CASCADE CHARTER TOWNSHIP

YEAR 2024

THORNAPPLE RIVER SPECIAL ASSESSMENT DISTRICT

ANNUAL REPORT

2024

MEMBERS

THORNAPPLE RIVER SAD COMMITTEE MEMBERS

John Shipley, Trustee
Jeff Carpenter, Cascade Thornapple River Assoc. Rep
Thomas Keith
Scott Rissi
Leann Rowland
Chuck Whitley
Michael Wiegand

TOWNSHIP STAFF ASSISTING THE COMMITTEE

Jade Smith, Township Manager
Dan Zwick, Parks & Facilities Director
Aric Thorne, Township Engineer
Jessica Stine, Executive Assistant

SAFETY & NAVIGATIONAL MARKING PROJECT

The Thornapple River SAD Committee continued 2023 work on the Safety & Navigational Marking Project by receiving approval to install the desired markers from EGLE; the permit will remain open for 5 years. Viking Marine Construction began planning the installation of the markers. The marking of objects/the channel will primarily be between the I-96/M-6 bridges and the CSX railroad bridge. More markers were requested than will be placed as it is easier to modify the placement of approved markers without applying for additional permits. The committee has limited the number of markers to be installed so that site lines to the water remain scenic.

This project was set for completion in late 2024 but came to an abrupt halt due to delays Viking Marine Construction experienced on one of their other projects. By the time they were able to begin work on the Thornapple River, portions of it were frozen, making it unnavigable. Conversations are ongoing, but the project will likely be completed in early to mid-2025, once the ice on the river has melted.

AQUATIC VEGETATION CONTROL & WATER TESTING

This year marked the third successful season of weed treatments and river water quality testing by PLM Lake & Land Management Corp (PLM). The appendix includes Water Quality results, including tests for E. coli, conductivity, total dissolved solids, pH, alkalinity, total phosphorus, nitrates, and chlorophyll. The 2024 cutting and removal of weeds went smoothly, and neither the committee nor the Township received negative feedback.

Jaimee Desjardins, the contact for PLM, attended the October 14, 2024, meeting and discussed the company's river observations for the year. Three treatments occurred due to the increased prevalence of weeds caused by the warmth of the previous two winters. Nutrients in the river increased in 2024 over 2023, but this was primarily attributed to clumps of algae dying in the river.

Ada Township experienced an extensive algae bloom again in 2024, but Cascade Township noted only one—to two-foot sections of algae growing in the river. PLM attributed this to the greater width and depth of the Cascade portion of the Thornapple River in comparison to Ada's portion.

PLM's suggestions for expansion of the program included weed treatment in major inlets and harvesting the large bayou at Thornapple River Dr.

PLANNING FOR THE FUTURE

The Thornapple River SAD committee discussed potential future projects to address portions of the river in the SAD that haven't received the benefits outlined in the original benefit's scope. Some of these ideas have included, but are not limited to, working with MI Natural Shorelines on bank stabilization, conducting a sediment management study, continued relocation of hazardous debris, dredging around the CSX train bridge bypass to improve navigability, and investigation on how to decrease nuisance weeds in bayous that are part of the SAD. In early 2025, the committee will begin work on a strategic plan to determine future projects and is committed to informing residents of the SAD about how their assessments are being spent, ensuring their involvement and understanding of the project's progress.

At the January 22, 2025 Township Board meeting, the Board of Trustees approved a three year contract with PLM (2025-2027) to continue river management services.

APPENDIX

2024 WATER QUALITY REPORT: TEST SITE #1

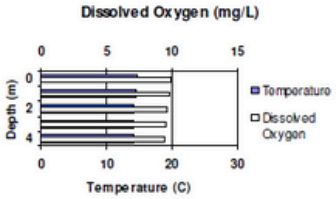
2024003

LAKE CHECK **Water Quality Monitoring Report**

Customer	Waterbody	Sample Information
Thornapple River Cascade	Thornapple River Cascade	Date: 4/16/2024
		Site: #1

On-Site Results

Depth (m)	Temperature (degrees C)	Dissolved Oxygen mg/L	Dissolved Oxygen %
0	14.7	9.9	98
1	14.5	9.8	96
2	14.3	9.6	94
3	14.3	9.5	93
4	14.3	9.5	93



Secchi Disk Depth	1.5	meters
Thermocline Depth		meters

Analytical Results

Parameter	Result	Units	Interpretation
Fecal Bacteria (E. coli		CFU/100 mL	N/A
Conductivity	456	uS/cm	Moderate concentration of dissolved salts
Total Dissolved Solids	371	mg/L	
pH	8.4	S.U.	Water is slightly alkaline
Alkalinity	237	mg CaCO3/L	Water is very hard
Total Phosphorus	26	ug/L	Moderately phosphorus enriched
Nitrates	1820	ug/L	Nitrogen enriched
Chlorophyll	N/A		

Trophic State Evaluation

	TSI	Trophic Status
Based on Secchi Disk Depth	54	moderately eutrophic
Based on Total Phosphorus	47	mesotrophic
Based on Chlorophyll	N/A	

Conclusions

- Conditions are good for fish growth.
- Minimum dissolved oxygen is adequate for good fish production.
- pH is within acceptable limits.
- Sample is somewhat phosphorus enriched. Create natural buffer between lawn & lakeshore.
- Sample is nitrogen enriched. Consider nutrient abatement measures.
- Repeat LakeCheck in Fall.

- WARNING, condition requires immediate attention.
- CAUTION, condition requires further evaluation.
- OK, condition within acceptable limits.
- NEUTRAL, condition neither good nor bad.

2024 WATER QUALITY REPORT: TEST SITE #1

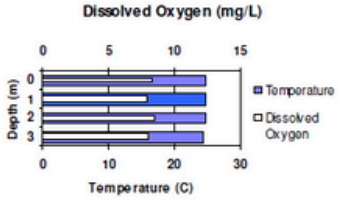
2024016

LAKE CHECK **Water Quality Monitoring Report**

Customer	Waterbody	Sample Information
Thornapple River Cascade	Thornapple River Cascade	Date: 8/29/2024
		Site: #1

On-Site Results

Depth (m)	Temperature (degrees C)	Dissolved Oxygen mg/L	Dissolved Oxygen %
0	24.8	8.3	77
1	24.8	7.9	73
2	24.8	8.5	78
3	24.5	8.1	76



Secchi Disk Depth	1.5	meters
Thermocline Depth		meters

Analytical Results

Parameter	Result	Units	Interpretation
Fecal Bacteria (E. coli		CFU/100 mL	N/A
Conductivity	526	uS/cm	Moderate concentration of dissolved salts
Total Dissolved Solids	406	mg/L	
pH	8.4	S.U.	Water is slightly alkaline
Alkalinity	245	mg CaCO3/L	Water is very hard
Total Phosphorus	17	ug/L	Moderately phosphorus enriched
Nitrates	1190	ug/L	Moderately nitrogen enriched
Chlorophyll	N/A		

Trophic State Evaluation

	TSI	Trophic Status
Based on Secchi Disk Depth	54	moderately eutrophic
Based on Total Phosphorus	41	mesotrophic
Based on Chlorophyll	N/A	

Conclusions

- Conditions are good for fish growth.
- Minimum dissolved oxygen is adequate for good fish production.
- pH is within acceptable limits.
- Sample is somewhat nutrient (N and P) enriched. Adopt appropriate lakeshore landscaping and lawn care practices.
- REPEAT LakeCheck NEXT YEAR!

- WARNING, condition requires immediate attention.
- CAUTION, condition requires further evaluation.
- OK, condition within acceptable limits.
- NEUTRAL, condition neither good nor bad.

2024 WATER QUALITY REPORT: TEST SITE #2

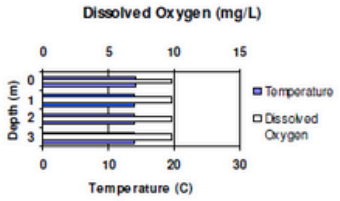
2024004

LAKE CHECK **Water Quality Monitoring Report**

Customer	Waterbody	Sample Information
Thornapple River Cascade	Thornapple River Cascade	Date: 4/16/2024 Site: #2

On-Site Results

Depth (m)	Temperature (degrees C)	Dissolved Oxygen mg/L	Dissolved Oxygen %
0	14.2	9.8	96
1	14.0	9.8	96
2	14.0	9.8	96
3	14.0	9.8	95



Secchi Disk Depth	1.8	meters
Thermocline Depth		meters

Analytical Results

Parameter	Result	Units	Interpretation
Fecal Bacteria (E. coli		CFU/100 mL	N/A
Conductivity	536	uS/cm	Moderate concentration of dissolved salts
Total Dissolved Solids	374	mg/L	
pH	8.4	S.U.	Water is slightly alkaline
Alkalinity	242	mg CaCO3/L	Water is very hard
Total Phosphorus	20	ug/L	Moderately phosphorus enriched
Nitrates	1870	ug/L	Nitrogen enriched
Chlorophyll	N/A		

Trophic State Evaluation

	TSI	Trophic Status
Based on Secchi Disk Depth	52	moderately eutrophic
Based on Total Phosphorus	43	mesotrophic
Based on Chlorophyll	N/A	

Conclusions

- Conditions are good for fish growth.
- Minimum dissolved oxygen is adequate for good fish production.
- pH is within acceptable limits.
- Sample is somewhat phosphorus enriched. Create natural buffer between lawn & lakeshore.
- Sample is nitrogen enriched. Consider nutrient abatement measures.
- Repeat LakeCheck in Fall.

- WARNING, condition requires immediate attention.
- CAUTION, condition requires further evaluation.
- OK, condition within acceptable limits.
- NEUTRAL, condition neither good nor bad.

2024 WATER QUALITY REPORT: TEST SITE #2

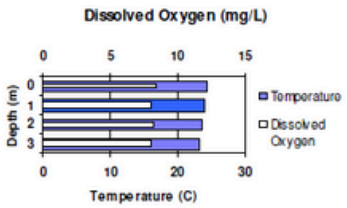
2024017

LAKE CHECK **Water Quality Monitoring Report**

Customer	Waterbody	Sample Information
Thornapple River Cascade	Thornapple River Cascade	Date: 8/29/2024 Site: #2

On-Site Results

Depth (m)	Temperature (degrees C)	Dissolved Oxygen mg/L	Dissolved Oxygen %
0	24.5	8.4	77
1	24.0	8.1	71
2	23.6	8.2	73
3	23.2	8.1	72



Secchi Disk Depth	1.5	meters
Thermocline Depth		meters

Analytical Results

Parameter	Result	Units	Interpretation
Fecal Bacteria (E. coli		CFU/100 mL	N/A
Conductivity	523	uS/cm	Moderate concentration of dissolved salts
Total Dissolved Solids	404	mg/L	
pH	8.4	S.U.	Water is slightly alkaline
Alkalinity	252	mg CaCO3/L	Water is extrmely hard
Total Phosphorus	21	ug/L	Moderately phosphorus enriched
Nitrates	1240	ug/L	Nitrogen enriched
Chlorophyll	N/A		

Trophic State Evaluation

	TSI	Trophic Status
Based on Secchi Disk Depth	54	moderately eutrophic
Based on Total Phosphorus	44	mesotrophic
Based on Chlorophyll	N/A	

Conclusions

- Conditions are good for fish growth.
- Minimum dissolved oxygen is adequate for good fish production.
- pH is within acceptable limits.
- Sample is somewhat nutrient (N and P) enriched. Adopt appropriate lakeshore landscaping and lawn care practices.
- REPEAT LakeCheck NEXT YEAR!

- WARNING, condition requires immediate attention.
- CAUTION, condition requires further evaluation.
- OK, condition within acceptable limits.
- NEUTRAL, condition neither good nor bad.

2024 BACTERIA SAMPLING REPORT

Bacteria Sampling Report

Waterbody:
Thornapple River

Thornapple River Cascade

Date Sampled:
7/23/2024

Location	*E. coli*	Total Coliforms	Interpretation
1	12		Water meets bacteriological standards for safe swimming.
2	32		Water meets bacteriological standards for safe swimming.
3	52		Water meets bacteriological standards for safe swimming.

Bacterial counts are expressed as the number of Colony Forming Units per 100 milliliters (CFU/100mL).

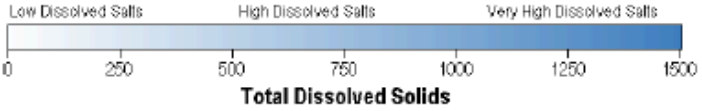
For full body contact recreation (including swimming) counts of E. coli should not exceed 130 (CFU/100mL)as a monthly geometric mean of at least five samples per the State of Michigan standard, or single samples should not exceed 298 (CFU/100mL) [235 CFU/100mL in a designated bathing beach area] per Federal (EPA) guidelines.

Current recreational water quality standards do not rely on Total Coliform counts.

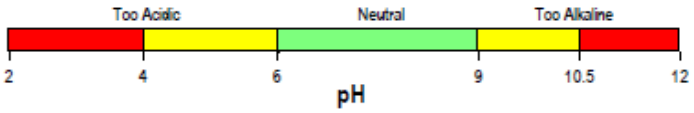
2024 OVERALL WATER QUALITY MEASUREMENTS

LAKE CHECK WATER QUALITY MEASUREMENTS

Conductivity and Total Dissolved Solids (TDS) measure the total amount of material dissolved in the water. Higher values indicate potentially richer, more productive water, whereas lower values indicate potentially cleaner, less productive water. Localized increases in conductivity and TDS may indicate inputs of groundwater or other nutrient-enriched water. [Note: Human activities that result in nutrient pollution (e.g., fertilizer runoff) can increase the productivity of algae and other organisms without raising conductivity/total dissolved solids very much. If nutrient pollution is occurring, the total phosphorus concentration is a much better indicator of potential productivity.]

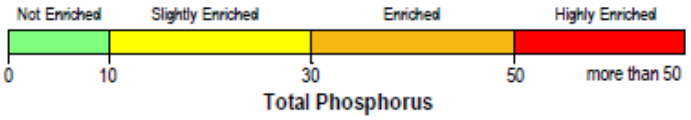


pH describes the balance between acids and bases in the water. Neutral values of pH (between 6 and 9) are desirable. Low pH values typically result either from the growth of bog vegetation (such as peat moss), acid precipitation ("acid rain"), or acid runoff (as in acid mine drainage). Excessive growth of certain plants and algae can raise pH values above 9.0 or 10.0.

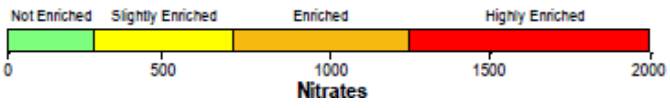


Alkalinity measures the concentration of carbonates and bicarbonates in the water. These compounds and other ions associated with them make water "hard". High alkalinity lakes are hardwater lakes, while low alkalinity lakes are softwater lakes. Different kinds of plants, algae, and other aquatic organisms live in hardwater than in softwater. Alkalinity also influences the effectiveness of some herbicides and algicides. Alkalinity is a basic characteristic of water, but is neither inherently good nor bad.

Total Phosphorus measures the total (organic and inorganic, dissolved and particulate) amount of phosphorus in the water. Phosphorus is usually the plant nutrient (i.e., fertilizer) that controls the amount of algal growth in lakes and ponds. Most Midwestern lakes have more phosphorus and more algae than is desirable, so lower values are generally better, though very unproductive water bodies typically support little fish production.

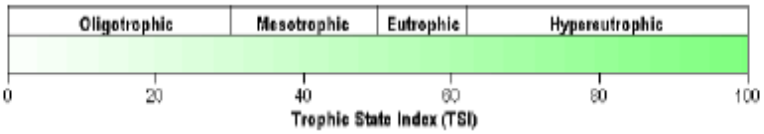


Nitrate measures the total inorganic amount of nitrogen in the water. Nitrogen is the plant nutrient (i.e., fertilizer) most likely to control the amount of rooted plant growth in lakes and ponds. Most Midwestern lakes have more nitrogen and more rooted plant growth than is desirable, so lower values are generally considered better

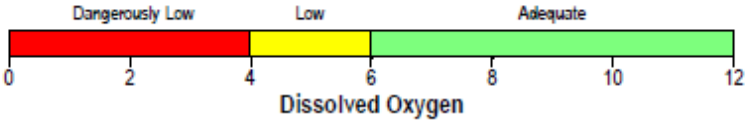


2024 OVERALL WATER QUALITY MEASUREMENTS

Trophic State Indices calculate the trophic status of the waterbody. Waterbodies are classified as oligotrophic, mesotrophic, eutrophic or hypereutrophic depending on the overall amount of plants, algae and other organisms the waterbody supports. Lakes of different trophic states vary in a number of chemical characteristics and support different types of organisms (see the enclosure "Lake Trophic States and Eutrophication"). Thus the trophic state of a waterbody provides a wealth of information concerning the types of organisms living in the waterbody, the processes likely to occur there and the kinds of problems to be expected. Trophic State Index values can be calculated from a number of variables. LakeScan calculates Carlson's Trophic State Index (TSI) from total phosphorus, Secchi disk depth and chlorophyll (separate TSI values are calculated for each of the variables that was measured as part of your LakeCheck package).

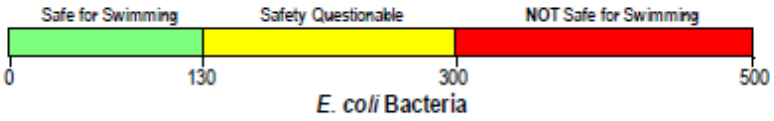


Dissolved Oxygen is a measure of the amount of oxygen dissolved in the water. Oxygen is needed by fish and other aquatic organisms to allow them to "breath" underwater. Plants and algae produce oxygen by photosynthesizing during the day and use oxygen for respiration at night.



Temperature provides information about the kinds of fish that can grow in a lake, information necessary for interpretation of other parameters, and information about the extent to which a lake is stratified into layers having water of different temperatures. If the lake is stratified, the **thermocline depth** tells how deep the surface layer of warm water is.

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, agricultural runoff, or waterfowl or wildlife droppings.



- *E. coli* counts of 300 (CFU/100 mL) and above in a single sample are considered to represent conditions that are **UNSAFE** for swimming and other body contact recreation.
- *E. coli* counts of 130 (CFU/100 mL) and above averaged (using a geometric mean) over measurements made during a 30-day period are considered to represent conditions that are UNSAFE for swimming and other body contact recreation. When values of 130 (CFU/100 mL) or higher but less than 300 are encountered, LakeCheck rates the safety of the water for swimming as questionable.
- *E. coli* counts below 130 are considered safe for swimming and other body-contact recreation

We recommend prompt retesting whenever Fecal Indicator Bacteria counts exceed 100 (CFU/100 mL) to determine whether contamination is an ongoing problem. If frequent contamination is detected, steps to identify and eliminate the source of contamination are highly recommended.