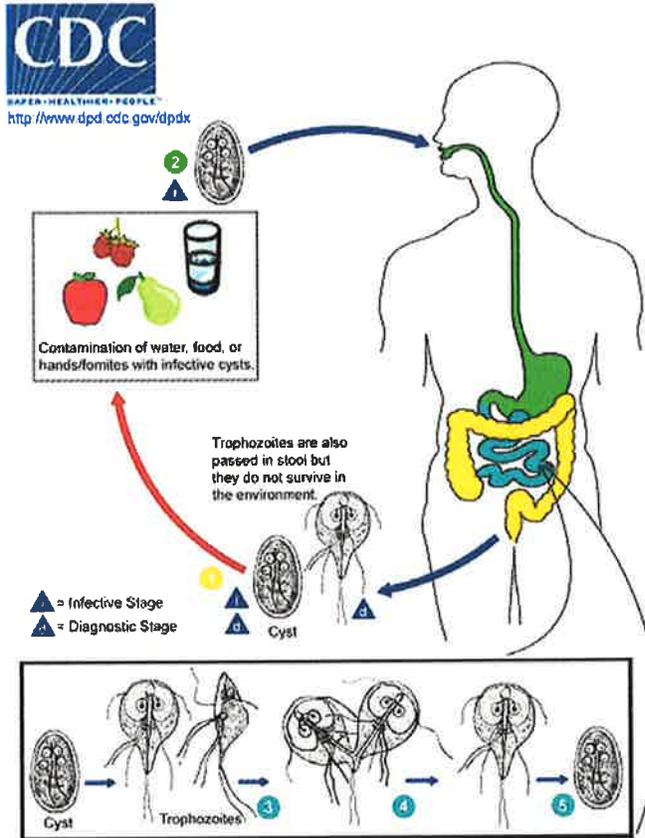
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potential in contaminating water sources is considered low (Zhou et al. 2004).

Cryptosporidium. Image: CDC

Despite the insignificant role geese may play in the transmission of human-infectious cryptosporidium, protection of water purity remains important. A chief concern lies in cryptosporidium's ability to remain viable after traditional chlorination practices (Corso et al. 2003). The cyst stage of the organism is relatively resistant to normal disinfection procedures and tends to persist even in dry environments (Brown et al. 1999; Kassa et al. 2004). People have become infected even when they swam in chlorinated water (Kassa et al. 2004). Although no confirmed reports of cryptosporidiosis has been reported from direct contact (as opposed to contact with focally contaminated water) with goose feces (Zhou et al. 2004), individuals exposed to geese feces should take reasonable precautions. These include, avoid swallowing contaminated water, washing hands thoroughly and drying with disposable paper towels, scrubbing contaminated shoes and clothing with disinfectant, and keeping hands away from mouth and face until showering. Although geese have been shown to transmit infectious cysts (Graczyk et al. 1998), they are merely mechanical carriers of cysts as geese do not become infected (Jellison et al. 2004).

Giardia. The cysts of giardia have been found in the feces of Canada geese (Graczyk et al. 1998; Kassa et al. 2004, Centers for Disease Control Giardia Factsheet). Giardia is a protozoan parasite that causes gastrointestinal infection in humans (Centers for Disease Control Giardia Factsheet). Giardia infection is of particular concern due to the organism's ability to survive various environments including its resistance to waste water treatment (Brown et al. 1999). For example, giardia can survive in salt water for up to 21 days and longer in freshwater (Brown et al. 1999). It is important not to consider all geese infected as this is not true (Fallacara et al. 2001).



Giardia lifecycle. Image: CDC.

Toxoplasmosis.

Toxoplasma gondii infection has been found in a single Canada goose (Dubey et al. 2004). Humans typically become infected through eating undercooked meat containing the parasite or by drinking contaminated water (Dubey et al. 2004). Human exposure to the organism does not necessarily lead to infection. Due to the paucity of Toxoplasma gondii infections in geese found in the survey (n=1) further surveillance of disease prevalence among geese is warranted. Although the risk of humans being infected by this disease by geese is low, we encourage pregnant women to use caution when eating geese or drinking water with large numbers of geese.

Other Parasites. Canada geese feces can carry parasites from phyla Apicomplexa, Nematoda, and Arthropoda with the majority from the nematode group (Fallacara et al. 2004). Geese also are subject to a wide variety of blood borne parasites including Leucocytozoon, Haemoproteus, microfilariae, and Plasmodium. But plasmodium and haemoproteus infections were light (Bradshaw and Trainer 1966).

BACTERIA

Campylobacter jejuni.

Campylobacter jejuni is a bacterium usually associated with food-borne pathogens (The Center for Food Safety and Applied Nutrition 2009). Although recent findings have demonstrated that geese are significant carriers of Campylobacter jejuni (Fallacara et al. 2004), overturning previous negative findings (Converse et al. 1999), the public health impacts of these positive results are unclear for several reasons. First, the eggs of Canada geese were found to be free of the bacterium (Bonner et al. 2004). Second, researchers are still determining which of the bacterium's strains are pathogenic (The Center for Food Safety and Applied Nutrition 2009). It should be noted,



Campylobacter. Image: CDC

however, that chicken borne strains tend to be pathogenic (The Center for Food Safety and Applied Nutrition 2009).

Chlamydiosis (a.k.a. Psitticosis). Chlamydiosis is a common infection of birds which when it infects people is called Psitticosis. (Compendium 1997). Canada geese can transmit this disease to humans and the agent is viable in goose eggs (Bonner et al. 2004). Its official name is Chlamydiosis psittacae and is transmitted to human via a variety of birds (Bonner et al. 2004). Infected birds shed the bacteria through feces and nasal discharge. Humans normally manifest infection by pneumonia (Johnston 2000). Unless one is working with Canada geese or involved in feces clean up, the risk of infection is quite low (Bradshaw and Trainer 1966; Palmer and Trainer 1969).

E-Coli. A survey of goose droppings at Fort Collins, Colorado discovered E-coli in 16.7% of the samples. Although the highly virulent O157:H7 strain of E-coli was not found, 4 serotypes of E-coli were (Kullas et al. 2002). Prevalence of E-coli did not correlate to numbers of geese. E-coli presence correlated to temperature with 94% of droppings tested in June containing E-coli with only 2% in February (Kullas 2002). Similar seasonal variation was also found by Fallacara et al. (2004). Perhaps most disturbing was how the strains of E-coli found were resistant to several antibiotics (Fallacara et al. 2001, 2004).

Listeria. Converse et al. (1999) found *Listeria* spp. including *Listeria monocytogenes*, in goose droppings. Listeriosis is a serious medical threat as infection can cause abortions in pregnant women and result in septicemia and meningitis (The Center for Food Safety and Applied Nutrition 2009).



Listeria.
Image: CDC

Pasteurella multocida. *Pasteurella multocida* is the bacterium that causes avian cholera (Blanchong et al. 2006). It is transmitted between birds via direct contact, breathing of droplets (e.g. when they sneeze) or through contaminated water (Blanchong et al. 2006). Fortunately, the bacteria does not persist in lakes provided infected birds or their carcasses are not present (Blanchong et al. 2006). Fallacara et al. (2004) found that *Pasteurella multocida* was not present in healthy birds. Humans typically only encounter this bacterium following a bite, typically from a dog or a cat (Cummings et al. 2002). We do not consider this infection to be a significant public health threat. However, anyone bitten by a Canada goose should consider this infection a possibility if the wound does not respond to normal treatment.

Salmonella.

Fallacara et al. (2004) asserts that geese are not significant carriers of salmonella but believes that they can be carriers (2001). While the bacterium has not been found in the eggs of Canada geese (Bonner et al. 2004), it has been found in their droppings (Converse et al. 1999, Fallacara et al. 2001). While salmonella can survive for up to 9 months in the environment, connecting salmonella infections in humans with Canada geese remains unproven (Converse et al. 1999). Nevertheless, picnickers should wash their hands before handling food and before eating when in areas where geese droppings are present (Centers for Disease Control 2009 "Salmonellosis", Å, Å).



Salmonella.
Image: CDC

VIRUSES

Avian Influenza. Canada geese are members of a group of birds that have been known to contract avian influenza more commonly known as fowl plague (Rosenberger and Kraus 1975; Ellis et al. 2004). The infection is transmitted through the birds' mucous membranes and is shed in the feces. Avian influenza comes in two forms, low path and high path. Low path can exist in birds and is generally asymptomatic and results in few bird deaths and is of little threat to humans. High path, on the other hand, can result in massive die off of birds (Centers for Disease Control 2005 Avian Influenza). As we learned in the 2002, a high path avian influenza known as H5N1 can infect and kill humans (Ellis et al. 2004). In 2004, researchers confirmed that Canada geese could in fact contract H5N1 (Clark and Hall 2006). While H5N1 has not become a problem in the United States at this time, researchers have been concerned that migratory birds (including Canada geese) could introduce the disease. Pasick et al. (2007) found Canada geese are susceptible to high-path avian influenza (H5N1) and could act as a sentinel species for monitoring of H5N1 outbreaks.

In laboratory tests and linear modeling it was found that Avian Influenza virus (AVI) viability was significantly extended in water temperatures with 17 C and with pH 7.4-7.8 with low dissolved salt. Researchers also found that infectivity is inversely related to salt content and the virus viability improves with increased acidity (Stallknecht et al. 1990a). In other findings, the authors suggested that large flocks of waterfowl in winter water habitats could raise AIV high enough to infect other animals that shared the water (Stallknecht et al. 1990a). Bonner et al. (2004) summarizes the issue as follows, "Since most of the lakes are visited frequently by people for recreational purposes, questions arise as to the possible risk of transmission of zoonotic agents from these birds to man. It is currently unknown whether influenza A and paramyxoviruses are carried and shed by free-living Canada geese; eggs were collected in the study area and examined."

Encephalitic Viruses. Geese are not significant carriers of encephalitic (e.g. Eastern encephalitis virus EEV, western encephalitis virus WEV, St. Louis encephalitis virus SLEV, Venezuelan encephalitis virus VEV and California encephalitis virus CEV) or Chlamydia diseases (Bradshaw and Trainer 1966; Palmer and Trainer 1969). Canada geese can carry West Nile Virus (WNV) (Centers for Disease Control West Nile Virus: Bird Species 2009). Since WNV is carried by a number of birds (Centers for Disease Control West Nile Virus: Vertebrate Ecology 2009), control of Canada geese to manage WNV would be impractical and imprudent.

FUNGUS

Histoplasmosis. *Histoplasma capsulatum* is the fungus that causes the disease histoplasmosis (Centers for Disease Control 2009 Histoplasmosis). The fungus grows in soil enriched with bird droppings, including those from geese. When these contaminated soils are stirred up, the fungal spores can become dispersed and inhaled, thereby infecting individuals (Centers for Disease Control 2009 Histoplasmosis). Lenhart et al. (2004) says that goose droppings have not been identified as a source for histoplasmosis. However, in light of the conflicting information, we suggest individuals practice prudent caution when raking or stirring up soil enriched with goose droppings. It does not appear that goose droppings on sidewalks and other non-soil surfaces pose a risk (Lenhart et al. 2004).

WATER-BORNE DISEASES

According to Edgcumbe Ford (1999), it is difficult to define water borne diseases because "In principle almost all enteric pathogens and opportunistic pathogens that are transmissible by the fecal-oral route can be transmitted through water." He suggests focusing on diseases that have been directly or strongly associated with transmission via drinking water. Several of the diseases mentioned above (giardia, cryptosporidium, E-coli) would affect water quality. It is for this reason that Edgcumbe Ford (1999) suggests that watershed protection should include practices "to reduce the impact of waterfowl, particularly near water intake sites."

PROTECTING YOURSELF FROM THESE DISEASES

As a general rule, keeping one's distance from geese and areas frequented by geese will be sufficient to prevent exposure to goose borne diseases. Individuals with compromised immune systems should pay particular attention to sanitation procedures. Kassa et al. (2001) provides several practices to protect individuals who work in areas contaminated with goose dropping from contracting cryptosporidium, giardia, and campylobacter.

1. Wear protective gloves while working
2. Wash hands after performing activities that could contaminate hands with goose feces. It is highly recommended to wash hands before eating or touching your mouth,
3. If goose contaminated soils will be disturbed, follow guidelines for protecting yourself from [histoplasmosis](#) infection.
4. Launder work clothes daily and shower at the end of each workday
5. Those who develop gastrointestinal infections have their stools tested for cryptosporidium, giardia, and campylobacter (Kassa et al. 2001).

We would suggest, however, that anyone coming into contact with goose contaminated areas follow the above sanitation recommendations.

Recommended Control Techniques

These techniques should be used particularly to keep geese away from water intake areas.

Hazing

Capture and Removal

For details on these techniques visit [Goose Control Methods](#)



Recommended Citation

Canada Goose Management Website. University of Nebraska-Lincoln, NRES 348 Wildlife Damage Management class, Spring Semester, 2010. Scott Hygnstrom, Instructor; Stephen Vantassel, Webmaster.
<http://icwdm.org/handbook/Birds/CanadadGeese/Default.aspx>

Picture (left) is a Canada goose track. Photo: Wildlife Control Consultant, LLC.

[Contact](#)



P.O. Box 12 • Walled Lake, MI 48390 • www.lahalifestyle.com

TO: Novi City Manager. City of Novi, Michigan **1-2-2019**

From: Lakes Area Homeowners Association (LAHA)

Subject: Goose roundup and relocation resolution for 2019

The Lakes Area Homeowners Association is requesting the city of Novi to issue a resolution authorizing the roundup and relocation of geese from Walled Lake. Pavilion Park would be the proposed location. LAHA currently funds the nest and egg destruction program authorized by the City of Novi. We would ask the city to fund the roundup program. The contractor we currently use for the nest and egg program is licensed to remove the geese. Pavilion Park has created increased geese population and the health and safety issues associated with that. The popularity of the park with additional events and added parking crates conflicts between park users and the geese droppings. The Parks and Recreation Department currently expends a lot of effort and money trying to keep the area clean, adding this program would go a long way towards our goal of a user friendly park.

Please add this to your agenda, our contractor will be present to answer questions and outline the steps required to help resolve this problem.

Thank you

Jerry Anderson

President

Lakes Area Homeowners Association LAHA

LAHA represents homeowners with deeded access to Walled and Shawood Lake



3088 Hottis Rd. Hale, MI 48739 Hale: 989.728.2200 Clare: 989.386.0600 Fax: 989.516.5900

February 5, 2019

Walled Lake Improvement Board
Attn: David Galloway/ Megan Mikkus
c/o City of Novi Clerk's Office
45175 W Ten Mile Road
Novi, MI 48375

2019 Recommendations and cost analysis

Permit fees, surveys, and studies:

2019 DEQ permit fee = \$1,500.00
2019 Water Quality study at (3) sites in spring and fall = \$1,325.00
Annual spring vegetation visual survey = \$ 475.00
Annual fall vegetation visual survey = \$475.00
Annual treatment/services report including maps and 2020 recommendations = \$775.00

Total recommendations costs for permit fees, surveys, and studies/reports = \$4,550.00

In late May to early June Savin Lake Services will plan a treatment for Curly Leaf pondweed and any remaining Eurasian Watermilfoil after the annual Spring vegetation survey is completed. We anticipate this treatment to be around 70 – 80 acres of Curly Leaf pondweed (based on treatment records in the past years) with contact herbicides. Also, during this treatment, we anticipate doing approximately 10-15 acres of systemic control of Eurasian Watermilfoil. If algal blooms are present during the spring survey, we will also treat them during the first application where they are present

70 – 80 acres of contact herbicides @ \$258.86/acre = \$18,120.20 - \$20,708.80
10 – 15 acres of systemic Milfoil control @ \$645.71/acre = \$6,457.10 - \$9,685.65
70 – 80 acres of algae control @ \$57.97/ acre = \$3,478.20 - \$4,057.90

Total projected cost range for first treatment in 2019 = \$28,055.50 - \$34,452.35

Then in late June – early July we recommend treating the entire shoreline with algaecides for filamentous algae if necessary. After treating large amounts of vegetation as they are dying off they can produce a lot of algal blooms that usually float into the shoreline areas. The water temperatures are rapidly warming during this time and can also be a contributing factor in the large amount of algal

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blooms. Also, during this timeframe, we would recommend providing some relief and completing a treatment for the riparian owners in the shoreline area of the lake for nuisance native weeds in and around their docks. During this treatment we will evaluate the Starry Stonewort and treat it also if needed.

80 acres of shoreline algae control @ \$57.97/acre = \$4,637.60
30 - 40 acres of contact herbicides @ \$258.86/ acre = \$7,765.80 - \$10,354.40
15 -20 acres of Starry Stonewort treatment @ \$300.50/acre = \$4,507.50 - \$ 6,010.00

Total projected cost range for second treatment = \$16,910.90 – \$21,002.00

In August, we will complete another treatment for Starry Stonewort if needed and complete a touch up treatment for nuisance native vegetation in shore line areas in and around docks again.

15 - 20 acres of Starry Stonewort treatment @ \$300.50/acre = \$4,507.50 - \$ 6,010.00
15 - 20 acres of contact herbicides @ \$258.86/acre = \$3,882.90 - \$5,177.20

Total projected cost range for August treatment = \$8,390.40 - \$11,187.20

If needed Savin Lake Services would like to conduct another late fall systemic treatment for Eurasian Watermilfoil. This treatment may not be necessary with the previous systemic Milfoil treatment being completed but for budgetary purposes I think it's a good idea to plan for it just in case.

15 - 20 acres of systemic Milfoil control @ \$645.71/acre = \$9,685.65 - \$12,914.20

Total projected cost range for 2018 = \$67,592.45 - \$84,105.75

Please keep in mind that these are approximate numbers based on treatment record in the past and survey evaluations completed this year. We expect the total overall cost to fall within these parameters. There are many variables in a lakes ecosystem that can change from year to year that make it hard to give an exact number. These figures should get us real close and should not exceed the higher end of the scale. Savin Lake Services will only recommend and treat what we feel is needed to improve the overall health of the lake, and make it more desirable for use by the riparian owners. Our goal is to keep the non-native and exotic plant communities in check throughout the entire lake and treat nuisance natives in and around riparian owner's docks and swim areas to make those areas more desirable for use.

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Savin Lake Services appreciates your business and we look forward to working with the Walled Lake Improvement Board to continuously improve the overall health of Walled Lake in the future. If you have any questions, comments, or require any additional information please feel free to contact us.

Sincerely,

Paul Barber – Operations Manager

Savin Lake Services Inc.

3088 Hottis Road

Hale, Michigan 48739

Hale Office: 989-728-2200

Clare Office: 989-386-0600

Toll Free: 877-SAV-LAKE

Fax: 989-516-5900

Email: Paulbarber@LakeAndPond.com

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**WALLED LAKE IMPROVEMENT BOARD
2019 ANNUAL BUDGET
PROPOSED**

<i>Description</i>	<i>Annual Budget</i>
<u>Income</u>	
City of Novi Assessments	\$42,014.79
City of Walled Lake Assessments	\$25,421.00
Use of Surplus Funds	\$26,564.21
TOTAL INCOME	\$94,000.00
<u>Expenses</u>	
Harvesting and Herbicide Treatments	\$85,000.00
Lake Management (surveys, studies)	\$5,000.00
Permit Fee	\$1,500.00
Administrative & Legal	\$1,500.00
Other	\$1,000.00
TOTAL EXPENSES	\$94,000.00