

**ONEKAMA TOWNSHIP BOARD REGULAR MEETING
WEDNESDAY, April 12, 2023, 4 P.M.
AGENDA**

CALL TO ORDER

PLEDGE OF ALLEGIANCE

ATTENDANCE

MINUTES

March 1, 2023 Special Meeting Public Hearing Minutes

March 8, 2023 Regular Meeting Minutes

March 10, 2023 Special Meeting Minutes

AMEND AGENDA

PUBLIC COMMENT

CLERK'S REPORT

Revenue & Expense Report

Trial Balance

TREASURER'S REPORT

Treasurer's Report

Cash & Investments, Investment Income, Balance Sheet

COUNTY COMMISSIONERS

Jeff Dontz

Janice McCraner

NEW BUSINESS

PLM Report

UNFINISHED BUSINESS

Property Deed Update from Grier

Short-Term Rental Ordinance

REPORTS OF BOARDS AND COMMITTEES:

FIRE

Report

ROADS

Speed Limit Sign Application/Permit

PLANNING COMMISSION

Regular Meeting / Public Hearing April 20, 2023

ZBA

ZONING

ASSESSOR

HARBOR COMMISSION

PARKS & RECREATION

Report

INVASIVE SPECIES

TLSA

PLA

RECYCLE

PUBLIC COMMENT

CORRESPONDENCE

BILLS TO BE PAID

ADJOURN

**ONEKAMA TOWNSHIP
SPECIAL BOARD MEETING
WEDNESDAY, MARCH 1, 2023 at 5:00 PM**

Meeting called to order by Supervisor David Meister at 5:00 PM

Pledge of Allegiance

ATTENDANCE: Bob Blackmore, Ed Bradford, Shelli Johnson, and Meister. Absent: Al Taylor

PUBLIC COMMENT: Comment received regarding the camera equipment for the Township and a Thank-you for putting it in the budget.

OPEN THE PUBLIC HEARING ON THE DRAFT 2023/2024 BUDGET AT 5:04 PM

Question on the Road Fund, current budget and the Cost for repairs to Herkelrath, Christensen, and 11 Mile Road. Comment received regarding the installation of the speed marker signs being put into the budget.

Open discussion on the budget categories with the public. Herkelrath is not included in the Road Fund project. Budget Resolutions were reviewed with additions and corrections.

CLOSE THE PUBLIC HEARING ON THE DRAFT 2023/2024 BUDGET AT 6:38 PM

MEETING DISCUSSION: None

PUBLIC COMMENT: Comment received regarding the placeholder put into the Fire Fund for the purchase of a boat.

ADJOURNED AT 6:40 PM

Shelli Johnson, Clerk

**ONEKAMA TOWNSHIP
REGULAR BOARD MEETING
WEDNESDAY, March 8, 2023 at 4:00 PM**

Meeting called to order by Supervisor David Meister at 4:00 PM

Pledge of Allegiance

ATTENDANCE: Bob Blackmore, Al Taylor, Ed Bradford, Shelli Johnson, and Meister.

MINUTES:

Regular Board Meeting of February 8, 2023. **Motion** by Blackmore, Second by Bradford to approve the Minutes for the Regular Board Meeting of February 8, 2023. M/C

Special Board Meeting of February 15, 2023. **Motion** by Blackmore, Second by Bradford to approve the Minutes as presented. M/C

Special Board Meeting of March 1, 2023. **Motion** by Bradford, Second by Blackmore to approve the Minutes as presented. M/C

AMEND AGENDA: None

PUBLIC COMMENT: Comment received requesting a policy and Procedure for the Township Website. Comment received regarding a name change on a parcel for the proposed sewer district.

CLERK'S REPORT: Johnson reported the Revenue and Expenses for the month, along with the Trial Balance.

TREASURER'S REPORT: Bradford reported the cash balances and investment reports, along with the investments for the month. Regarding property taxes, Bradford is currently working with the County and should be done (settling) by the end of the month.

COUNTY COMMISSIONERS:

Report given by Commissioner Jeff Dontz. Mr. Jeff Seng was appointed to the Manistee County Road Commission Board. Sheriff Brian Gutowski recognized Corrections Officer Ken Wilson for saving a life of an inmate at the jail, and Deputy Dillon Rosa for life-saving actions at Homeward Bound Animal Shelter from a dog attack. Senator Vanderwall attended the meeting and addressed the Board. The Parks and Recreation Commission needs 1 (one) person to fill a position. The Recycling Grant was submitted, thank you for the letter of support! The Regional Summit is coming up at the Wagner Center. Charter Spectrum Director, State Government Affairs, Marilyn Passmore, came to visit with information regarding Broadband grant on the East Side of the County. She is looking for a letter of support. DHD#10 is looking for the County's feedback on placing free refurbished newspaper vending machines for Narcan through a Harm Reduction Project outside the Health Departments for all Counties. The Planning

Department is updating its speaker system in the Conference Room. There was a meeting last week with the Railroad Relocation. No real updates regarding that.

NEW BUSINESS

MRA Agreement: Annual Funding formula report given by Dursa Marshall. **Motion** by Blackmore, Seconded by Johnson to approve the 2023 Agreement in the amount of \$4,100. M/C

Household Hazardous Waste: Correspondence was received regarding the local Conservation District Household Hazardous Waste (HHW) and Clean-Sweep collection event to be held on Saturday, August 19th, 2023. The collection cost per lb will be at least \$1.08 for disposal. Last year's collection was nearly 80,000 lbs of material across Manistee, Mason and Oceana Counties, costing nearly \$70,000 for the one-day event. **Motion** by Bradford, Seconded by Taylor to approve the 2023 Contract and Agreement for services for Onekama Township/Onekama Village and Manistee, Mason and Oceana Conservation Districts in the amount of \$535.20. M/C

Betsie Valley Irrigation: **Motion** by Blackmore, Seconded by Taylor to continue with Program D (4 visits per year, includes all of Program B Plus 1 visit in late June and 1 visit in mid August for Inspection, fine tuning and monitoring of System) for the 2023 Service Agreement on the Irrigation System for \$350.00. M/C

Motion by Blackmore, Seconded by Taylor to offer Resolution 2023-004 for the 2023-2024 General Fund Budget as presented with Roll Call Vote. Yeas: 5 Nays: 0 Absent: 0 M/C

Motion by Johnson, Seconded by Blackmore to offer Resolution 2023-005 for the 2023-2024 Road Fund Budget as presented with Roll Call Vote. Yeas: 5 Nays: 0 Absent: 0 M/C

Motion by Blackmore, Seconded by Taylor to offer Resolution 2023-006 for the 2023-2024 Fire Fund Budget as presented with Roll Call Vote. Yeas: 5 Nays: 0 Absent: 0 M/C

Motion by Johnson, Seconded by Blackmore to offer Resolution 2023-007 for the 2023-2024 Lake Improvement Fund Budget as presented with Roll Call Vote: Yeas: 5 Nays: 0 Absent: 0 M/C

Motion by Blackmore, Seconded by Bradford to offer Resolution 2023-008 for the Clerk's Salary as of April 1, 2023 with a Roll Call Vote. Yeas: 5 Nays: 0 Absent: 0 M/C

Motion by Johnson, Seconded by Bradford to offer Resolution 2023-009 for the Trustee's Salary as of April 1, 2023 with Roll Call Vote. Yeas: 5 Nays: 0 Absent: 0 M/C

Motion by Blackmore, Seconded by Johnson to offer Resolution 2023-010 for the Treasurer's Salary as of April 1, 2023 with Roll Call Vote. Yeas: 5 Nays: 0 Absent: 0 M/C

Motion by Blackmore, Seconded by Blackmore to offer Resolution 2023-011 for the Supervisor's Salary as of April 1, 2023 with Roll Call Vote. Yeas: 5 Nays: 0 Absent: 0 M/C

Motion by Blackmore, Seconded by Bradford to adopt Resolution 2023-012 for the Wages, Salary, Charges Chart for the 2023-2024 Fiscal Year with Roll Call Vote. Yeas: 5 Nays: 0 Absent: 0 M/C

UNFINISHED BUSINESS

Short-Term Rental Ordinance: Ordinance is with the Attorney for final review. Once received back, it will be placed on the website for public input.

REPORTS OF COMMITTEES AND COMMISSIONS:

HARBOR COMMISSION: Report given by Jim Simons. Simons requested the extension of Roger Burger and Duncan McColl's terms. **Motion** by Blackmore, Seconded by Johnson to extend the terms of Burger and McColl through March 31, 2026. M/C Approval has been made for \$900,000 to dredge from the Army Corps of Engineering. The dredging would be out front of the channel (to the west).

ROADS: Report from Blackmore. The application is ready to submit for the MCRC for the Speed Limit sign installation. A check for the \$400 application fee is needed. Bradford to check with Topline Equipment regarding their proposal, and also to contact Tom Amor. A request was received to pave Avenue E.

PLANNING COMMISSION: Report from Dave Wallace. When the Planning Commission reconvenes at the April meeting, it will host a Public Hearing to amend the SUP for Brixstone Farms. The Planning Commission from the Village expressed interest in having a joint meeting with the Planning Commission for the Township. Consensus of the Board is in favor of this and the process of moving forward and working together in the future.

ASSESSOR: Report received from Meister. Board of Reviews will be taking place County wide. Great Lakes Assessing handles the assessing for Onekama Township's properties. They are very professional, and procedures are done "by the book". Residents are being rude and voile towards them and it is very unfortunate. It makes the Onekama community look bad, as people can approach their concerns in a better manner. The sales studies for the past 3 years are on the Township website, along with the State Guidelines from Proposal A, which was passed. Meister went on to explain the effects of Proposal A, and reasoning for the increase in assessed value. He also explained the process for appealing to the Board of Review.

PARKS & REC: Report was received via email and reviewed in the Board packet. Budget numbers were submitted and an ad was placed for temporary help this summer.

INVASIVE SPECIES: Report by Doug Barry. The committee is in the process of working with PLM in developing an Early Detection Rapid Response Plan. They are also in discussions with them in regards to the chemicals used in treatment. For example, Copper that is currently being used. The Committee wants to find an alternative to the use of Copper. PLM will be at the next Township Board Meeting, in April. The meeting will most likely need to start an hour early as the PLM presentation will take an hour.

TLSA: Report given by Meister. A letter was received from the Authority's attorney, Eric Williams. The letter was his opinion regarding the letters received at the Township level, using the Township Clerk's return mailing address. Meister stated that he is removing himself from the Authority for reason of the focus being on the Authority people vs the Sewer Project itself. **Motion** by Johnson, Seconded by Bradford to accept Meister's resignation. **Motion** by Meister, Seconded by Johnson to appoint Blackmore to the Authority Board as Onekama Township's representative. M/C The Application will be turned in on Friday to USDA RD, Johnson will get an answer from Wade Trim on getting a hard copy of the application to each entity.

PLA: Report from Taylor. The events for this year will be the same as last year. Onekama Days may have a change as they are not sure about the involvement that the Lions Club will have.

PUBLIC COMMENT:

Comment received requesting a new schedule to be posted for the TLSA

CORRESPONDENCE:

Correspondence received from Libby Schleiffarth
Correspondence received regarding Hodenpyl Dam

BILLS TO BE PAID:

Motion by Blackmore, Seconded by Johnson to pay the incoming regular February Bills.
M/C

ADJOURNED AT 6:39

Shelli Johnson, Clerk

**ONEKAMA TOWNSHIP
SPECIAL BOARD MEETING
FRIDAY, March 10, 2023 at 9:00 AM**

Meeting called to order by Supervisor David Meister at 9:00 AM

Pledge of Allegiance

ATTENDANCE: Bob Blackmore, Shelli Johnson, and Meister. Absent: Bradford, Taylor (Taylor Arrived at 9:30 AM)

PLEDGE OF ALLEGIANCE

PUBLIC COMMENT: Comment received from Libby Schleiffarth stating “Kudos” to David Meister for going out of his way and calling me and notifying me of the Special Meeting for today. That is an example of going above and beyond.

Letter read and received from Nola Teye.

ONEKAMA TOWNSHIP BOARD TWO LAKE SEWER AUTHORITY BOARD MEMBER

REPRESENTATIVE:

After second thoughts, Trustee Blackmore is declining his position as Authority Representative.

Motion by Johnson, Seconded by Meister to accept the Resignation of Blackmore as TLSA Representative. M/C **Motion** by Johnson, Seconded by Blackmore to reappoint Meister as the TLSA Representative. M/C

Meister has received some apologies and comments from the public since the TLSA meeting on Tuesday, March 7th.

PUBLIC COMMENT:

Comment received from Libby Schleiffarth, Thanking Meister for taking the position back. Comment also received encouraging the Township Board to date and time stamp to show up on postings on the website.

The Letter from DHD#10 will be put on the website.

Comment received from David Wallace, stating that there is disturbing information over social media that is very powerful. The people portraying it make it sound like facts, and others get upset over it. The posts are regarding Assessments, and when a person will try and post the correct information, people get angry at the Board of Review. False information is being put out there. It isn't hard to check and find out the correct facts and information on who does what for the Township. Wallace hopes that we can get back to some civility in this community. It's out of control.

****All of the tax tables, sales, values are on the township's website. (Assessor's tab)**

ADJOURNED AT 6:39

Shelli Johnson, Clerk

User: SHELLI

DB: Onekama Twp

PERIOD ENDING 03/31/2023

GL NUMBER	DESCRIPTION	2022-23	2022-23	YTD BALANCE	ACTIVITY FOR	AVAILABLE		% BGDG USED
		ORIGINAL BUDGET	AMENDED BUDGET	03/31/2023 NORM (ABNORM)	MONTH 03/31/23 INCR (DECR)	BALANCE NORM (ABNORM)		
Fund 101 - GENERAL FUND								
Revenues								
Dept 000								
101-000-402.000	CURRENT PROPERTY TAXES	277,000.00	277,000.00	267,523.76	3,712.56	9,476.24	96.58	
101-000-411.000	DELINQUENT PROPERTY TAXES	10,600.00	10,600.00	0.00	0.00	10,600.00	0.00	
101-000-445.000	PENALTIES AND INTEREST ON TAXES	0.00	0.00	435.44	329.24	(435.44)	100.00	
101-000-447.000	PROPERTY TAX ADMINISTRATION FEE	70,000.00	70,000.00	72,013.81	0.00	(2,013.81)	102.88	
101-000-448.000	SUMMER TAX COLLECTION FEE	8,000.00	8,000.00	7,048.00	0.00	952.00	88.10	
101-000-476.000	BUSINESS LICENSE AND PERMITS	4,000.00	4,000.00	1,700.00	0.00	2,300.00	42.50	
101-000-478.000	LAND AND SPECIAL USE PERMITS	10,000.00	10,000.00	24,605.00	0.00	(14,605.00)	246.05	
101-000-479.000	VARIANCE AND APPEALS	2,000.00	2,000.00	3,000.00	0.00	(1,000.00)	150.00	
101-000-480.000	CEMETERY FEES	500.00	500.00	150.00	0.00	350.00	30.00	
101-000-528.000	FEDERAL GRANTS - OTHER	95,000.00	95,000.00	94,895.10	0.00	104.90	99.89	
101-000-540.000	STATE GRANTS	75,900.00	75,900.00	0.00	0.00	75,900.00	0.00	
101-000-541.000	LIQUOR LICENSE REVENUE	1,000.00	1,000.00	1,318.90	0.00	(318.90)	131.89	
101-000-542.000	METRO ACT REVENUE	5,000.00	5,000.00	4,866.84	0.00	133.16	97.34	
101-000-573.000	LOCAL COMMUNITY STABILIZATION AUTHORITY	800.00	800.00	813.67	0.00	(13.67)	101.71	
101-000-574.000	STATE REVENUE SHARING	90,000.00	90,000.00	79,986.00	17,219.00	10,014.00	88.87	
101-000-626.000	CHARGE FOR SERVICES	50.00	50.00	21.70	0.00	28.30	43.40	
101-000-665.000	INTEREST INCOME	1,000.00	1,000.00	19,289.66	3,407.35	(18,289.66)	1,928.97	
101-000-668.000	ROYALTIES	2,500.00	2,500.00	1,639.19	0.00	860.81	65.57	
101-000-674.000	DONATIONS	1,000.00	1,000.00	1,075.00	0.00	(75.00)	107.50	
101-000-676.000	REIMBURSEMENT TO TWP	1,000.00	1,000.00	827.45	(219.50)	172.55	82.75	
101-000-684.000	OTHER REVENUE	2,500.00	2,500.00	3,588.37	80.75	(1,088.37)	143.53	
Total Dept 000		657,850.00	657,850.00	584,797.89	24,529.40	73,052.11	88.90	
TOTAL REVENUES		657,850.00	657,850.00	584,797.89	24,529.40	73,052.11	88.90	
Expenditures								
Dept 101 - TOWNSHIP BOARD								
101-101-702.000	WAGES	18,500.00	18,500.00	18,549.25	1,427.68	(49.25)	100.27	
101-101-715.000	SOCIAL SECURITY	1,420.00	1,420.00	1,425.67	109.21	(5.67)	100.40	
101-101-727.000	SUPPLIES	8,000.00	8,000.00	3,635.35	536.47	4,364.65	45.44	
101-101-801.000	PROFESSIONAL SERVICES	20,400.00	20,400.00	32,421.60	0.00	(12,021.60)	158.93	
101-101-802.000	CONTRACTUAL SERVICES	11,500.00	11,500.00	8,679.23	267.00	2,820.77	75.47	
101-101-860.000	MILEAGE	500.00	500.00	131.60	58.80	368.40	26.32	
101-101-900.000	PUBLISHING	5,000.00	5,000.00	4,103.55	491.50	896.45	82.07	
101-101-921.000	LIGHTING	4,500.00	4,500.00	5,617.16	554.47	(1,117.16)	124.83	
101-101-930.000	REPAIRS AND MAINTENANCE	300.00	300.00	0.00	0.00	300.00	0.00	
101-101-955.000	OTHER EXPENSE	7,000.00	7,000.00	1,329.15	(0.06)	5,670.85	18.99	
101-101-956.000	TRAINING & EDUCATION	2,000.00	2,000.00	0.00	0.00	2,000.00	0.00	
101-101-957.000	MEMBERSHIP DUES	3,300.00	3,300.00	3,193.85	129.00	106.15	96.78	
101-101-958.000	INSURANCE	0.00	0.00	4,915.00	0.00	(4,915.00)	100.00	
101-101-971.000	CAPITAL OUTLAY	9,000.00	9,000.00	0.00	0.00	9,000.00	0.00	
Total Dept 101 - TOWNSHIP BOARD		91,420.00	91,420.00	84,001.41	3,574.07	7,418.59	91.89	
Dept 171 - SUPERVISOR								
101-171-702.000	WAGES	18,270.00	18,270.00	17,605.82	1,384.62	664.18	96.36	
101-171-715.000	SOCIAL SECURITY	1,377.00	1,377.00	1,346.85	105.92	30.15	97.81	
101-171-727.000	SUPPLIES	500.00	500.00	0.00	0.00	500.00	0.00	
101-171-860.000	MILEAGE	500.00	500.00	0.00	0.00	500.00	0.00	
101-171-956.000	TRAINING & EDUCATION	500.00	500.00	0.00	0.00	500.00	0.00	

PERIOD ENDING 03/31/2023

GL NUMBER	DESCRIPTION	2022-23	2022-23	YTD BALANCE	ACTIVITY FOR	AVAILABLE	% BDGT USED
		ORIGINAL BUDGET	AMENDED BUDGET	03/31/2023 NORM (ABNORM)	MONTH 03/31/23 INCR (DECR)	BALANCE NORM (ABNORM)	
Fund 101 - GENERAL FUND							
Expenditures							
Total Dept 171 - SUPERVISOR		21,147.00	21,147.00	18,952.67	1,490.54	2,194.33	89.62
Dept 215 - CLERK							
101-215-702.000	WAGES	37,930.00	37,930.00	36,739.68	2,880.70	1,190.32	96.86
101-215-715.000	SOCIAL SECURITY	2,982.00	2,982.00	2,796.90	220.37	185.10	93.79
101-215-727.000	SUPPLIES	2,000.00	2,000.00	2,825.43	0.00	(825.43)	141.27
101-215-860.000	MILEAGE	500.00	500.00	115.62	0.00	384.38	23.12
101-215-956.000	TRAINING & EDUCATION	500.00	500.00	0.00	0.00	500.00	0.00
101-215-957.000	MEMBERSHIP DUES	150.00	150.00	0.00	0.00	150.00	0.00
Total Dept 215 - CLERK		44,062.00	44,062.00	42,477.63	3,101.07	1,584.37	96.40
Dept 247 - BOARD OF REVIEW							
101-247-702.000	WAGES	1,200.00	1,200.00	800.00	640.00	400.00	66.67
101-247-715.000	SOCIAL SECURITY	90.00	90.00	61.20	48.96	28.80	68.00
101-247-900.000	PUBLISHING	500.00	500.00	0.00	0.00	500.00	0.00
101-247-956.000	TRAINING & EDUCATION	500.00	500.00	0.00	0.00	500.00	0.00
Total Dept 247 - BOARD OF REVIEW		2,290.00	2,290.00	861.20	688.96	1,428.80	37.61
Dept 253 - TREASURER							
101-253-702.000	WAGES	37,930.00	37,930.00	37,110.84	3,093.64	819.16	97.84
101-253-715.000	SOCIAL SECURITY	2,710.00	2,710.00	2,836.30	236.67	(126.30)	104.66
101-253-727.000	SUPPLIES	1,000.00	1,000.00	1,147.49	0.00	(147.49)	114.75
101-253-802.000	CONTRACTUAL SERVICES	11,000.00	11,000.00	11,546.27	71.97	(546.27)	104.97
101-253-860.000	MILEAGE	200.00	200.00	0.00	0.00	200.00	0.00
101-253-955.000	OTHER EXPENSE	500.00	500.00	0.00	0.00	500.00	0.00
101-253-957.000	MEMBERSHIP DUES	150.00	150.00	0.00	0.00	150.00	0.00
Total Dept 253 - TREASURER		53,490.00	53,490.00	52,640.90	3,402.28	849.10	98.41
Dept 257 - ASSESSOR							
101-257-702.000	WAGES	0.00	0.00	1,038.47	0.00	(1,038.47)	100.00
101-257-715.000	SOCIAL SECURITY	0.00	0.00	79.45	0.00	(79.45)	100.00
101-257-727.000	SUPPLIES	1,000.00	1,000.00	0.00	0.00	1,000.00	0.00
101-257-802.000	CONTRACTUAL SERVICES	48,500.00	48,500.00	43,422.00	3,859.00	5,078.00	89.53
Total Dept 257 - ASSESSOR		49,500.00	49,500.00	44,539.92	3,859.00	4,960.08	89.98
Dept 262 - ELECTIONS							
101-262-702.000	WAGES	9,420.00	9,420.00	5,406.75	0.00	4,013.25	57.40
101-262-727.000	SUPPLIES	10,000.00	10,000.00	3,544.16	0.00	6,455.84	35.44
101-262-802.000	CONTRACTUAL SERVICES	1,000.00	1,000.00	1,197.25	0.00	(197.25)	119.73
101-262-860.000	MILEAGE	100.00	100.00	0.00	0.00	100.00	0.00
101-262-900.000	PUBLISHING	300.00	300.00	142.20	0.00	157.80	47.40
101-262-956.000	TRAINING & EDUCATION	500.00	500.00	0.00	0.00	500.00	0.00
Total Dept 262 - ELECTIONS		21,320.00	21,320.00	10,290.36	0.00	11,029.64	48.27
Dept 265 - BUILDING & GROUNDS							

PERIOD ENDING 03/31/2023

GL NUMBER	DESCRIPTION	2022-23	2022-23	YTD BALANCE	ACTIVITY FOR	AVAILABLE		% BDGT USED
		ORIGINAL BUDGET	AMENDED BUDGET	03/31/2023 NORM (ABNORM)	MONTH 03/31/23 INCR (DECR)	NORM	(ABNORM)	
Fund 101 - GENERAL FUND								
Expenditures								
101-265-702.000	WAGES	5,460.00	5,460.00	4,360.00	384.00	1,100.00		79.85
101-265-715.000	SOCIAL SECURITY	420.00	420.00	333.54	29.38	86.46		79.41
101-265-727.000	SUPPLIES	12,000.00	12,000.00	1,823.75	0.00	10,176.25		15.20
101-265-802.000	CONTRACTUAL SERVICES	11,000.00	11,000.00	12,735.33	0.00	(1,735.33)		115.78
101-265-920.000	UTILITIES	6,600.00	6,600.00	8,469.20	519.73	(1,869.20)		128.32
101-265-930.000	REPAIRS AND MAINTENANCE	7,000.00	7,000.00	1,936.50	0.00	5,063.50		27.66
101-265-955.000	OTHER EXPENSE	500.00	500.00	253.59	0.00	246.41		50.72
101-265-958.000	INSURANCE	11,500.00	11,500.00	10,645.00	0.00	855.00		92.57
Total Dept 265 - BUILDING & GROUNDS		54,480.00	54,480.00	40,556.91	933.11	13,923.09		74.44
Dept 266 - ATTORNEY								
101-266-803.000	ATTORNEY	65,000.00	65,000.00	34,733.21	3,738.00	30,266.79		53.44
Total Dept 266 - ATTORNEY		65,000.00	65,000.00	34,733.21	3,738.00	30,266.79		53.44
Dept 330 - LIQUOR LAW ENFORCEMENT								
101-330-702.000	WAGES	1,200.00	1,200.00	1,246.05	92.30	(46.05)		103.84
101-330-715.000	SOCIAL SECURITY	90.00	90.00	95.31	7.06	(5.31)		105.90
Total Dept 330 - LIQUOR LAW ENFORCEMENT		1,290.00	1,290.00	1,341.36	99.36	(51.36)		103.98
Dept 536 - SANITARY SEWER								
101-536-801.000	PROFESSIONAL SERVICES	2,000.00	2,000.00	0.00	0.00	2,000.00		0.00
101-536-955.000	OTHER EXPENSE	1,000.00	1,000.00	185.00	0.00	815.00		18.50
Total Dept 536 - SANITARY SEWER		3,000.00	3,000.00	185.00	0.00	2,815.00		6.17
Dept 567 - CEMETERY								
101-567-727.000	SUPPLIES	500.00	500.00	47.26	0.00	452.74		9.45
101-567-802.000	CONTRACTUAL SERVICES	14,000.00	14,000.00	1,925.00	0.00	12,075.00		13.75
101-567-930.000	REPAIRS AND MAINTENANCE	2,000.00	2,000.00	1,625.00	0.00	375.00		81.25
Total Dept 567 - CEMETERY		16,500.00	16,500.00	3,597.26	0.00	12,902.74		21.80
Dept 701 - PLANNING COMMISSION								
101-701-702.000	WAGES	5,730.00	5,730.00	4,949.00	40.00	781.00		86.37
101-701-715.000	SOCIAL SECURITY	440.00	440.00	358.02	3.06	81.98		81.37
101-701-727.000	SUPPLIES	2,200.00	2,200.00	276.58	0.00	1,923.42		12.57
101-701-801.000	PROFESSIONAL SERVICES	17,000.00	17,000.00	11,498.75	0.00	5,501.25		67.64
101-701-900.000	PUBLISHING	4,000.00	4,000.00	0.00	0.00	4,000.00		0.00
101-701-956.000	TRAINING & EDUCATION	500.00	500.00	0.00	0.00	500.00		0.00
101-701-957.000	MEMBERSHIP DUES	700.00	700.00	0.00	0.00	700.00		0.00
Total Dept 701 - PLANNING COMMISSION		30,570.00	30,570.00	17,082.35	43.06	13,487.65		55.88
Dept 702 - ZONING								
101-702-702.000	WAGES	1,140.00	1,140.00	430.00	0.00	710.00		37.72
101-702-715.000	SOCIAL SECURITY	90.00	90.00	32.89	0.00	57.11		36.54
101-702-727.000	SUPPLIES	300.00	300.00	0.00	0.00	300.00		0.00

PERIOD ENDING 03/31/2023

GL NUMBER	DESCRIPTION	2022-23	2022-23	YTD BALANCE	ACTIVITY FOR	AVAILABLE		% BDGT USED
		ORIGINAL BUDGET	AMENDED BUDGET	03/31/2023 NORM (ABNORM)	MONTH 03/31/23 INCR (DECR)	NORM	(ABNORM)	
Fund 101 - GENERAL FUND								
Expenditures								
101-702-802.000	CONTRACTUAL SERVICES	38,000.00	38,000.00	31,472.10	0.00	6,527.90		82.82
101-702-900.000	PUBLISHING	700.00	700.00	0.00	0.00	700.00		0.00
Total Dept 702 - ZONING		40,230.00	40,230.00	31,934.99	0.00	8,295.01		79.38
Dept 751 - PARKS & RECREATION								
101-751-727.000	SUPPLIES	4,500.00	4,500.00	10,585.81	0.00	(6,085.81)		235.24
101-751-801.000	PROFESSIONAL SERVICES	22,000.00	22,000.00	0.00	0.00	22,000.00		0.00
101-751-802.000	CONTRACTUAL SERVICES	15,500.00	15,500.00	64,996.22	47,438.65	(49,496.22)		419.33
101-751-920.000	UTILITIES	1,000.00	1,000.00	701.84	65.50	298.16		70.18
101-751-921.000	LIGHTING	400.00	400.00	419.42	28.81	(19.42)		104.86
101-751-930.000	REPAIRS AND MAINTENANCE	39,000.00	39,000.00	11,518.24	0.00	27,481.76		29.53
101-751-955.000	OTHER EXPENSE	1,000.00	1,000.00	32.34	0.00	967.66		3.23
101-751-971.000	CAPITAL OUTLAY	59,636.00	59,636.00	0.00	0.00	59,636.00		0.00
Total Dept 751 - PARKS & RECREATION		143,036.00	143,036.00	88,253.87	47,532.96	54,782.13		61.70
TOTAL EXPENDITURES		637,335.00	637,335.00	471,449.04	68,462.41	165,885.96		73.97
Fund 101 - GENERAL FUND:								
TOTAL REVENUES		657,850.00	657,850.00	584,797.89	24,529.40	73,052.11		88.90
TOTAL EXPENDITURES		637,335.00	637,335.00	471,449.04	68,462.41	165,885.96		73.97
NET OF REVENUES & EXPENDITURES		20,515.00	20,515.00	113,348.85	(43,933.01)	(92,833.85)		552.52

PERIOD ENDING 03/31/2023

GL NUMBER	DESCRIPTION	2022-23	2022-23	YTD BALANCE	ACTIVITY FOR	AVAILABLE		% BGD USED
		ORIGINAL BUDGET	AMENDED BUDGET	03/31/2023 NORM (ABNORM)	MONTH 03/31/23 INCR (DECR)	NORM	(ABNORM)	
Fund 204 - ROAD FUND								
Revenues								
Dept 000								
204-000-402.000	CURRENT PROPERTY TAXES	186,000.00	186,000.00	179,960.92	2,497.88	6,039.08		96.75
204-000-411.000	DELINQUENT PROPERTY TAXES	7,100.00	7,100.00	0.00	0.00	7,100.00		0.00
204-000-665.000	INTEREST INCOME	600.00	600.00	7,451.42	2,093.60	(6,851.42)		1,241.90
Total Dept 000		193,700.00	193,700.00	187,412.34	4,591.48	6,287.66		96.75
TOTAL REVENUES		193,700.00	193,700.00	187,412.34	4,591.48	6,287.66		96.75
Expenditures								
Dept 000								
204-000-727.000	SUPPLIES	0.00	0.00	15,065.07	0.00	(15,065.07)		100.00
204-000-801.000	PROFESSIONAL SERVICES	20,000.00	20,000.00	0.00	0.00	20,000.00		0.00
204-000-930.000	REPAIRS AND MAINTENANCE	300,000.00	300,000.00	36,295.27	400.00	263,704.73		12.10
Total Dept 000		320,000.00	320,000.00	51,360.34	400.00	268,639.66		16.05
TOTAL EXPENDITURES		320,000.00	320,000.00	51,360.34	400.00	268,639.66		16.05
Fund 204 - ROAD FUND:								
TOTAL REVENUES		193,700.00	193,700.00	187,412.34	4,591.48	6,287.66		96.75
TOTAL EXPENDITURES		320,000.00	320,000.00	51,360.34	400.00	268,639.66		16.05
NET OF REVENUES & EXPENDITURES		(126,300.00)	(126,300.00)	136,052.00	4,191.48	(262,352.00)		107.72

PERIOD ENDING 03/31/2023

GL NUMBER	DESCRIPTION	2022-23	2022-23	YTD BALANCE	ACTIVITY FOR	AVAILABLE		% BDGT USED
		ORIGINAL BUDGET	AMENDED BUDGET	03/31/2023 NORM (ABNORM)	MONTH 03/31/23 INCR (DECR)	NORM	(ABNORM)	
Fund 206 - FIRE FUND								
Revenues								
Dept 000								
206-000-402.000	CURRENT PROPERTY TAXES	185,000.00	185,000.00	178,998.65	2,484.50	6,001.35		96.76
206-000-411.000	DELINQUENT PROPERTY TAXES	7,100.00	7,100.00	0.00	0.00	7,100.00		0.00
206-000-502.000	FEDERAL GRANTS	0.00	0.00	53,005.00	0.00	(53,005.00)		100.00
206-000-626.001	FIRE AND RESCUE CHARGES	9,000.00	9,000.00	9,000.00	750.00	0.00		100.00
206-000-642.000	SALES	30,200.00	30,200.00	0.00	0.00	30,200.00		0.00
206-000-665.000	INTEREST INCOME	600.00	600.00	8,016.09	1,683.69	(7,416.09)		1,336.02
206-000-674.000	DONATIONS	1,000.00	1,000.00	2,460.00	0.00	(1,460.00)		246.00
206-000-675.000	LOCAL GRANTS	5,000.00	5,000.00	0.00	0.00	5,000.00		0.00
206-000-684.000	OTHER REVENUE	0.00	0.00	5.00	5.00	(5.00)		100.00
Total Dept 000		237,900.00	237,900.00	251,484.74	4,923.19	(13,584.74)		105.71
TOTAL REVENUES		237,900.00	237,900.00	251,484.74	4,923.19	(13,584.74)		105.71
Expenditures								
Dept 000								
206-000-702.000	WAGES	38,000.00	38,000.00	41,728.21	3,009.04	(3,728.21)		109.81
206-000-715.000	SOCIAL SECURITY	2,900.00	2,900.00	3,134.97	218.79	(234.97)		108.10
206-000-727.000	SUPPLIES	10,000.00	10,000.00	17,603.25	0.00	(7,603.25)		176.03
206-000-728.000	SUPPLIES - MEDICAL & SAFETY	12,000.00	12,000.00	2,219.64	0.00	9,780.36		18.50
206-000-880.000	ADVERTISING AND PROMOTION	1,000.00	1,000.00	1,519.28	0.00	(519.28)		151.93
206-000-920.000	UTILITIES	6,600.00	6,600.00	5,353.27	578.85	1,246.73		81.11
206-000-930.000	REPAIRS AND MAINTENANCE	7,000.00	7,000.00	3,891.96	0.00	3,108.04		55.60
206-000-931.000	REPAIRS AND MAINT - AUTO & APPARATUS	25,000.00	25,000.00	25,995.82	0.00	(995.82)		103.98
206-000-955.000	OTHER EXPENSE	0.00	0.00	157.50	0.00	(157.50)		100.00
206-000-956.000	TRAINING & EDUCATION	2,500.00	2,500.00	1,130.00	0.00	1,370.00		45.20
206-000-957.000	MEMBERSHIP DUES	1,325.00	1,325.00	1,325.00	0.00	0.00		100.00
206-000-958.000	INSURANCE	20,700.00	20,700.00	18,552.00	0.00	2,148.00		89.62
206-000-971.000	CAPITAL OUTLAY	163,000.00	163,000.00	61,888.56	0.00	101,111.44		37.97
Total Dept 000		290,025.00	290,025.00	184,499.46	3,806.68	105,525.54		63.62
TOTAL EXPENDITURES		290,025.00	290,025.00	184,499.46	3,806.68	105,525.54		63.62
Fund 206 - FIRE FUND:								
TOTAL REVENUES		237,900.00	237,900.00	251,484.74	4,923.19	(13,584.74)		105.71
TOTAL EXPENDITURES		290,025.00	290,025.00	184,499.46	3,806.68	105,525.54		63.62
NET OF REVENUES & EXPENDITURES		(52,125.00)	(52,125.00)	66,985.28	1,116.51	(119,110.28)		128.51

PERIOD ENDING 03/31/2023

GL NUMBER	DESCRIPTION	2022-23	2022-23	YTD BALANCE	ACTIVITY FOR	AVAILABLE	% BDGT
		ORIGINAL BUDGET	AMENDED BUDGET	03/31/2023 NORM (ABNORM)	MONTH 03/31/23 INCR (DECR)	BALANCE NORM (ABNORM)	
Fund 220 - LAKE IMPROVEMENT FUND (INVASIVE SPECIES)							
Revenues							
Dept 000							
220-000-451.000	SPECIAL ASSESSMENTS	75,000.00	75,000.00	71,004.44	1,276.00	3,995.56	94.67
220-000-665.000	INTEREST INCOME	0.00	0.00	1.41	1.41	(1.41)	100.00
Total Dept 000		75,000.00	75,000.00	71,005.85	1,277.41	3,994.15	94.67
TOTAL REVENUES		75,000.00	75,000.00	71,005.85	1,277.41	3,994.15	94.67
Expenditures							
Dept 000							
220-000-802.000	CONTRACTUAL SERVICES	74,000.00	74,000.00	57,662.51	0.00	16,337.49	77.92
220-000-955.000	OTHER EXPENSE	1,000.00	1,000.00	418.77	418.77	581.23	41.88
Total Dept 000		75,000.00	75,000.00	58,081.28	418.77	16,918.72	77.44
TOTAL EXPENDITURES		75,000.00	75,000.00	58,081.28	418.77	16,918.72	77.44
Fund 220 - LAKE IMPROVEMENT FUND (INVASIVE SPECIES):							
TOTAL REVENUES		75,000.00	75,000.00	71,005.85	1,277.41	3,994.15	94.67
TOTAL EXPENDITURES		75,000.00	75,000.00	58,081.28	418.77	16,918.72	77.44
NET OF REVENUES & EXPENDITURES		0.00	0.00	12,924.57	858.64	(12,924.57)	100.00
TOTAL REVENUES - ALL FUNDS		1,164,450.00	1,164,450.00	1,094,700.82	35,321.48	69,749.18	94.01
TOTAL EXPENDITURES - ALL FUNDS		1,322,360.00	1,322,360.00	765,390.12	73,087.86	556,969.88	57.88
NET OF REVENUES & EXPENDITURES		(157,910.00)	(157,910.00)	329,310.70	(37,766.38)	(487,220.70)	208.54

PERIOD ENDING 03/31/2023

GL NUMBER	DESCRIPTION	BALANCE DEBIT	BALANCE CREDIT
Fund 101 - GENERAL FUND			
Dept 000			
101-000-001.000	CASH	185,130.69	
101-000-001.001	CASH - ESCROW	19,499.28	
101-000-005.000	CASH - MICHIGAN CLASS	825,644.42	
101-000-078.000	DUE FROM STATE	4,020.42	
101-000-084.206	DUE FROM FIRE FUND	1,287.71	
101-000-123.000	PREPAID EXPENDITURES	5,458.50	
101-000-200.000	FUNDS HELD IN ESCROW		19,499.28
101-000-202.000	ACCOUNTS PAYABLE		19,515.91
101-000-228.001	DUE TO STATE - INCOME TAX WITHHELD	627.73	
101-000-229.001	DUE TO FEDERAL - INCOME TAX WITHHELD	1,090.77	
101-000-229.002	DUE TO FEDERAL - FICA		4,392.98
101-000-390.000	FUND BALANCE		886,002.50
101-000-402.000	CURRENT PROPERTY TAXES		267,523.76
101-000-445.000	PENALTIES AND INTEREST ON TAXES		435.44
101-000-447.000	PROPERTY TAX ADMINISTRATION FEE		72,013.81
101-000-448.000	SUMMER TAX COLLECTION FEE		7,048.00
101-000-476.000	BUSINESS LICENSE AND PERMITS		1,700.00
101-000-478.000	LAND AND SPECIAL USE PERMITS		24,605.00
101-000-479.000	VARIANCE AND APPEALS		3,000.00
101-000-480.000	CEMETERY FEES		150.00
101-000-528.000	FEDERAL GRANTS - OTHER		94,895.10
101-000-541.000	LIQUOR LICENSE REVENUE		1,318.90
101-000-542.000	METRO ACT REVENUE		4,866.84
101-000-573.000	LOCAL COMMUNITY STABILIZATION AUTHORITY		813.67
101-000-574.000	STATE REVENUE SHARING		79,986.00
101-000-626.000	CHARGE FOR SERVICES		21.70
101-000-665.000	INTEREST INCOME		19,289.66
101-000-668.000	ROYALTIES		1,639.19
101-000-674.000	DONATIONS		1,075.00
101-000-676.000	REIMBURSEMENT TO TWP		827.45
101-000-684.000	OTHER REVENUE		3,588.37
Total Dept 000		1,042,759.52	1,514,208.56
Dept 101 - TOWNSHIP BOARD			
101-101-702.000	WAGES	18,549.25	
101-101-715.000	SOCIAL SECURITY	1,425.67	
101-101-727.000	SUPPLIES	3,635.35	
101-101-801.000	PROFESSIONAL SERVICES	32,421.60	
101-101-802.000	CONTRACTUAL SERVICES	8,679.23	
101-101-860.000	MILEAGE	131.60	
101-101-900.000	PUBLISHING	4,103.55	
101-101-921.000	LIGHTING	5,617.16	
101-101-955.000	OTHER EXPENSE	1,329.15	
101-101-957.000	MEMBERSHIP DUES	3,193.85	
101-101-958.000	INSURANCE	4,915.00	
Total Dept 101 - TOWNSHIP BOARD		84,001.41	0.00
Dept 171 - SUPERVISOR			
101-171-702.000	WAGES	17,605.82	
101-171-715.000	SOCIAL SECURITY	1,346.85	
Total Dept 171 - SUPERVISOR		18,952.67	0.00
Dept 215 - CLERK			
101-215-702.000	WAGES	36,739.68	
101-215-715.000	SOCIAL SECURITY	2,796.90	
101-215-727.000	SUPPLIES	2,825.43	
101-215-860.000	MILEAGE	115.62	
Total Dept 215 - CLERK		42,477.63	0.00
Dept 247 - BOARD OF REVIEW			
101-247-702.000	WAGES	800.00	
101-247-715.000	SOCIAL SECURITY	61.20	
Total Dept 247 - BOARD OF REVIEW		861.20	0.00
Dept 253 - TREASURER			
101-253-702.000	WAGES	37,110.84	
101-253-715.000	SOCIAL SECURITY	2,836.30	
101-253-727.000	SUPPLIES	1,147.49	

PERIOD ENDING 03/31/2023

GL NUMBER	DESCRIPTION	BALANCE DEBIT	BALANCE CREDIT
Fund 101 - GENERAL FUND			
101-253-802.000	CONTRACTUAL SERVICES	11,546.27	
Total Dept 253 - TREASURER		52,640.90	0.00
Dept 257 - ASSESSOR			
101-257-702.000	WAGES	1,038.47	
101-257-715.000	SOCIAL SECURITY	79.45	
101-257-802.000	CONTRACTUAL SERVICES	43,422.00	
Total Dept 257 - ASSESSOR		44,539.92	0.00
Dept 262 - ELECTIONS			
101-262-702.000	WAGES	5,406.75	
101-262-727.000	SUPPLIES	3,544.16	
101-262-802.000	CONTRACTUAL SERVICES	1,197.25	
101-262-900.000	PUBLISHING	142.20	
Total Dept 262 - ELECTIONS		10,290.36	0.00
Dept 265 - BUILDING & GROUNDS			
101-265-702.000	WAGES	4,360.00	
101-265-715.000	SOCIAL SECURITY	333.54	
101-265-727.000	SUPPLIES	1,823.75	
101-265-802.000	CONTRACTUAL SERVICES	12,735.33	
101-265-920.000	UTILITIES	8,469.20	
101-265-930.000	REPAIRS AND MAINTENANCE	1,936.50	
101-265-955.000	OTHER EXPENSE	253.59	
101-265-958.000	INSURANCE	10,645.00	
Total Dept 265 - BUILDING & GROUNDS		40,556.91	0.00
Dept 266 - ATTORNEY			
101-266-803.000	ATTORNEY	34,733.21	
Total Dept 266 - ATTORNEY		34,733.21	0.00
Dept 330 - LIQUOR LAW ENFORCEMENT			
101-330-702.000	WAGES	1,246.05	
101-330-715.000	SOCIAL SECURITY	95.31	
Total Dept 330 - LIQUOR LAW ENFORCEMENT		1,341.36	0.00
Dept 536 - SANITARY SEWER			
101-536-955.000	OTHER EXPENSE	185.00	
Total Dept 536 - SANITARY SEWER		185.00	0.00
Dept 567 - CEMETERY			
101-567-727.000	SUPPLIES	47.26	
101-567-802.000	CONTRACTUAL SERVICES	1,925.00	
101-567-930.000	REPAIRS AND MAINTENANCE	1,625.00	
Total Dept 567 - CEMETERY		3,597.26	0.00
Dept 701 - PLANNING COMMISSION			
101-701-702.000	WAGES	4,949.00	
101-701-715.000	SOCIAL SECURITY	358.02	
101-701-727.000	SUPPLIES	276.58	
101-701-801.000	PROFESSIONAL SERVICES	11,498.75	
Total Dept 701 - PLANNING COMMISSION		17,082.35	0.00
Dept 702 - ZONING			
101-702-702.000	WAGES	430.00	
101-702-715.000	SOCIAL SECURITY	32.89	
101-702-802.000	CONTRACTUAL SERVICES	31,472.10	
Total Dept 702 - ZONING		31,934.99	0.00
Dept 751 - PARKS & RECREATION			
101-751-727.000	SUPPLIES	10,585.81	

GL NUMBER	DESCRIPTION	BALANCE DEBIT	BALANCE CREDIT
Fund 101 - GENERAL FUND			
101-751-802.000	CONTRACTUAL SERVICES	64,996.22	
101-751-920.000	UTILITIES	701.84	
101-751-921.000	LIGHTING	419.42	
101-751-930.000	REPAIRS AND MAINTENANCE	11,518.24	
101-751-955.000	OTHER EXPENSE	32.34	
Total Dept 751 - PARKS & RECREATION		88,253.87	0.00
Total Fund 101 - GENERAL FUND		1,514,208.56	1,514,208.56

GL NUMBER	DESCRIPTION	BALANCE DEBIT	BALANCE CREDIT
Fund 204 - ROAD FUND			
Dept 000			
204-000-001.000	CASH	166,629.25	
204-000-005.000	CASH - MICHIGAN CLASS	507,262.18	
204-000-390.000	FUND BALANCE		537,839.43
204-000-402.000	CURRENT PROPERTY TAXES		179,960.92
204-000-665.000	INTEREST INCOME		7,451.42
204-000-727.000	SUPPLIES	15,065.07	
204-000-930.000	REPAIRS AND MAINTENANCE	36,295.27	
Total Dept 000		<u>725,251.77</u>	<u>725,251.77</u>
Total Fund 204 - ROAD FUND		<u>725,251.77</u>	<u>725,251.77</u>

GL NUMBER	DESCRIPTION	BALANCE DEBIT	BALANCE CREDIT
Fund 206 - FIRE FUND			
Dept 000			
206-000-001.000	CASH	136,133.73	
206-000-005.000	CASH - MICHIGAN CLASS	407,890.19	
206-000-123.000	PREPAID EXPENDITURES	9,574.75	
206-000-214.101	DUE TO GENERAL FUND		1,287.71
206-000-390.000	FUND BALANCE		485,325.68
206-000-402.000	CURRENT PROPERTY TAXES		178,998.65
206-000-502.000	FEDERAL GRANTS		53,005.00
206-000-626.001	FIRE AND RESCUE CHARGES		9,000.00
206-000-665.000	INTEREST INCOME		8,016.09
206-000-674.000	DONATIONS		2,460.00
206-000-684.000	OTHER REVENUE		5.00
206-000-702.000	WAGES	41,728.21	
206-000-715.000	SOCIAL SECURITY	3,134.97	
206-000-727.000	SUPPLIES	17,603.25	
206-000-728.000	SUPPLIES - MEDICAL & SAFETY	2,219.64	
206-000-880.000	ADVERTISING AND PROMOTION	1,519.28	
206-000-920.000	UTILITIES	5,353.27	
206-000-930.000	REPAIRS AND MAINTENANCE	3,891.96	
206-000-931.000	REPAIRS AND MAINT - AUTO & APPARATUS	25,995.82	
206-000-955.000	OTHER EXPENSE	157.50	
206-000-956.000	TRAINING & EDUCATION	1,130.00	
206-000-957.000	MEMBERSHIP DUES	1,325.00	
206-000-958.000	INSURANCE	18,552.00	
206-000-971.000	CAPITAL OUTLAY	61,888.56	
Total Dept 000		738,098.13	738,098.13
Total Fund 206 - FIRE FUND		738,098.13	738,098.13

GL NUMBER	DESCRIPTION	BALANCE DEBIT	BALANCE CREDIT
Fund 220 - LAKE IMPROVEMENT FUND (INVASIVE SPECIES)			
Dept 000			
220-000-001.005	CASH	46,349.45	
220-000-390.000	FUND BALANCE		33,424.88
220-000-451.000	SPECIAL ASSESSMENTS		71,004.44
220-000-665.000	INTEREST INCOME		1.41
220-000-802.000	CONTRACTUAL SERVICES	57,662.51	
220-000-955.000	OTHER EXPENSE	418.77	
Total Dept 000		104,430.73	104,430.73
Total Fund 220 - LAKE IMPROVEMENT FUND (INVASIVE SPECIES)		104,430.73	104,430.73
Total - All Funds:		3,081,989.19	3,081,989.19



Onekama Township
5435 Main Street, PO Box 458
Onekama, MI 49675
231 889-3308

March 21, 2023

Onekama Township,

The Township authorized the Tamminga PUD to use "Tamminga Way" as a road in the development at the Onekama Township Board Meeting on January 12th, 2022.

Please see the extent and location of the roadway the name is to be applied, as provided on Attachment A and the construction specifications on Attachment B.

If you have any questions, please feel free to contact me at 231-889-3308 Ext. 201.

Thank you,

A handwritten signature in black ink that reads "Shelli Johnson".

Shelli Johnson

Onekama Township Clerk



Memo to: Township Board
From: Ed Bradford, Treasurer
Subject: March 2023 Treasurer Report
Date: April 7, 2023

Cash Balances

I have included a cash and investment report in the packet for your review and information.

Balance Sheet

I have included a balance sheet in the packet for your review and information.

Investments

I have included an investment income report in the packet for your review and information. Total investment earnings for the month were \$7,186. Average daily yield is 4.96% as of March 31.

Revenues

Revenues are included in the Clerk's Revenue & Expense Report.

Property Taxes

Property taxes have been settled and I am waiting for the final payout and accounting from the County Treasurer.

Video Recording System

Research continues and I should have a recommendation at the May meeting.

CASH SUMMARY BY ACCOUNT FOR ONEKAMA TOWNSHIP
 FROM 03/01/2023 TO 03/31/2023
 FUND: 101 204 206 220 703
 CASH AND INVESTMENT ACCOUNTS

Fund Account	Description	Beginning Balance 03/01/2023	Total Debits	Total Credits	Ending Balance 03/31/2023
Fund 101	GENERAL FUND				
001.000	CASH	238,843.24	79,015.37	132,727.92	185,130.69
001.001	CASH - ESCROW	19,499.28	0.00	0.00	19,499.28
005.000	CASH - MICHIGAN CLASS	822,248.32	3,396.10	0.00	825,644.42
	GENERAL FUND	<u>1,080,590.84</u>	<u>82,411.47</u>	<u>132,727.92</u>	<u>1,030,274.39</u>
Fund 204	ROAD FUND				
001.000	CASH	164,524.30	2,504.95	400.00	166,629.25
005.000	CASH - MICHIGAN CLASS	505,175.65	2,086.53	0.00	507,262.18
	ROAD FUND	<u>669,699.95</u>	<u>4,591.48</u>	<u>400.00</u>	<u>673,891.43</u>
Fund 206	FIRE FUND				
001.000	CASH	136,867.50	3,343.43	4,077.20	136,133.73
005.000	CASH - MICHIGAN CLASS	406,212.44	1,677.75	0.00	407,890.19
	FIRE FUND	<u>543,079.94</u>	<u>5,021.18</u>	<u>4,077.20</u>	<u>544,023.92</u>
Fund 220	LAKE IMPROVEMENT FUND (INVASIVE SPECIES)				
001.000	CASH	45,490.81	104,430.73	149,921.54	0.00
001.005	CASH	0.00	93,535.03	47,185.58	46,349.45
	LAKE IMPROVEMENT FUND (INVASIVE SPECIES)	<u>45,490.81</u>	<u>197,965.76</u>	<u>197,107.12</u>	<u>46,349.45</u>
Fund 703	TAX FUND				
001.000	CASH	34,890.75	1,386.00	36,140.77	135.98
	TOTAL - ALL FUNDS	<u>2,373,752.29</u>	<u>291,375.89</u>	<u>370,453.01</u>	<u>2,294,675.17</u>

REVENUE AND EXPENDITURE REPORT FOR ONEKAMA TOWNSHIP
PERIOD ENDING 03/31/2023
% Fiscal Year Completed: 100.00

GL NUMBER	DESCRIPTION	2022-23	YTD BALANCE	ACTIVITY FOR		AVAILABLE		% BGD USED
		AMENDED BUDGET	03/31/2023	MONTH 03/31/2023	INCREASE (DECREASE)	NORMAL (ABNORMAL)	BALANCE	
101-000-665.000	INTEREST INCOME	1,000.00	19,289.66	3,407.35		(18,289.66)	1,928.97	
204-000-665.000	INTEREST INCOME	600.00	7,451.42	2,093.60		(6,851.42)	1,241.90	
206-000-665.000	INTEREST INCOME	600.00	8,016.09	1,683.69		(7,416.09)	1,336.02	
220-000-665.000	INTEREST INCOME	0.00	1.41	1.41		(1.41)	100.00	
TOTAL REVENUES - ALL FUNDS		2,200.00	34,758.58	7,186.05		(32,558.58)	1,579.94	
TOTAL EXPENDITURES - ALL FUNDS		0.00	0.00	0.00		0.00	100.00	
NET OF REVENUES & EXPENDITURES		2,200.00	34,758.58	7,186.05		(32,558.58)	1,579.94	

Fund 101 GENERAL FUND

GL Number	Description	Balance
*** Assets ***		
101-000-001.000	CASH	185,130.69
101-000-001.001	CASH - ESCROW	19,499.28
101-000-002.000	CASH - MM	0.00
101-000-003.000	CASH - CD'S	0.00
101-000-005.000	CASH - MICHIGAN CLASS	825,644.42
101-000-020.000	PROPERTY TAXES RECEIVABLE	0.00
101-000-040.000	ACCOUNTS RECEIVABLE	0.00
101-000-078.000	DUE FROM STATE	4,020.42
101-000-081.000	DUE FROM OTHER GOVERNMENT	0.00
101-000-084.204	DUE FROM ROAD FUND	0.00
101-000-084.206	DUE FROM FIRE FUND	1,287.71
101-000-084.220	DUE FROM LAKE IMPROVEMENT FUND	0.00
101-000-084.703	DUE FROM TAX COLLECTION	0.00
101-000-123.000	PREPAID EXPENDITURES	5,458.50
Total Assets		1,041,041.02
*** Liabilities ***		
101-000-200.000	FUNDS HELD IN ESCROW	19,499.28
101-000-202.000	ACCOUNTS PAYABLE	19,515.91
101-000-214.000	DUE TO OTHER FUNDS	0.00
101-000-214.202	DUE TO ROAD FUND	0.00
101-000-214.206	DUE TO FIRE FUND	0.00
101-000-228.001	DUE TO STATE - INCOME TAX WITHHELD	(627.73)
101-000-229.001	DUE TO FEDERAL - INCOME TAX WITHHE	(1,090.77)
101-000-229.002	DUE TO FEDERAL - FICA	4,392.98
101-000-230.000	DUE TO OTHER UNITS OF GOVERNMENT	0.00
101-000-231.000	DUE TO STATE - SUTA	0.00
101-000-257.000	ACCRUED WAGES PAYABLE	0.00
101-000-339.000	UNEARNED REVENUE	0.00
Total Liabilities		41,689.67
*** Fund Balance ***		
101-000-390.000	FUND BALANCE	886,002.50
Total Fund Balance		886,002.50
Beginning Fund Balance		882,619.42
Net of Revenues VS Expenditures		113,348.85
Fund Balance Adjustments		3,383.08
Ending Fund Balance		999,351.35
Total Liabilities And Fund Balance		1,041,041.02

Fund 204 ROAD FUND

GL Number	Description	Balance
*** Assets ***		
204-000-001.000	CASH	166,629.25
204-000-005.000	CASH - MICHIGAN CLASS	507,262.18
204-000-020.000	PROPERTY TAXES RECEIVABLE	0.00
204-000-084.101	DUE FROM GENERAL FUND	0.00
Total Assets		673,891.43
*** Liabilities ***		
204-000-202.000	ACCOUNTS PAYABLE	0.00
204-000-214.101	DUE TO GENERAL FUND	0.00
Total Liabilities		0.00
*** Fund Balance ***		
204-000-390.000	FUND BALANCE	537,839.43
Total Fund Balance		537,839.43
Beginning Fund Balance		537,839.43
Net of Revenues VS Expenditures		136,052.00
Fund Balance Adjustments		0.00
Ending Fund Balance		673,891.43
Total Liabilities And Fund Balance		673,891.43

Fund 206 FIRE FUND

GL Number	Description	Balance
*** Assets ***		
206-000-001.000	CASH	136,133.73
206-000-002.000	CASH - MM	0.00
206-000-005.000	CASH - MICHIGAN CLASS	407,890.19
206-000-020.000	PROPERTY TAXES RECEIVABLE	0.00
206-000-040.000	ACCOUNTS RECEIVABLE	0.00
206-000-084.101	DUE FROM GENERAL FUND	0.00
206-000-123.000	PREPAID EXPENDITURES	9,574.75
206-000-133.000	ACCUMULATED DEPRECIATION	0.00
206-000-146.000	FURNITURE AND EQUIPMENT	0.00
Total Assets		553,598.67
*** Liabilities ***		
206-000-202.000	ACCOUNTS PAYABLE	0.00
206-000-214.101	DUE TO GENERAL FUND	1,287.71
206-000-231.000	DUE TO STATE - SUTA	0.00
206-000-257.000	ACCRUED WAGES PAYABLE	0.00
206-000-339.000	UNEARNED REVENUE	0.00
Total Liabilities		1,287.71
*** Fund Balance ***		
206-000-390.000	FUND BALANCE	485,325.68
Total Fund Balance		485,325.68
Beginning Fund Balance		485,325.68
Net of Revenues VS Expenditures		66,985.28
Fund Balance Adjustments		0.00
Ending Fund Balance		552,310.96
Total Liabilities And Fund Balance		553,598.67

Fund 220 LAKE IMPROVEMENT FUND (INVASIVE SPECIES)

GL Number	Description	Balance
*** Assets ***		
220-000-001.000	CASH	0.00
220-000-001.005	CASH	46,349.45
220-000-020.000	PROPERTY TAXES RECEIVABLE	0.00
220-000-084.101	DUE FROM GENERAL FUND	0.00
Total Assets		46,349.45
*** Liabilities ***		
220-000-202.000	ACCOUNTS PAYABLE	0.00
220-000-214.101	DUE TO GENERAL FUND	0.00
Total Liabilities		0.00
*** Fund Balance ***		
220-000-390.000	FUND BALANCE	33,424.88
Total Fund Balance		33,424.88
Beginning Fund Balance		33,424.88
Net of Revenues VS Expenditures		12,924.57
Fund Balance Adjustments		0.00
Ending Fund Balance		46,349.45
Total Liabilities And Fund Balance		46,349.45

Fund 703 TAX FUND

GL Number	Description	Balance
*** Assets ***		
703-000-001.000	CASH	135.98
Total Assets		135.98
*** Liabilities ***		
703-000-202.000	ACCOUNTS PAYABLE	0.00
703-000-214.101	DUE TO GENERAL FUND	135.98
703-000-214.204	DUE TO ROAD FUND	0.00
703-000-214.206	DUE TO FIRE FUND	0.00
703-000-214.220	DUE TO LAKE IMPROVEMENT FUND	0.00
703-000-222.001	DUE TO COUNTY - OPERATING	0.00
703-000-222.002	DUE TO COUNTY - 911	0.00
703-000-222.003	DUE TO COUNTY - RECYCLING	0.00
703-000-222.005	DUE TO COUNTY - CONSERVATION DISTF	0.00
703-000-222.006	DUE TO COUNTY - COUNCIL ON AGING	0.00
703-000-222.007	DUE TO COUNTY - DIAL A RIDE	0.00
703-000-222.008	DUE TO COUNTY - MEDICAL CARE	0.00
703-000-223.000	DUE TO COUNTY - LIBRARY	0.00
703-000-225.001	DUE TO SCHOOL - DEBT	0.00
703-000-225.002	DUE TO SCHOOL - OPERATING	0.00
703-000-225.003	DUE TO SCHOOL - SINKING FUND	0.00
703-000-227.001	DUE TO VILLAGE - DLQ SEWER	0.00
703-000-228.002	DUE TO STATE - SET	0.00
703-000-228.003	DUE TO STATE - QUALIFIED FOREST FE	0.00
703-000-230.000	DUE TO OTHER UNITS OF GOVERNMENT	0.00
703-000-234.000	DUE TO MANISTEE INTERMEDIATE SCHOC	0.00
703-000-235.000	DUE TO WEST SHORE COLLEGE	0.00
703-000-275.000	DUE TO TAXPAYERS	0.00
Total Liabilities		135.98
*** Fund Balance ***		
703-000-390.000	FUND BALANCE	0.00
Total Fund Balance		0.00
Beginning Fund Balance		0.00
Net of Revenues VS Expenditures		0.00
Fund Balance Adjustments		0.00
Ending Fund Balance		0.00
Total Liabilities And Fund Balance		135.98



Photos courtesy of the Portage Lake Association. Photographers: Valerie Harmon, Jeffery Zupin, David Maylen, Al Taylor.

Portage Lake

Lake Management Plan 2022

Prepared for Onekama Township and the Invasive Species Committee



PLM
LAKE & LAND
MANAGEMENT CORP

Submitted By:
BreAnne Grabill, Environmental Scientist
Senior Regional Manager

TABLE OF CONTENTS

Executive Summary	5
Introduction	6
Characteristics of the Lake	6
Management Goals for Portage Lake	6
Lake Management Overview including various Best Management Practices	9
Integrated Pest Management (IPM)	9
Prevention	9
Monitoring	9
Early Detection Rapid Response (EDRR)	10
Wake Boats	10
Fishery	11
Submersed Nonnative Plant Management	11
Emergent Nonnative Plant Management	11
Native Plant Management	12
Algae Management	12
Natural Shoreline/Nutrient Loading Abatement	13
Restoration	14
Lake Management Approaches	15
Aeration	15
Bacteria augmentation	15
Benthic barriers	16
Biological control	16
Chemical control	17
Diver assisted suction harvesting (DASH)	17
EutroSORB – Phosphorus Filtration Technology	18
Mechanical harvesting	18
Swimmers itch	18
Lake Management Activities Conducted in 2022	19
Water Quality	19
Weather Challenges of 2022	19
Aquatic Plant Control	20
Map 1: Portage Lake June 2022 Treatment Map	21
Map 2: Portage Lake September 2022 Treatment Map	21
Map 3: Private nonnative emergent treatment areas	22
Map 4: Portage Lake 2009 EWM Infestation Treatment Map	22
Map 5: Portage Lake 2022 EWM/SSW Treatment Map	23
Table 1: Submersed Plant Treatment Quantities 2022	23
Table 2: Terrestrial Treatment Summary 2021-2009	23
Graph 1: Annual Management Acres	24
Graph 2: Annual Management Cost	25
Planning/Evaluation	25
Table 3: Plant Species Found in Portage Lake –2022	26
Map 6: Portage Lake AVAS/Grid Combination Map (updated 2022)	27
Map 7: Portage Lake Plant Density Map	27

Portage Lake - Lake Management Plan | 2022

Graph 3: Native Plant Species (Fall AVAS Surveys)	28
Graph 4: EWM, SSW & Native Plant Cumulative Cover (Fall Data)	28
Current Conditions in the Lake	29
Aquatic Vegetation	29
Water Quality Monitoring	29
Map 8: Portage Lake Water Quality Testing Locations	30
Temperature and Dissolved Oxygen Profiles	30
pH	31
Total Alkalinity	31
Conductivity and Total Dissolved Solids	31
Oxidative Reduction Potential (ORP)	32
Turbidity	32
Secchi Disk Depth	33
Graph 5: Spring Transparency (Secchi Disk) – Deep Hole Basins 1, 2 (1993-2022)	33
Graph 6: Fall Transparency (Secchi Disk) – Deep Hole Basins 1, 2 (1993-2022)	33
Total Phosphorus	34
Graph 7: Total Phosphorus – Deep Hole Basins 1, 2 (2009-2022)	35
Graph 8: Total Phosphorus & Dissolved Oxygen – Deep Hole Basin 1, (2009-2022)	35
Graph 9: Total Phosphorus & Dissolved Oxygen – Deep Hole Basin 2, (2009-2019)	36
Graph 10: Total Phosphorus Spring – Tributaries 2009-2022	36
Graph 11: Total Phosphorus Fall – Tributaries 2009-2022	37
Graph 12: Total Phosphorus – Tributaries 2013-2022	37
Graph 13: Total Phosphorus – Tributaries May 2022	38
Graph 14: Total Phosphorus – Tributaries End of Summer 2022	38
Graph 15: Total Phosphorus – Storm Drains May 2022	39
Graph 16: Total Phosphorus – Storm Drains May 2013 - 2022	39
Total Kjeldahl Nitrogen (TKN)	40
Graph 17: TKN – Portage Lake Basins 1, 2 (2009-2022)	40
Graph 18: TKN & Dissolved Oxygen– Portage Lake Basin 1 (2009-2019)	41
Graph 19: TKN & Dissolved Oxygen– Portage Lake Basin, 2 (2009-2022)	41
Nitrates	41
Graph 20: Nitrates– Portage Lake Tributaries	42
Graph 21: Portage Lake Nitrates Basin 1 (2014-2022)	43
Graph 22: Portage Lake Nitrates Basin 2 (2014-2022)	43
Ammonia	44
Graph 23: Ammonia– Portage Lake Basin 1 (2014-2022)	44
Graph 24: Ammonia– Portage Lake Basin 2 (2014-2022)	45
Chlorophyll	45
Graph 25: Chlorophyll a– Portage Lake Deep Basins	46
Algae and Zooplankton Composition	46
Fecal Indicator Bacteria (E. Coli)	47
Tributary Flow and Phosphorus	47
Graph 26 and 27: Tributary Flow Rates –May (top); September (bottom) 2013-2022	48
Graph 28 and 29: Tributary Flow Rates and Phosphorus (ug/L) comparisons – May 2022 (top) – September 2022 (bottom)	49
Additional Tributary/Upstream testing	49
Evaluation of Trophic Status	50

Portage Lake - Lake Management Plan | 2022

Table 4: 2022 Trophic State Index (TSI) Values	50
2022 Water Quality Concerns/Recommendations	51
Management Recommendations for 2023	51
Submersed Aquatic Plants	51
Emergent Vegetation Management	51
Monitoring	51
Proposed Budget	51
Table 5: Proposed 2023 Budget Portage Lake	52
The Recommended Management Schedule for 2023:	52
Addendum 1 Product Explanation guide	53
Aquathol K	53
Flumioxazin	53
ProcellaCOR	53
Navigate (2,4-d)	53
Renovate 3	53
Renovate OTF	53
SeClear G	54
Sculpin G	54
Tribune	54
Addendum 2 Product Terminology	55
Addendum 3A Portage Lake Product Use Overview	56
Table 6: Submersed Plant Control Program Product Use Overview	56
Addendum 3B Portage Lake Treatment Cost Overview	58
Table 7: Portage Lake Treatment Cost Overview	58
Addendum 4 Portage Lake Water Quality Data	60
Table 8: Tributary Water Quality Portage Lake –2022	60
Table 9: Storm Drain Sampling Portage Lake –2022	60
Table 10: Shoreline Sampling Portage Lake –2022	60
Table 11: Deep Hole Basin 1 Portage Lake –2022	61
Table 12: Deep Hole Basin 2 Portage Lake –2022	61

Lake Management Plan

Executive Summary

In 2008, a group of concerned citizens began working on Phragmites control, to prevent this invasive species from continuing to spread throughout the Portage Lake Watershed. Throughout the process of learning Best Management Practices (BMPs) and determining priority areas of Phragmites control on Portage Lake, other nonnative, invasive plants were identified. A formal survey was completed on Portage Lake and initiation began to manage these environmentally damaging species in 2009. Although some of the species identified as a concern had been present for quite some time, others were newer infestations. In an attempt to manage all high risk invasive species, a lake management plan was set in place, with goals of identifying and reducing the presence of aquatic invasive species (AIS) throughout Portage Lake as well as the Portage Lake watershed. The plan included controlling high risk species, including those that had been left unmanaged and were continuing to spread in Portage Lake and negatively impact native plants, as well as tracking plant trends, monitoring water quality and ultimately protecting Portage Lake into the future. The following report breaks down the specifics of the previous, current and future management needs.

As part of this integrated program, numerous best management practices have been utilized in this management plan, including biological control methods for Purple loosestrife. Annual monitoring is key to the success of the program and regular surveys found a new nonnative infestation in 2022 and 2020. European frog bit (EFB) was found on the east shoreline of the lake, mixed in with cattails. EFB is a highly concerned floating leaf plant and as part of the early detection rapid response program underway on Portage Lake was addressed quickly and none was found post management. Starry Stonewort (SSW) was positively identified in Portage Lake in 2020 through early detection and rapid response, the negative impacts of this plant have been kept minimal, thus far. In 2022, just over 50 acres of nonnative aquatic plants were managed in total, ~2.5% of Portage Lake, while at no time has more than nine percent of the lake received herbicide management. This program has successfully removed and managed the exotic infestation population, while preserving much of the lake from exotic plant disturbance. Further, with over 92% of the lake not receiving any herbicide treatment, the native plant community has been left as natural as a lake will allow with adjusting water levels/depths, a constant changing environment and exotic species introductions.

Extensive vegetation surveys and water quality testing is included in the management program annually, to allow a checks and balance over the program and ensure the long-term protection of the lake. The abundance of healthy native plants in Portage Lake increases the long-term stability of the lake, which has been continually found in the extensive surveys performed on Portage Lake. While some water quality parameters have maintained themselves with little change over the years, other parameters have shown some fluctuations. One of the most important parameters to test is Total Phosphorus (TP). Generally speaking, a downward trend in TP has been found in many years, with a few random elevations. However, trendline data shows consistent low levels, an excellent sign. Additionally, internal loading has only shown small peaks or elevated levels, meaning that overall lake trends are positive. The Tributaries and Storm Drains around Portage Lake continue to show elevated nutrient levels and prove to be a point source for bringing excess nutrients into the lake. In 2021, sampling showed the smallest TP input in recent years, but in 2022, results were similar to historic levels, showing a source of concern. This information is vital in determining the areas within Portage Lake that need to be focused on to reduce nutrient loading to help reduce the productivity in Portage Lake. The ability of Portage Lake to produce algae and aquatic plants is directly related to the overall health (nutrient base) of Portage Lake and its surrounding watershed. While the main goal of the management program is to protect the long-term ecological health of the lake, it is also important to protect the recreational, aesthetical and financial aspects of the lake as well. All of these factors play into the management efforts on Portage Lake, which need to be continued into next season.

Introduction

This management plan documents management activities during 2022, examines current conditions in the lake, and provides management recommendations for 2023. The plan will detail an integrated approach to lake management including but not limited to exotic weed control, water quality monitoring and aquatic vegetation surveying.

Characteristics of the Lake

Portage Lake is a 2110-acre lake located in Onekama Township and the Village of Onekama, Manistee County, Michigan. Public access to the lake is provided by multiple access sties. A large portion of the shoreline has been developed and of that, a majority for single-family year-round homes. A formal lake-use survey was not included in this study, but observations made while working on the lake indicate that



the lake is used for fishing, boating (power & non-power), and swimming. Portage Lake makes up 13.6% of the overall Portage Lake Watershed, which drains into Lake Michigan. Numerous other lakes and tributaries flow into Portage Lake, which has a man-made channel into Lake Michigan on the west end. Portage Lake is a natural lake with two deep holes approximately 60' deep.

A few problems necessitating management of Portage Lake are: (1) exotic and invasive species, and (2) water quality concerns. The presence of multiple exotic species has required annual management of the aquatic and terrestrial plants within and around Portage Lake.

Establishment of weedy exotic aquatic plants, including Eurasian watermilfoil and curly leaf pondweed, exacerbates problems caused by aquatic vegetation in the lake. These weedy exotic plants grow to the surface and cause substantially more interference with recreation than native plants.

Management Goals for Portage Lake

- The primary goal of management in Portage Lake is to control and manage nonnative plants, to allow recreational use of the lake and promote a healthy fishery. The nonnative or exotic plant species, Eurasian watermilfoil, Starry stonewort, Curlyleaf pondweed and Phragmites, should be controlled throughout Portage Lake to the maximum extent possible. Native plants should be encouraged throughout the lake to promote an overall healthy ecosystem. Genetic testing in Portage Lake has found that the Eurasian watermilfoil is hybrid, a new genetic strand of milfoil. In reference to Portage Lake, Eurasian milfoil or EWM will be referring to both EWM and Hybrid milfoil as it all needs to be managed as a nonnative or exotic, invasive species.
- Aquatic plant management should preserve species diversity and cover of native plants sufficient to provide habitat for fish and other aquatic organisms. Native plants should be managed to encourage the growth of plants that support the Portage Lake fishery (by creating structure and habitat) provided that they do not excessively interfere with recreational uses of the lake (e.g., swimming and fishing) in high-use areas. Where they must be managed, management techniques that reduce the stature of native plants without killing them (e.g., harvesting, contact herbicides) should be used whenever possible. Specific areas should be set aside where native plants will not be managed, to provide habitat for fish and other aquatic organisms. Muskgrass (*Chara*) should be allowed to grow throughout the lake, except in where it grows so tall as to interfere with boating and swimming.
- Water quality efforts in Portage Lake should continue to be made to reduce external loading of nutrients. Proper watershed management techniques should be applied where possible and lake

residents should be encouraged to practice "lake friendly" lawn maintenance.

- Outreach/education of the Portage Lake residents should continue in an attempt to communicate lake activities and management goals. The Portage Lake website should be maintained as a way to directly relay pertinent information along with annual meetings and newsletters.
- Based on currently survey results, the following species are recommended for specific management on Portage Lake.

- EWM, an exotic species, is an extremely aggressive submerged aquatic plant that has the abilities to form a monoculture among vegetation. EWM spreads by fragmentation (every inch of plant can sprout new growth) and has a very strong root system. EWM forms a canopy above native plants, choking out the competition. EWM also has the ability to overwinter underneath the ice, allowing it to be present throughout the winter. This gives the plant a head start in growing during the spring and chokes out native plants very quickly. EWM should be controlled as soon as it is found within a waterbody to prevent further infestation and loss of native plant diversity. NOTE: Once a native plant is lost in a lake, there is no guarantee it will return.



- The macroalgae species, Starry stonewort (SSW), should be actively controlled and managed. Starry stonewort is in the same family as Muskgrass (Chara) but is considered an exotic invasive species. Starry stonewort, which looks very similar to the beneficial species Chara, is appearing in more and more lakes. Chara is a highly desired plant because it is typically low growing, keeps the water clear and can slow down the invasion of exotic weed species. Starry stonewort also forms dense mats, but unlike chara, it can grow from 5 to 7 feet tall. Starry stonewort can be very detrimental to a lake's ecosystem and has the ability to kill off native plants and have a negative impact on a lake's fisheries.

- European frog-bit, an exotic plant found in Portage Lake in 2022, is a free-floating aquatic plant native to Europe, Asia and Africa. European frog-bit was first found in SE Michigan in 1996 but has recently made its way to west Michigan over the last 5 years and is now popping up in Northern Michigan and in numerous areas along the Lake



Michigan coastline. European frog-bit can form dense mats on the surface of slow-moving waters like bayous, backwaters and wetlands. Mats can impede boat traffic and alter food and habitat for fish. Prolific growth of European frog-bit can also reduce oxygen and light in the water column. The plant is spread by plant fragments or turions (seed pods) transported on boats, trailers and recreational gear. Once established, drifting mats of vegetation spread to connected waters. Control options include chemical, mechanical and physical removal.



- The aquatic invasive terrestrial plants, Purple loosestrife and Phragmites should be controlled along the shoreline and adjacent wetlands where present. Both species are exotic and have the ability to displace beneficial native vegetation. Purple loosestrife grows 2 -4 feet tall and is a vibrant magenta color. It is very aggressive and can quickly become the dominant wetland vegetation. Phragmites (common reed) is a wetland grass that ranges in height from 6 to 15 feet tall. “Phrag” quickly becomes the dominant feature in aquatic ecosystems, aggressively invading shorelines, wetlands, and ditches. This plant creates dense “strands” - walls of weeds crowding out beneficial native wetland vegetation and indigenous waterfowl habitats. Spreading by fragmentation and an extensive root system, Phragmites ultimately out-competes native plant life for sun, water and nutrients. As Portage Lake also hosts a healthy native Phrag community, it is vital to identify each strand for proper management and promote native Phragmites, when present.



- The terrestrial invasive plant, Japanese knotweed should be controlled throughout the Portage Lake Watershed. Japanese knotweed is a large, herbaceous perennial plant native to Eastern Asia. In North America, the species has been classified as an invasive species. Japanese knotweed has hollow stems with distinct raised nodes that give it the appearance of bamboo, though it is not closely related. Reaching a maximum height of about 12’ each growing season, it is typical to see much smaller plants in places where they sprout through cracks in the pavement or are repeatedly cut down. The invasive root system and strong growth can damage concrete foundations, buildings, roads, paving, retaining walls and architectural sites. It can also reduce the capacity of channels to carry water. It forms thick, dense colonies that completely crowd out any other herbaceous species. The success of the species has been partially attributed to its tolerance of a very wide range of soil types, pH and salinity. The plant is also resilient to cutting, vigorously resprouting from the roots. The most effective method of control is by herbicide application close to the flowering stage in late summer or autumn.



- Narrow-leaf cattails, another terrestrial invasive species, which can often be confused with the Common cattail, are often found growing in marches, lakeshores, ponds, ditches, etc. Similar to other invasive species, Narrow-leaf cattails often form monocultures and outcompete other native species, leading to a concern for species habitat and often affecting recreational use of the area. Narrow-leaf cattail’s leaves are about ½ inch wide, roughly half the width of the native broadleaf cattail. The stem is roughly 3-6’ tall. The two species also hybridize, producing a cross that can exhibit characteristics of both species, though is often taller and more aggressive than either parent species and can be more difficult to identify. Management options include mowing, digging, grazing, water level manipulation, and chemical control.



Lake Management Overview including various Best Management Practices

Integrated Pest Management (IPM)

IPM approaches to aquatic plant control emphasize spending more effort evaluating the problem, so that exactly the right control can be applied at just the right time to control the pest. IPM approaches minimize treatment costs and the use of chemicals. Lake Management planning



ensures the most appropriate, cost-effective treatment for your lake. Planning is an essential phase of Integrated Pest Management and includes lake vegetation surveys, water quality evaluation and a detailed,



written lake management plan. Having the plan in place helps lake users know what to expect from lake management. Survey results provide a permanent record of conditions in the lake and the impact of management practices.

Prevention

Early detection and rapid response are key to a successful program. As part of any community education and outreach program, preventing introductions is key. More often than not, nonnative aquatic plants (exotic species) were possibly introduced to Portage Lake by plant fragments carried on boats and/or boat trailers. A variety of other troublesome exotic plants and animals that have been introduced to Portage Lake are also transported this way. Preventing their inadvertent introduction to Portage Lake can significantly lower the cost of future lake management. Education can be an effective preventative measure. Newsletter articles should alert lake residents to the threat from exotic nuisance plants and animals. Warning signs should be erected at any public boat access sites, if applicable, that encourage boaters to clean boats and trailers when launching or removing watercraft from the lake.



**STOP AQUATIC
HITCHHIKERS!™**

Be A Good Steward.
Clean. Drain. Dry.

StopAquaticHitchhikers.org

Monitoring

It is important to maintain a record of lake conditions and management activities. Vegetation surveys monitor types and locations of plants in the lake, providing information that is essential to the administration of efficient, cost-effective control measures. Vegetation surveys also document the success or failure of management actions and the amount of native vegetation being maintained in the lake. Water quality monitoring can identify trends in water quality before conditions deteriorate to the point where remediation is prohibitively expensive or impossible. Records of past conditions and management activities also help to keep management consistent despite changes in the membership of the organization. Records should include (at a minimum):

- Temperature, dissolved oxygen and Secchi disk depth should be measured in the lake at both deep hole basins. Temperature and dissolved oxygen profiles should be obtained in the deep hole, so as to monitor the timing and extent of oxygen depletion in the hypolimnion (i.e., bottom water).
- Total phosphorus, nitrates, and ammonia should be measured in the surface and bottom water at least two times per season (spring and late summer) to monitor nutrient accumulation in the hypolimnion.
- Chlorophyll a sampling
- Tributary testing including flow and nutrient sampling

- Lake vegetation should be surveyed on an annual basis (late spring and/or late summer/early fall) to document the results of plant management efforts and provide information necessary for planning future management.

Early Detection Rapid Response (EDRR)

Early detection and rapid response, EDRR, addresses the critical period between introduction and establishment of a new invasive species population, and is the point when the focus of management shifts from prevention to containment, control and eradication. In Michigan, numerous watch list species are listed with established procedures to appropriately and efficiently respond to new invasions. This list to the right includes some high priority species within Michigan. Other species may be found within Michigan but not in Portage Lake and therefore would be considered a watchlist species for your lake (i.e. Starry stonewort). Portage Lake has successfully used an EDRR protocol to address the new introductions in the last three years including, Starry stonewort and European frog bit. To better allow the Portage Lake management program and Invasive Species Committee to be successful, if and when a new nonnative species and/or watchlist species is found in Portage Lake, action will take place including: immediate notification to the Invasive Species Committee and local municipality (township) via email and/or immediate phone call while on site to Committee Chair; notification to the State of Michigan, including but not limited to EGLE, CISMA, Michigan Invasive Species Program, DNR; signage erected at the site if needed to prevent transport in/and our of area; containment of area if possible; review of management options with committee; use of funds from current SAD funds, if applicable; implementation of best management practice for control. This policy may be modified and updated as required by the committee. Additional resources are set up to assist in identification and management including

www.misin.msu.edu;

www.michigan.gov/invasives;



MISIN Midwest Invasive Species Information Network

Wake Boats

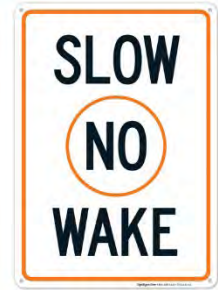
The popularity of wake sports has been on the rise over the past decade and with it the number of “wake boats” operating on lakes. Whether wake boarding or wake surfing, these boats are designed to produce large waves. Hull shape, ballast tanks, adjustable plates, and horse power are some of the technologies used. These waves are often equal to or greater than most major storm events which can increase shoreline erosion. Unlike old school/conventional “ski” boats which typically push thrust parallel to the water’s surface, wake boats tend to push thrust at a downward angle and therefore have a greater potential to disrupt bottom sediments in addition to shoreline erosion.

Several recent scientific findings provide unequivocal evidence that the dramatic upsurge in popularity of enhanced wake dependent water sports are having an adverse impact on frequently exposed aquatic ecosystems. Shoreline degradation, shallow water habitat disturbance, safety related incidences, and damage to waterfront property occur primarily as a result of operating too close to shore. Waves decrease in size the longer they travel. When operated too close to the shoreline, extensive damage to natural shorelines, seawalls and waterfront property occur. Impacts from wake boats include but high volume sediment resuspension, deposition and accumulation includes loss or degradation of fish spawning areas, less desirable fish species, loss of fish foraging habitat,



impaired or destroyed adjoining wetlands and a reduction in the capacity of affected lakes, rivers and wetlands to support diverse and recreational opportunities (Johnstone *et al.*, 2010).

Studies conducted on different wake boat models suggest that thrust (depending on the trim angle) will typically reach a depth of ~12 feet. Operating wake boats in depths greater than 12 feet whenever possible is highly recommended. Maintaining isolation areas from shorelines is also recommended and/or trying to avoid shoreline areas of importance due to erosion, habitat, etc. As time goes on there is certain to be more research done in this area and/or regulation. For the time being, being aware of potential effects on your lake and adapting boating practices to minimize impacts is the best practice.



Fishery

Portage Lake has a diverse fishery including both cool and warm water species. Many of the fish species rely on vegetated areas to spawn, forage and seek refuge. A healthy native aquatic plant community offers favorable habitat for many species that benefit from the complexity of architectural diversity. Exotic invasive aquatic plant species, such as Eurasian watermilfoil and Starry Stonewort are known to displace native plant communities, reduce architectural diversity and have negative effects on fish populations. Managing exotic aquatic plant species while maintaining native plant communities promotes a healthy and stable fish community.



Submersed Nonnative Plant Management

Areas of nonnative plant growth need to be identified and mapped for management. Utilizing latest technologies available, such as GIS software, precise management maps can be created for implementation. Nonnative infestations, such as Eurasian watermilfoil, require prompt control. Methods of management are provided in this lake management plan. Although a variety of options are available and should be weighed out for each lake, the most common management method is treatment using herbicides.

Starry stonewort should be aggressively controlled to reduce biomass as soon as it is detected. Treatments are most effective when controlled early using algaecides such as SeClear G, Copper Sulfate, and/or Chelated Copper.

When management strategies are applicable and used correctly, control is achievable. Although one management strategy may have been successful for one waterbody, many factors impact success from lake to lake and each unique ecosystem and infestation requires evaluation.

Emergent Nonnative Plant Management

Emergent species such as Purple loosestrife and Phragmites need to be actively monitored and control around the lake.

Purple loosestrife is an exotic species, which is out competing native vegetation, destroying valuable wetlands and animal habitat and expanding in density along Portage Lake. Purple loosestrife can be managed through a variety of techniques including hand pulling, digging, spot treatments or biological control. Selective control through the use of triclopyr (Renovate) is a feasible option for large or small infestations. Hand pulling/digging is more viable for small infestations or in response to an early detection and rapid response. The biological control effort, beetles, have shown positive control measures and this method. Portage Lake has utilized all three management efforts in the past.

Both native and nonnative Phragmites is present in the Portage Lake watershed. Nonnative Phrag, which can out compete native vegetation, destroys valuable wetlands and animal habitat. Research has proven that the BMP for Phragmites is to selectively control the plant through the use of glyphosate or imazapyr herbicides. Treatment techniques often include both hand swiping of plants as well as foliar spray. After treatment, controlled burns, cutting, mowing, etc. can be done with success to remove biomass. Burning or mowing prior to application can further the spread of this highly invasive species. Chemical treatment on Portage Lake has successfully remove much of this biomass and allowed native plants to naturally recover.

Narrowleaf cattails, another exotic species, can outcompete native cattails and wetland vegetation. Management options are limited and spot treatments can be effective.

Native Plant Management

Native plants should be controlled primarily by harvesting if required. Unlike Eurasian watermilfoil, most native plants do not regrow rapidly after harvesting, and a single harvest is often sufficient to control them for the entire summer. Normally low-growing species should not be controlled unless unusually fertile growing conditions allow them to grow tall in areas of high recreational use. Contact herbicides applied at higher rates can be effective at controlling native plants that are causing a nuisance close to shore, in between docks.

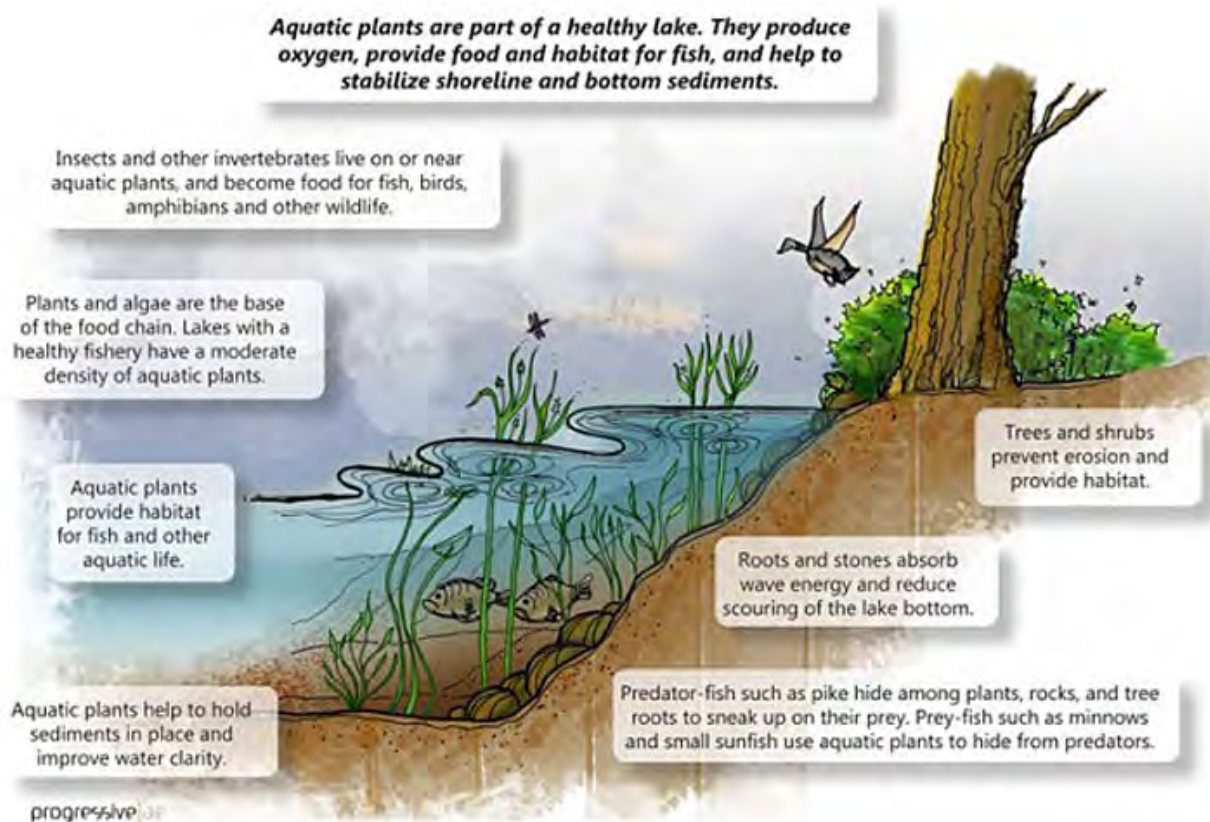


Photo curiosity Progressive AE

Algae Management

Algae are divided into planktonic, filamentous, and macroalgae forms. Planktonic algae are microscopic, free floating plants, often referred to as "water bloom". In large number, the algae can cause water to appear green, brown, yellow, or even red. Cyanobacteria are planktonic algae and can produce a toxin called cyanotoxins. This doesn't mean that if you see any planktonic algae it will have a toxin, but it is wise to be cautious. These algae blooms can last from days to months if conditions are right. Filamentous

algae, commonly called "pond scum" can form raft-like masses over the water surface. Since they are vulnerable to winds and currents, they are generally restricted to bays, bayous, and sheltered shorelines. Filamentous algae can grow attached to the lake bottom, weeds and docks. The filamentous algae will frequently detach from the lake bottom and form floating mats. The macroalgae includes three types, Chara, Starry stonewort and Nitella. Chara grows like a carpet on the bottom of the lake. It is nature's water filter and is excellent for fish bedding. Chara grows approximately one inch a week during the summer months.

An overabundance of algae is an indicator that there is an excess amount of nutrients within the water column/lake, causing the waterbody to become overly productive. Algae are very beneficial in a lake ecosystem and can be thought of as the base of the food chain. Therefore, some alga is required.

However, when an alga reaches the point of hindering the use of the lake, control measures are available. Firstly, actions should be taken within the watershed to promote a healthy lake ecosystem and decrease nutrient loading, etc. However, no immediate change will be seen with these actions. Therefore, many lakes opt to include limited algae control within their management program.

Filamentous algae control is not required at this time, on Portage Lake. Whenever possible reducing nutrient loading entering the lake and watershed is recommended to help reduce future growth. A natural shoreline can also help buffer out nutrients,

Chara, a macroalgae should be encouraged lake wide and is one of the most vital species within the waterbody as it is a natural filter for clarity and is very beneficial for sediment stabilization and the fishery.

Starry stonewort, another macroalgae species, is nonnative and needs to be aggressively managed to prevent ecological damage and the loss of Chara. Although these species look similar, SSW requires immediate management, which can be done through chemical application as well as harvesting (mechanical and suction). This species can spread by fragmentation as well, so harvesting practices need to be very specific to avoid spread. Early detection and rapid response with chemical treatments have proven high effective. Established infestation management practices may differ.

Management of algae is best done through watershed management and reducing the nutrient loading that enters the lake, which can reduce the phosphorus present that feeds algae. If and when algae is present and requires management, a thorough review of options should take place. One common method of algae control is treatment using algaecides. Some algaecides contain copper based products. Whenever using a algaecides, permits, proper licensing and labels must be followed. One of the large concerns with using copper based products is with them building up in the sediments. Although it is true that copper accumulates in the environment, the accumulation occurs in the form of copper carbonates, which are not bioavailable. Copper is a necessary dietary micronutrient and is naturally found in the environment already and like any management tool, should be fully evaluated using best management practices and an integrated approach to determine the cost/risk benefit analysis of the species being discussed.

Natural Shoreline/Nutrient Loading Abatement

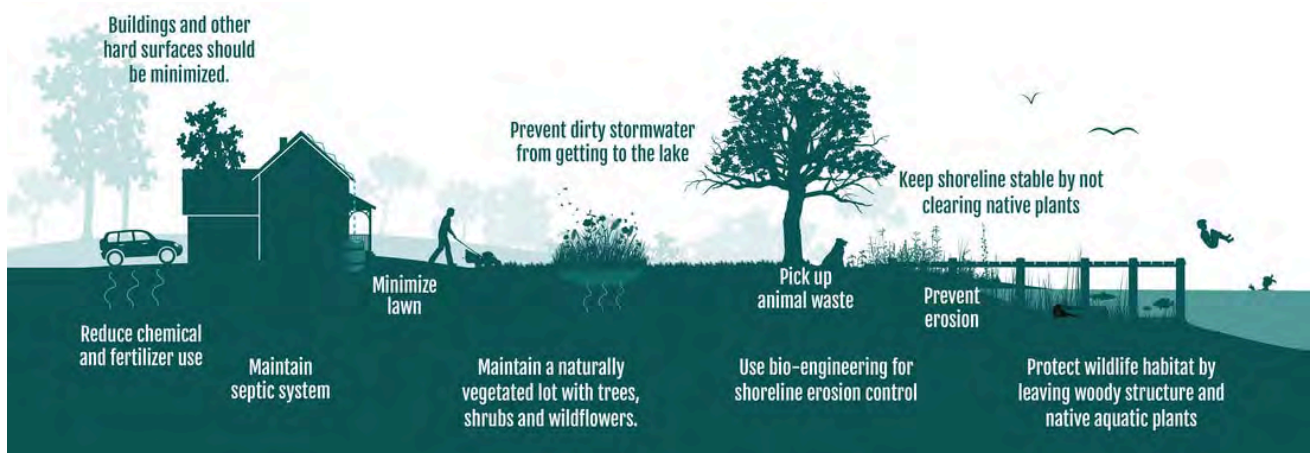
Lakeshore property owners should be encouraged to use phosphorus-free fertilizers on lawns and other areas that drain into Portage Lake or the adjacent wetlands. Lakeshore residents should also be encouraged to manage their waterside landscapes according to the recommendations outlined in publications on this topic available from the MSU Extension.

It is also important to remember that rooted plants derive most of their key nutrients from the sediments; thus, they respond slowly, if at all, to reductions in nutrient loading. In fact, if reductions in nutrient loading lead to improved water clarity, the growth of rooted plants will probably increase.

If organic material (muck) accumulates to undesirable levels in shoreline areas, bacterial treatments should be considered as a way to alleviate the buildup.

Shoreline development has led to habitat degradation and as lakes continue to become more and more developed, the impacts continue to be damaging to the lake ecosystem. From mowed grass and sandy beaches, to seawalls and riprap to wake boat waves and fertilizer, development has negatively impacted a lake in all ecological aspects. By working to reduce the human footprint around the lake, the health of the lake will be improved. Natural shoreline restoration is helpful from reducing nutrient loading and runoff to providing habitat for frogs and fish to naturally defending against Canadian geese congregating in your yard, it is important that action is taken to minimize development impact and restore natural features. Maintaining a natural shoreline can greatly aid in the overall health of the lake.

The implementation of natural shorelines should be encouraged around Portage Lake. Converting seawall shorelines back to natural vegetation; plants, trees and shrubs along the water's edge has many benefits for the lake. Some of benefits of having a natural shoreline are erosion control, nutrient and pollution absorption, increase in wildlife and fish habitat and reduction of nuisance geese on lawns. If seawall removal is not feasible there are other options residents can do to improve and protect the lake. Placing rip rap in front of a seawall will help reduce wave action thus reducing lake scour. Rip rap can also create a suitable shoreline for animals to access the land and provide places for aquatic insects and plants to grow. Also, native vegetation can be planted within the rip rap, creating a more natural shoreline. Adding rip rap is an easy, affordable and effective way to help the lake.



Picture courtesy of MI Natural Shoreline Partnership

Restoration

Pending the level of a waterbody's impairment, specific activities such as phosphorus mitigation, native plantings, fish plantings, etc. can be recommended. As this varies tremendous on a site by site basis, it is generally best to work with healthy lake front living practices, early detection rapid response and education/outreach to prevent infestations and make improvements in the overall ecosystem.

In regards to nonnative plant infestations, it is best to control early. Controlling nonnative plants early is key to lowering the impact to the native plant communities. If and when a monoculture is formed, there is no guarantee that a native species will return. In most cases, once a nonnative plant has been controlled, native plants will naturally flourish in that area. If and when a planting is considered, it is important to only use native species as well as species that have a historical presence within that system. Even native species, once introduced into a new environment can cause negative impacts and have consequences (i.e. Wild Celery (*Vallisneria americana*)).

Lake Management Approaches

Areas of the lake that support vegetation will grow plants, despite intense efforts to remove them. Aquatic vegetation provides important benefits to a lake, including stabilizing sediments, providing habitat for fish and other aquatic organisms, and slowing the spread of exotic plant species. In general, native plants interfere less with recreation and other human activities than exotic species. Non-native plant species, Eurasian watermilfoil and curly leaf pondweed concentrate their biomass at the water surface where they strongly interfere with boating, swimming and other human activities. This growth form also allows exotic plants to displace native plants and form a monospecific (i.e., single species) plant community. The dense surface canopies of Eurasian watermilfoil and Curly leaf pondweed provide a lower quality habitat than that provided by a diverse community of native plants. Control of exotic plant species minimizes interference of plant growth with human activities and protects the native vegetation of the lake. The goal of environmentally responsible aquatic plant management, therefore, is not to remove all vegetation, but to control the types of plants that grow in the lake and the height of plants, to minimize interference with human activities. All activities performed should be do so using best management practices (BMP) and an integrated pest management (IPM) approach using environmental sound technologies and finically feasible options.

It is important that control techniques meet the needs and expectations of lake users. Each technique has advantages and disadvantages. Many aquatic plants are relatively susceptible to some control measures but resistant to others. Too often, lake groups select a control technique before determining what their needs are and the pros and cons associated with various techniques. Further, upon goals being achieved or shifted, various practices may become better suited (or less) for a desired outcome. Often times, one practice will not meet every stakeholders individual goal, however the established practice for various pests needs to be explored for the outcome that best meets practicability. All practices have inherit risk associated with them and reviewing best management practices can be determine which is best suited for each individual situation.

Aeration

Aeration can be a beneficial tool to sustain ecological balance within an aquatic ecosystem. By maintaining sufficient oxygen levels throughout a waterbody, the entire eutrophication process can be slowed down, the health of the fishery can be maintained and overall water quality can be improved. The implementation of an aeration system to control rooted aquatic plant growth is not recommended. Rooted plants, such as Eurasian watermilfoil, will not be affected by aeration. Similar to the use of biological control, the impact of aeration on improving water quality and reducing organic sediment will vary greatly from site to site. Therefore, it is extremely important to thoroughly evaluate each site's conditions and expectations before implementing an aeration system. Aeration systems are regulated by EGLE with an extensive and costly monitoring program. Aeration is not permitted and hshould not be used for plant management. It can be used to help improve dissolved oxygen levels in lakes. The cost of aeration systems can very and are currently not permittable in deep water with the State of Michgian. Aditonal costs include electrical costs and maintenace in additon to the water quality testing and equipment. Project costs are various with ballpark figures of \$10,000-\$15,000 for a 10 acre shallow basins with estimated annually management/testing fees of \$5,000. Some Pros: Potential improvemend in DO, water quaity. Some Cons: Cost, permitting, maintenance.



Bacteria augmentation

The use of bacteria product formulations and application techniques has greatly improved in recent years. Granular bacteria products can be applied to specific shoreline areas to reduce organic muck that has accumulated over the years. As waterbodies age, organic sediment can build up due to excessive plant

and algae growth. This process is called eutrophication. Increasing native populations of bacteria can slow this process down. Reductions in the depth of muck may depend on many variables. Most importantly, the percent of sediment that is organic. The more organics in the sediment, the greater the potential for muck reduction via bacteria augmentation. Bacteria use is performed under a Rule 97 permit, overseen by EGLE and is a nonrestrive, all natural product. Bacteria augmentation is utilized within lake management for muck control, not plant or algae management. Costs of products can range, with an approximate cost of \$300/acre/application. Application recommendations vary with product and are typically monthly during the warmer months, equating to \$1,500.00/acre/season. Some Pros: All natural product, DIY. Some Cons: Slow results, varied amongst site conditions.

Benthic barriers

The use of benthic barriers dates back quite far as a form of pest or weed control. Mats can be placed on bottom sediments to stop light penetration and control places in small areas. This method is not selective and should be used with caution in areas of spawning. Securely placing mats and avoiding navigational hazards is highly important as well. This management technique does require a permit through EGLE and should be used in smaller areas to avoid negative impacts to the native plant community. Benthic barriers are not species selective, therefore using them in areas of high native plant diversity is discouraged as they can negative impact native plants. The cost and practicality of placing them is most appropriate for small scale projects. Various materials can be used but need to be environmentally friendly and costs can vary. For example, Lake Leelanau has spent ~\$200,000 in two years to control several acres (~3.5) of EWM, giving that program an average of \$57,142/acre. The manpower/labor of installing the mats is a large portion of this as well. Some Pros: Chemical free. Some Cons: non selective, cost, labor, navigation, water depth.



Biological control

Biological control options for nuisance aquatic vegetation are limited. Grass carp, which indiscriminately devour aquatic vegetation, have been restricted in many states because of their nonselective grazing and fear they may escape into nonintended waters. The use of the milfoil weevil (*Euhrychipsis lecontei*) to control Eurasian watermilfoil has been implemented in many Michigan lakes. The idea of using a native weevil to target nonnative plants would be ideal, but the success remains extremely varied. Overwintering, shoreline habitat, being eaten by fish are some concerns evaluated when reviewing the appropriateness of planting them on a waterbody. PLM Lake & Land Management Corp has many years of experience participating in weevil stocking, evaluations and longterm observations related to their performance and sustainability. Although the milfoil weevils may impact EWM populations in certain situations, the use of this tool remains unpredictable. Often time control was off the top few inches of the plant, potentially stopping a canopy from forming, but not controlling the entire plant and leaving it available for fragmentation as well as negative impacts to native plant communities. In recent years, the production of milfoil weevils has ceased. Historically, a weevil cost ~\$1.00/bug and thousands would be needed per acre with annual stocking. The use of Purple loosestrife beetles (*Galerucella* beetle) has shown some success on dense infestations of Purple loosestrife with less impact on sparse populations. Some Pros: non chemical; natural. Some Cons: Cost; habitat/overwintering/shoreline; being eaten by fish; results are varied.



Chemical control

Michigan Department of Environment, Great Lakes and Energy (EGLE) regulates the use of chemical control in lakes and ponds across Michigan. This highly restrictive practice uses federal and state approved herbicides and/or algaecides under permits for controlling plants or algae. Dosage, timing, product, and location and among some factors restricted by the permit. The use of aquatic herbicides, is the most common strategy for controlling nonnative or exotic plant species. Aquatic herbicides provide predictable results and there is a great deal of research and data regarding these products. There are two types of herbicides, systemic or contact. Many of the aquatic herbicides available can be used to selectively control exotic species with minimal or no impact on native species.

Systemic herbicides are capable of killing the entire Eurasian watermilfoil plant with little or no impact on most native plant species. Under ideal conditions, several consecutive annual applications of these herbicides can reduce Eurasian watermilfoil to maintenance (low) abundance, such that only relatively small spot treatments are required to keep it under control. For this strategy to succeed, it is necessary to treat most of the Eurasian watermilfoil in the lake each time. There are currently five systemic herbicides, 2,4-D (Sculpin G or Navigate), Triclopyr (Renovate 3 & OTF), Fluridone (Sonar or Avast), and ProcellaCOR which can be used to achieve long-term, selective control of Eurasian watermilfoil. ProcellaCOR has systemic like capabilities, while using low application rates and potentially allowing for multiple season control. Triclopyr is a systemic herbicide with selectivity very similar to 2,4-D. Triclopyr is not subject to the well setback restrictions that currently affect 2,4-D. Therefore, triclopyr can be used to control Eurasian watermilfoil in near shore areas. A combination of both systemic herbicides in Portage Lake could greatly reduce the growing Eurasian watermilfoil problem.

Several contact herbicides, including diquat (Reward) can also provide short-term control of Eurasian watermilfoil and other nonnative species. These herbicides kill only the shoots of the plant, and plants regrow relatively rapidly from their unaffected below ground parts.

Chemical control should only be used by licensed and trained applicators. The State of Michigan has a rigorous licensing protocol. Additionally, using an experienced applicator can ensure that proper dosages and labels are followed. The label is the law when using aquatic herbicides. When using any sort of drug or chemical, from Tylenol to caffeine to herbicides, inherent risk is involved. Aquatic herbicides have inherent risk that is reduced through proper use. Using a licensed applicator does increase the cost of chemical control, as does applying them under a State of Michigan EGLE permit. Pending the type of product as well as the location within the lake, water depth, etc., the rate of products can vary, further impacting cost. Some products can provide residual (seasonal or multiple season control) while others are short term. Cost per acre of control can vary, but systemic control with the goal of seasonal management can range from \$400-\$800/acre. Some Pros: selective; lower per acre cost than other options; can be used numerous water types, i.e. flow, no-flow, deep, shallow, turbid, etc.; fast acting; used in small and large scale systems. Some Cons: use of chemicals is often misunderstood and not organic; plant response can vary; may require annual management; water use restrictions may apply including irrigation restrictions.

Diver assisted suction harvesting (DASH)

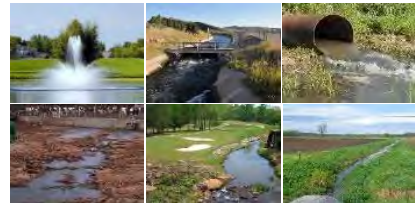
DASH utilizes a suction hose and a diver that hand removes individual plants in selected areas (similar to a vacuum). On land, the collection of material is removed to an offsite location. This management option is also permitted through EGLE. Although very costly on a per acre basis, it is more commonly used on very small infestations. Bottom sediment type is a consideration with this management type as the area can become very stirred up and make visibility extremely difficult, impacting the end results. As fragmentation is a concern, prevention of spreading plants needs to be a consideration. This tool can be used specifically for both nonnative and native species. DASH costs can vary pending projects and is typically charged on a per day basis/project based on depth, location from access/shore, etc. With varying costs, an approximate range is \$6,000- \$9,000/acre. Some Pros: Non chemical management.

Some Cons: Cost; offsite disposal; turbidity/visibility may impact results, distance from shore/access site.

EutroSORB – Phosphorus Filtration Technology

Reducing the phosphorus loading coming into the waterbody, specifically from the numerous creeks and storm drains entering Portage Lake would directly improve the waterbody. Through new technology, SePRO (a leader in water quality enhancement technology) has developed a phosphorus filtration product, EutroSORB, that rapidly binds nutrients in flowing water. This proactive water management technique is a critical need for most waterbodies large and small. This ecologically benign product can be used to offset the need for responsive algae management. EutroSORB bags filter phosphorus from entering a waterbody for a safe, efficient and environmental sound alternative for nutrient control. As a new technology, prices are not yet available as the State of Michigan is still finalizing the permitting process. Some Pros: proactive approach; non herbicide; preventative. Some Cons: permitting.

EutroSORB™
Phosphorus Filtration Technology



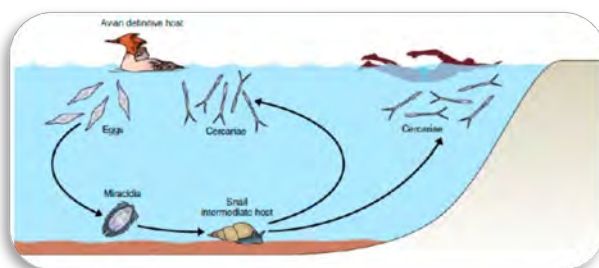
Mechanical harvesting

Mechanical harvesting is best suited for native plant species. Most native plant species have a higher tolerance to aquatic herbicides and require higher dosage rates (higher cost and reduced selectivity). Mechanical harvesting can be used to provide relief from native plant species if they are causing a recreational nuisance. Harvesting does not kill the plants, but simply reduces it's stature, leaving lower growth for fish habitat and sediment stabilization. Mechanical harvesting of Eurasian watermilfoil is not recommended as it will expedite its spread throughout a lake through fragmentation. Harvesting is typically charged on a per hour basis and there is often a minimum or mobilization fee associated with moving equipment into an area, meaning that it often best suited for medium or larger projects. Cost per acre can range and are often estimated at \$300- \$700/hour. Some Pros: Non chemical; quick results. Some Cons: Non selective; depth/distance from shore; dumping/offload sites; speed on water.



Swimmers itch

Swimmers itch, caused by a parasite that travels through waterfowl (i.e. Mergansers) after eating snails and is present in the water column. This parasite can cause an allergic reaction on the skin of lake users, resulting in a rash. Although managing a lake for swimmers itch is difficult, there are preventions that swimmers can use to reduce the impact. Applying sunscreen prior to water entry to create a barrier on your skin, toweling dry immediately upon leaving the water and swimming in deeper water are recommended. Michigan Department of Environment, Great Lakes and Energy (EGLE) no longer permits



the control of Swimmers Itch using copper sulfate, which was historically done. Reducing the presence of the parasite by limiting the presence of the hosts (Mergansers) is promising. Much research is being done on this front currently across the State of Michigan and additional management recommendations may become available in the future.

Lake Management Activities Conducted in 2022

Water Quality

Water quality was evaluated on May 12, June 6, July 27, and September 29, 2022. The May sampling included storm drain and tributary testing. In June, deep hole testing and shoreline testing of Portage Lake occurred. The later July sampling for deep hole testing occurred (this was an additional sampling added into the program in 2015) as well as shoreline sampling. During the last sampling; tributaries, shoreline and the deep hole basins were sampled. During the deep hole sampling the following occurred, (1) a depth profile of water temperature and dissolved oxygen concentrations were measured at ten feet intervals at both Deep Hole Basins and the Secchi disk depth was measured, (2) samples for LakeCheck™ analysis was collected from the deep holes of the lake (surface, bottom and every 10' between) for numerous parameters, (3) chlorophyll and algal composition analysis was collected from surface, mid thermocline and bottom samples. During the shoreline sampling, the following occurred, (1) depth profile for water temperature and dissolved oxygen concentrations were measured at the surface, (2) samples for LakeCheck™ analysis was collected at the surface for numerous parameters, (3) chlorophyll and algae composition analysis was collected at the surface. During the Storm Drain sampling the following occurred at four designated drains, (1) Flow testing, (2) surface reading of temperature and dissolved oxygen (3) samples for LakeCheck™ analysis was collected. During the tributary testing, the following occurred at seven designated tributaries, (1) surface reading for temperature and dissolved oxygen, (2) samples for LakeCheck™ analysis was collected and (3) flow was determined. LakeCheck measures at the various sites included some or all of the following parameters: Conductivity, Total Dissolved Solids, pH, Conductivity, Total Phosphorus, Oxidative Reduction Potential (ORP), Alkalinity, Ammonia, Nitrates and Total Kjeldahl Nitrogen. The additional tributary testing included sampling at one tributary and including testing multiple locations from the entrance at the lake, upstream. Parameters tested included Total Phosphorus, Nitrates and Alkalinity.



Eurasian watermilfoil

Weather Challenges of 2022

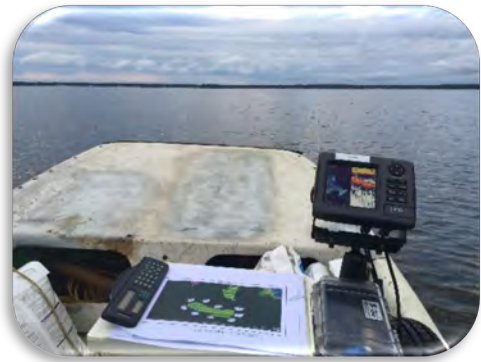
Michigan winters are usually quite different from year to year. While some are very cold and have high snowfall amounts, others are the opposite. The winter of 2021/2022 was relatively mild. When looking at the previous few winters, which were also rather mild, it brings some concern with how the lakes, specifically the plants, will respond the following summer. Weather patterns can have impacts well into the next few seasons, so when we have a mild Michigan winter, it is not helpful with controlling exotic species. Further, ice coverage came late and was not as thick as normal; leading to more sunlight penetration and ability for EWM to overwinter. Weather patterns throughout the summer also have impacts. Each lake responds differently from the weather impact and as Portage Lake tends to be slow to grow in the spring, the longer, warmer falls may impact growth differently than smaller, inland lakes. Finally, weather patterns have brought unusually high-water levels to the Great Lakes, which in turn have had large impacts on Portage Lake. Changes in water levels will have impacts on a waterbody, both short and long term and do need to be taken into consideration when managing aquatic plants.

Exotic species tend to benefit from changes in weather conditions. In Portage Lake, little plant growth is evident early on into the growing season and it is not until mid-summer that diverse plant coverage is found. Weather patterns can have impacts on lakes and individual plant trends that may not be evident right way.

Aquatic Plant Control

Weed treatments were conducted in June and August to control Eurasian watermilfoil (EWM) and Starry Stonewort in Portage Lake. Phragmites was also treated in 2022. The lake was closely monitored this year for any areas of exotic plant growth and treated accordingly.

The management strategy for the control of Eurasian watermilfoil has been working, with substantial reductions in EWM treatments from when the initial treatments began. Although some years see some fluctuation, overall there is a downward trend. However, despite our efforts, EWM control is a constant battle that is heightened with hybrid watermilfoil. The presence of Hybrid watermilfoil supports the conclusion that milfoil treatments will continue to be required annually. Although fewer acres of milfoil management have been required in recent years, the recommended application rates have increased, which uses up the budget more quickly. It is important to plan according for increasing costs from the economy as well as from an evolving plant community. In 2020, through early detection and rapid response, Starry stonewort was identified and treated quickly, in hopes of limiting the spread lake wide. 2022 surveys found the previous year's actions to be very successful, with very little regrowth and no new areas of infestation found. Having a management program in place allowed for the SSW to be detected and treated within a matter of days versus months. Post survey results in both 2020 and 2022 showed a highly effective treatment and time will tell on future impact from this species.



A reflection of proper/successful management is a good fishery, which has been verified through Michigan DNR surveys (separate reports available) as well as the fishing reports on the lake. An independent fish survey of Portage Lake may be beneficial to further research the species, size and fishery habitat within the lake. Additionally, a fish study may help to alleviate some concern about the management program's impacts on the native plant community.

The Phragmites Treatment Program has been very effective as well. After the initial treatment of 83 acres, the follow up years have required just small treatments in proportion to the initial application. In certain years, Purple loosestrife beetles have been planted as a biological control method in the Portage Lake Plan. Access to beetles is currently limited and has prevented new plantings.

The below maps and table show a breakdown of the treatments in Portage Lake in 2022.

Map 1: Portage Lake June 2022 Treatment Map



June 16, 2022 EWM and CLP Treatment, 6.5 acres Flumioxazin, marked in yellow.

Map 2: Portage Lake September 2022 Treatment Map



September 7, 2022 EWM Treatment- 45 acres EWM with ProcellaCOR/Diquat, Flumioxazin (yellow) and 2 acres SSW with SeClear G (red)

Map 3: Private nonnative emergent treatment areas

Private Nonnative Emergent Treatment Areas

i.e. Narrowleaf cattails <0.2acres



Map 4: Portage Lake 2009 EWM Infestation Treatment Map

Portage Lake
Onkama, MI
2009 EWM Treatment (161acres)



Map 5: Portage Lake 2022 EWM/SSW Treatment Map

**Portage Lake Onekama, MI
2022 EWM/SSW Treatment
(~54 acres)**

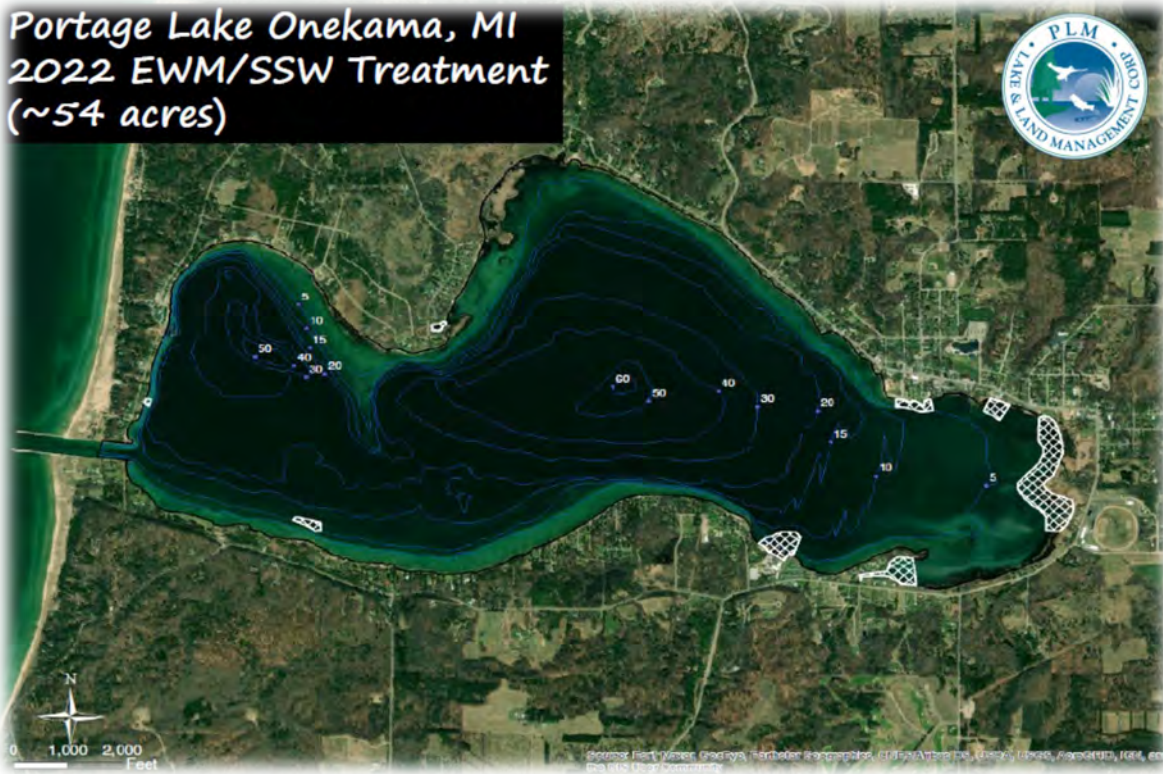


Table 1: Submersed Plant Treatment Quantities 2022

		Product	Rate lbs/Acre	Acres	Total Acres
2022	6-Jun	Flumioxazin	200ppb	6.5	53.9
	27-Jul	Flumioxazin	200ppb	0.2	
	7-Sep	Flumioxazin	200ppb	0.2	
		SeClear G	50lbs	2	
		ProcellaCOR/Diquat	6pdu/1gal	45	

For a complete, historical overview of product usage, treatment dates, acres, etc., please see addendum 2.

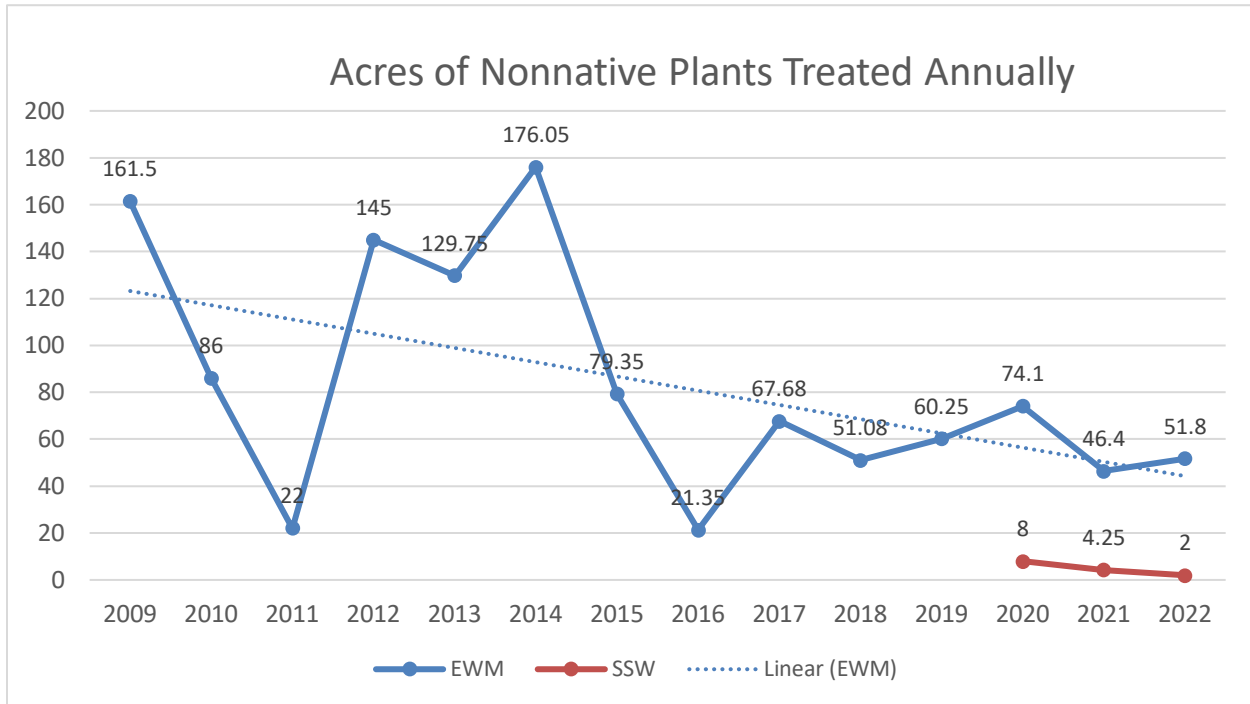
Table 2: Terrestrial Treatment Summary 2021-2009

(Phragmites, Narrow leaf cattails, Yellow iris, Purple loosestrife, Japanese knotweed)-

Year	Product	Rate	Acres
2022	Glyphosate	5%	0.2
2021	Glyphosate	5%	0.23
2020	Glyphosate	5%	0.35
2019	Glyphosate/Imazapyr	3%	6.8
2018	Glyphosate/Imazapyr	1.5,3%	0.2
2017	Glyphosate/Imazapyr	1-3%	0.15

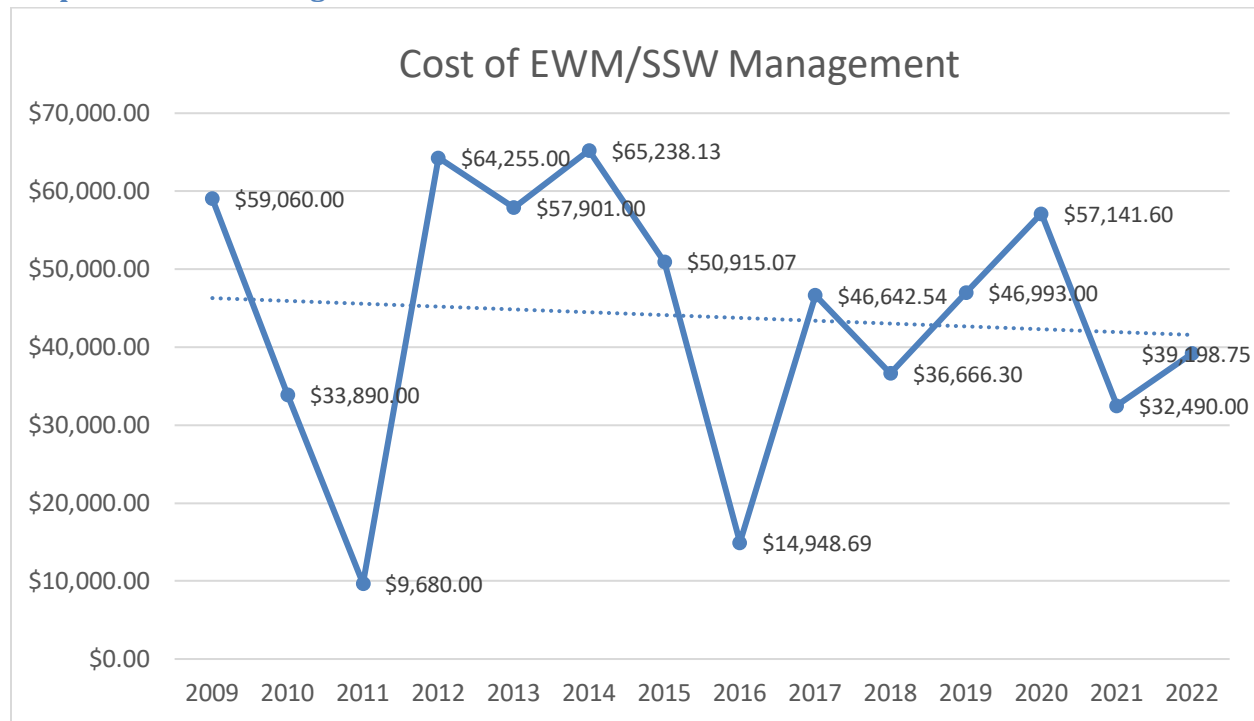
2016	Glyphosate/Imazapyr	1-3%	0.48
2015	Glyphosate/Imazapyr; Triclopyr	1-3%	4
2014	Glyphosate/Imazapyr	4%	6.2
2013	Glyphosate/Imazapyr	2%	7.9
2012	Glyphosate/Imazapyr	2%	13.5
2011	Glyphosate/Imazapyr	2%	7
2010	Glyphosate/Imazapyr	2%	10
2009	Glyphosate/Imazapyr	2%	83

Graph 1: Annual Management Acres



This graph shows acres of EWM and SSW treated since the start of the program. The EWM trendline shows a clear trend down, indicating the success of reducing the coverage of EWM through proper management techniques.

Graph 2: Annual Management Cost



Graph 2 shows the cost of EWM and SSW treatment since the start of the program. The overall trendline here is decreasing as well, an excellent sign. Although unit costs have increased with application rates and economic impacts, the program has been able to keep a similar budget and minimize cost increases whenever possible.

Planning/Evaluation

Surveys of the aquatic vegetation of the lake were conducted on June 6, 16; July 27; September 7 and 29, 2022. Surveys of the lake were made frequently throughout the summer months for pre or post treatment evaluation, to collect water quality parameters, as well as to have additional survey data available for management purposes. Vegetation surveys determine the locations of target and non-target plant species. The results of the surveys are used to determine the most appropriate management strategy. The vegetation surveys also document the success of the prescribed management program. An AVAS survey is the State of Michigan's method for conducting a complete aquatic vegetation survey. The Aquatic Vegetation Assessment Site (AVAS) survey divides the parts of the lake capable of growing plants (littoral zone) into subareas and records the cover of each aquatic plant found in each "site". This method of surveying considers not only the types of plant species present in the lake but also the densities of those species. AVAS surveys are also an excellent way to track plant species trends over time. A goal of invasive plant management is to have native plants increase while exotic plants decrease over time. The success of this goal can be illustrated using the AVAS data collected over several years. Since different native plants grow at varying times throughout the season, it is important to evaluate the lake multiple times to account for *all* species in the lake. The first evaluation is conducted in the spring/early summer while the second is conducted in late summer or fall.

Table 3: Plant Species Found in Portage Lake –2022

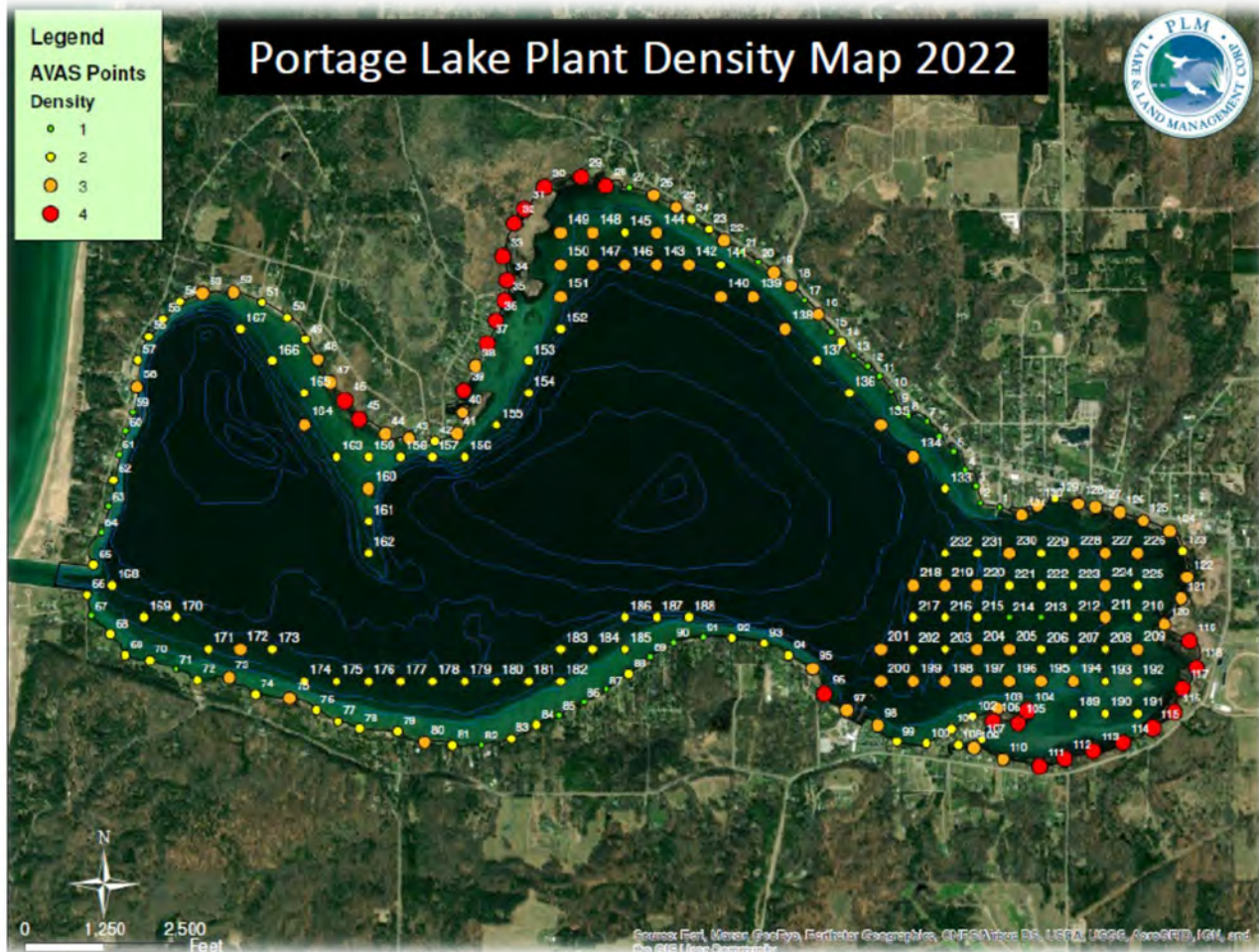
* Based from boat survey, not as precise as a walking shoreline survey

AVAS Code	Common Name	Scientific Name	% Cumulative Cover June 2022	% Cumulative Cover September 2022
	<i>Submerged- Exotic</i>			
1	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>	0.94	0.15
2	Curlyleaf pondweed	<i>Potamogeton crispus</i>	0.08	0.01
29	Starry stonewort	<i>Nitellopsis obtusa</i>	0.00	0.00
	<i>Submerged- Native</i>			
3	Muskgrass	<i>Chara</i>	24.17	18.50
4	Thinleaf pondweed	<i>Potamogeton spp.</i>	5.67	0.52
5	Flatstem pondweed	<i>Potamogeton zosteriformis</i>	1.90	2.08
6	Robbins pondweed	<i>Potamogeton robbinsii</i>	0.00	0.35
7	Variable leaf pondweed	<i>Potamogeton gramineus</i>	1.13	4.91
8	White stem pondweed	<i>Potamogeton praelongus</i>	1.79	0.17
9	Richardsons pondweed	<i>Potamogeton richardsonii</i>	4.64	3.30
10	Illinois pondweed	<i>Potamogeton illinoensis</i>	4.72	0.09
11	Largeleaf pondweed	<i>Potamogeton amplifolius</i>	1.57	0.67
14	Water stargrass	<i>Zosteria dubia</i>	0.34	0.00
15	Wild Celery	<i>Vallisneria Americana</i>	6.43	13.11
17	Northern milfoil	<i>Myriophyllum sibiricum</i>	0.00	0.01
19	Variable leaf watermilfoil	<i>Myriophyllum heterophyllum</i>	0.22	0.24
20	Coontail	<i>Ceratophyllum demersum</i>	0.43	1.57
21	Elodea	<i>Elodea Canadensis</i>	1.34	0.35
22	Bladderwort	<i>Utricularia vulgaris</i>	0.36	0.04
24	Buttercup	<i>Ranunculus longirostris</i>	0.05	0.00
25	Naiad	<i>Najas flexilis</i>	2.49	8.54
27	Sago pondweed	<i>Potamogeton pectinatus</i>	1.10	2.75
48	Water smartweed	<i>Polygonum amphibium</i>	0.04	0.00
	<i>Emergent- Native</i>			
30	Water lily	<i>Nymphaea odorata</i>	0.00	0.04
33	Duckweed	<i>Lemna minor</i>	0.00	0.17
37	Pickerelweed	<i>Pontederia cordata</i>	0.00	0.09
39	Cattail	<i>Typha spp.</i>	8.15	10.24
40	Bulrush	<i>Scirpus spp.</i>	4.98	7.34
42	Swamp loosestrife	<i>Dianthera americana</i>	0.00	0.00
	<i>Emergent - Exotic</i>			
43	Purple loosestrife	<i>Lythrum salicaria</i>	0.00	0.00
44	Common reed	<i>Phragmites</i>	0.05	0.39*
	Total		72.75	75.63

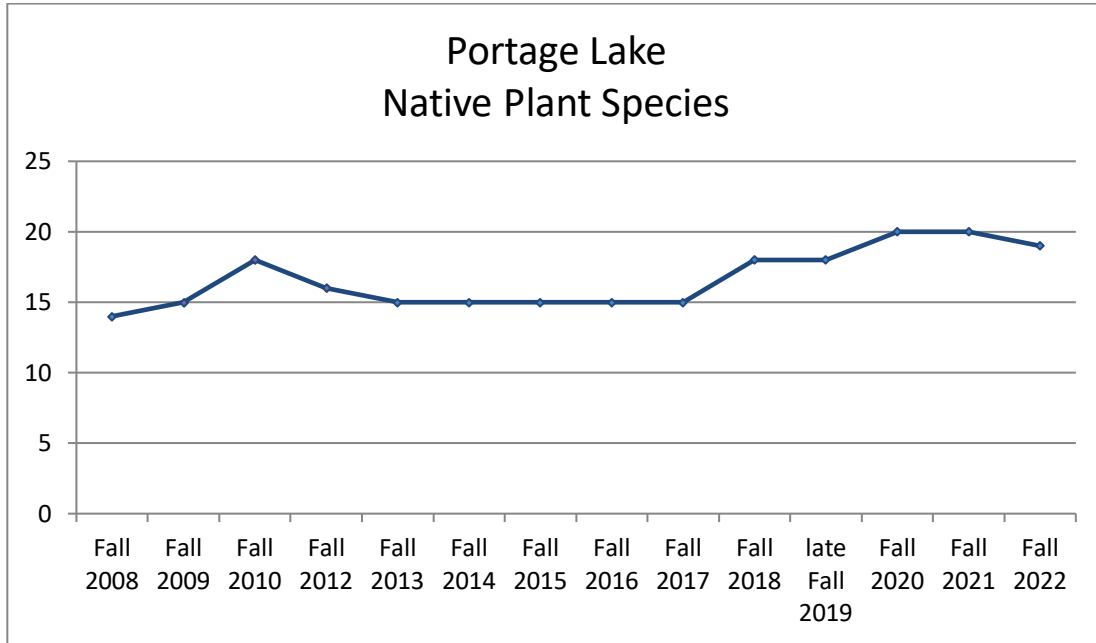
Map 6: Portage Lake AVAS/Grid Combination Map (updated 2022)



Map 7: Portage Lake Plant Density Map

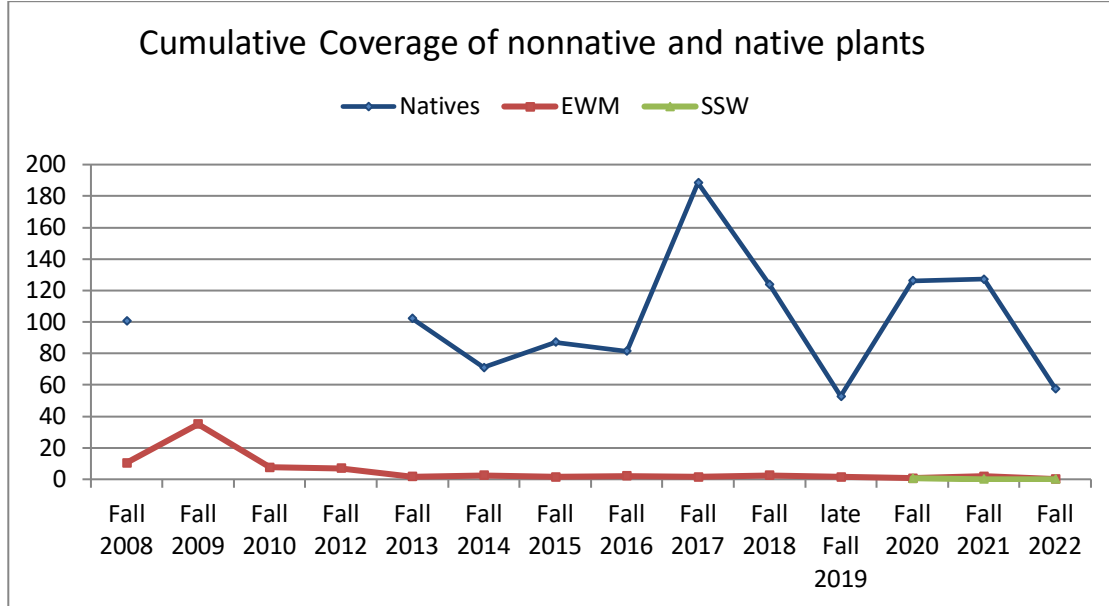


Graph 3: Native Plant Species (Fall AVAS Surveys)



Graph 3 shows the diversity of native plants in Portage Lake. Portage Lake has excellent native plant diversity and this has been maintained throughout managing the nonnative plant species within the waterbody. Although seasonal fluctuation is expected, trendlines are strong and maintaining a diverse native plant community has been archived.

Graph 4: EWM, SSW & Native Plant Cumulative Cover (Fall Data)



Graph 4 shows the cumulative coverage of EWM, SSW & Native plants from 2008-2022. The overall decline in the presence of EWM from the start of the management program shows the success of the program and that the population is currently being maintained at very low levels. The 2019 survey found great diversity but lower density, likely contributed to the weather patterns and a cooler September than the previous few years when increases in plant densities were found. As thought in 2019, the 2020 densities increased, with a warmer fall and earlier survey. In 2022, the number of sites surveyed increased with the additional points, and therefore the comparison of data is skewed and further reflection of numbers can be determined upon additional data being collected. The native plant population will naturally vary from year to year based on weather, water depth and many other factors; but has been maintained during the management of EWM. EWM data marked with purple dots was not collected by PLM, some data provided in Portage Lake LMP's, 2009-2012.

Current Conditions in the Lake

Aquatic Vegetation

Over the years, the presence of Eurasian watermilfoil and Curlyleaf pondweed undoubtedly reduced native plant diversity in the lake. Curlyleaf pondweed, although aggressive, naturally dies out mid-season and the increase in native plants after that die off is evident when looking at the early and late season surveys. With the new introduction of Starry stonewort, potential impact to native plant communities is increased with this aggressive species. Native plants currently have good diversity and density in the lake and though proper management, they can be maintained.

Native plant diversity will continue to be promoted in the lake. The native plant species in Portage Lake benefit the lake, performing such functions as stabilizing sediments and providing habitat for fish and other aquatic organisms. In general, native species cause few problems, compared with those caused by exotic plants. Plant diversity is key to maintaining and improving the overall ecological balance of Portage Lake.

All of the plants listed in Table 3 are native North American species except Eurasian watermilfoil, Curlyleaf pondweed, Starry stonewort Purple loosestrife and Phragmites. These plants are non-indigenous aquatic nuisance species, i.e., plants from other places. These exotic plants cause considerably more problems than most native species. Eurasian watermilfoil and Starry stonewort can attain nuisance levels of growth at almost any time of year, whereas curly leaf pondweed completes its lifecycle and drops out of the water column by approximately the Fourth of July.

The native plant species benefit the lake, performing such functions as stabilizing sediments and providing habitat for fish and aquatic organisms. In general, native species cause few problems, compared with those caused by exotic plants. Three species commonly found in Portage Lake:



Coontail



Sago pondweed



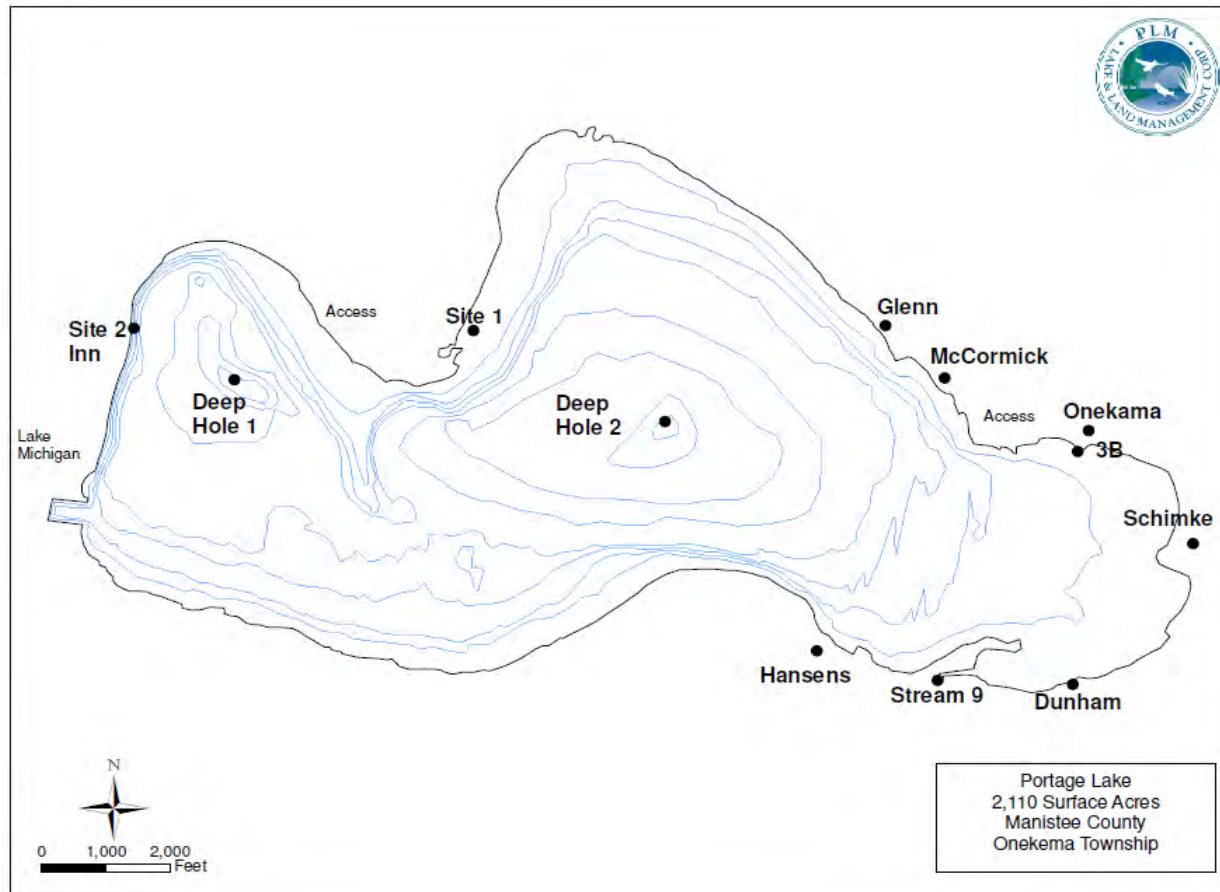
Wild Celery

Water Quality Monitoring

Water quality monitoring is a critical part of lake management. Water quality monitoring provides an ongoing record of conditions in a waterbody. Changes in water quality can indicate threats from sources such as failed or inadequate septic systems, agricultural and lawn runoff, burgeoning development and erosion from construction site. Prompt identification of threats to water quality makes it possible to remedy them before irreversible harm has been done. Riparian's enjoyment of the water resource and the value of their property depend on maintaining water quality. The following tables break down the parameters tested in the different locations in Portage Lake including the Deep Hole Basins (Basin 1 and Basin 2), Shoreline Sites (3A, 3B, 3D), Tributaries (Glen Creek, McCormick Creek, Onekama Creek, Schimke Creek, Dunham Creek, Stream #9, Hansen Creek) and Storm Drains (#2, #5, #6, #7).

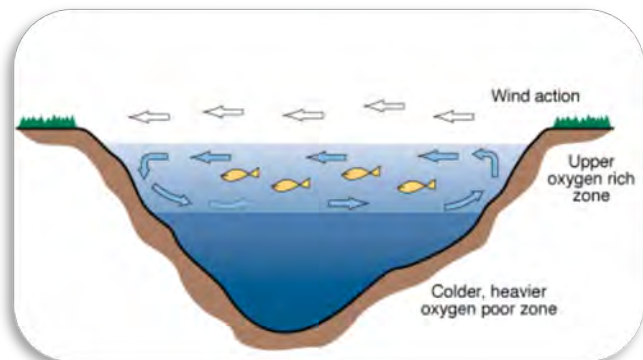
The graphs and tables below contain historical water quality data on Portage Lake that has been collected from numerous parties other than PLM. All information was made available to PLM via the Invasive Species Committee, on behalf of the Portage Lake Watershed Forever and Onekama Township and used with permission.

Map 8: Portage Lake Water Quality Testing Locations



Temperature and Dissolved Oxygen Profiles

Depth profiles of temperature and dissolved oxygen indicate that on June 6 the lake was already stratified. The surface levels were above saturation, 9.96 mg/L at Basin 1 and 10.04 mg/L at Basin 2 with shoreline ranging from 8.88 to 10.04 mg/L. At this time, Portage Lake had adequate dissolved oxygen all the way down to 60' in depth (7.9 mg/L in Basin 1 and 9.64 mg/L in Basin 2). On June 6, the lake was thermally stratified, with a thermocline at approximately 20' in Basin 1 and 30' in Basin 2 - much deeper than in 2021. The epilimnion (i.e., water above the thermocline) was well oxygenated, with oxygen concentrations at adequate levels to support a healthy fishery. Conditions in the hypolimnion (i.e., water below the thermocline) were also oxygenated.



On May 12, four storm drains (table 9) and seven tributaries (table 4) were tested coming into Portage Lake. The storm drains had similar DO levels to past years, including Drain #2 Zosel Park, which couldn't be sampled in 2021 due to water levels. All of the tributaries were well oxygenated ranging from 8.63 to 10.52 mg/L, similar to previous years.

In late July, the lake was still strongly divided. The late July sampling was added into the program in 2015 and has been sampled since. Basin 1 was stratified and was almost anoxic at the bottom of the lake

(void of oxygen). The thermocline in Basin 1 was 20', similar to most recent years. Oxygen levels stayed more consistent and didn't start declining until 40' and at that point the oxygen levels started a quick drop from 7.3 mg/L to 0.3 mg/L. These levels are lower (more concerning) than 2021 sampling. 3.0 mg/L is generally considered anoxic. In Basin 2, the surface waters had oxygen levels at 9.18 mg/L (similar to past years) and a thermocline at 30'. Oxygen levels the last few years have been better in the July sampling, but in 2022, levels were concerning again. Basin 2 deep sample had a reading of 0.3 mg/L compared to 4.83 mg/L in 2020, 3.45 mg/L in 2019 and to 0.93 mg/L in 2018. In 2022, oxygen levels below 40' were concerning, showing signs of anoxic water.

During the fall, the lake was still stratified strongly in Basin 1 and not in Basin 2 during the sampling period. In years past, both mixing and no mixing has been found during this sampling period. The warmer Michigan fall seasons of the last few years will impact this greatly. Basin 1 was stratified and it was still anoxic below the thermocline (void of oxygen), which has not been found this late into the year in the past. DO levels ranged from 9.15 mg/L at the surface to 1.2 mg/L at the bottom, much lower than in 2021. In Basin 2, which is often already mixed at this time of year due to the fetch of the lake, had no thermocline during the sampling. As such, there was dissolved oxygen present throughout the water column and it saturated from top to bottom. 9.07 mg/L at the surface and 8.65 mg/L at the bottom.

Substantial oxygen demand leads to rapid deoxygenation of the hypolimnion upon thermal stratification in the spring and oxygen concentrations are frequently decreased in bottom waters during the summer. Depletion of oxygen beneath the thermocline during the summer is a common symptom of eutrophication, and often leads to elevated internal nutrient loading as the result of the release of phosphorus from hypolimnetic sediments. The 2019 sampling showed good oxygen levels present in the hypolimnion, compared to previous years, as did some of the 2020 readings. The 2021 and 2022 sampling wasn't as positive.

pH

pH describes the balance between acids and bases in the water. Neutral values of pH are desirable. Low pH values typically result either from the growth of bog vegetation (such as peat moss), acid precipitation ("acid rain"), or acid runoff (as in acid mine drainage). Excessive growth of certain plants and algae can raise pH values. A majority of Michigan lakes have pH values in the 7-9 range. Portage Lake pH was recorded in Basin 1 and Basin 2 in the June, July and September as well as in the tributaries and shoreline sites. The pH average in June was 8.32, in July 8.08 and in September averaged 8.34. The shoreline sampling was similar to the deep hole basins as was the tributary and storm drain sampling. This data is consistent with previous samplings.

Total Alkalinity

Alkalinity, in addition to pH, measures the amount of dissolved bases and the balance of acids and bases in the water. Alkalinity specifically measures the concentration of carbonates and bicarbonates in the water. These compounds and other ions associated with them can make water "hard". High alkalinity lakes are hardwater lakes, while low alkalinity lakes are softwater lakes. Different kinds of plants, algae and other aquatic organisms live in hardwater versus softwater. Alkalinity is a basic characteristic of water and is neither inherently good nor bad. Total Alkalinity was measured in June, July and September in both Basin 1 and Basin 2. The average sampling between both basins in June was 110 mg/L with a range of 106-113 mg/L. The July samples were similar with an average of 124 mg/L with a range of 111 - 130 mg/L. The September samples were similar with an average of 124 mg/L with a range of 115 - 128 mg/L. All samplings show the lake to be considered "soft" with readings under 150 mg/L, a typical threshold of a hardwater lake. Overall, the 2022 readings on the lake are similar than previous readings, but overall show consistent softwater data for Portage Lake.

Conductivity and Total Dissolved Solids

Conductivity and Total Dissolved Solids (TDS) measure the total amount of material dissolved in the water. Higher values indicate potentially rich, more productive water, whereas lower values indicate

potentially clean, less productive water. (If nutrient pollution is occurring, the total phosphorus concentration is a much better indicator of potential productivity.) The combined readings of TDS on Portage Lake ranged from June readings averaging 206 ug/L, July averages of 210 ug/L to September readings averaging 204 ug/L. (Shoreline samplings were very similar to deep basins). The tributary sampling was slightly higher, averaging 274 ug/L in May and 259 ug/L in September. Overall, these averages classify the overall TDS of Portage Lake as Low Dissolved material. The conductivity readings on Portage Lake are slightly higher than the TDS readings with the basin average of 318 uS/cm in June, 322 uS/cm in late July and 313 uS/cm in September. (uS/cm=microsiemens per centimeter). Higher levels can likely be due to runoff, which is also supported by the slightly higher conductivity readings from the tributaries (May average Conductivity reading is 330 uS/cm while September average is 421 uS/cm). Tributary readings are similar to past readings.

Oxidative Reduction Potential (ORP)

The oxidative reduction potential of a lake measures the ability of the water to serve as potential oxidizers and indicates the degree of reductants present within the water (the ability to gain or lose electrons). The reduction potential measurement has proven useful as an analytical tool in monitoring changes in a system rather than determining their absolute value. Like pH, the redox potential represents an intensity factor. It does not characterize the capacity of the system for oxidation or reduction; in much the same way that pH does not characterize the buffering capacity. Generally speaking, higher ORP values, the healthier the lake. As a lake stratifies and oxygen levels decrease towards the bottom of the lake, ORP values will decrease even in a healthy lake due to the lack of oxygen. This is because there are many bacteria working in the sediments to decompose the material and they use up the available oxygen. ORP is measured in addition to pH and dissolved oxygen as it can provide additional information of the water quality and degree of pollution, if present. High ORP values indicate high levels of oxygen in the water and that bacteria that decompose the dead matter can work more effectively. The deep basins ranged from 56 - 112 mV in June sampling to 80 - 112 mV in the late July sampling to 67 - 87 mV in the end of summer/fall sampling, indicating oxidized conditions. Tributaries and shoreline samples had similar results to past years.

Turbidity

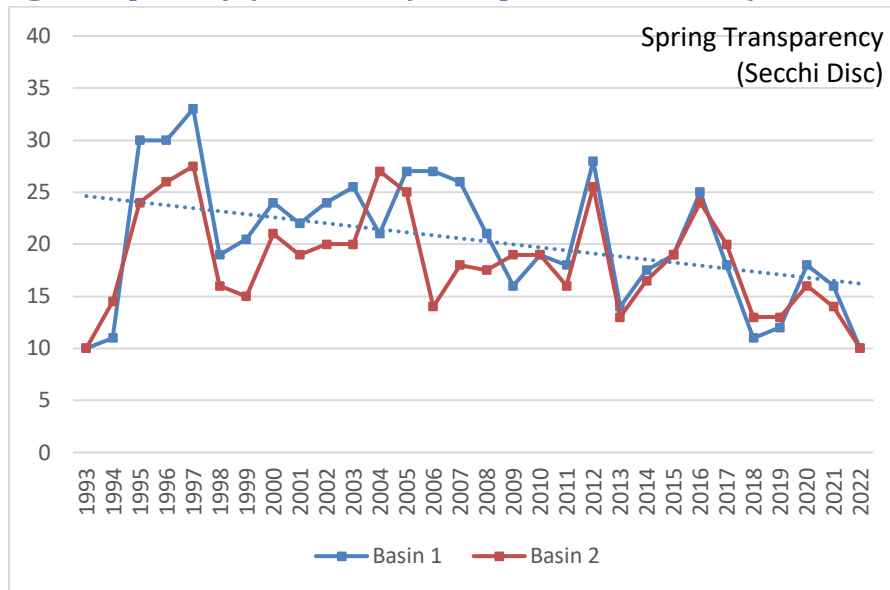
Turbidity is a measure of the clarity of the water, specifically from the presence of suspended particles in the water. Turbidity will typically increase as the suspended particles in the water increase, lowering clarity of the water. Turbidity may be caused by a variety of factors from the bottom sediments, erosion, algae production, and runoff and possibly from fish species such as carp. Suspended particles can capture heat from the sun raising water temperature as well (often witnessed in shallow waters). Turbidity readings on Portage Lake ranged from 0.96 - 2.45 NTU's in June to 0.17 -1.67 (at the bottom) NTU's in late July to 0.18 - 11.81 NTU's in October. This outlier result is likely due to the bottom sediments getting disrupted during sampling and should be thrown out based on historical data. Shoreline sampling ranged from 0.53 - 0.75 NTU's in June, 1.7 - 2.7 NTU's in late July and 1.6 - 2.2 NTU's in September. The 2022 turbidity readings are overall higher than previous years. This may have been noticeable in the water column, with less clear water, which was also found with the lower clarity readings with the secchi disc sampling. The World Health Organization (WHO) requires drinking water be less than 5 NTU's, but recreational water can be significantly higher. Overall, the turbidity readings on Portage Lake are within safe drinking water standards (this does not mean that the lake water should be used for drinking as it is not filtered).

Secchi Disk Depth

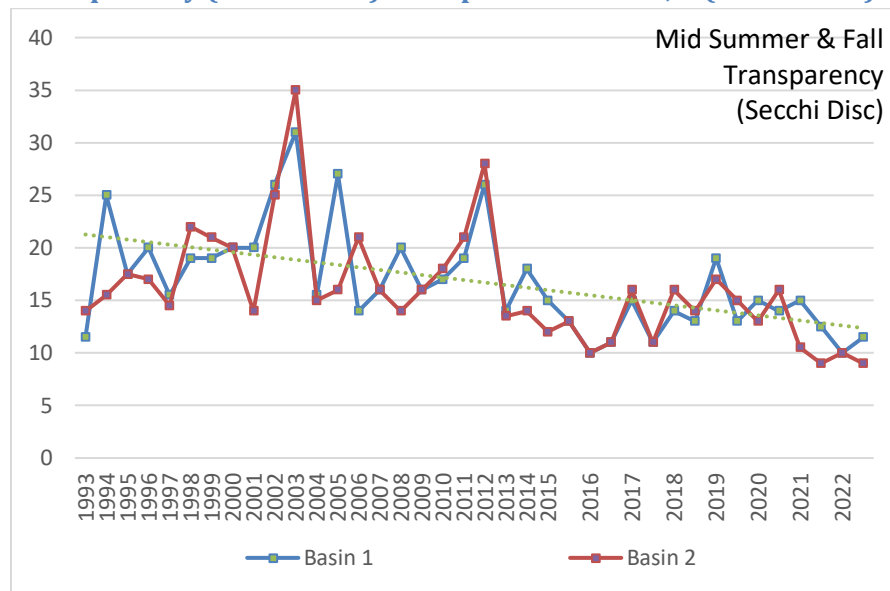
The Secchi disk depth is another measure of water clarity, determined by measuring the depth to which a black and white disk can be seen from the surface. (Larger numbers represent greater water clarity.) In June, Basin 1 was 10' as was Basin 2. Clarity remained similar with the Secchi disk depth of 10' in late July in Basin 1 and 10' in Basin 2 and was at 11.5' in Basin 1 and Basin 2 was at 9' in September. Generally speaking these results are slightly lower than normal. Water clarity can fluctuate from week to week depending on several environmental factors such as rain fall & algal production. Basin 2 may likely be more affected by the fetch of the lake, therefore could likely have a lower Secchi disk reading. These clarity readings show that sunlight is available for plant and algae throughout a good portion of the lake. Reviewing trendline data for clarity, Portage Lake clarity is decreasing.



Graph 5: Spring Transparency (Secchi Disk) - Deep Hole Basins 1, 2 (1993-2022)



Graph 6: Fall Transparency (Secchi Disk) - Deep Hole Basins 1, 2 (1993-2022)



Total Phosphorus

Total phosphorus measures the total amount of phosphorus in the water. Phosphorus is an important plant nutrient (i.e., fertilizer) and the nutrient most likely to limit algal growth. Phosphorus levels are not only related to internal loading of nutrients but also from external sources. Elevated phosphorus inputs to lakes caused by human activities are a major cause of cultural eutrophication. Readings above 10 µg/L are considered slightly enriched while readings over 30 µg/L are considered enriched.

Total phosphorus concentrations in June in Basin 1 were 8 µg/L at the lake surface, and 8 µg/L at thermocline depth and 8 µg/L in the bottom water. In Basin 2, 10 µg/L at the lake surface, and 8 µg/L at thermocline depth and 8 µg/L in the bottom water. The June shoreline readings from sites Cove was 8 µg/L, 3B was 8 µg/L and the Inn was 13 µg/L.

The tributary TP readings in May ranged from 8 - 27 µg/L (more consistent with historical data as 2021 samples were lower than normal). Storm Drain TP May readings were from 24 - 31 µg/L. In the past, higher TP readings have been found coming from the tributaries and storm drains. Overall, the spring samplings on the lake have stayed similar to past years, showing a slight trend down. The tributaries were similar to the past while the storm drains were similar to the past, both of which are standardly more elevated than the basins.

Late July Total Phosphorus concentrations were 8 µg/L at the surface, 8 µg/L in the thermocline and 8 µg/L at bottom in both basin. No increases from the June testing and readings are still well below levels of concern. This indicates that the TP is consistent from top to bottom and even with a void of dissolved oxygen, TP levels are not elevated, indicating no internal loading.

End of summer Total Phosphorus concentrations were: Basin 1 10 µg/L at the surface, 10 µg/L at 30' and 10 µg/L at bottom while Basin 2; 20 µg/L at the surface, 10 µg/L in the thermocline and 10 µg/L at bottom. These samples are slightly higher than the July readings, but still considered relatively low.

In 2017, levels were increased from 2016, but in 2018, levels had decreased and were back similarly to 2016 concentrations. Overall, the sampling in 2019, 2020 and 2021 and 2022 are all similar, with very few fluctuations overall. This is a positive sign for Portage Lake.

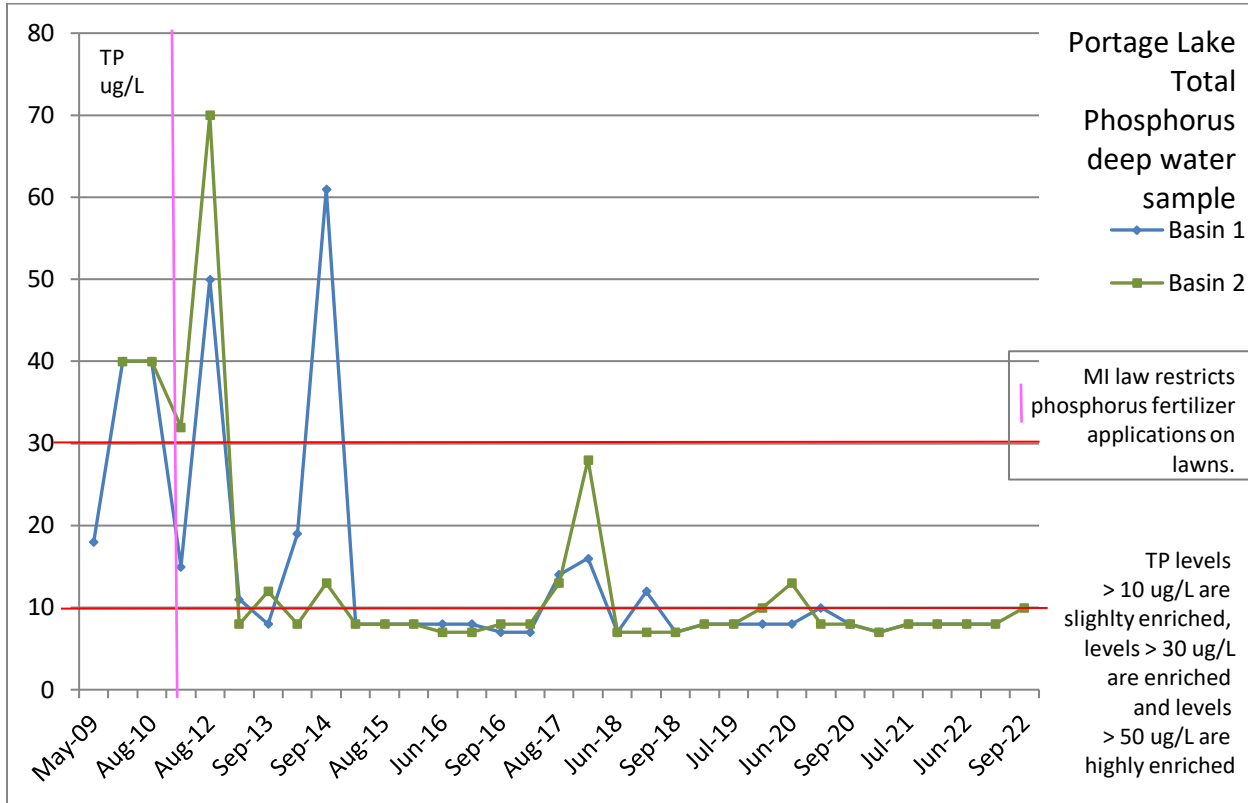
In years past, tributary sampling showed Stream #9 was generally the highest of the reading; however, in recent years, this is not always been the case. In 2022, the tributaries were similar in the spring and fall and are classified as enriched to highly enriched. Historically, the tributary samplings show higher levels of TP compared to the basins. Stream #9, which has had additional tributary upstream testing completed upstream in the past, did not have enough flow or water present in the creek, to collect adequate samples in 2021 or 2022.

Overall readings show that higher phosphorus concentrations are found in the tributaries and that internal loading was not a contributing factor to TP in 2022. The 2022 data shows the TP had stayed low in both Basins, similar to what was found in 2019, 2020 and 2021, and still well below historical data. Past data has shown that Basin 2 is routinely higher in concentrations than Basin 1, which is expected due to the fetch and potential lack of oxygen of Portage Lake; however, the last few years of data has shown a declining trend.

See below graphs of TP concentrations from 2022. Basin 1 and 2 are graphed using data previously collected on Portage Lake (via various sources, provided to PLM via the Portage Lake Watershed Forever website with permission from the committee).

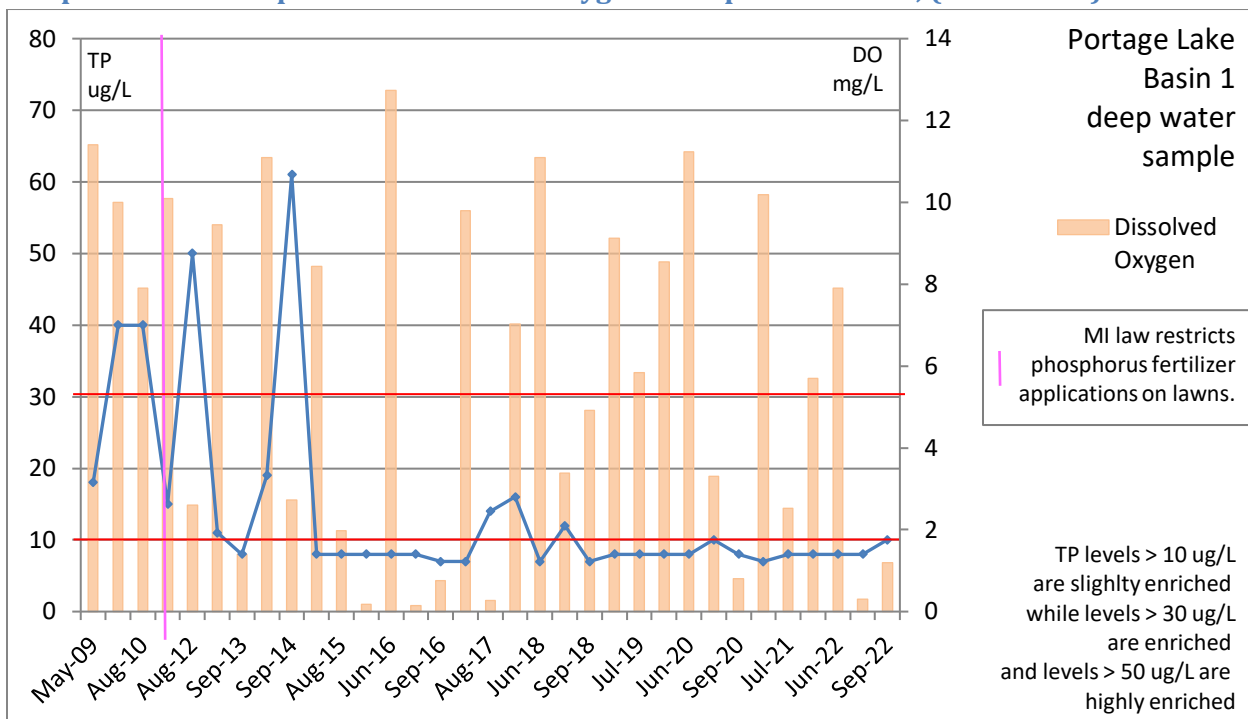
Beginning January 1, 2012, Michigan law restricts phosphorus fertilizer applications on lawns. This is noted in graphs as an event to track Phosphorus trends post ban.

Graph 7: Total Phosphorus - Deep Hole Basins 1, 2 (2009-2022)



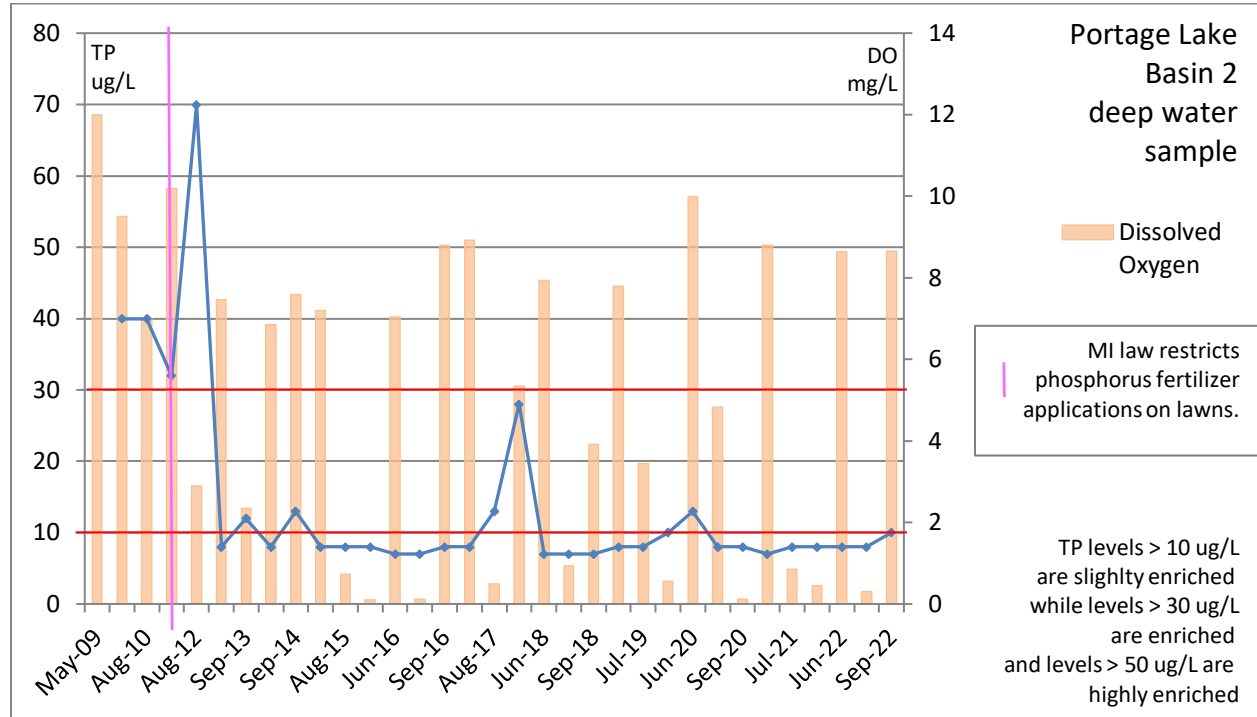
There have been a few spikes in TP over time but generally speaking, the bottom waters of Portage Lake are not classified enriched based on the sampling in recent years. Note: Basin 2 May 2009 sample is not graphed as the reading of 340 ug/L is an extreme outlier and not reflective of the overall lake results.

Graph 8: Total Phosphorus & Dissolved Oxygen - Deep Hole Basin 1, (2009-2022)



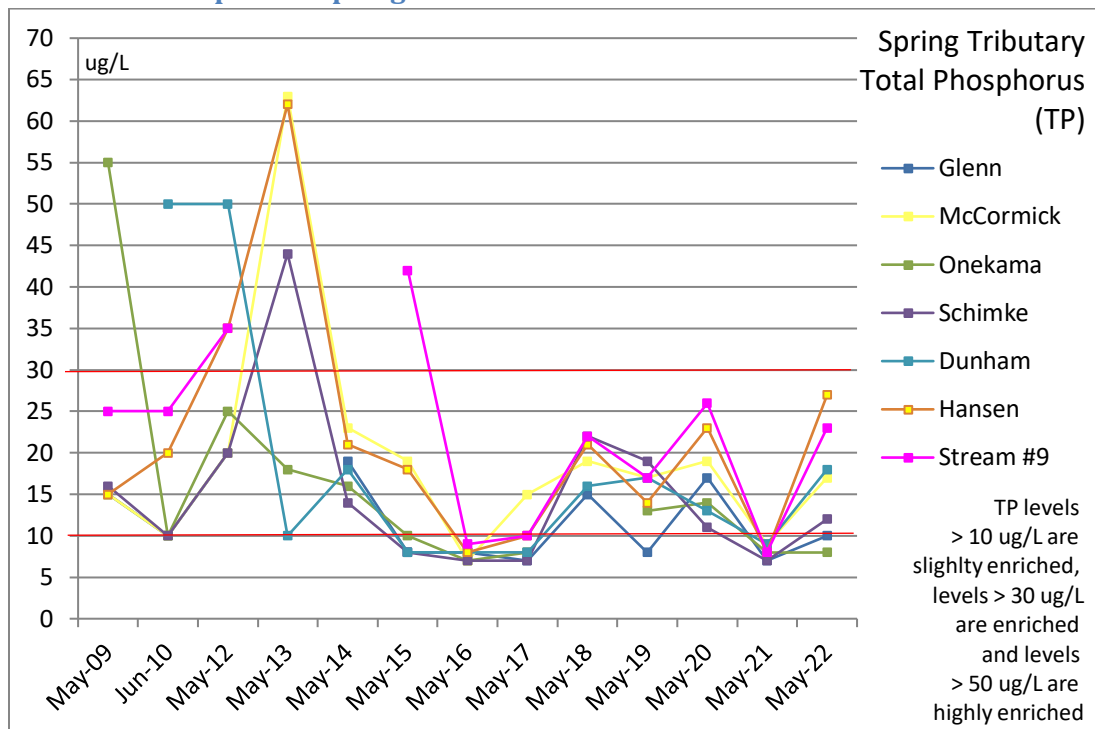
Looking at the trendlines, Basin 1 has higher DO levels during mid to late summer months than Basin 2. Higher DO levels are better. Internal loading (spikes in TP) can take place when DO levels decrease. There is no indication of internal loading taking place.

Graph 9: Total Phosphorus & Dissolved Oxygen - Deep Hole Basin 2, (2009-2019)

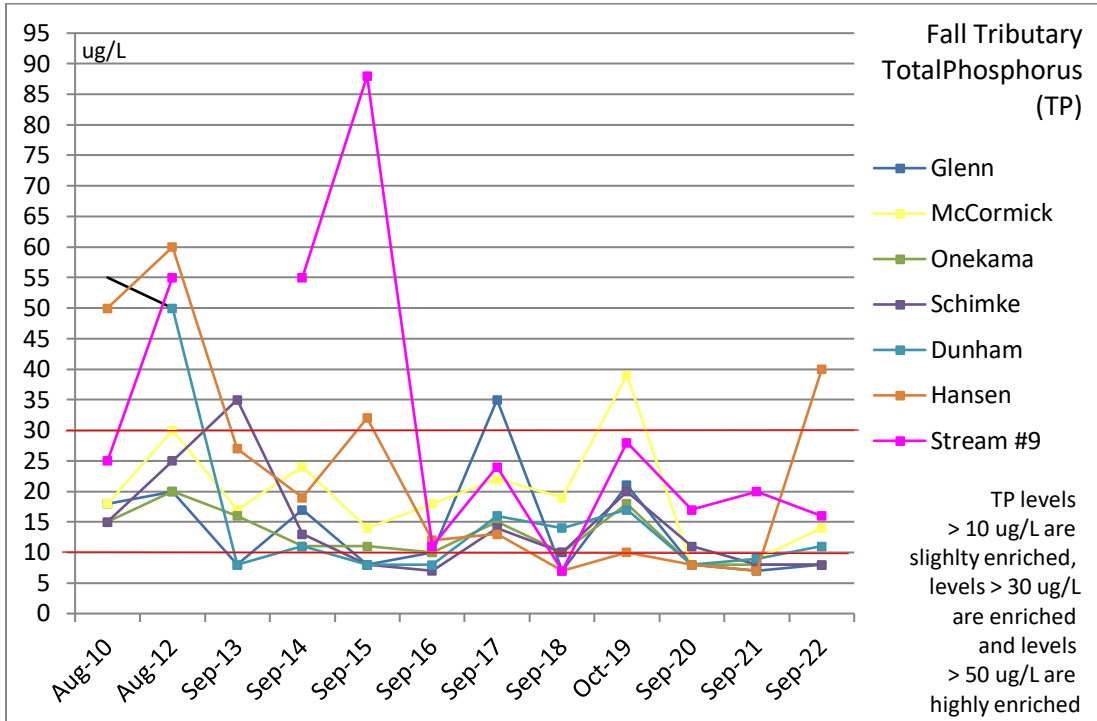


Looking at the trendline data, DO has consistency declined in the mid to late summer months, leading to anoxic conditions. However, TP levels have stayed low; which is an excellent sign. There is no indication of internal loading in Basin 2.

Graph 10: Total Phosphorus Spring - Tributaries 2009-2022

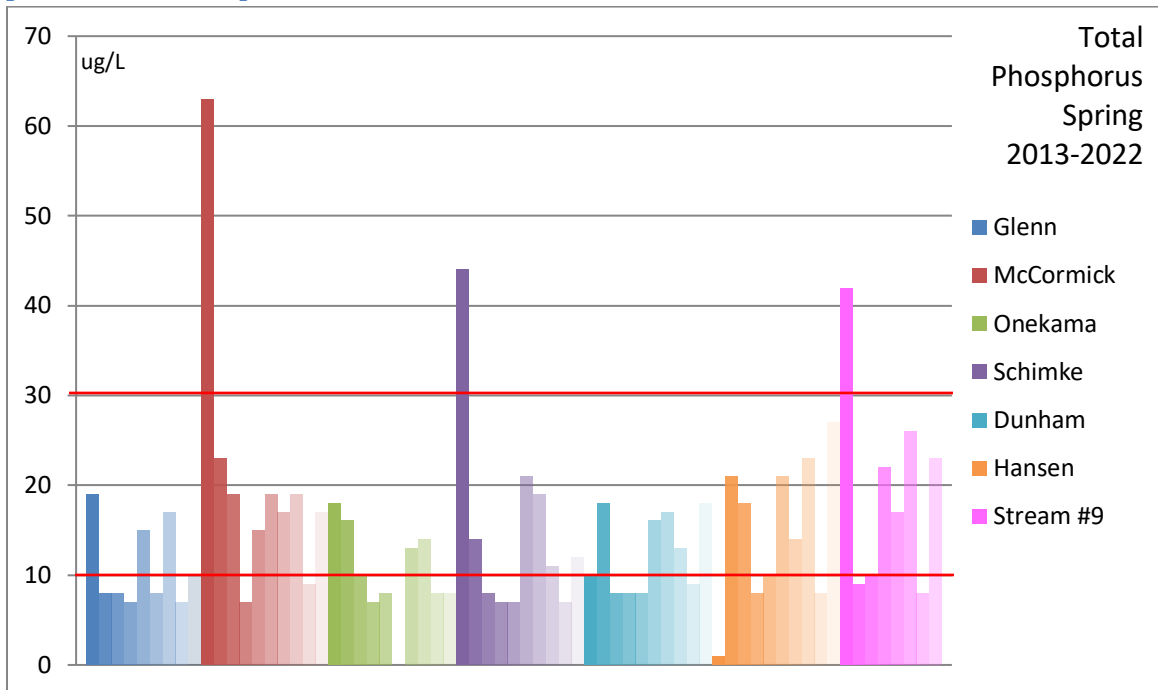


Graph 11: Total Phosphorus Fall - Tributaries 2009-2022



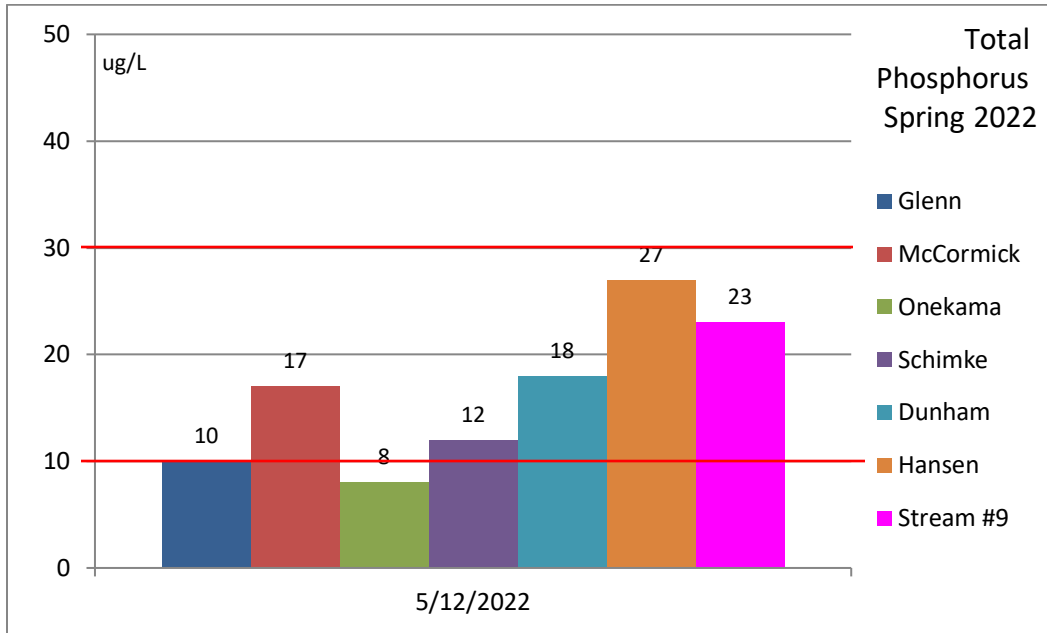
Graphs 10 and 11 indicate there are fluctuations between the creeks over time. See below graphs to show the 2022 comparisons between the creeks. Glenn Creek May 2013 sample was removed from this graph as an extreme outlier, likely from a contaminated sample. Stream #9 was not sampled in 2013.

Graph 12: Total Phosphorus - Tributaries 2013-2022



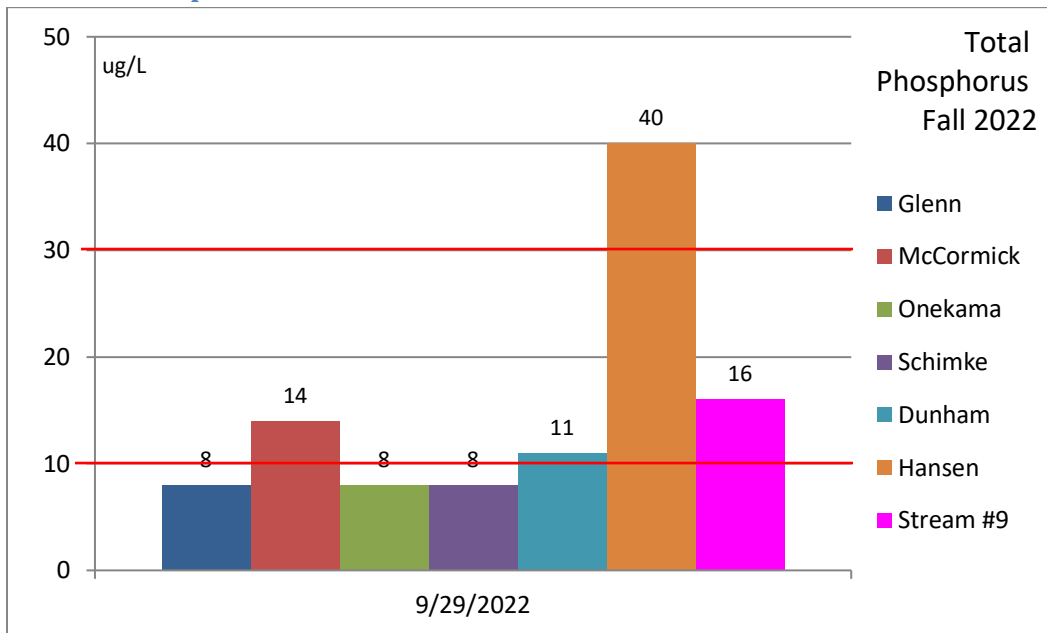
Graph 12 shows the fluctuation in TP in each Tributary over time. Historically, the tributaries have been and remain a point source of pollution for Portage Lake.

Graph 13: Total Phosphorus – Tributaries May 2022



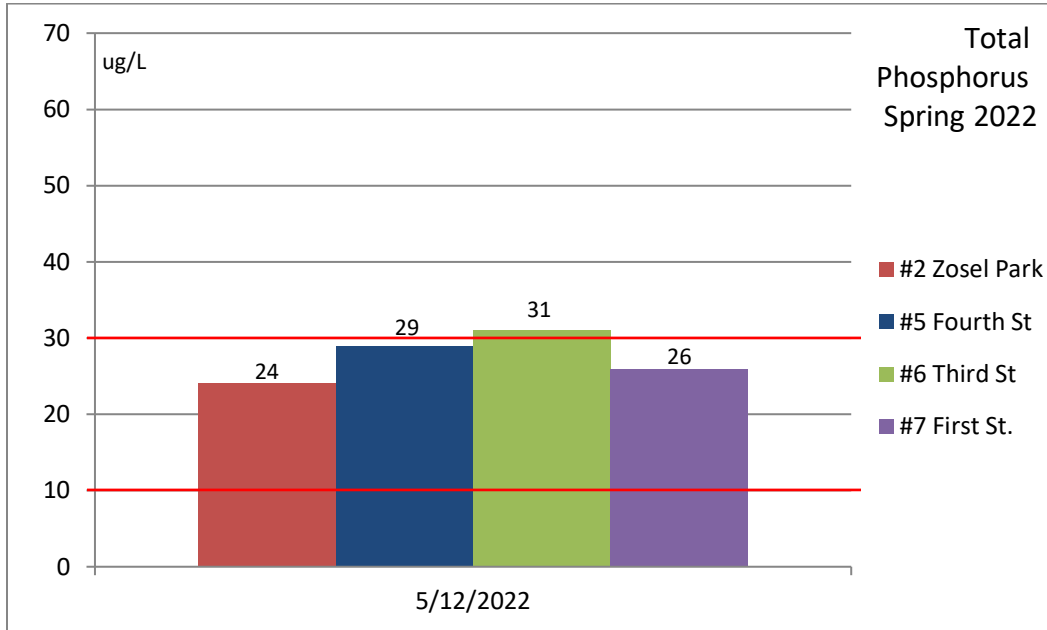
Graph 13 includes the Total Phosphorus from each Tributary tested in 2022, showing increases from 2022 and most are classified as enriched.

Graph 14: Total Phosphorus – Tributaries End of Summer 2022



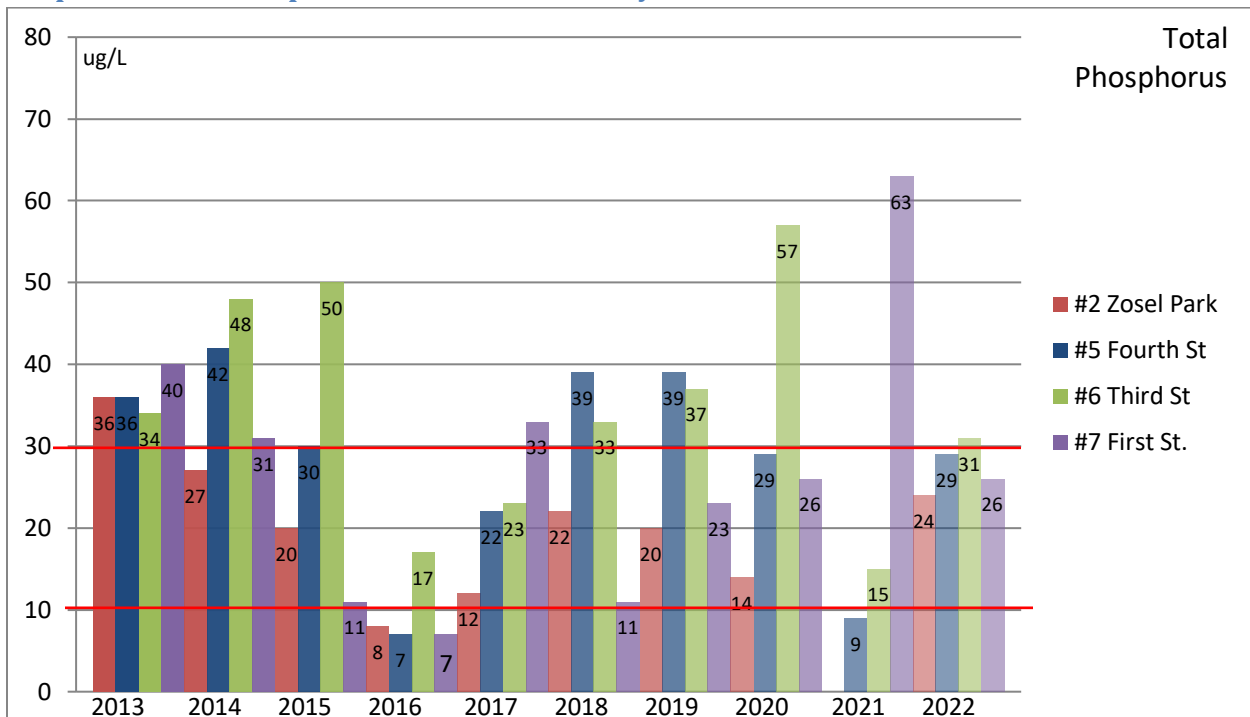
Graph 14 illustrates the TP in the fall sampling, which generally speaking is lower than the spring sampling. Rainfall and flow is traditionally higher in the spring, correlating with increased phosphorus inputs.

Graph 15: Total Phosphorus – Storm Drains May 2022



As the graph illustrates, there is little fluctuation between the TP in the different storm drains around Portage Lake and overall, the samples are enriched.

Graph 16: Total Phosphorus – Storm Drains May 2013 - 2022

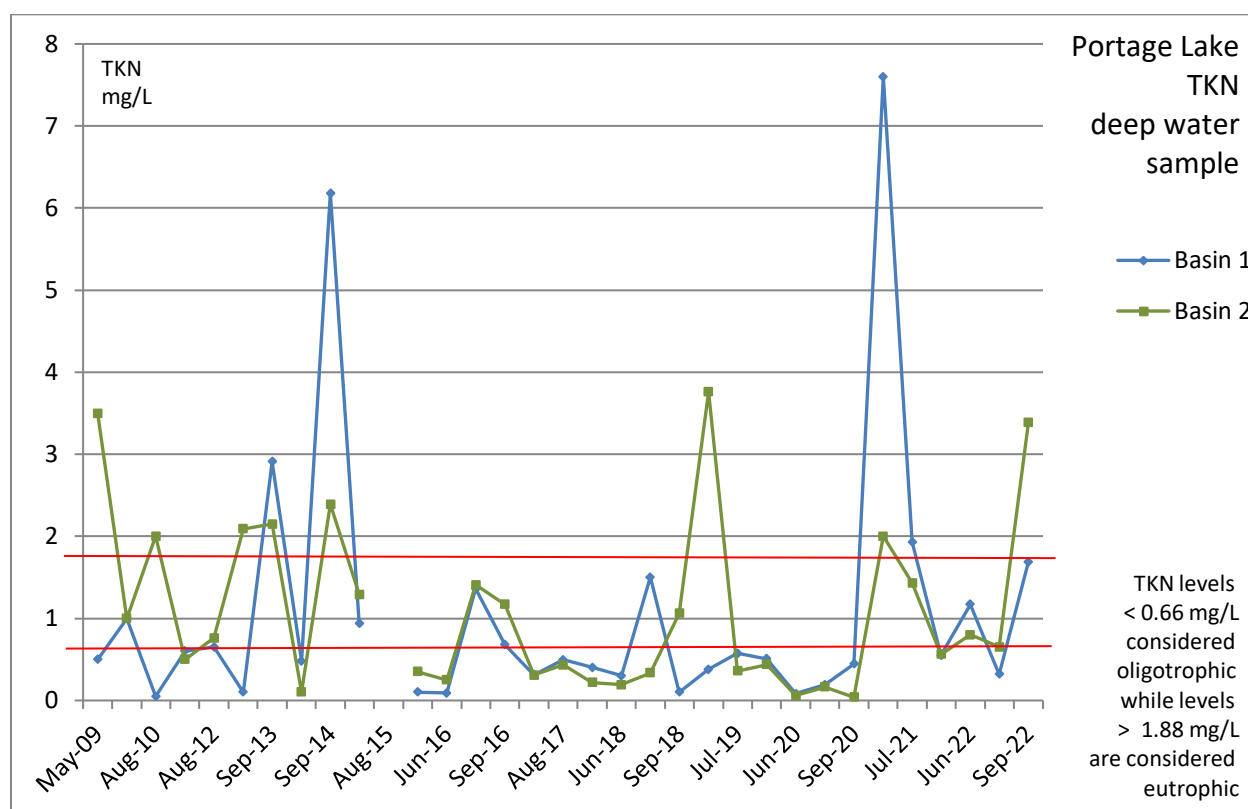


Graph 16 shows the storm drain TP over time and most of the TP concentrations are considered enriched. These sites are a key introduction point of Phosphorus into Portage Lake. Historical data shows a decline in TP in 2016 but that was short lived and current concentrations are enriched.

Total Kjeldahl Nitrogen (TKN)

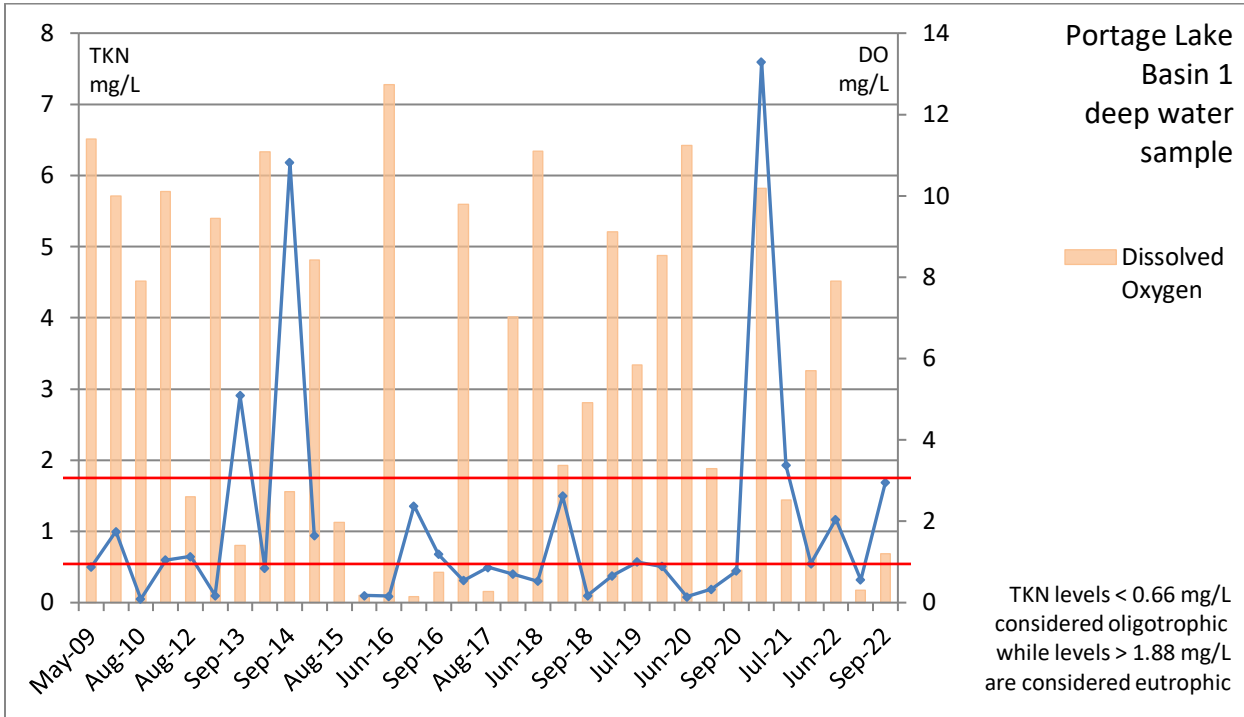
TKN measures the total organic amount of nitrogen (nitrate and nitrite) and ammonia in the water. Nitrogen is the plant nutrient (i.e. fertilizer) most likely to control the amount of rooted plant growth in lakes and ponds. Most Midwestern lakes have more nitrogen and more rooted plant growth than is desirable, so lower values are generally considered better. The major sources of nitrogen in lakes are from agriculture (animal waste, fertilizer) and atmospheric emissions (fossil fuel). Lakes with a TKN value of 0.66 mg/L or less are typically classified as oligotrophic lakes (having fewer nutrients, less productivity). Lakes with TKN values above 1.88 mg/L may be classified as eutrophic (highly productive and nutrient rich). Nitrates do not accumulate very much in the bottom waters during the summer because when nitrate is void of oxygen it turns into ammonia. Therefore, ammonia testing is an excellent way to determine internal loading of nitrogen. The TKN readings on Portage Lake at Basins 1 and 2 in June ranged from 0.81 mg/L to 1.12 mg/L, in late July from 0.4 mg/L to 0.818 mg/L and in September from 1.56 mg/L - 3.39 mg/L between both basins. The tributaries samples ranged from 0.15 mg/L- 0.8 mg/L in May and from 2.2 mg/L - 3.5 mg/L in September.

Graph 17: TKN – Portage Lake Basins 1, 2 (2009-2022)

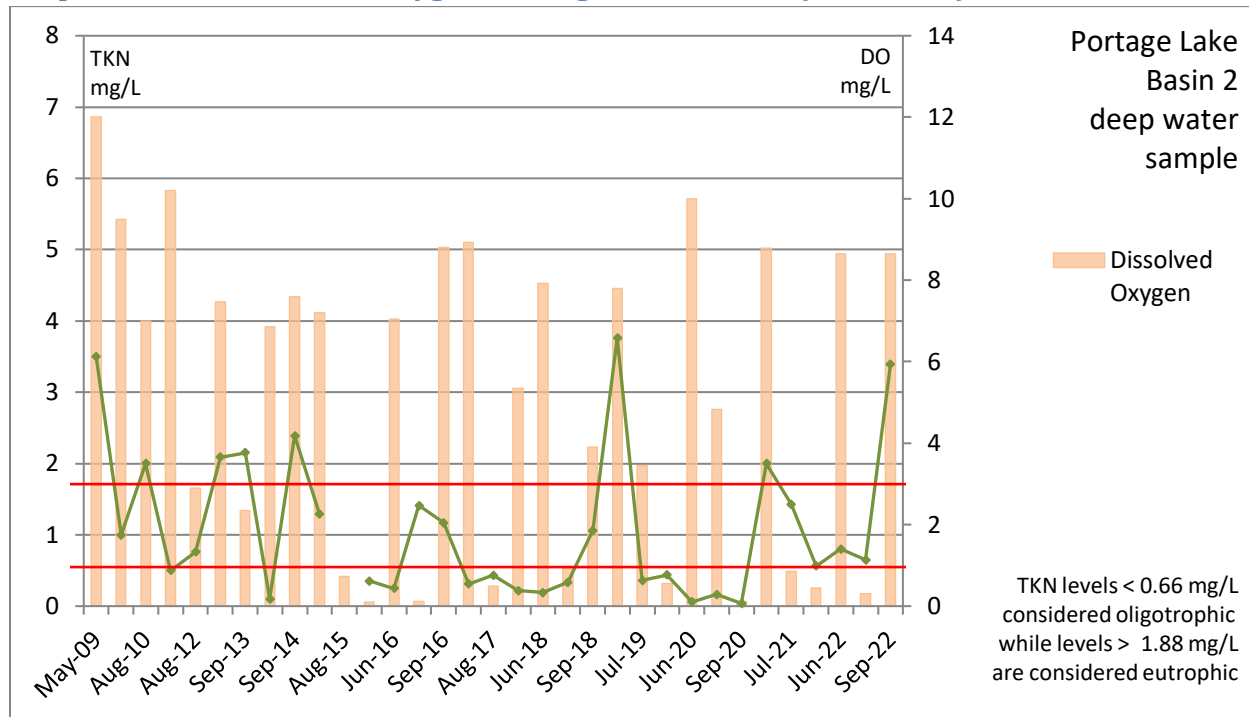


As the above graph illustrates, the TKN concentrations on Portage Lake have fluctuated some in recent years with some large spikes. A larger spike (or outlier) in August 2015 is not graphed. 2022 sampling shows elevated levels and additional sampling in 2023 is highly recommended. The below graphs illustrates Basin 1 in more detail and that the spike in 2022 is not correlated to DO levels.

Graph 18: TKN & Dissolved Oxygen- Portage Lake Basin 1 (2009-2019)



Graph 19: TKN & Dissolved Oxygen- Portage Lake Basin, 2 (2009-2022)



Basin 2 has followed a similar pattern to Basin 1 but the spikes in 2022 was greater, despite low DO levels.

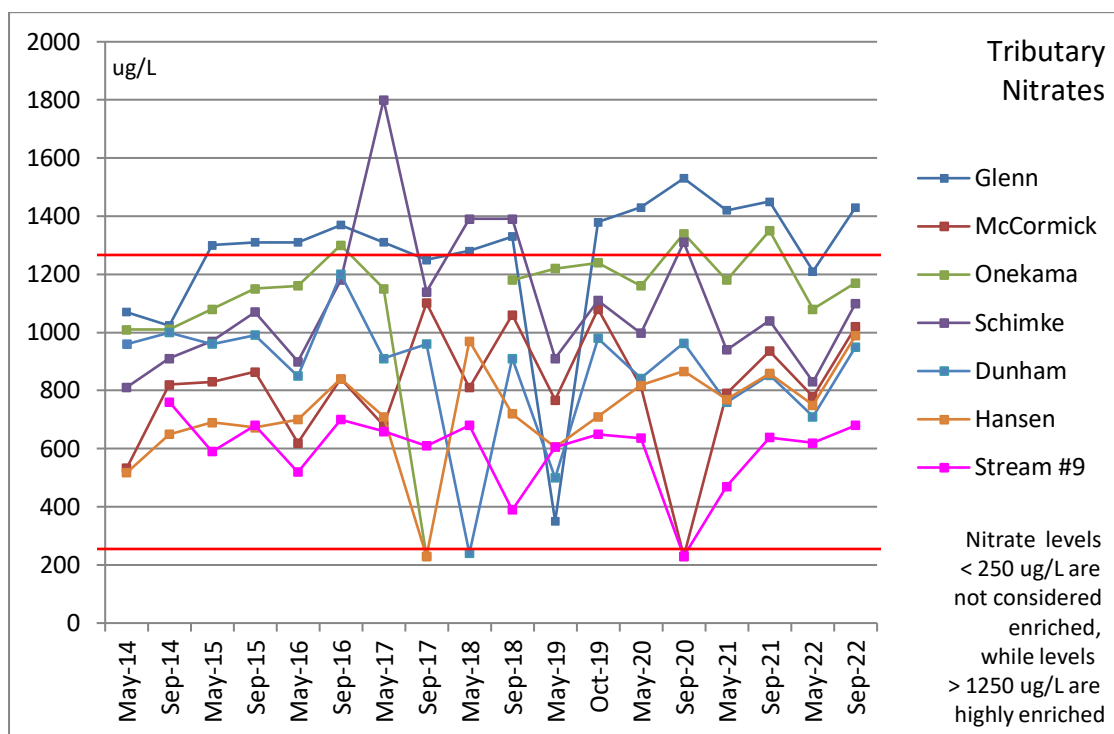
Nitrates

Nitrates measure the total amount of in-organic nitrogen in the water. Again, nitrogen is an important plant nutrient (i.e., fertilizer) and the nutrient most likely to limit the growth of rooted plants. Most Midwestern lakes have more nitrogen and more rooted plant growth than is desirable, so lower values are generally considered better. Nitrate levels under 250 µg N/L are considered not enriched while readings between 250-750 µg N/L are slightly enriched, readings from 750-1250 µg N/L are enriched and

readings over 1250 µg N/L are highly enriched. The sampling in both Basins were consistent this year. The June concentrations of nitrates in Basin 1 and 2 were ranged from 230 µg N/L to 550 µg N/L. The late July readings ranged from 230 µg N/L to 270 µg N/L and September concentrations of nitrates were 230 µg N/L throughout the water column. Nitrates in the tributaries ranged from 620 µg N/ to 1210 µg N/L in the spring and from 680 µg N/ to 1430 µg N/L in September, which were similar to last season. Nitrates are typically higher in the spring when the water is colder because the bacteria needed to digest the nitrates are not as productive in cooler temperatures. Nitrates will often decrease over the spring and be slightly less in the lake by the end of the summer. Based on the higher levels of nitrates observed in inlets (Tributaries and Storm Drains) in May and September, loading of the lake appears to be mainly from external sources. External sources for nitrate pollution are agricultural practices (manure, fertilizer), animal feedlots, urban runoff and municipal wastewater runoff. Based on the location of Portage Lake and the makeup of the surrounding watershed, nitrate enrichment is most likely coming from agricultural practices that have leached into the groundwater and animal feedlots. Nitrates did not accumulate very much in the bottom waters during the summer. The nitrates did not accumulate because when nitrate is void of oxygen it turns into ammonia. Therefore, ammonia testing is a better way to determine internal loading of nitrogen.

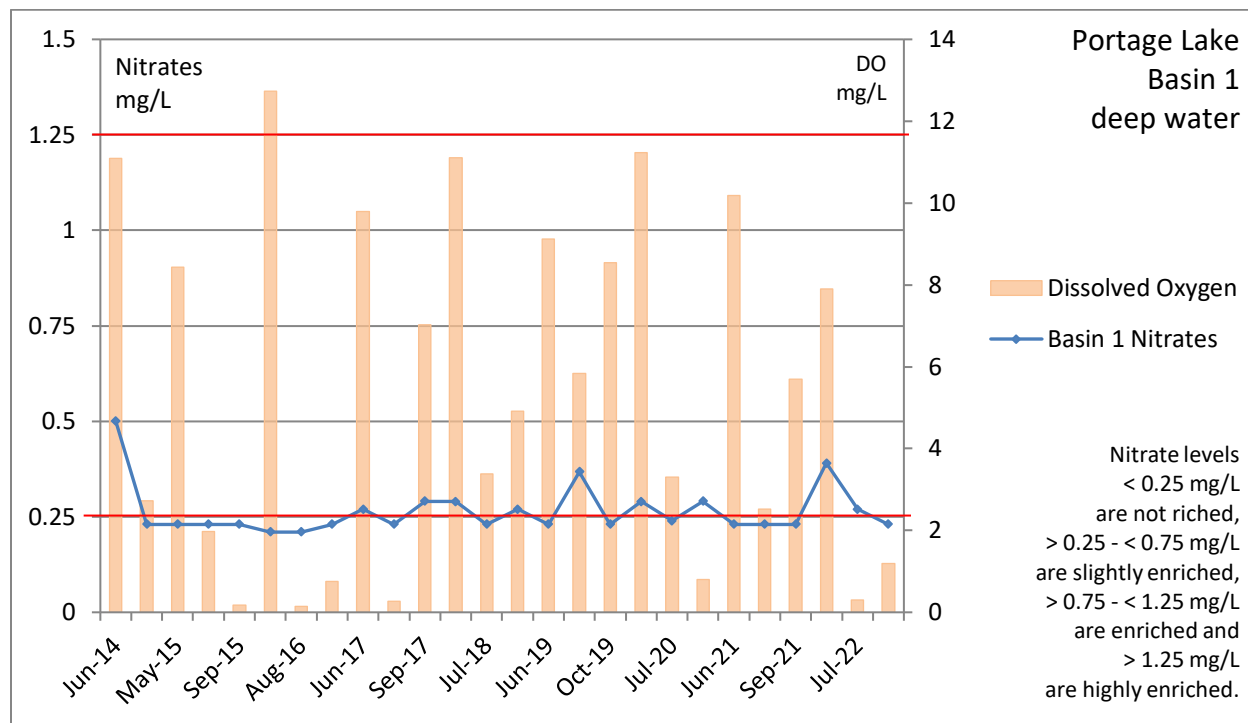
These samples show that the lake (at the time of sampling) may be Phosphorus limited. Phosphorus limited lakes tend to have a TN:TP >15. In 2022, the average TN was 270 ug/L in the basins and the TP 8.7 ug/L, giving a TN:TP of 31. This reading indicates Phosphorus may be the limiting nutrient. This is common in most lakes in this geographical area.

Graph 20: Nitrates– Portage Lake Tributaries

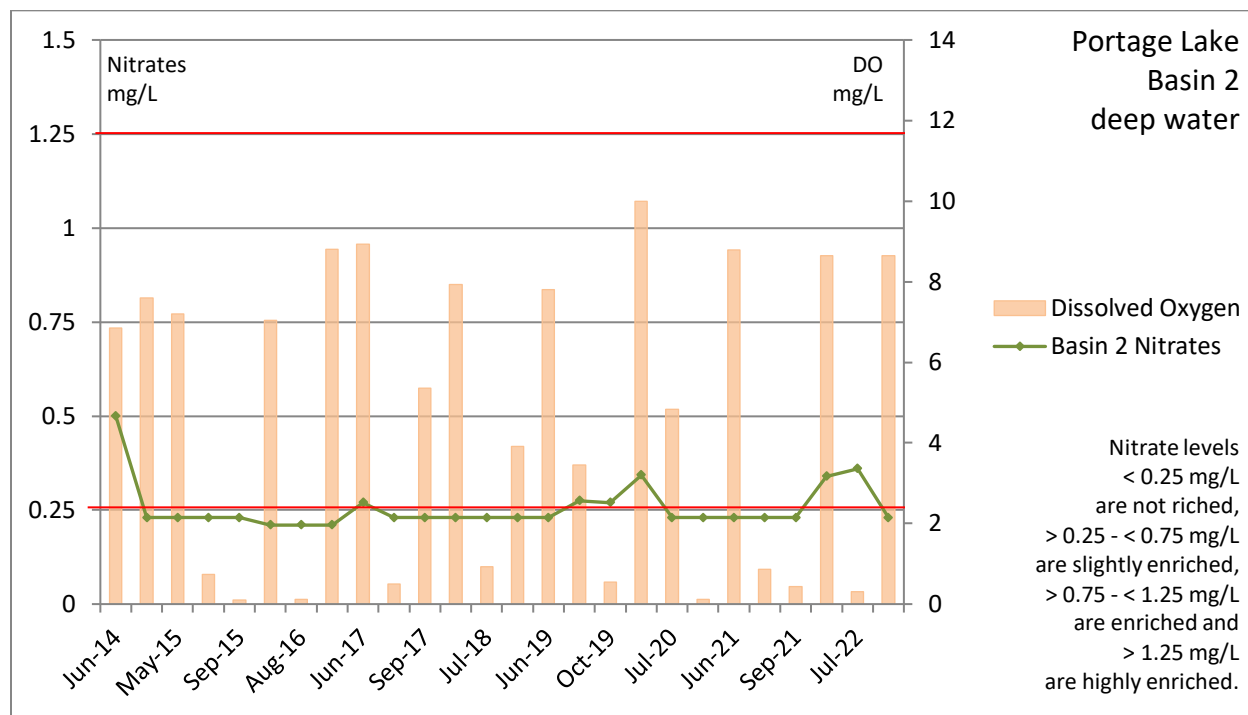


Graph 20 shows the nitrate concentrations in the Portage Lake Tributaries range from slightly enriched to enriched to highly enriched. It is recommended to continue testing.

Graph 21: Portage Lake Nitrates Basin 1 (2014-2022)



Graph 22: Portage Lake Nitrates Basin 2 (2014-2022)

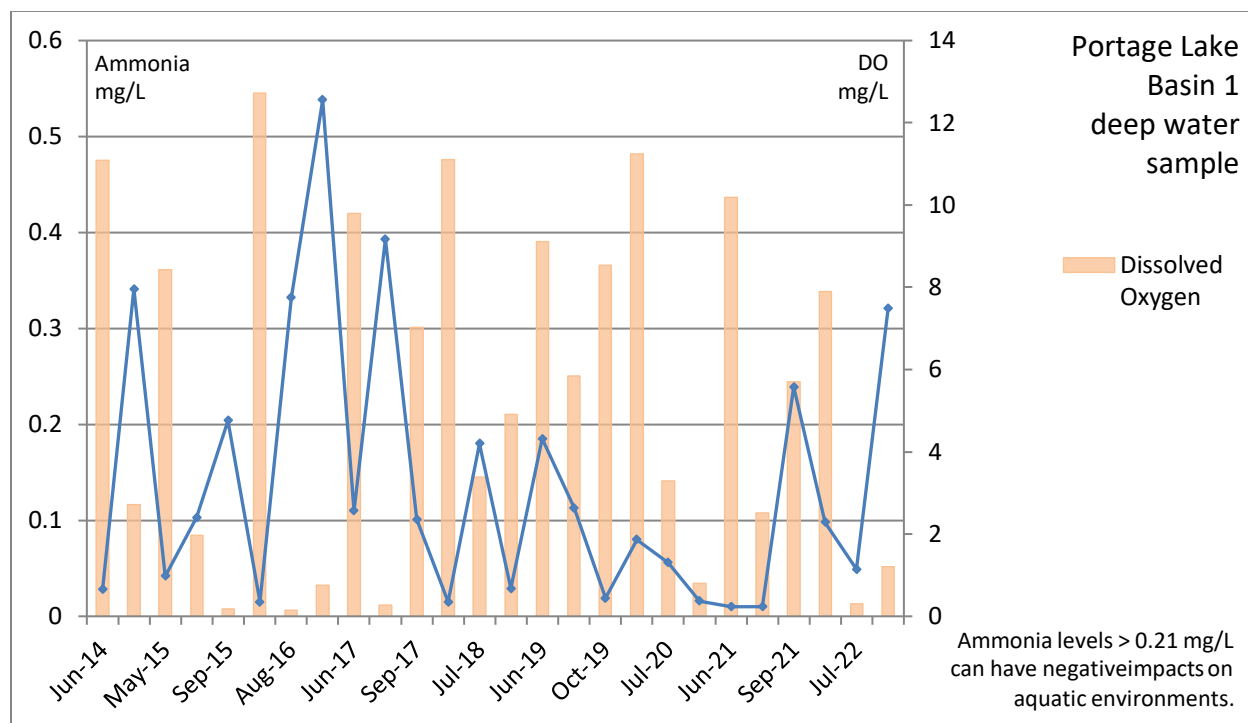


Graphs 21 and 22 show the DO levels with the nitrates in both Basins. Nitrate levels do not increase with decreased DO levels.

Ammonia

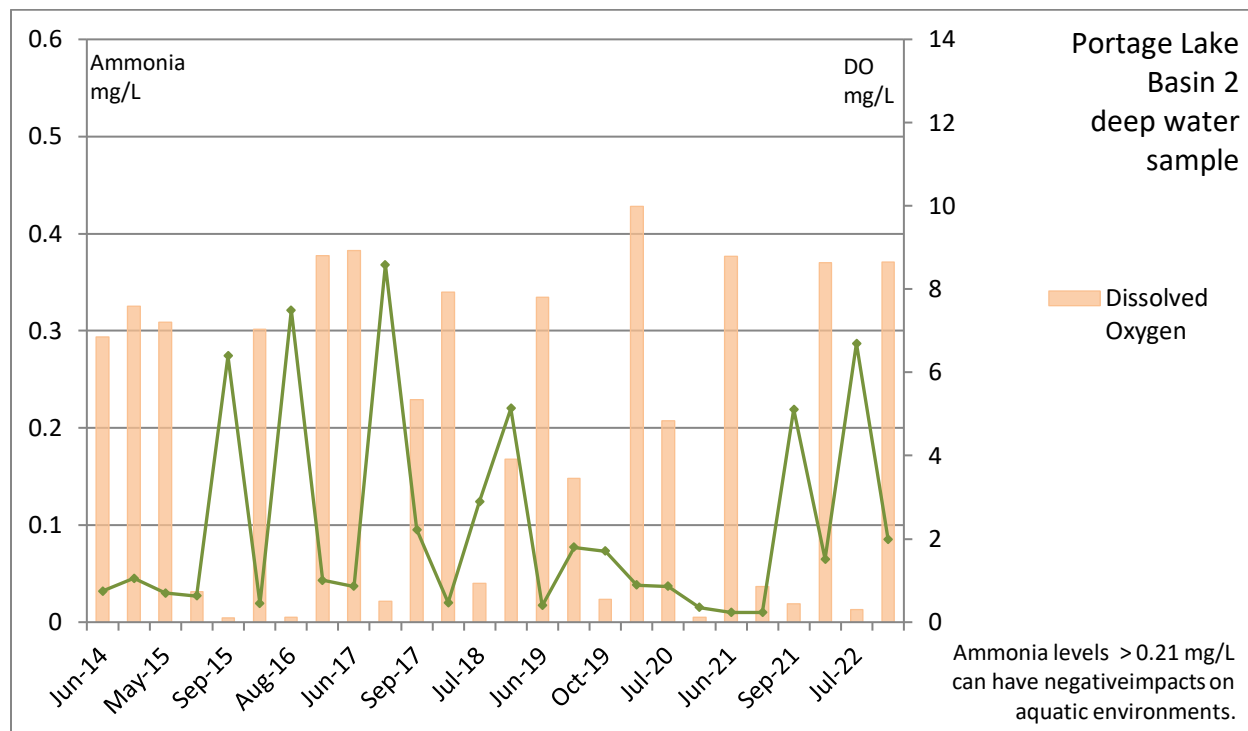
Ammonia is a form of nitrogen found in organic materials, sewage, and many fertilizers. It is the first form of nitrogen released when organic matter decays. Also, when ammonia degrades it consumes oxygen, which worsens already existing anaerobic conditions. However, ammonia can be used by most aquatic plants and is therefore an important nutrient. When oxygen is present in a lake ecosystem, ammonia will convert to nitrates. Ammonia is toxic to fish at relatively low concentrations in pH-neutral or alkaline water. In fish, ammonia affects hatching and growth rates, and can cause changes in tissues of gills, the liver and the kidneys. Ammonia concentrations below 1 mg/L (or 1000 ug/L) are generally considered suitable for healthy fisheries; however, Ammonia concentrations can have impacts on aquatic organisms at lower levels. It is important to review all ammonia concentrations based on the specific lake type, temperature, pH and dissolved oxygen. Michigan EGLE includes standards in part 4 (Water Resources Protection, Water Quality Standards) that ammonia shouldn't exceeded the Aquatic Maximum Value (AMV) threshold of 0.21 mg/L (210 ug/L) in which they feel negative impacts can occur in aquatic communities. Further, the Final Acute Value (FAV) shouldn't exceed a concentration of 0.42 mg/L (or 420 ug/L) where short term exposure can lead to negative impacts on aquatic organisms. Ammonia concentrations usually do not become elevated until water is void of oxygen and the nitrates are converted. Therefore, concentrations of Ammonia do not become elevated until anaerobic conditions are present, typically mid-summer. The concentration of ammonia at the Basin 1 in June was 0.031 mg/L (or 31 ug/L) at the surface and 0.09 mg/L (98 ug/L) at the bottom while in Basin 2 it was 0.031 mg/L (or 31 ug/L) at the surface and 0.065 mg/L (or 65 ug/L) at the bottom. In late July, the concentrations were 0.015 mg/L at the surface and 0.11 mg/L at the bottom in Basin 1 and 0.113 mg/L at the surface and 0.287 mg/L at the bottom in Basin 2. The September concentrations were 0.086 mg/L at the surface and 0.321 mg/L at the bottom in Basin 1 and 0.063 mg/L at the surface and 0.085 mg/L at the bottom in Basin 2. All readings are well within range for a healthy fishery. The shoreline areas ranged from 0.029 mg/L - 0.1 mg/L throughout the summer, all considered very low. As oxygen is not an issue here, this is expected.

Graph 23: Ammonia- Portage Lake Basin 1 (2014-2022)



Graph 23 shows ammonia concentrations in Basin 1 are elevated when DO levels decline (i.e. in 2016); which is expected in anaerobic conditions. Although some thresholds have concentration spikes elevated on Portage Lake, the general review of the Ammonia trend is low. When spikes have been seen, internal loading of ammonia was likely.

Graph 24: Ammonia- Portage Lake Basin 2 (2014-2022)

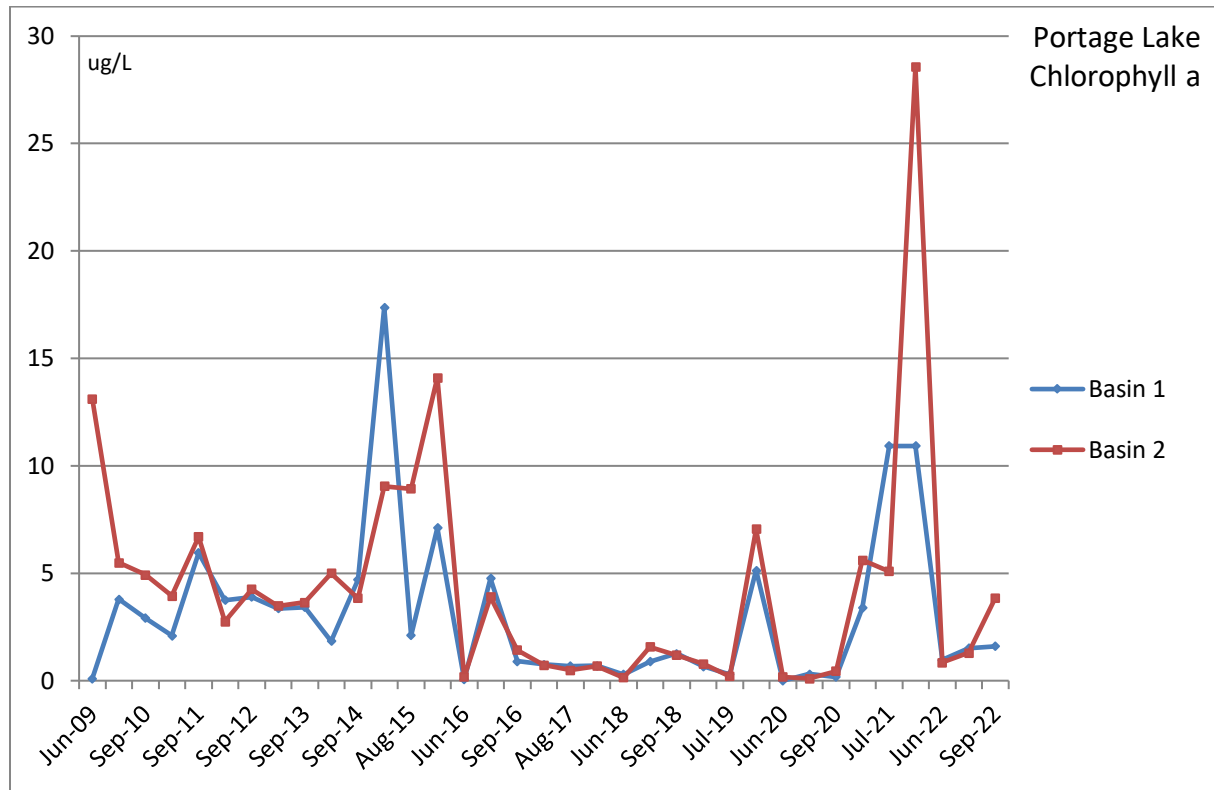


Basin 2 follows Basin 1 with spikes in Ammonia concentrations when DO levels drop.

Chlorophyll

Chlorophyll measures the amount of plankton (green algae) in the water. Some plankton or algal growth is essential to support the growth of other organisms (e.g., fish) in the lake, but human activities and natural eutrophication often lead to excessive algal growth; thus, lower concentrations of chlorophyll are usually considered desirable. Chlorophyll concentrations in Portage Lake Deep Basins in June ranged from 0 ug/L to 1.61 µg/L indicating similar plankton populations than previous years. Shoreline samplings sites averaged 1.29 ug/L in June. Chlorophyll in the Deep Basins ranged from 0.7 ug/L - 1.76 ug/L in late July, while shoreline sites averaged 1.89 ug/L. In September, Chlorophyll ranged from 0.8 ug/L to 3.6 ug/L. The shoreline sites averaged 0.67 ug/L in September. A higher level, in shallow, warmer waters is common as the warmer water can be a breeding ground for plankton. Overall, chlorophyll levels have varied some in recent years, were much higher in 2021 and more consistent with historical data (and lower) in 2022. Additional sampling is recommended and over time, sampling technology has improved as well.

Graph 25: Chlorophyll a- Portage Lake Deep Basins



Chlorophyll a sampling has declined over the last few years with some spikes, likely weather related and 2021 sampling showed large increases and returned to more consistent data in 2022. Additional sampling is recommended.

Algae and Zooplankton Composition

Algal composition testing was performed at both deep Basins as well as the shoreline testing sites in June, late July and September. The June testing showed the majority genera present included (presented as most abundant to least abundant); Cyanophyta (blue green algae): *Microcystis sp.*, Bacillariophyta (diatoms): *Cyclotella sp.*, *Asterionella sp.*, *Fragilaria sp.*, *Tabellaria sp.*; Chlorophyta (green algae): *Chlamydomonas sp.*, *Scenedesmus sp.*, *Spirogyra sp.*, *Pediastrum sp.* The July sampling found Bacillariophyta (diatoms): *Fragilaria sp.*, *Cyclotella sp.*; Chlorophyta (green algae): *Pediastrum sp.*, *Chlorella sp.*, *Gloeocystis sp.*, *Ulothrix sp.*; Euglenophyta, specifically *Trachelomonas sp.*; Cyanophyta (blue green algae), specifically *Microcystis sp.*, The September sampling found Cyanophyta (blue green algae), specifically *Microcystis sp.*, *Gloeotrichia sp.*, the most abundant species and genera of phytoplankton followed by Chlorophyta (green algae): *Pediastrum sp.*, *Chlorella sp.*; Bacillariophyta (diatoms): *Fragilaria sp.* Some blue green algae, including *Microcystis sp.*, can produce toxins. These toxins are normally released when the algae near the end of the life cycle and often occur for short phases during a growing season, often times towards the end of the season after the water temperatures and nutrient loading have reached a high. Further, blue green algae are not consumed by Zebra mussels, so if Zebra mussels are present in a lake ecosystem, it is likely to have lower green algae populations and higher blue green algae, as the Zebra Mussels will filter the green algae out of the water column and leave the blue green algae alone. The levels of blue green algae are not high enough to warrant a concern at this time. The blue green algae “scum” that forms on the lake surface when densities are extremely high should be avoided if that were to occur, but the densities in Portage Lake are not high enough to cause a bloom at this point.

The zooplankton communities were also identified while looking at the phytoplankton and numerous species of zooplankton were documented including; *Cladocera sp. (Daphnia).*, *Rotifer sp.*, *Brachiopoda*

sp., and *Copepods sp.* Diverse and present phytoplankton is required to have a healthy zooplankton community as the base of the food chain.

Fecal Indicator Bacteria (E. Coli)

Fecal Indicator Bacteria (E. Coli) measurements count the number of live fecal indicator bacteria in the sample. These bacteria are considered reliable indicators of fecal contamination when they are found in a pond or lake; it is very likely that the water is being contaminated by animal feces. Contamination can potentially be derived from a number of sources, including failed septic systems, agriculture runoff, or waterfowl or wildlife droppings.

In the last decade, E.Coli monitoring has become a priority for the watershed in order to ensure healthy, clean water for the area's residents and visitors. E.Coli data has been collected throughout the watershed by various entities including District 10 Health Department, Onekama Village, Onekama Township and PLM Lake & Land Management. Between 2009 and 2022, over 300 composite samples were collected around Portage Lake and its tributaries. Only two of these samples exceeded partial body contact and four exceeded total body contact criteria. All samples that exceeded these water quality standards were collected in Schimke Creek and Stream #9.

In the year 2018, the scope of the E.Coli monitoring expanded to include road end beaches and tributary streams. A total of three samples at 10 sites were collected six times between June and August, five of which were dry weather events and one which took place during a rain event. As previously mentioned, Schimke Creek and Stream #9 had elevated E.Coli levels over the total body contact criteria and are under further inspection.

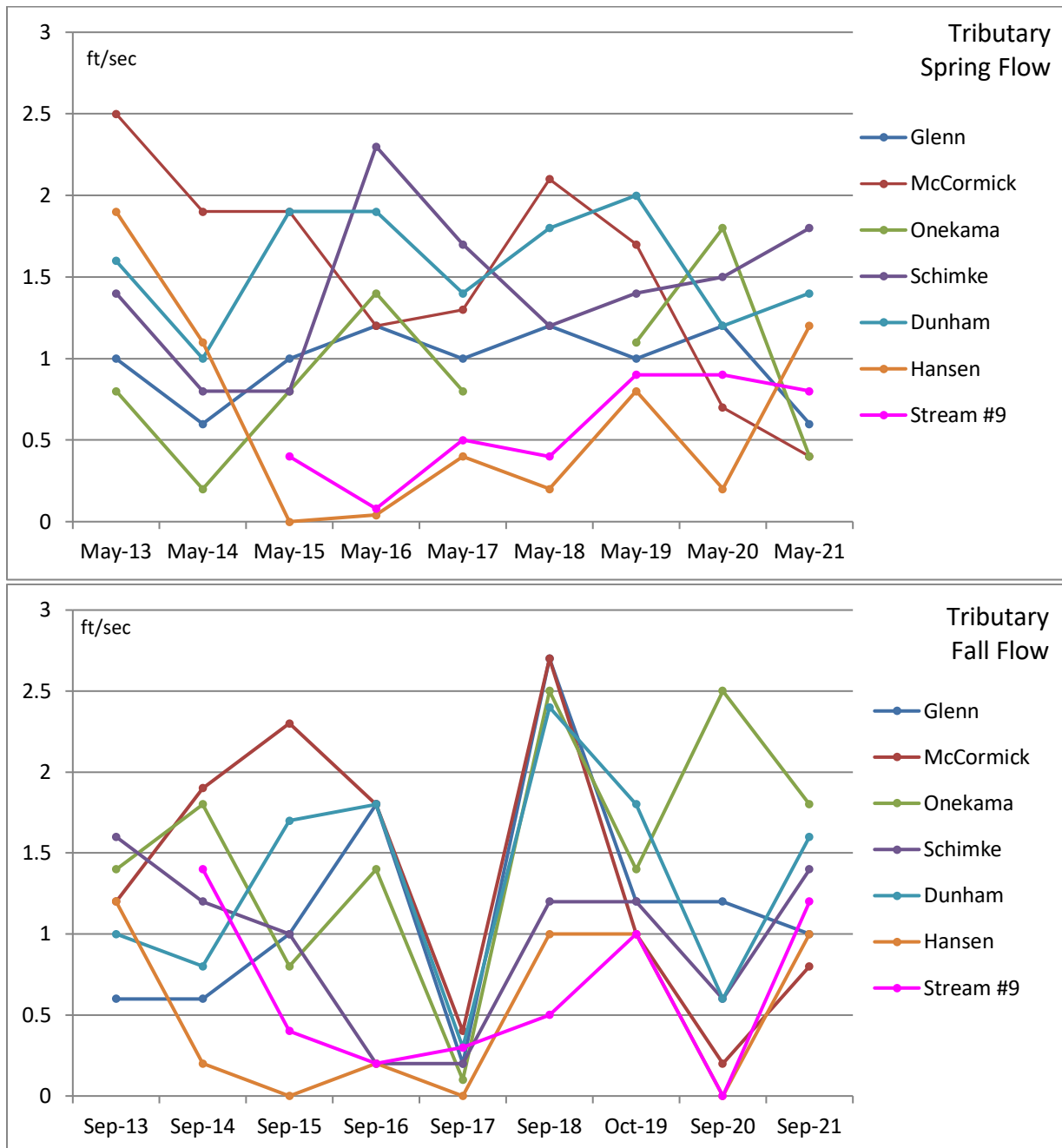
The majority of the sample sites in the Portage Lake watershed that have been monitored for E.Coli have had consistently low concentrations meaning that in the context of E.Coli, water quality is high and public health risk is low.

2022 monitoring found no elevated sampling in the July sampling, which tested numerous locations including Portage Point Inn, Swimming beaches, Camps, and inlet areas.

Tributary Flow and Phosphorus

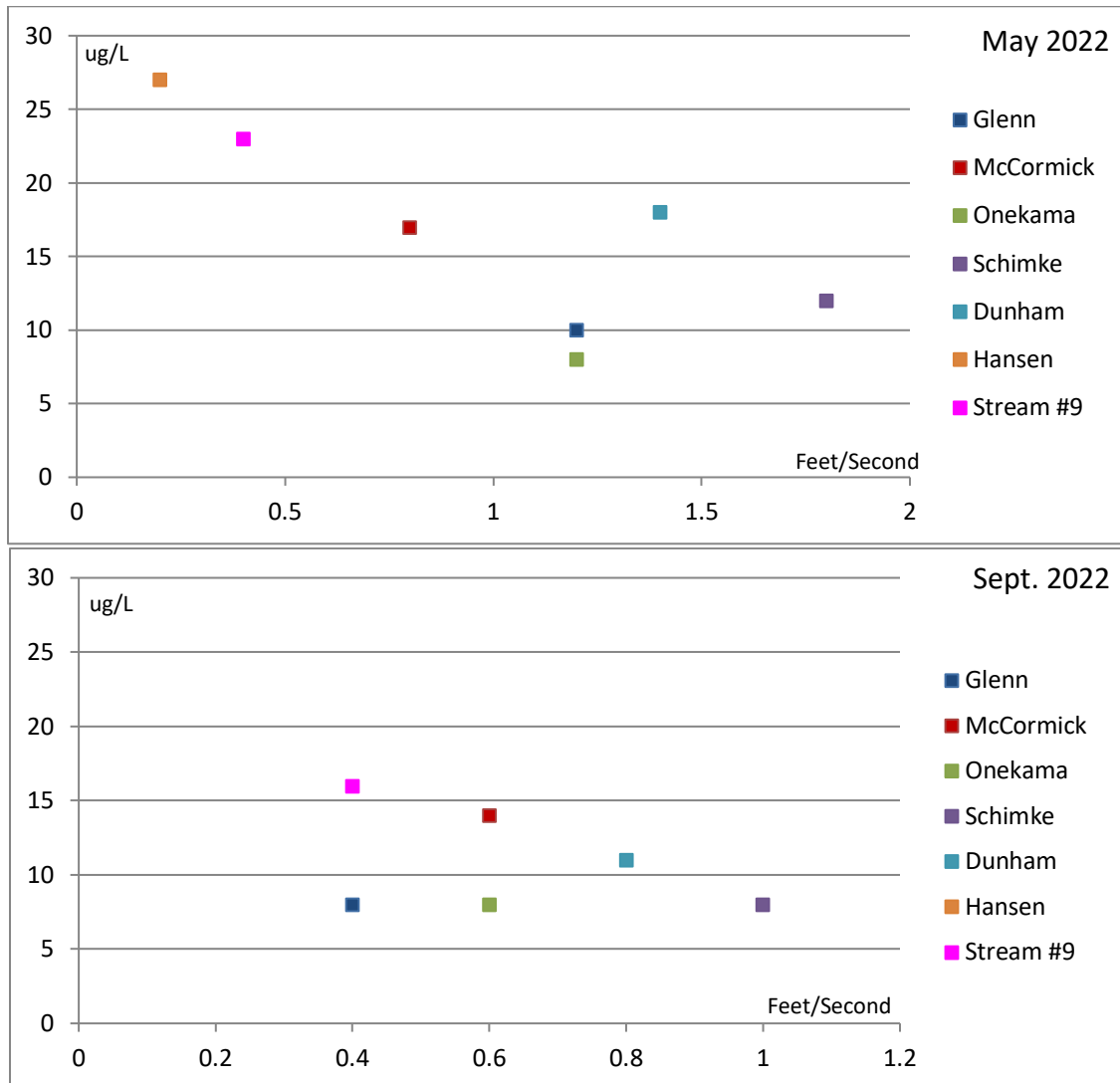
Flow rate data was determined, using a digital flow meter, at the seven tributaries studied in May and in September. Flow ranged from 0.2 feet/second - 1.8 feet/second in the May sampling and from 0.4 feet/second - 1 feet/second in September. Schimke Creek was the fastest flowing in 2022. The rates of flow varied from each creek and the basic chemistry varied as well. Nutrients coming in from the creeks are a concern, as it is a transport from the watershed into Portage Lake. Total Phosphorus is graphed below along with flow to see how the flow and TP are connected.

Graph 26 and 27: Tributary Flow Rates –May (top); September (bottom) 2013-2022



Historically, these graphs illustrate that there is a decline in flow rate at the end of the summer versus the beginning of the summer. Typically, higher flows in spring will increase nutrient inputs in the spring and they decrease in the fall. This is standardly due to snow melt and spring rain. Generally speaking, the flow in 2023 and 2022 had a higher range and overall higher average. This likely correlated with high water levels in the watershed. High water levels in the watershed could be having impacts on other parameters including nutrient levels as well as plant growth.

Graph 28 and 29: Tributary Flow Rates and Phosphorus (ug/L) comparisons – May 2022 (top) – September 2022 (bottom)



In years past, the graph has illustrated a correlation between flow and TP. The greater the flow, the higher the Total Phosphorus. (This correlation has historically been strong.) In 2021 and 2022, the TP concentrations were all very similar, down from recent years, regardless to flow.

Additional Tributary/Upstream testing

Tributary testing was expanded in 2016 to include testing four creeks upstream to determine if there were any point source locations determined or pinpointed. Determining any area of concern would allow future work to reduce nutrient loading into the lake be done. Using best management practices throughout the entire watershed, but especially on the creeks leading directly into the lake are essential. Determining if there is a location within the first few miles of the creek off of the lake that has elevated nutrient levels would allow future focus to be determined.

Based on historical data of nutrient levels from the tributaries, four creeks were selected to have additional testing done. Those creeks include: McCormick, Schimke, Hansen and Stream #9. During this test, each creek was also tested upstream at locations that were determined upon walking up the creek. Upon walking upstream, visual observations were made for any concerns including but not limited to drain tiles, erosions, buffers, invasive, flow issues, sources of nutrient inputs, etc. Based on observations

the following locations were selected as potential sources of nutrient inputs: culverts, wetlands, location of golf course, farming field, houses, roads, etc.

Of the data collected, most locations came up somewhat enriched, with the largest concern being Stream #9. Because Stream #9 was the largest concern in 2016, it was selected for upstream testing in 2017 and all the years since. The last few years have shown lower TP than prior testing, which is a positive sign.

The water depth and flow going into the lake in 2021 and 2022 was too low for upstream sampling. Evaluating conditions in 2023 is recommended to determine if additional sampling is needed.

Evaluation of Trophic Status

Carlson’s Trophic State Index (TSI) is used to measure the trophic state of individual lakes. Lakes are ranked from 1 to 100 based on Secchi disc depth, Total phosphorus concentrations and/or Chlorophyll a levels. Based on that ranking, the TSI is determined. This chart gives the approximate classification for each category.

Portage Lake’s June data yielded values between 29 and 46, in 2022 (Table 12). In general, these values rate Portage Lake as mesotrophic. Characteristics associated with oligotrophic to meso-oligotrophic lakes are low nutrient levels, clear water and low productivity. High dissolved oxygen levels typically occur and survival of cold water fish is possible. Mesotrophic lakes tend to have moderate nutrient levels, clear water and moderate productivity. Rooted plants are abundant and the lake can still support a cold water fishery. As the picture to the right shows, eutrophic lakes (not Portage Lake at this time, but given for comparison) have high nutrient levels, turbid water, algae blooms are likely and sometimes severe. Plants are abundant and dissolved oxygen is often depleted from bottom waters, restricting fish populations to warm water species.

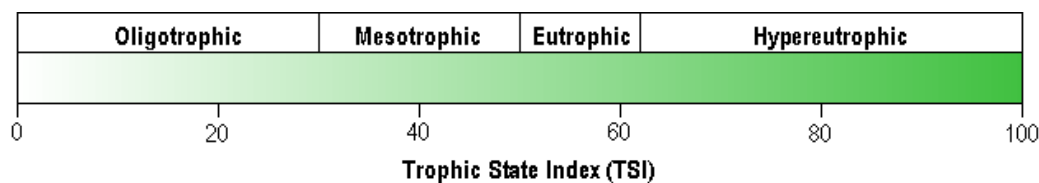
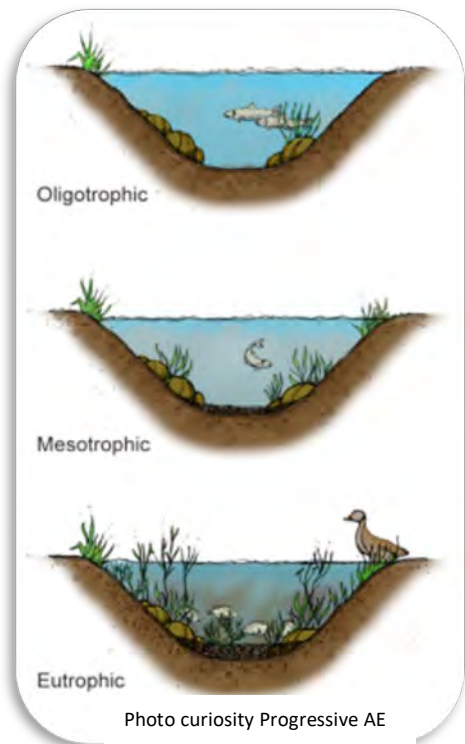


Table 4: 2022 Trophic State Index (TSI) Values

Site	Secchi Depth	Total Phosphorus	Chlorophyll a
Basin 1 - June	44	30	30
Basin 2 - June	44	30	29
Basin 1- July	44	30	35
Basin 2- July	44	30	34
Basin 1 - Sept.	42	33	35
Basin 2 - Sept.	46	33	44

2022 Water Quality Concerns/Recommendations

Current water quality problems in Portage Lake can result from nutrient loading from the watershed and nutrient rich bottom sediments in the lake. Please note that the overall nutrient levels in Portage Lake are still relatively low compared to most Michigan waterbodies. Reductions in external nutrient loads may eventually reduce internally generated water quality problems, though improvements will require that dramatic reductions in external loading be sustained for long periods of time. Even if sufficient loading reductions are achieved, many years will be required before improvement is evident. In order to manage external nutrient inputs, it would be necessary to develop and implement a watershed management plan for the Portage Lake watershed. Watershed activities and public awareness using good management practices in the watershed will have long term positive improvements in the lake. This could be one cause of the decrease in nutrient levels in the lake.

Management Recommendations for 2023

Management options are dependent on many factors, including but not limited to, species abundance (density), species richness, species location and many lake characteristics. Whenever an exotic species is found within an aquatic environment, action needs to be taken to prevent long term ecological damage as well as recreational and aesthetic loss that will take place.

Submersed Aquatic Plants

The 2023 aquatic plant management program should detect and manage/treat any areas where Eurasian watermilfoil or hybrid watermilfoil and Starry stonewort are present in addition to any other invasive, exotic species.

As part of this program, the Invasive Species Committee would prefer to avoid using Copper based products as part of their program whenever possible. Before Copper based products are used, specific review of the species, acreage and management goals needs to be reviewed.

Emergent Vegetation Management

Purple loosestrife and Phragmites should continue to be addressed around the perimeter of the lake to prevent the further spread of these exotic species. Continuing biological control of Purple Loosestrife with beetles, if available, is recommended to continue. In addition, any other invasive terrestrial plants including but not limited to Japanese knotweed, honey suckle, garlic mustard and autumn olive should be targeted for control.

Monitoring

Aquatic vegetation and water quality should continue to be monitored to document the condition of the lake and to provide warning of any changes in the condition of the lake that need to be addressed by additional lake management activities.

Proposed Budget

The following budget is proposed based on previous requirement on Portage Lake and the budget is limited to the management and treatment of Portage Lake. If additional costs are required in the maintenance of the SAD or from outside factors, they may not be included in this budget. Please also note that as additional data becomes available from the Grant Study and application rates increase, the budget may have to be adjusted long term to account for genetically changing plants.

Table 5: Proposed 2023 Budget Portage Lake

Proposed/ Estimated Budget*	2023
Emergent Control	1,000
EWM/SSW Control	40,000
Permit	1,600
Lake Management/Fish Survey	35,000
Contingency Funds	6,000
Total	83,600
<i>*updated to include expanded professional services</i>	

The Recommended Management Schedule for 2023:

- A spring and fall vegetation survey (to evaluate conditions in the lake).
- Exotic plant management/treatment, as required
- Pre and post implementation surveys as required, in addition to a mid-summer survey
- Extensive water quality monitoring throughout season
- Late summer/fall Phragmites Control
- Community Education/outreach activities
- Fish Study
- Cold season sampling (optional)
- Early Detection Rapid Response (EDRR) to new infestations

Addendum 1 Product Explanation guide

Aquathol K

Active ingredient- Dipotassium Endothall 40.3%

Use- Contact herbicide

Half-life- 5-8days

Target Species- Curlyleaf pondweed

Mode of action- Respiration is inhibited, during which, oxygen consumption is also inhibited.

Effects are greater in the dark, due to the fact that the results are non-photosynthesis-based.

Flumioxazin

Active ingredient- Flumioxazin 51%

Trade names- Clipper, Propeller

Use-systemic herbicide

Half-life- >1-4 days pending pH

Target Species- Eurasian watermilfoil

Mode of action- Inhibitor of the enzyme protoporphyrinogen oxidase. This enzyme is part of the chlorophyll biosynthesis pathway and its inhibition leads to a loss of chlorophyll and carotenoids and irreversible damage to the cell membrane function and structure.

ProcellaCOR

Active ingredient- Florpyrauxifen-benzyl 2.7%

Use- Systemic herbicide

Half-life- 1-6days (pH and temp. dependent)

Target Species- Eurasian watermilfoil, Curlyleaf pondweed, some pondweeds

Mode of action- Indoleacetic acid (IAA) is the main auxin in plants, regulating growth and development which is triggered to disrupt growth by binding to it. Roots are most sensitive to fluctuations in IAA level. This product mimics the plant growth hormone auxin that causes excessive elongation of plant cells that ultimately kills the plant.

Navigate (2,4-d)

Active ingredient- 2,4-dichlorophenoxy acetic acid 27.6%

Use- Systemic herbicide

Half-life- 15days

Target Species- Eurasian watermilfoil

Mode of action- Acts as a plant growth hormone (auxin) which stimulates rapid excessive growth which interferes with cell division, food utilization, and other vital processes of the plant. Systemic effects are more specific to dicots as opposed to monocots.

Renovate 3

Active ingredient- Triclopyr 44.4%

Use- Systemic herbicide

Half-life- 1 day with light

Target Species- Eurasian watermilfoil

Mode of action- Acts as a plant growth hormone (auxin) which stimulates rapid excessive growth which interferes with cell division, food utilization, and other vital processes of the plant. Systemic effects are more specific to dicots as opposed to monocots.

Renovate OTF

Active ingredient- Triclopyr 14.0%

Use- Systemic herbicide

Half-life- 1 day with light

Target Species- Eurasian watermilfoil

Mode of action- Acts as a plant growth hormone (auxin) which stimulates rapid excessive growth which interferes with cell division, food utilization, and other vital processes of the plant. Systemic effects are more specific to dicots as opposed to monocots.

SeClear G

Active ingredient- Copper Sulfate Pentahydrate 58.9%

Use- Algaecide

Target Species- Starry stonewort

Mode of action- Copper is regulated by plants/algae because it is an essential mineral. Too much copper can be toxic to plants as it inhibits photosynthesis. Copper naturally occurs in the environment and is highly soluble in water and it can bind with sediments.

Sculpin G

Active ingredient- 2,4-dichlorophenoxyacetic acid, dimethylamine salt 20%

Use- Systemic herbicide

Half-life- 14days

Target Species- Eurasian watermilfoil

Mode of action- Acts as a plant growth hormone (auxin) which stimulates rapid excessive growth which interferes with cell division, food utilization, and other vital processes of the plant. Systemic effects are more specific to dicots as opposed to monocots.

Tribune

Active ingredient- Diquat dibromide 37.3%

Use- Contact herbicide

Half-life- 48hours

Target Species- Eurasian watermilfoil, Curlyleaf pondweed

Mode of action- Reduction of a free radical through the natural processes of respiration and photosynthesis. The salts formed can bond and release with electrons in the plant over and over again, virtually "short circuiting" the plants ability to use photosynthesis.

Addendum 2 Product Terminology

Active ingredient: An active ingredient are the chemicals in the pesticide that kills, controls or repels pests. Often, the active ingredient makes up a small portion of the whole product.

Inert ingredient: An inert or other ingredient are combined with active ingredients to make a pesticide product. Inert ingredients are used to stabilize the product, help it stick, sink, dissolve, improve ease of application, drift among other factors.

Half-life: The half-life of an herbicide is the length of time it takes for 50% of the herbicide to break down to secondary compounds. "The half-life can help estimate whether or not a pesticide tends to build up in the environment. Pesticides with shorter half-lives tend to build up less because they are much less likely to persist in the environment." National Pesticide Information Center

Systemic herbicide: Systemic herbicides are absorbed and transported through the plant's vascular system, killing the entire plant.

Contact herbicide: Contact herbicides kill the part of the plant in contact with the chemical but the roots may survive.

Selective herbicide: A selective herbicide is formulated to control specific weeds. It is a material that is toxic to some plant species but not all.

Addendum 3A Portage Lake Product Use Overview

Table 6: Submersed Plant Control Program Product Use Overview

Year	Date	Product	Rate lbs/Acre	Acres	Total Acres	Total Product	% active ingredient	Total active ingredient used
2022	6-Jun	Flumioxazin	200ppb	6.5	53.9	20lbs	51%	10.2lbs
	27-Jul	Flumioxazin	200ppb	0.2		0.5lbs	51%	0.25lbs
	7-Sep	Flumioxazin	200ppb	0.2		0.5lbs	51%	0.25lbs
		SeClear G	50lbs	2		100lbs	58.90%	58.9lbs
		ProcellaCOR/Diquat	6pdu/1gal	45		270pdu/45g	2.7%/37.3%	23.10ou/16.78gal
2021	17-Jun	Aquathal K	1gal	6.5	50.65	6.5gal	40.30%	2.6195gal
	12-Aug	ProcellaCOR/Diquat	4pdu/1gal	1.5		6pdu/1.5g	2.7%/37.3%	0.51ou/0.55gal
		ProcellaCOR/Diquat	5pdu/1gal	16		80pdu/16g	2.7%/37.3%	6.84ou/5.96gal
		Sculpin G	300lbs	22.4		6720lbs	20%	1344lbs
		SeClear G	50lbs	4.25		212.5lbs	58.90%	125.16lbs
2020	17-Jun	Clipper	200ppb	6.3	82.1	19.8lbs	51%	10lbs
	2-Aug	ProcellaCOR/Ren3	4pdu/3.5g	13.5		47.25pdu/54g	22.7%/44.4%	4ou/23.9gal
		Sculpin G	240lbs	4.15		1000lbs	20%	200lbs
		ProcellaCOR/Diquat	4pdu/1gal	19.65		78.6pdu/19.65g	2.7%/37.3%	6.7ou/7.3gal
		ProcellaCOR	9pdu	30.5		247.5pdu	2.70%	21.18ou
		SeClear G	50lbs	8		400lbs	58.90%	235.6lbs
2019	17-Jun	Clipper	200ppb	6.3	60.25	19.8lbs	51%	8.5lbs
	15-Aug	Renovate 3	4g	4.5		18gal	44.40%	7.99gal
		Renovate OTF	240lbs	25.25		6312.5lbs	14%	883.75lbs
		Sculpin G	240lbs	20		4800lbs	20%	960lbs
		ProcellaCOR	11pdu	4.2		45.6pdu	2.70%	3.9ou
2018	17-Jun	Clipper	200ppb	1.58	51.08	5lbs	51%	2.55lbs
	15-Aug	Renovate 3	4gal	4.5		18gal	44.40%	7.99gal
		Renovate OTF	200ppb	8		1600lbs	14%	224lbs
		ProcellaCOR	11.43pdu	3.5		40.4pdu	2.70%	3.45ou
		Sculpin G	240lbs	33.5		8040lbs	20%	1608lbs
2017	14-Jun	Clipper	200ppb	1.58	67.68	5.53lbs	51%	2.82lbs
	15-Aug	Renovate OTF	240lbs	13		3120lbs	14%	436.8lbs
		Renovate OTF	200lbs	14		2800lbs	14%	392lbs
		Renovate 3	4gal	5.6		22.4gal	44.40%	9.94gal
		Sculpin G	240lbs	29.5		7080lbs	20%	1416lbs
		Sculpin G	200lbs	4		800lbs	20%	160lbs
2016	27-Jun	Clipper	200ppb	1.25	21.35	3.9lbs	51%	1.98lbs
	2-Aug	Renovate OTF	200lbs	6.6		1320lbs	14%	184.8lbs
		Renovate OTF	240lbs	3.5		840lbs	14%	117.6lbs
	3-Aug	Renovate OTF	200lbs	3		600lbs	14%	8.4lbs

		Renovate 3	4gals	2		8gal	44.40%	3.55gal
		Sculpin G	240lbs	5		1200lbs	20%	240lbs
2015	19-Jun	Clipper	200ppb	1.25	79.35	4lbs	51%	2.04lbs
	28-Jul	Renovate OTF	200lbs	4		800lbs	14%	112lbs
	28-Jul	Renovate OTF	240lbs	3.8		920lbs	14%	128.8lbs
	28-Jul	Sculpin G	200lbs	4		800lbs	20%	160lbs
	28-Jul	Sculpin G	240lbs	66.3		15920lbs	20%	3184lbs
2014	26-Jun	Renovate OTF	200lbs	1.5	176.05	300lbs	14%	42lbs
	29-Jul	Renovate OTF	200lbs	0.8		160lbs	14%	22.4lbs
		Renovate LZR Max	120lbs	95		11360lbs	18%	2044.8lbs
		Sculpin G	200lbs	10		2000lbs	20%	400lbs
		Clipper	200ppb	1.25		4lbs	51%	2lbs
	8-Sep	Sculpin G	160lbs	23		3680lbs	20%	736lbs
		Sculpin G	200lbs	12.5		2500lbs	20%	500lbs
		Sculpin G	240lbs	6		1440lbs	20%	288lbs
		Renovate LZR Max	160lbs	26		4160lbs	18%	748.8lbs
Year	Date	Product	Rate lbs/Acre	Acres	Total Acres	Total Product	% active ingredient	Total active ingredient used
2013	24,27-Jun	Renovate OTF	160lbs	5	129.75	800lbs	14%	112lbs
		Renovate Max G	160lbs	39		6240lbs	18%	1123.2lbs
		Sculpin G	160lbs	74.5		11920lbs	20%	2384lbs
	8-Aug	Sculpin G	160lbs	10		1600lbs	20%	320lbs
		Clipper	200ppb	1.25		4lbs	51%	2.04lbs
2012	9-Jul	Renovate OTF	120lbs	10	145	1200lbs	14%	168lbs
		Renovate Max G	160lbs	55		8800lbs	18%	1584lbs
	24-Jul	Renovate OTF	120lbs	5		600lbs	14%	84lbs
		Renovate Max G	120lbs	40		4800lbs	18%	864lbs
		Sculpin G (2,4-D)	160lbs	35		5600lbs	20%	1120lbs
2011	27-Jul	Renovate OTF	120lbs	22	22	2640lbs	14%	369.6lbs
2010	29-Jun	Renovate OTF	120lbs	5	86	600lbs	14%	84lbs
		Navigate 2,4-D	100lbs	17		1700lbs	27.60%	469.2lbs
	27-Sep	Renovate OTF	120lbs	14		1680lbs	14%	235.2lbs
		Navigate 2,4-D	120lbs	50		6000lbs	27.60%	1656lbs
2009	15-Sep	Renovate OTF	120lbs	~41.5	161.5	5000lbs	14%	700lbs
		Navigate 2,4-D	100lbs	120		12000lbs	27.60%	3312lbs
Total					1132.76			

Addendum 3B Portage Lake Treatment Cost Overview

Table 7: Portage Lake Treatment Cost Overview

Year	Date	Product	Price	Total Price
2022	6-Jun	Flumioxazin	\$3,298.75	
	27-Jul	Flumioxazin	\$0.00	
	7-Sep	Flumioxazin	\$650.00	
		SeClear G	\$600.00	
		ProcellaCOR/Diquat	\$34,650.00	\$39,198.75
2021	17-Jun	Aquathal K	\$1,072.50	
	12-Aug	ProcellaCOR/Diquat	\$862.50	
		ProcellaCOR/Diquat	\$10,800.00	
		Sculpin G	\$18,480.00	
		SeClear G	\$1,275.00	\$32,490.00
2020	17-Jun	Clipper	\$4,000.35	
	2-Aug	ProcellaCOR/Ren3	\$9,450.00	
		Sculpin G	\$2,739.00	
		ProcellaCOR/Diquat	\$11,102.25	
		ProcellaCOR	\$27,450.00	
		SeClear G	\$2,400.00	\$57,141.60
2019	17-Jun	Clipper	\$4,000.50	
	15-Aug	Renovate 3	\$1,620.00	
		Renovate OTF	\$22,472.50	
		Sculpin G	\$13,200.00	
		ProcellaCOR	\$5,700.00	\$46,993.00
2018	17-Jun	Clipper	\$1,003.50	
	15-Aug	Renovate 3	\$1,620.00	
		Renovate OTF	\$5,932.80	
		ProcellaCOR	\$6,000.00	
		Sculpin G	\$22,110.00	\$36,666.30
2017	14-Jun	Clipper	\$1,003.30	
	15-Aug	Renovate OTF	\$11,570.00	
		Renovate OTF	\$10,383.24	
		Renovate 3	\$2,016.00	
		Sculpin G	\$19,470.00	
		Sculpin G	\$2,200.00	\$46,642.54
2016	27-Jun	Clipper	\$793.75	
	2-Aug	Renovate OTF	\$4,894.96	
		Renovate OTF	\$3,115.00	
	3-Aug	Renovate OTF	\$2,224.98	
		Renovate 3	\$720.00	
	Sculpin G	\$3,200.00	\$14,948.69	
2015	19-Jun	Clipper	\$768.75	
	28-Jul	Renovate OTF	\$2,933.32	
	28-Jul	Renovate OTF	\$3,344.00	
	28-Jul	Sculpin G	\$2,100.00	
	28-Jul	Sculpin G	\$41,769.00	\$50,915.07
2014	26-Jun	Renovate OTF	\$1,031.25	
	29-Jul	Renovate OTF	\$550.00	
		Renovate LZR Max	\$47,500.00	

		Sculpin G	\$5,187.50	
		Clipper	\$750.00	
	8-Sep	Sculpin G	\$0.00	
		Sculpin G	\$6,484.38	
		Sculpin G	\$3,735.00	
		Renovate LZR Max	\$0.00	\$65,238.13
2013	24,27 -Jun	Renovate OTF	\$2,800.00	
		Renovate Max G	\$19,500.00	
		Sculpin G	\$32,258.50	
	8-Aug	Sculpin G	\$4,330.00	
		Clipper	\$812.50	\$59,701.00
2012	9-Jul	Renovate OTF	\$4,400.00	
		Renovate Max G	\$27,500.00	
	24-Jul	Renovate OTF	\$2,200.00	
		Renovate Max G	\$15,000.00	
		Sculpin G (2,4-D)	\$15,155.00	\$64,255.00
2011	27-Jul	Renovate OTF	\$9,680.00	\$9,680.00
2010	29-Jun	Renovate OTF	\$2,200.00	
		Navigate 2,4-D	\$5,780.00	
	27-Sep	Renovate OTF	\$6,160.00	
		Navigate 2,4-D	\$19,750.00	\$33,890.00
2009	15-Sep	Renovate OTF	\$18,260.00	
		Navigate 2,4-D	\$40,800.00	\$59,060.00
Total Price				\$616,820.08

Addendum 4 Portage Lake Water Quality Data

Table 8: Tributary Water Quality Portage Lake -2022

5/12/2022 Part Sun	Temp (C)	D.O. (mg/L)	Cond. (uS/cm)	TDS (ug/L)	pH (S.U.)	TP (ug/L)	TKN (mg/L)	Nitrate (ug/L)	Flow (Ft/sec)
Glenn	55.94	10.28	349.7	289	8.31	10	144.2	0.82	1.2
McCormick	55.76	8.98	353.8	297	8.16	17	853.1	3.54	0.8
Onekama*	56.12	10.52	329.1	275	8.44	8	140.3	1.65	1.2
Schimke	55.4	10.31	318.5	268	8.24	12	189.5	1.09	1.8
Dunham	54.5	10.43	307.9	262	8.28	18	185	0.667	1.4
Hansen	54.68	8.63	361.6	297	8.03	27	173.3	0.851	0.2
Stream #9	59.9	9.29	294.1	234	8.05	23	153.2	15.9	0.4
9/29/2022	Temp (C)	D.O. (mg/L)	Cond. (uS/cm)	TDS (ug/L)	pH (S.U.)	TP (ug/L)	TKN (mg/L)	Nitrate (ug/L)	Flow (Ft/sec)
Glenn	48.2	11.28	332.8	263	8.42	8	68.8	3.47	0.4
McCormick	49.8	10.01	449.8	292	8.29	14	72.7	3.84	0.6
Onekama	47.1	11.29	432.7	281	8.48	8	64.1	4.62	0.6
Schimke	45.5	11.32	433.4	282	8.42	8	75.5	7.62	1
Dunham	44.7	11.35	416.7	271	8.35	11	79.6	1.5	0.8
Hansen	46.7	10.8	461.2	300	8.32	40	31.2	5.6	0.4
Stream #9	46.58	11.12	243.3.	128	8.24	16	63.8	12.95	0.4

Table 9: Storm Drain Sampling Portage Lake -2022

May 12, 2022	Temp (C)	D.O. (mg/L)	Cond. (uS/cm)	TDS (mg/L)	pH (S.U)	TP (ug/L)	Nitrate (ug/L)	Flow (Ft/sec)	Weather Sunny, Calm
#2 Zosel Park	57.02	9.25	396.6	327	7.84	24	1030	0.2	Clear
#5 Fourth St	54.32	8.08	555	479	7.94	29	680	0	Dark
#6 Third St	68.9	5.82	840	599	7.63	31	810	0	Dark, Stagnant
#7 First St.	51.8	8.54	362	306	7.69	26	230	0.8	Clear

Table 10: Shoreline Sampling Portage Lake -2022

Jun6 Secchi	Temp (C)	D.O. (mg/L)	Cond. (uS/cm)	TDS (ug/L)	pH (S.U.)	TP (ug/L)	ORP (mV)	Turb. (NTU)	TKN (mg/L)	Nitrate (ug/L)	Amm. (mg/L)	ALK (mg/L)	Chl. A (ug/L)
Cove- 4.5'	65.3	9.85	314.1	204	8.55	8	95.5	1.82	0.91	230	33	119	1.31
Inn- 4'	64.73	10.04	314.6	204	8.56	13	93.5	1.12	1	240	32	117	1.66
#3B- 3'	64.73	8.88	343.9	224	8.38	8	81.9	1.6	0.98	290	55	125	0.898
Jul 27 Secchi	Temp (C)	D.O. (mg/L)	Cond. (uS/cm)	TDS (ug/L)	pH (S.U.)	TP (ug/L)	ORP (mV)	Turb. (NTU)	TKN (mg/L)	Nitrate (ug/L)	Amm. (mg/L)	ALK (mg/L)	Chl. A (ug/L)
Cove-3.4'	74.1	9.09	307.6	200	8.69	8	73.9	1	0.56	230		125	1.8
Inn-4.5'	74.1	8.44	307.1	200	8.55	8	81.9	1.06	0.13	230		112	1.1
#3B- 3.2'	75.2	9.12	304.5	198	8.67	8	73.2	1.07	0.35	230		113	2.77
Sep29 Secchi	Temp (C)	D.O. (mg/L)	Conduct- ivity (uS/cm)	TDS (ug/L)	pH (S.U.)	TP (ug/L)	ORP (mV)	Turb. (NTU)	TKN (mg/L)	Nitrate (ug/L)	Amm. (mg/L)	ALK (mg/L)	Chlor. A (ug/L)
Cove-3'	60.62	9.01	310.7	202	8.49	20	66.7	1.6	2.15	230	103	109	0.85
Inn- 3'	60.62	9.28	308.8	201	8.54	24	67	1.98	1.91	230	84	109	0.96
#3B- 2.7'	55.4	10.04	316.2	206	8.51	8	70.2	1.34	1.87	230	29	120	0.20

In 2019, samplings were moved to new shoreline sites. 3B remained the same standard site 3B, but 3A was moved to the small cove and 3D was moved to Portage Point Inn.

Table 11: Deep Hole Basin 1 Portage Lake -2022

(Secchi Disc: June 10', July 10', Sept.11.5')

Basin 1 6/8/22	Temp (C)	D.O. (mg/L)	Cond. (uS/cm)	TDS (ug/L)	pH (S.U.)	TP (ug/L)	ORP (mV)	Turb. (NTU)	TKN (mg/L)	Nitrate (ug/L)	Amm. (mg/L)	ALK (mg/L)	Chl. A (ug/L)
s.	65.3	9.96	3145.3	205	8.54	8	99.2	1.1	0.81	230	31	106	1.61
10'	64.9	10.04	315.1	205	8.53	-	100.3	1.19	-	-	-	-	-
20'	54.6	11.05	313.4	204	8.4	-	105.9	0.96	-	-	-	-	-
30'	52.1	11.22	315.1	205	8.31	8	108.4	0.84	1.23	550	15	113	1.28
40'	51.2	10.17	318.2	207	8.089	-	112.5	0.96	-	-	-	-	-
50'	50.7	8.25	323.3	210	7.89	-	56.2	1.55	-	-	-	-	-
60'	48.2	7.9	321.2	210	7.9	8	78.9	1.45	1.17	390	98	118	0
Basin1 7/27/22	Temp (C)	D.O. (mg/L)	Cond. (uS/cm)	TDS (ug/L)	pH (S.U.)	TP (ug/L)	ORP (mV)	Turb. (NTU)	TKN (mg/L)	Nitrate (ug/L)	Amm. (mg/L)	ALK (mg/L)	Chl. A (ug/L)
s.	73.7	9.07	307	200	8.7	8	81.7	0.96	0.4	230	15	115	1.76
10'	73.7	9.01	307	200	8.68	-	80.4	0.98	-	-	-	-	-
20'	70.1	9.22	310	202	8.51	-	86.5	0.96	-	-	-	-	-
30'	58.6	7.3	324	211	8.03	8	102.3	1.45	0.77	260	25	111	2.1
40'	54.1	2.68	336	219	7.59	-	112	1.63	-	-	-	-	-
50'	53.4	0.4	337	219	7.56	-	108.8	2.45	-	-	-	-	-
60'	52.1	0.3	335	217	7.6	8	108	1.9	0.32	270	49	122	0.7
Basin1 9/29/22	Temp (C)	D.O. (mg/L)	Cond. (uS/cm)	TDS (ug/L)	pH (S.U.)	TP (ug/L)	ORP (mV)	Turb. (NTU)	TKN (mg/L)	Nitrate (ug/L)	Amm. (mg/L)	ALK (mg/L)	Chl. A (ug/L)
s.	60.4	9.15	309.4	201	8.52	10	74.6	1.7	2.09	230	86	127	2.2
10'	60.2	9.09	309.3	201	8.52	-	74.9	1.74	-	-	-	-	-
20'	59.9	9.03	309.3	201	8.51	-	75.2	1.9	-	-	-	-	-
30'	57.3	7.41	315.8	205	8.1	10	84.4	2.29	1.83	230	135	128	1.8
40'	55	6.91	316	205	8.04	-	15.2	1.94	-	-	-	-	-
50'	53.6	3.25	335.2	218	7.71	-	87.7	2.1	-	-	-	-	-
60'	52.1	1.2	325	217	7.9	10	70.2	2.3	1.69	230	321	123	0.8

Table 12: Deep Hole Basin 2 Portage Lake -2022

(Secchi Disc: June 10', July 10.5', Sept. 9')

Basin 2 6/6/22	Temp (C)	D.O. (mg/L)	Cond. (uS/cm)	TDS (ug/L)	pH (S.U.)	TP (ug/L)	ORP (mV)	Turb. (NTU)	TKN (mg/L)	Nitrate (ug/L)	Amm. (mg/L)	ALK (mg/L)	Chl. A (ug/L)
s.	65.6	10.04	315.8	205	8.53	10	82.8	1.03	0.98	250	31	107	0.842
10'	65.6	10.12	315.8	205	8.61	-	83.4	1.06	-	-	-	-	-
20'	65.1	10.14	316.2	206	8.61	-	85.3	1.06	-	-	-	-	-
30'	47.9	10.73	316.2	205	8.41	8	94.3	0.46	1.17	250	18	106	0.852
40'	54.6	10.17	322.2	209	8.29	-	98.2	1.02	-	-	-	-	-
50'	53.06	9.15	323.9	211	8.18	-	101.4	1	-	-	-	-	-
60'	52.8	8.64	323.9	210	8.2	8	99.2	1.02	0.88	340	65	112	0.85
Basin2 7/27/22	Temp (C)	D.O. (mg/L)	Cond. (uS/cm)	TDS (ug/L)	pH (S.U.)	TP (ug/L)	ORP (mV)	Turb. (NTU)	TKN (mg/L)	Nitrate (ug/L)	Amm. (mg/L)	ALK (mg/L)	Chl. A (ug/L)
s.	74.8	9.18	307	200	8.68	8	77.7	1.51	0.618	230	113	129	1.02
10'	74.8	9.22	307	200	8.6	-	84.5	1.21	-	-	-	-	-
20'	74.8	9.2	307	200	8.91	-	69.1	1.32	-	-	-	-	-
30'	64.2	6.49	325	212	8.12	8	96	1.14	0.818	230	383	130	0.9
40'	57.7	2.31	337	219	7.22	-	105.6	1.56	-	-	-	-	-

50'	55.5	0.35	340	222	7.62	-	112.8	1.21	-	-	-	-	-
60'	53.2	0.3	337	222	7.35	8	98	1.3	0.65	260	287	137	2.2
Basin2 9/29/22	Temp (C)	D.O. (mg/L)	Cond. (uS/cm)	TDS (ug/L)	pH (S.U.)	TP (ug/L)	ORP (mV)	Turb. (NTU)	TKN (mg/L)	Nitrate (ug/L)	Amm. (mg/L)	ALK (mg/L)	Chl. A (ug/L)
S.	61.3	9.04	310.4	202	8.5	10	67.4	1.62	1.68	230	63	124	5.1
10'	60.9	8.94	310.5	202	8.51	-	67.6	1.69	-	-	-	-	-
20'	60.8	8.92	310.3	202	8.51	-	67.9	1.59	-	-	-	-	-
30'	60.6	8.85	310.5	202	8.49	10	69	1.62	1.56	230	64	128	3.6
40'	60.4	8.77	310.6	202	8.49	-	68.8	1.56	-	-	-	-	-
50'	59.5	8.78	310.7	202	8.49	-	70	2.7	-	-	-	-	-
60'	57.9	8.65	311	202	8.49	10	70.2	2.1	3.39	230	85	115	2.9

APPLICATION FOR SHORT TERM RENTAL CERTIFICATE - Onekama Township Ordinance #PP 2019-08

A Short Term Rental certificate is required for any rental lease or contract for the rental of a residential dwelling for a period of less than 30 days. Certificate fee is \$100. The Certificate shall be valid per calendar year.

APPLICATION DATE _____

RENTAL UNIT OWNER INFORMATION: Applicant name _____ Applicant mailing address _____ City, State, ZIP _____ Applicant phone # _____ Applicant e-mail address _____
--

RENTAL PROPERTY ADDRESS: _____
City, State, ZIP _____

Property ID # 51- _____

LOCAL RENTAL UNIT MANAGER CONTACT INFORMATION:

Name: _____
Mailing Address: _____
Phone# _____ E-mail _____

Number of bedrooms _____
Occupant capacity (see Ordinance-Section 4, Item D) _____
Site sketch. > Attached ___ Not Attached ___
Required fire protection items are provided in the Short Term Rental unit: Smoke/CO alarms, fire extinguishers (Class 2-A). YES ___ NO ___ (Applicant initial)

I HEREBY CERTIFY THAT THE ABOVE INFORMATION AND STATEMENTS ARE TRUE TO THE BEST OF MY KNOWLEDGE. I WILL COMPLY WITH ONEKAMA TOWNSHIP ORDINANCE PP- 2019-08 "SHORT TERM RENTALS" AND ALL OTHER PERTINENT LAWS AND ORDINANCES, AND FULLY UNDERSTAND THAT FAILURE TO COMPLY WITH ALL SAID ORDINANCES AND LAWS MAY RESULT IN CITATIONS FOR MUNICIPAL CIVIL INFRACTIONS, FINES AND RECOVERY OF ENFORCEMENT COSTS AS PROVIDED BY ORDINANCE, AND / OR SUSPENSION OR LOSS OF CERTIFICATION FOR USE OF THE RESIDENTIAL DWELLING AS A SHORT TERM RENTAL.

_____ PACKET RECEIVED AND REVIEWED WITH OWNERS AND MANAGER _____

APPLICANT (OWNER) NAME (PRINT): _____

APPLICANT (OWNER) SIGNATURE _____

=====FOR OFFICE USE ONLY=====

DATE REC'D: _____ FEE PAID: _____ TREAS. APPROVED: _____

DATE ACCEPTED: _____ STR CERT. # _____ CLERK APPROVED: _____

TOWNSHIP OF ONEKAMA

ORDINANCE NO. 2019-02 (police power)

FIREWORKS ORDINANCE

An Ordinance to regulate the ignition, discharge, and use of consumer fireworks to conform to amendments of the Michigan Fireworks Safety Act, MCL Section 28.451, *et. seq.*, as has been amended by Public Acts 634,635, and 636 of 2018.

Definitions. As used in this section, the following terms shall be defined as follows:

(A) *APA standard 87-1* means 2001 APA standards 87-1, Standard for the Construction and Approval for Transportation of Fireworks, Novelties and Theatrical Pyrotechnics, published by the American Pyrotechnics Association of Bethesda, MD.

(B) *Consumer fireworks* means fireworks devices that are designed to comply with the construction, chemical composition and labeling regulations promulgated by the United States Consumer Protection Safety Commission under 16 CFR parts 1500 and 1507, and that are listed in APA standard 87-1, 3.1.2, 3.1.3, or 3.5. Consumer fireworks do not include low-impact fireworks.

(C) *Fireworks* means any composition or device, except for a starting pistol, a flare gun, or a flare, designed for the purpose of producing a visible or audible effect by combustion, deflagration or detonation.

(D) *Low impact fireworks* means ground and handheld sparkling devices as that phrase is defined under APA standard 87-1, 3.1, 3.1.1.1 to 3.1.1.8 and 3.5.

(E) *Minor* means an individual who is less than 18 years of age.

Section. 1 - Ignition, Discharge or Use of Consumer Fireworks.

A. Except as provided in this Section, a person shall not ignite, discharge, or use consumer fireworks at any time.

B. A person may ignite, discharge, or use consumer fireworks on the following days during the following hours:

1. Between 11:00 a.m. on December 31 and 1:00 a.m. on the immediately following January 1.
2. Between 11:00 a.m. and 11:45 p.m. on the Saturday immediately preceding Memorial Day.
3. Between 11:00 a.m. and 11:45 p.m. on the Sunday immediately preceding Memorial Day.
4. Between 11:00 a.m. and 11:45 p.m. on June 29, June 30, July 1, July 2, July 3 and July 4.
5. Between 11:00 a.m. and 11:45 p.m. on July 5, if that date is a Friday or a Saturday.

6. Between 11:00 a.m. and 11:45 p.m. on the Saturday immediately preceding Labor Day.
7. Between 11:00 a.m. and 11:45 p.m. on the Sunday immediately preceding Labor Day.

C. A minor shall not possess consumer fireworks.

D. A violation of this Section is a civil infraction, punishable by a fine of not more than \$1,000.

Section 2 – Special Permits

Upon application in writing by any association or group of individuals, the Township Board of Trustees may grant permission for the public display of Consumer Fireworks on days other than those specified in Section 1 of this Ordinance, subject to such conditions as deemed necessary to safeguard the welfare of the public and property. Such applications for Special Permits must be filed with the Township clerk at least thirty (30) days before the proposed display event.

Section 3 – Ignition, Discharge, or Use of Consumer Fireworks While Under the Influence.

- A. A person shall not ignite, discharge, or use consumer fireworks or low-impact fireworks while under the influence of alcoholic liquor, a controlled substance, or a combination of alcoholic liquor and a controlled substance.
- B. As used in this Section, “alcoholic liquor” means that term as defined in Section 1d of the Michigan Vehicle Code, MCL 257.1d, as may be amended, and “controlled substance” means that term as defined in Section 8b of the Michigan Vehicle Code, MCL 257.8b, as may be amended.
- C. A violation of this Section is a civil infraction, punishable by a fine of not more than \$1,000.

Section 4 - Ignition, Discharge or Use of Consumer Fireworks on Public Property, School Property, Church Property or the Property of Another Person

1. A person shall not ignite, discharge and/or use Consumer Fireworks on public property, school property, church property, or the property of owned by another person or entity without that organization’s or person’s express permission.

2. A person shall not discharge Consumer Fireworks in such a manner so as remnants from consumer fireworks land on public property or the property of another, including, but not limited to, residential dwellings, hotel and motel property, apartment property, and condominium property, without that person or organization’s express permission.

3. An individual who owns property and/or is in charge of property that knowingly allows a violation of Section 4 (1-3) to occur on his/her property shall be liable for a municipal civil infraction and subject to a civil fine of at least \$100 and no more than \$500 for each violation of this Ordinance.

Section 5 - Determination of Violation; Seizure; Destruction; Storage Costs.

1. If a police officer determines that a violation of this Article has occurred, the Department may seize the firework as evidence of the violation. The Department shall store, or cause to be stored, the evidence seized under this Section pending disposition of any proceedings arising from the violation.

2. Following a final disposition of an appeal of a finding of responsibility under this Article that affirms the finding, the Department may dispose of or destroy any fireworks retained as evidence in that proceeding.

3. A person from whom fireworks are seized under this Article shall pay the actual costs of storage and disposal of the seized fireworks if found responsible for a violation of this Article.

SECTION 6 - Enforcement

The Fire Chief, his / her designees, and sworn law enforcement officers are authorized to enforce the provisions of this ordinance.

SECTION 7 - Severability

This Ordinance and each of the various parts, sections, subsections, sentences, phrases, and clauses hereof are declared to be severable. If any part, section, subsection, sentence, phrase, or clause is determined to be invalid or unenforceable by a court of competent jurisdiction, it is hereby provided that the remainder of the Ordinance shall not be affected thereby and shall remain in full force and effect.

SECTION 8 – Effective date

This Ordinance shall take effect immediately upon publication.

Motion by Bob Blackmore, Second by James Wisniski for approval of Ordinance 2019-02 as presented by Planning Commission. Roll Call Vote: Wisniski – Yes, Blackmore – Yes, Beebe – Yes, Johnson – Yes, Meister – Absent. M/C

CERTIFICATION

I certify that this Fireworks Ordinance Amendment was adopted by the Board of Trustees of Onekama Township, Michigan at a regular meeting held on June 4, 2019.

TOWNSHIP OF ONEKAMA - SHELLI JOHNSON, clerk

_____ (date) _____

3/1/2023	Ron Woods	Bayview	applying for deck extension and roof/screen-in deck, dropped off documents but still needs to submit payment, will process permit as soon as payment is received.
3/1/2023	Steve Brooks	2nd Street	wondering if a permit is required to do some kind for windbreak around firepit chairs with sandbags or pallets. Let him know this would not require a permit unless it is a permanent or larger structure that meets the definition of a fence for example
3/1/2023	Mark Greening	N/A - Ag?	wondering if he needs a new LUP for a greenhouse he had shown on a site plan for a different structure several years ago. Let him know he would need to reapply as that permit would be expired and i do not have permitting records dating before 2019.
3/6/2023	Bruce P	8671 Portage Point Dr	working on site plan for property owners, needed to confirm setbacks, impervious surface coverage and water setback. Also asked about preliminary site plan review, let him know I can do a preliminary review before they actually submit if it would be helpful.
3/7/2023	Bob & Pat Pierce	2680 Lakeview Road	Called to clarify what needed to be submitted for the land use app. Had submitted last summer and did not provide remaining documentation so I returned everything to them and requested they resubmit when all documentation is complete/obtained. They needed payment and a BPA from the health department
3/7/2023	Dave Vanecek	Portage Point Drive	talked with him about the side yard fence that is not in compliance with the ZO. Due to the ongonig ZBA appeal, a deadline for conformance was not set but he said he would get in contact with his fence company to have them come out and lower the height of the fencing to be compliant with the ZO. Will follow up with him in a month or so
3/8/2023	Dave Emenheiser	N/A	looking to combine two vacant lots adjacent to parcel with home on it that they just purchased. Let him know this is done through EQ and sent him their combo form via email
3/10/2023	Ronald Woods	Bayview	came in to drop off check for LUP, all set and permit was issued for deck extension
3/13/2023	Rick Tompke	N/A	wondering where a camp ground is allowed per zoning. Went over SIC Codes with him and that a campground (SIC Code 7033, falls under Services [I; 70-89]) is allowable as a special use in the AG-1 District, and Sports and Recreation camps are allowable as a special land use in AG-2 (SIC Code 7032)
3/13/2023	Denny Hughes	2531 Pine Run Drive	emailed to let me know they are going to pursue a new home construction by building a guest dwelling instead of splitting the parcel and building another primary dwelling, sent land use app via email
3/13/2023	Lindsey Malhoit	Portage Lake	Looking to purchase a property on Portage Lake but wanted to confirm the fence regulations before pursuing anything since they have dogs. Sent her regulation via email
3/14/2023	Wayne Faber	Little Eden Camp	wondering if an amendment the SUP is require to add additional ingress/egress for new cottages propsoed under Phase I, reviewed the SUP and site plan and talked to PC Chair, nothing in permit that specifies dimensions of cottages just general layout and capacity. Determined an amendment would not be required
3/20/2023	Wayne Faber	Little Eden Camp	called to let me know they would like to modify aspects of their phasing for construction approved under the amended SUP due to sewer capacity of their current infrastructure. Let him know we could take this to the PC in May and we are going to also schedule a preliminary meeting with ZA and PC chair to go over what will be presented and what the PC will want to see, prior to the May meeting

3/20/2023	Vicky CBS Solar	51-11-410-107-10	Wanted to know if a Land Use Permit was needed for rooftop solar panel installation. Caller is all set and sending in Land Use Permit Application
3/23/2023	John Judge	Ivanhoe	Realtor looking for the most UTD ZO, sent it to him via email and also included the stand alone docs i have for sections that have been approved and updated in the ZO but have not been added to the document yet
3/23/2023	Vicki CBS Solar	206 3rd st	Confirming documents in rapid fire email sequences to discuss recieved materials and where/ how to make a payment
3/24/2023	Tom Frakes	11-330-045-00	wanted to put in a driveway and pad to park camper, let him know this is not allowable in the residential districts. Sent him via email the sections of the ZO that detail temporary dwellings and parking of recreational vehicles
3/27/2023	Darrell Burkhart	Onekama Twp	inquiring when a land-use permit is needed on a prebuilt shed that will be placed without a foundation. I shared section 503. Definitions: Accessory Building.
3/28/2023	John Ogren	10126 Ivanhoe	Calling for information permits needed to begin a project in the Township. I provided a LU Permit Application, Soil and Erosion Permit Application, and Chuck Erikson contact info
3/30/2023	Maureen Culp	PPI Doll Houses	wondering if these are allowed to be purchased and converted into a larger doll house. Let her know bob has not proposed an amendment to his SUP for this, and that would have to be satisfied before any changes to the buildings on the property. Also let her know that i believe Bobs intent was to condo these to sell them off but that I am not 100% sure on that
3/31/2023	BethAnn Kozicki	11-290-019-00	Inquiring on a parcel's "buildability" from a zoning aspect. Gave her the Required sqft, and paper road map to show access.
4/3/2023	Matt Kolmar	9611 Herklerath	called: needed his LU Permit # to schedule final inspection
4/4/2023	Kelly Weiner	2840 Cresent Beach Rd	Dicussed Rosewood St. that runs through the middle of the parcel. Needs additional information on Guest Apt, road vacation, plotted subdivisions, as well as EGLE and Health DEPT Contact info.
4/5/2023	Kelly Weiner	2840 Cresent Beach Rd	Follow up Email with more information
4/5/2023	Township		Dropping off permits and payments

Portage Lake Harbor Commission Meeting Notes
March 16,2023

Call to order: 10:00 Am

Minutes from January 12 approved.

Burger: Village news, No secret sewer meetings,new budget approved,Jetti at park launch being repaired in April,making repairs to dock at launch.

Bromley: New renter at Café at PLM,Water down 44 inches since high water 2 years ago, losing slips along wall at PLM facility, high demand for slips for 2023 season, pontoon rentals already for summer.

Mc Coll: Lighthouse at DNR launch in good shape, water down at marina, already booking seasonal and transient slips.

Hughes: Submitted Port Assistance grant Criteria to chairman Simons, Invasive species committee recommended fish study to township board.

Simons: Port Assistance grant does not seem to fit Onekama s needs .Called Doug Barry from DNR about the status of DNR launch, trying to mobilize funds from Senator Bumstead to assist in the repair and update to dock and dredge for 2023 season. Dredging allocated for Channel in 2023 or 2024 season by Feds (980,000). Also met with CORP and discussed the status of the stone infill for revetment on pier.

New Business: Still looking for new member to replace Frank English, 650 dollars received from Franks memorial.

Discussion: Jim presented some information in regards to negative effect of wake boats to underwater habitat. Also, Hughes mentioned the growing use of boat washes in some lakes in northern Michigan to help control introduction of new invasive species.

Meister: Looking for a boat for the fire department for rescue. Have fire fighters on staff willing to train and operate vessel. Onekama Marine will donate slip for boat when purchased.

Public Comment: None

Next Meeting: May 11,2023, 10:00 Am

Adjourn: 10:48 Am

Onekama Township Parks and Recreation Committee
Monthly Meeting
Township Hall
March 3, 2023 8:30AM

In attendance: Bick Pratt, Tyler Dula, Chair Michelle Ervin, Brian Allen, Andrea Arthur. By telephone: Paul Mueller. Absent: Gary Madden, Al Taylor, Justin Sedelmaier.
Meeting called to order at 8:31AM.

Public comment: Amber Sedelmaier- Recreational opportunities for youth
- volleyball langland - Amber
-fitness festival - Amber
- fishing for kids - Mr. Sedelmaier

Motion to approve February meeting minutes by Arthur, 2nd by Allen. AIF, motion carries.
Correspondence: none
Sub-committee reports: none

Old business:

Budget and employee report by Bick

- Discussion about other places to advertise the posting
- Applications received by March 31
- Decision by 4/15.
- Discussion about on-line forms
- Michelle to make modifications with deadlines, start dates etc.

Invasive species:

- injecting in big trees
- consensus that time release ground application in small amounts would be safe for groundwater.

Motion to move forward with invasive species treatment if approved in the Parks and Rec budget.

Bick motion, Andrea second. All in agreement. Motion carries.

Further, looking into the Juniper issue at North point and other places. Tyler & Brian to talk to Josh.

Parks Management Plan: no disagreement to North Point Park. Plans will be a 5 year vision.

Individual projects will not be included. Some edits to the animal species. A motion to accept North Point plan subject to final edits to species carries.

Bick to email Langland Park notes to Michelle to be formatted as North Point Park.

New business:

Election of Officers:

Andrea motion to keep current structure of P&R officers (Chair, Vice-Chair, no secretary) and current structure of committees, subcommittees, and committee membership. Mueller second. AIF Motion carries.

Public comment: none

Member comment: Discussion about wetlands

Motion to adjourn meeting by Ervin

Adjourn at 9:31.

Next meeting April 7, 2023 at 8:30AM in Township Hall

Onekama Township Parks and Recreation Committee Report

Tuesday, March 28, 2023

Michelle Ervin, Chair

Bick Pratt Vice Chair

Al Taylor, Board Representative

Andrea Arthur (Village of Onekama), Gary Madden (Onekama Consolidated Schools), Tyler

Dula (Manistee Conservation District), Paul Mueller, Justin Sedelmaier, Dr. Brian Allen

Health and Wellness advisor, Dr. Jay Siwek

PURPOSE, OBJECTIVE & DUTIES

The general purpose of the Committee is to assist and advise the Onekama Township Board in Township parks and recreation matters.

The Committee's responsibilities and duties shall be:

(a) Develop and recommend an annual budget for parks & recreation.

(b) Recommend the acquisition, design and improvement of current and future areas and facilities for recreation.

(c) Recommend maintenance standards for each of the Township's parks and recreation areas.

(d) Recommend rules and regulations governing the use of Township parks and recreation areas.

(e) Develop and lead recreation programs.

(f) Research, recommend, foster and evaluate new and existing recreational partnerships.

Summary of recent accomplishments and current activities

Pratt:

- Submitted Manistee Community Foundation Grant request for parks signage
- Langland boardwalk repairs and Mobi Mat plans with Blackmore.

Ervin:

- Created flyer and sign-up for 2023 Bird Walks (by Dr. Brian Allen), submitted to Amber for posting on Township Website
- Created event Kids and Kites in Langland Park, purchased kites for giveaway. Costs of 75 kites and prizes covered by donation of Al Taylor.
- Created sign up for 2023 programming, submitted to Amber for posting on Township Website
- Created flyer for Kites and Kids event
- Through partnership with Portage Lake Garden Club, scheduled a field trip of OCSD 10th grade students to plant native black willows in Portage Wetlands Park in late May/early June. Costs of 22 trees covered by Betsy Tyson as a donation.
- Set schedule of History Subcommittee meetings and event
- Posted Seasonal Parks Manager Job Description on 14 College job boards (Handshake), distributed through Onekama community.
- Requested return of ADA accessible portable restroom from C&W in time for April events

Activities in progress

Manistee County Community Foundation Grant for Parks Signage: Pratt

Parks Management Plan Langland: All

Spicer Proposal for final design services and improvements to Langland Park: Pratt

Onekama Parks Species Management Plan: Dula, Sedelmaier, Taylor

Contacted James Scarlata-scheduling Spring invasive plant species treatment:Ervin

Receiving Seasonal Parks Manager applications through April 6, 2023: All

Upcoming February events

Guided Bird Walks in North Point Park: April 20@ 8:45PM Owl Prowl & Spring Migration April 27 @ 8:00AM

Kids and Kites Event in Langeland Park: April 22, 3:00PM to 4:30PM

Financial

Billing resumes for North Point Park ADA Portable restroom

Committee Recommendations to the Board of Trustees

Review and approve

History Subcommittee Proposal

James Scarlata: Consulting Forester, LLC

PO Box 88
 Manistee, MI 49660

Proposal

Date	Proposal #
1/5/2023	2472

Name / Address
Michelle Irvin Onekam Township Parks

			Project
Description	Qty	Cost	Total
Treat scattered invasive woody shrubs (autumn olive, honeysuckle, barberry, privet) in prairie Savannah areas by hand pulling or cut-stump treatment with herbicide applied directly to the stump. Herbicide used will be Garlon 4 or Milestone. Plants will be left in place to decompose. If treatment occurs late in summer when viable seeds may be present then I recommend having volunteers collect the cut plants that contain seeds and make burn piles. Areas of dense thickets or forest will not be treated at this time. Winter - summer 2023		1,300.00	1,300.00
Treat black locust colony inside of rustic trail. larger trees will be treated by trunk injection of Velpar herbicide, smaller trees will be treated with basal soil treatment with Velpar herbicide. Summer 2023		326.00	326.00
Recommended Treatments		Total	\$1,626.00

Phone #
231 723 6996



March 23, 2023

David Meister, Township Supervisor
Onekama Township
5435 Main Street
P.O. Box 458
Onekama, MI 49675

RE: Langland Park Improvements
Onekama Township, Manistee County
Agreement for Professional Services

Dear Mr. Meister:

As requested, we are submitting a proposal to you for Spicer Group's assistance for final design services and for improvements to Langland Park on Lake Michigan in Onekama Township of Manistee County. It is our understanding that the Township wishes to review and pursue drainage improvements to better handle developed runoff from the existing parking lot and County road.

SCOPE OF BASIC PROFESSIONAL SERVICES

The scope and fee for our professional engineering services are as follows:

1. Complete topographic survey for parking lot and county road sufficient to clearly identify drainage patterns and all areas contributing developed runoff and complete existing conditions drawing for parking lot, pavilion area, walkways to beach and eroded areas to be restored.

Estimated Fee: \$3,750.00

2. Investigate and develop plan for restoration of existing concrete slab platform on northwest side of site. This platform had been constructed during a previous project on beach sand without a deeper foundation such as helical piles. Plan will need to replace foundation support which has been eroded from parking lot drainage. Construction measures for this area will likely depend upon coordination with the control of drainage from the parking lot to reduce future erosion. Our services under this scope would include preparing opinions of probable construction cost.

Estimated Fee: \$2,800.00

3. Investigate and develop plan to provide positive drainage for developed runoff from the parking lot and a portion of the County Road which outlets to the parking lot. Potential solutions may include perimeter surface drainage or curbing along west side of the parking lot to collect runoff and convey to a stormwater 'dry well' basin system for controlled drainage outlet and/or infiltration to prevent future erosion issues. Our services under this scope would include preparing opinions of probable construction cost.

Estimated Fee: \$6,500.00

SERVICES NOT INCLUDED

For a clearer understanding of our work scope, the following is not included in our Scope of Professional Services.

- Grant and/or project funding administration
- Environmental impact statements or reports
- EGLE/JPA permit plans or applications
- Consultation for threatened or endangered species
- Construction Bid Letting
- Construction Engineering and Administration
- Construction staking and inspection

ADDITIONAL SERVICES

We will furnish additional services related to this project after you authorize the work. Our fee for the additional services will be determined at the time they are agreed to and rendered. Requests by regulatory agencies that require supplemental design may require additional services.

FEE SCHEDULE

Our proposed fees for the project are estimated as listed above based on standard hourly rates. We will submit monthly invoices to you for the portion of work completed in the billing period and for any reimbursable expenses during each phase on the amount of work completed.

Attached to this letter is a copy of our general conditions for our services, which are part of this agreement. Any changes to this agreement must be agreed to by both of us.

March 23, 2023

Page 3 of 3

If this proposal meets with your approval, please acknowledge that the project is authorized by signing the enclosed copy in the space provided and returning it to our office.

We deeply appreciate your confidence in our firm, and we are looking forward to working with you and for you on this project.

Sincerely,



Brian M. Boals, P.E.
Senior Project Manager

SPICER GROUP, INC
302 River Street
Manistee, MI 49660
Phone: (231) 313-4863
mailto: brian.boals@spicergroup.com

Above proposal accepted and approved by Owner:

By: _____

David Meister
Onkama Township Supervisor

Date: _____

Enclosure:

Spicer Group General Conditions
Hourly Rate Schedule

Date: March 13, 2023

To: Local Municipalities

From: Rachel Nelson, County Treasurer & Land Bank Authority Chair



RE: Land Bank Project Suggestions

The Manistee County Land Bank Authority can receive a guaranteed grant from the State Land Bank Authority of \$200,000 if blight elimination projects are ready to go and the funds are successfully applied for through two rounds. Applications for Round One were due January 31st, and funding for three demolition projects has been granted in the amount of \$54,648. This leaves a remainder of \$145,352 that can be applied for in Round Two. Official application information hasn't been released yet, but it is anticipated that the deadline will be May 31st. Properties can be owned by the Land Bank (through donation, purchase, etc) or be privately owned (resulting in a lien with the State). Eligible activities include, but are not limited to:

1. Demolition of vacant residential, commercial, or industrial structures, including reasonable and necessary costs directly related to demolition.
2. Stabilization of vacant residential, commercial, or industrial structures identified for future rehabilitation.

The Land Bank is requesting your help in making the most of these grant funds for our community. Do you have ideas about potential projects? Does your municipality own property that might benefit from this grant? Do you know of property owners that might be interested in donating or selling to the Land Bank? Please share your feedback with us as soon as possible, but no later than 5:00 P.M. on April 18, 2023, by email to landbank@manisteecountymi.gov, by mail to 415 3rd Street, Manistee, MI 49660, or by calling 231-723-3173.

If you come up with additional ideas after the deadline, please continue to share them with us. We look forward to working together to revitalize Manistee County.

JOURNALIZED
 BOTH OPEN AND PAID

GL Number	Invoice Date	Vendor	Invoice Desc.	Invoice	Chk Date	Amount	check #
Fund 101 GENERAL FUND							
Dept 101 TOWNSHIP BOARD							
101-101-727.000	02/28/23	JACKPINE BUSINESS CENTER	TONER	482881-0	03/15/23	431.97	5888
101-101-727.000	03/02/23	JACKPINE BUSINESS CENTER	ENVELOPES	482881-1	03/15/23	39.97	5888
101-101-727.000	03/03/23	JACKPINE BUSINESS CENTER	PENS AND BATTERIES	482881-2	03/15/23	64.53	5888
101-101-802.000	03/13/23	MANISTEE COUNTY PLANNING DEPA	ONEKAMA TOWNSHIP PARCEL DATA	10-2023	03/15/23	267.00	5891
101-101-900.000	02/28/23	THE PIONEER GROUP	NEWSPAPER PUBLISHING	PIONEERMAR2023	03/08/23	491.50	5883
101-101-921.000	03/01/23	CONSUMERS ENERGY	CONSUMERS ENERGY- FAIRWAY ST	CONF AIRWAYSTMAR2	03/08/23	28.81	5881
101-101-921.000	03/01/23	CONSUMERS ENERGY	CONSUMERS ENERGY- LED LIGHTS	CON LEDMAR2023	03/08/23	246.60	5881
101-101-921.000	03/01/23	CONSUMERS ENERGY	CONSUMERS ENERGY- STREETLIGHTS	CON STREETMAR2023	03/08/23	91.13	5881
101-101-921.000	03/01/23	CONSUMERS ENERGY	CONSUMERS ENERGY- 2ND ST	CON 2NDSTMAR2023	03/08/23	30.83	5881
101-101-921.000	03/01/23	CONSUMERS ENERGY	CONSUMERS ENERGY- MAIN ST	CON MAINSTMAR2023	03/08/23	157.10	5881
101-101-957.000	02/27/23	ELAN CARDMEMBER SERVICE	CREDIT CARD PAYMENT	ELANMARCH2023	03/15/23	99.00	5886
101-101-957.000	03/01/23	MANISTEE COUNTY CHAPTER MTA	ANNUAL DUES FOR 2023 MANISTEE COUNT	MTADUES2023	03/15/23	30.00	5890
Total For Dept 101 TOWNSHIP BOARD						1,978.44	
Dept 253 TREASURER							
101-253-802.000	02/27/23	ELAN CARDMEMBER SERVICE	CREDIT CARD PAYMENT	ELANMARCH2023	03/15/23	71.97	5886
Total For Dept 253 TREASURER						71.97	
Dept 257 ASSESSOR							
101-257-802.000	03/01/23	GREAT LAKES ASSESSING	ASSESSING CONTRACT	MARCH2023	03/15/23	3,859.00	5887
Total For Dept 257 ASSESSOR						3,859.00	
Dept 265 BUILDING & GROUNDS							
101-265-920.000	02/28/23	REPUBLIC SERVICES	TRASH SERVICES- TWP HALL AND NORTH	0239-003310376	03/08/23	53.10	5882
101-265-920.000	03/01/23	CHARTER COMMUNICATIONS	TV, INTERNET AND PHONE	0010403030123	03/15/23	162.72	5885
101-265-920.000	02/28/23	SUPERIOR ENERGY COMPANY, LLC	NATURAL GAS BILL	SUPMAR2023	03/15/23	158.91	5893
101-265-920.000	03/01/23	VILLAGE OF ONEKAMA	SEWER BILL	SEWERMAR2023	03/15/23	145.00	5895
Total For Dept 265 BUILDING & GROUNDS						519.73	
Dept 266 ATTORNEY							
101-266-803.000	03/09/23	RUNNING, WISE & FORD, P.L.C.	ATTORNEY FEES- GENERAL MATTERS	44221	03/15/23	2,569.00	5892
101-266-803.000	03/09/23	RUNNING, WISE & FORD, P.L.C.	ATTORNEY FEES- STOKES/VANCEK ZBA	44222	03/15/23	1,169.00	5892
Total For Dept 266 ATTORNEY						3,738.00	
Dept 751 PARKS & RECREATION							
101-751-802.000	03/14/23	JOHNSON SIGN COMPANY	SIGNS FOR KAYAK LAUNCH	220956-1	03/15/23	5,075.25	5889
101-751-802.000	07/14/22	SWIDORSKI BROS. EXCAVATING LLC	LABOR AND EQUIPMENT FOR KAYAK LAUNCH	5058	03/15/23	1,150.00	5894
101-751-802.000	01/03/23	SWIDORSKI BROS. EXCAVATING LLC	LABOR AND EQUIPMENT FOR REMOVAL OF	5164	03/15/23	600.00	5894
101-751-802.000	03/01/23	SWIDORSKI BROS. EXCAVATING LLC	KAYAK LAUNCH	KAYAK2023	03/15/23	40,613.40	5894
101-751-920.000	02/28/23	REPUBLIC SERVICES	TRASH SERVICES- TWP HALL AND NORTH	0239-003310376	03/08/23	65.50	5882
101-751-921.000	03/01/23	CONSUMERS ENERGY	CONSUMERS ENERGY- GREENWAY ST	CON GREENWAYSTMAR	03/08/23	28.81	5881
Total For Dept 751 PARKS & RECREATION						47,532.96	
Total For Fund 101 GENERAL FUND						57,700.10	
Fund 204 ROAD FUND							
Dept 000							
204-000-930.000	03/13/23	MANISTEE COUNTY ROAD COMMISSIO	APPLICATION FOR SIGN INSTALLATION	ROADSMAR2023	03/13/23	400.00	1029
Total For Dept 000						400.00	
Total For Fund 204 ROAD FUND						400.00	
Fund 206 FIRE FUND							
Dept 000							

JOURNALIZED
 BOTH OPEN AND PAID

GL Number	Invoice Date	Vendor	Invoice Desc.	Invoice	Chk Date	Amount	check #
Fund 206 FIRE FUND							
Dept 000							
206-000-920.000	03/01/23	CONSUMERS ENERGY	CONSUMERS ENERGY - MAIN ST FF	CONMAINSTMAR2023	03/08/23	157.10	3134
206-000-920.000	02/28/23	REPUBLIC SERVICES	TRASH SERVICES- FIRE	0239-003310376FF	03/08/23	53.10	3135
206-000-920.000	03/01/23	CHARTER COMMUNICATIONS	TV, INTERNET AND PHONE- FIRE	0010403030123FF	03/15/23	162.72	3137
206-000-920.000	02/28/23	SUPERIOR ENERGY COMPANY, LLC	NATURAL GAS BILL- FIRE FUND	SUPMAR2023FF	03/15/23	158.92	3138
206-000-920.000	03/01/23	VILLAGE OF ONEKAMA	SEWER BILL- FIRE	SEWERMAR2023FF	03/15/23	145.00	3139
Total For Dept 000						676.84	
Total For Fund 206 FIRE FUND						676.84	
Fund 703 TAX FUND							
Dept 000							
703-000-214.101	03/14/23	ONEKAMA GENERAL FUND	ONEKAMA TOWNSHIP WINTER TAXES GENER.	WIN 2022-6	03/04/23	3,893.10	2242
703-000-214.101	03/14/23	ONEKAMA GENERAL FUND	ADMIN FEE SUMMER TAXES	SUM 2022-14	03/04/23	148.70	2242
703-000-214.204	03/14/23	ONEKAMA ROAD FUND	ONEKAMA TOWNSHIP WINTER TAXES ROADS	WIN 2022-6	03/04/23	2,497.88	2243
703-000-214.206	03/14/23	ONEKAMA FIRE FUND	ONEKAMA TOWNSHIP WINTER TAXES FIRE	SUM 2022-6	03/04/23	2,484.50	2241
703-000-214.220	03/14/23	ONEKAMA GENERAL FUND	ONEKAMA TOWNSHIP WINTER TAXES GENER.	WIN 2022-6	03/04/23	1,276.00	2242
703-000-222.001	03/14/23	MANISTEE COUNTY TREASURER	MANISTEE COUNTY SUMMER TAXES	SUM 2022-14	03/04/23	2,576.48	2238
703-000-222.002	03/14/23	MANISTEE COUNTY TREASURER	MANISTEE COUNTY WINTER TAXES	WIN 2022-6	03/04/23	2,531.77	2238
703-000-222.003	03/14/23	MANISTEE COUNTY TREASURER	MANISTEE COUNTY WINTER TAXES	WIN 2022-6	03/04/23	378.00	2238
703-000-222.005	03/14/23	MANISTEE COUNTY TREASURER	MANISTEE COUNTY WINTER TAXES	WIN 2022-6	03/04/23	573.80	2238
703-000-222.006	03/14/23	MANISTEE COUNTY TREASURER	MANISTEE COUNTY WINTER TAXES	WIN 2022-6	03/04/23	1,202.24	2238
703-000-222.007	03/14/23	MANISTEE COUNTY TREASURER	MANISTEE COUNTY WINTER TAXES	WIN 2022-6	03/04/23	1,265.69	2238
703-000-222.008	03/14/23	MANISTEE COUNTY TREASURER	MANISTEE COUNTY WINTER TAXES	WIN 2022-6	03/04/23	1,265.69	2238
703-000-223.000	03/14/23	MANISTEE COUNTY TREASURER	MANISTEE COUNTY WINTER TAXES	WIN 2022-6	03/04/23	2,531.77	2238
703-000-225.001	03/14/23	ONEKAMA CONSOLIDATED SCHOOLS	ONEKAMA SCHOOL SUMMER TAXES	SUM 2022-14	03/04/23	1,806.31	2240
703-000-225.002	03/14/23	ONEKAMA CONSOLIDATED SCHOOLS	ONEKAMA SCHOOL SUMMER TAXES	SUM 2022-14	03/04/23	4,460.50	2240
703-000-225.003	03/14/23	ONEKAMA CONSOLIDATED SCHOOLS	ONEKAMA SCHOOL SUMMER TAXES	SUM 2022-14	03/04/23	466.27	2240
703-000-228.002	03/14/23	MANISTEE COUNTY TREASURER	MANISTEE COUNTY SUMMER TAXES	SUM 2022-14	03/04/23	2,852.10	2238
703-000-234.000	03/14/23	MANISTEE INTERMEDIATE SCHOOL	MANISTEE ISD SUMMER TAXES	SUM 2022-14	03/04/23	1,079.63	2239
703-000-235.000	03/14/23	WEST SHORE COMMUNITY COLLEGE	WSCC OPERATING SUMMER TAXES	SUM 2022-14	03/04/23	1,464.34	2244
703-000-275.000	03/17/23	LLOYD RICHARD J & BOBBIE D	2022 Sum Tax Refund 11-530-027-10	03/17/2023	03/17/23	1,386.00	2245
Total For Dept 000						36,140.77	
Total For Fund 703 TAX FUND						36,140.77	

JOURNALIZED
BOTH OPEN AND PAID

GL Number	Invoice Date	Vendor	Invoice Desc.	Invoice	Chk Date	Amount	check #
Fund Totals:							
			Fund 101 GENERAL FUND			57,700.10	
			Fund 204 ROAD FUND			400.00	
			Fund 206 FIRE FUND			676.84	
			Fund 703 TAX FUND			36,140.77	
			Total For All Funds:			<u>94,917.71</u>	