Contents

2023 LEBAF LARGE RIVER Ottawa River/Ten Mile Creek Analysis

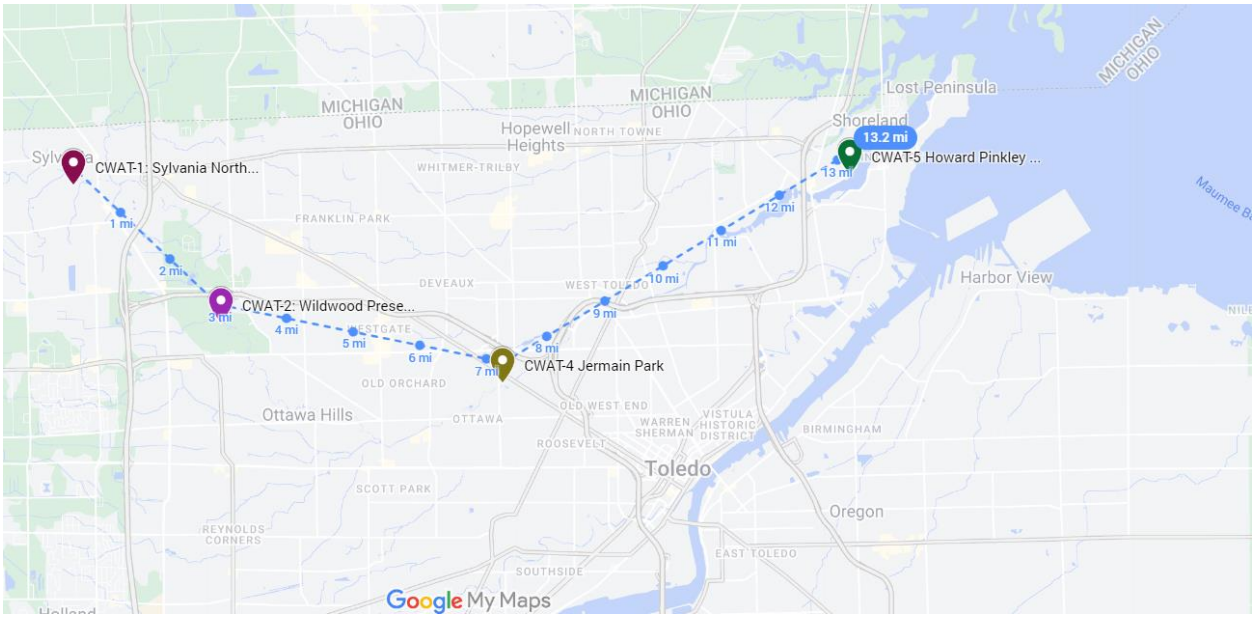
1. **Name of Organization and statement about organizations mission and participation in LEBAF:**

   Community Water Action Toledo: CWAT aims to increase understanding of water quality in Lake Erie tributaries and drive improvement for water quality across Northwest Ohio through aligning our members' sampling protocols with LEBAF, harnessing our collective programs' existing strengths, and engaging a wide range of volunteers in citizen science.

2. **Station information, summary of stations, locations, proximity to each other, how long monitoring and any other information useful for a data user**

   Monitoring at all stations began in 2023.

   CWAT-1: Sylvania Northview (5403 Silica Dr, Sylvania, OH 43560)
   CWAT-2: Wildwood Preserve (5100 Central Ave, Toledo, OH 43615)
   CWAT-4: Ottawa Park (Jermain Park, Toledo, OH 43606)
   CWAT-5: Howard Pinkley Landing (2250 Shoreland Ave, Toledo, OH 43611)



Map shows approximate distances between stations and station locations relative to each other. Lake Erie influence on the Ottawa River until ~River Mile 4.5, data at CWAT-5 Howard Pinkley Landing could be influenced by lacustrine dynamics.

Land Use Data for the Ottawa River/Ten Mile Creek Watershed per OEPA:

"Agriculture prevails in the western third of the area on Lake Plain glacial till deposits overlying Devonian bedrock. Rural and suburban development exists in the central third

largely occupying the Sand Plains of the Oak Openings on top of a Devonian or Silurian base. The eastern third is an urban area on Lake Plain lacustrine fine sand, silt, and clay deposits over Silurian bedrock. Area bedrock is dense, offering little ground water storage or contribution to surface flows (Schiefer 2002). Soils throughout the basin are poorly drained. The severely wet soils are generally unsuitable for basement building foundations, septic leach fields or manure application without artificial drainage (Stone et. al. 1980, Stone and Michael 1984)."

3. **2023 data summary, what parameters were sampled, sample season deviations, anything of importance to note.**

   Pull it together and find the story

   a. Compile the summary conditions of each parameter, complete this table, support for aquatic life equals - Acceptable (<20%) Concerning (20-50%) Degrading (>50%) based on the percent exceedance of each parameter, based on 2023 data, except Average Conductivity uses its own four bin conditions

Temp	pH	DO	*Avg Conductivity	Biocondition Gradient	TDS AQ Life
Acceptable	Acceptable	Acceptable	Likely Threats, Impact	Degrading	Acceptable

Chloride	Salinity	TDS/ DW
Acceptable	Acceptable	n/a

   b. Review and complete the items below, using information above:

Exceeded parameter, %	Dates exceedances occurred	Stations exceedances occurred
Conductivity/Biocondition, 96.36%	All	All
DO, 2%	June 13, 2023	CWAT-4 Ottawa Park
Salinity, 17.7%	June 13, August 15, 2023 September 26, 2023 May 30, June 20, Sep. 18, Oct 3, 2023 June 20, 2023 Sep 26, 2023	CWAT-1 Ten Mile Creek CWAT-2 Wildwood CWAT-3 Ottawa Park CWAT-4 Howard Pinkley
Water temperature, 4.4%	May 28, 2023; July 4, 2023	CWAT-4 Howard Pinkley

c. Key Metadata reviewed or to consider for interpretation: Metadata reviewed for interpretation: Upstream and adjacent land use, Ohio EPA reports for Ottawa River and Ten Mile Creek, LEBAF parameter thresholds and metadata tables, Student Watershed Watch Macroinvertebrate Data.

d. Collective and combined analysis statements from all exceeded parameters, include a characterization of extent, are these occurring at one or several locations or all, are they occurring all year or at specific times of year?
Collective Analysis statements:

For the purposes of screening most of the measured LEBAF parameters (pH, DO, Water Temperature, Salinity, Chloride) indicate acceptable or healthy stream conditions in the Ottawa River/Ten Mile Creek from April – October 2023. Conductivity/Biocondition exceeded the benchmarks with a 100% exceedance rate at all stations monitored on the river throughout the sampling season. This indicates that based on the collected data as whole, conductivity may degrade this stream for aquatic life during the summer and fall. Overall, all other collected data indicates a healthy waterway.

4. Aggregated Recommendations. Review Summary Recommendations from respective STATION Fact sheets and above and draft a location, parameter recommendation that overall conveys actions to protect, explore or restore that either LEBAF or others could embark.

Fact Sheet Summary Recommendations:

Parameter	Recommended Action(s)
Temperature	Continue monitoring.
pH	Continue monitoring.
DO	Continue monitoring.
Conductivity TDS AQL, Biocondition	Continue monitoring; add macroinvertebrate monitoring at stations where feasible. Continue to follow trends, investigate exceedances, and collaborate with other groups to aggregate more data.
Salinity	Continue monitoring.
Chloride	Continue monitoring.
TDS	Continue monitoring.
Additional Comments	

5. **Current Water Quality Data Exceedance Table.**

Notes:

For Salinity exceedances, look at CWAT-1 Sylvania Northview.

Note that DO, pH, Water Temperature, and Conductivity are directly measured parameters; Chloride, Salinity, and Conductivity/TDS are calculated parameters from conductivity, and Conductivity Biocondition is an index using conductivity to assess support for aquatic life.

Summary Statistics and Exceedances Basin - Ottawa River

Parameter	Mean Reading	Median Reading	Min. Reading	Max. Reading	Sample Count	N. Exceeded	Pct Exceeded
Chloride	46.98	48.52	28.78	68.20	34.00	0.00	0.00
Conductivity Biocondition	953.32	984.50	584.00	1,384.00	34.00	34.00	100.00
Conductivity TDS	524.33	541.48	321.20	761.20	34.00	0.00	0.00
Dissolved Oxygen	8.91	7.90	4.75	18.14	34.00	1.00	2.94
pH	8.03	7.99	7.40	8.65	34.00	0.00	0.00
Salinity	814.03	841.15	476.60	1,218.37	34.00	5.00	14.71
Water Temperature	18.51	19.65	8.10	29.90	34.00	2.00	5.88

Summary Statistics and Exceedances Basin - Ten Mile Creek

Parameter	Mean Reading	Median Reading	Min. Reading	Max. Reading	Sample Count	N. Exceeded	Pct Exceeded
Chloride	51.25	55.14	32.33	66.58	11.00	0.00	0.00
Conductivity Biocondition	1,039.91	1,119.00	656.00	1,351.00	11.00	11.00	100.00
Conductivity TDS	571.95	615.45	360.80	743.05	11.00	0.00	0.00
Dissolved Oxygen	10.71	10.66	7.21	14.02	11.00	0.00	0.00
pH	8.20	8.15	7.60	8.72	11.00	0.00	0.00
Salinity	894.45	966.87	540.85	1,186.80	11.00	3.00	27.27
Water Temperature	18.60	19.80	9.90	25.50	11.00	0.00	0.00

6. **Previous Year Water Quality Data Exceedance Table. Summary.**

N/A, first year sampling.

7. ***Summary for pH***
   a. *pH:* 45 samples, _0___ # exceedances,__0__ % exceedance rate.
   b. Is map illustration of station pH #/% exceedances the same as table: Y N
      Yes

c. Dates of exceedances: If none record NONE, do # of exceedances on graph match table Y N:
NONE

~~a. Insert graph of pH exceedances is below. If no exceedances skip graph export.~~

~~b. Make a statement about the magnitude, frequency and duration of any exceedances:~~

~~c. Does pH behave daily, seasonally, etc. as you would expect? Do you see an expected pattern, unexpected? Answer:~~

~~d. Add or adjusted and findings, patterns, etc. after review pH table of meta and ancillary information:~~

e. Overall Condition of this river this year is Acceptable (<20%) Concerning (20-50%) Degrading (>50%):
According to LEBAF thresholds, the pH in the Ottawa river/Ten Mile Creek is acceptable for the 2023 LEBAF field season.

f. Limitations, assumptions, qualifications, if none record NONE:
2 samples were included from CWAT-3, a station that was not fully monitored according to LEBAF standards. All data was collected this season with trained staff members present. Meters were calibrated for pH monthly throughout the field season. Limitations include sampling frequency (pH variation occurs on multiple timescales, from daily to seasonal; we measured 1-2 times monthly, April-October).

g. pH Findings Statement:
The lack of exceedances indicates that pH values for the Ottawa River/Ten Mile Creek are within the pH LEBAF analytical benchmarks of 6.5 - 9. During the dates and times recorded on this river, pH likely supported aquatic life and this is an indicator of stream health. However, a conclusive statement about the water quality/stream health cannot be made given a limited dataset.

h. pH Recommendations + limitations statement:
A conclusive statement about stream health for the Ottawa River/Ten Mile Creek cannot be made given a limited dataset. To further support the current LEBAF pH field season findings and prevent exceedances, we recommend the continuation of further monitoring of pH data at the site and qualification all readings with site images, day of chemistry sampling metadata, and site metadata.

i. Statement from comparing previous years to this year:
N/A, first sampling season.

8. ***Summary for DO***

a. *DO:* 45 samples, __1__ # exceedances,__2_ % exceedance rate.

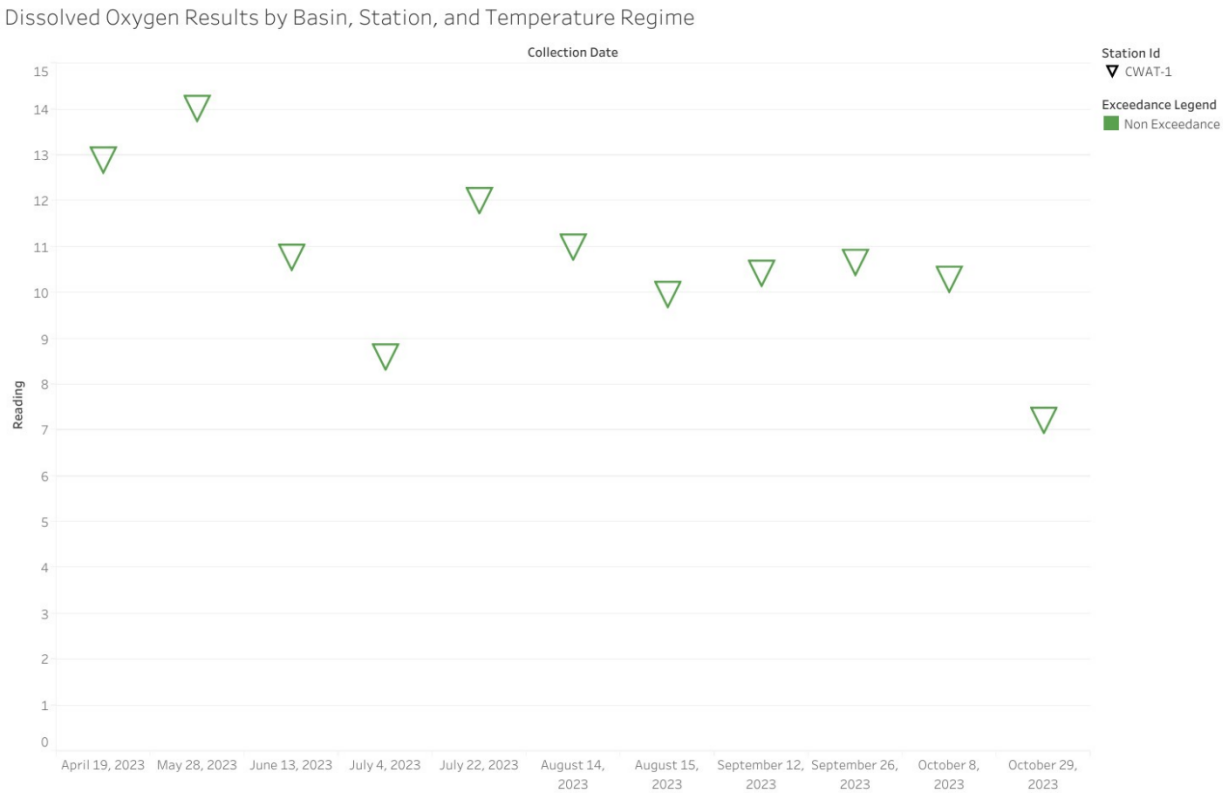
b. Is map illustration of station DO #/% exceedances the same as table: Y N

Yes

c. Dates of exceedances: If none record NONE, do # of exceedances on graph match table Y N:

June 13, 2023 (Ottawa Park Station)

d. Insert graph of DO exceedances is below. If no exceedances skip graph export.



e. Make a statement about the magnitude, frequency and duration of any exceedances:

Single exceedance at Ottawa Park station on June 13.

f. Does DO behave daily, seasonally, etc. as you would expect? Are there patterns upstream to downstream? Do you see an expected pattern, unexpected?
Answer: Yes, DO varies as expected seasonally/temporally.

~~g. Add or adjusted and findings, patterns, etc. after review DO table of meta and ancillary information:~~

h. Overall condition of this river, this year Acceptable (<20%) Concerning (20-50%) Degrading (>50%):

According to LEBAF thresholds, DO is acceptable for the 2023 LEBAF field season in Ottawa River/Ten Mile Creek.

i. Limitations, assumptions, qualifications, if none record NONE:

2 samples were included from CWAT-3, a station that was not fully monitored according to LEBAF standards. All data was collected this season with trained staff members present. Meters were not calibrated for DO throughout the field season. Limitations include sampling frequency (DO variation occurs on multiple timescales, from daily to seasonal; we measured 1-2 times monthly, April-October) and sampling location (DO varies spatially within streams). As a result, conclusions about stream health are not possible, but looking at trends can give us a picture of possible stream and aquatic community health. The LEBAF threshold only measures an exceedance below accepted range; high DO can also be a measure of eutrophication and excessive production, which we did not assess for.

j. DO Findings Statement:

98% of DO values recorded on the Ottawa River/Ten Mile Creek during the 2023 season were within the LEBAF analytical benchmark of <=5 mg/L. Based on this, we can expect that during the sampled dates and times the DO levels in the stream supported aquatic life, and this is an indicator of stream health. However, a conclusive statement about the water quality/stream health cannot be made given a limited dataset.

k. DO Recommendations + limitations statement:

A conclusive statement about stream health at this station cannot be made given a limited dataset. To further support the current 2023 LEBAF DO field season findings and prevent exceedances, we recommend the continuation of further monitoring of DO data on this stream, considering increases in monitoring frequency and/or periodic sampling throughout a day to capture variation on different time scales, and qualification all readings with site images, day of chemistry sampling metadata, and site metadata.

l. Statement from comparing previous years to this year:
N/A; first season sampling.

9. ***Summary for Temperature***

a. *Temperature:* samples, _2___ # exceedances,__4.4__ % exceedance rate.

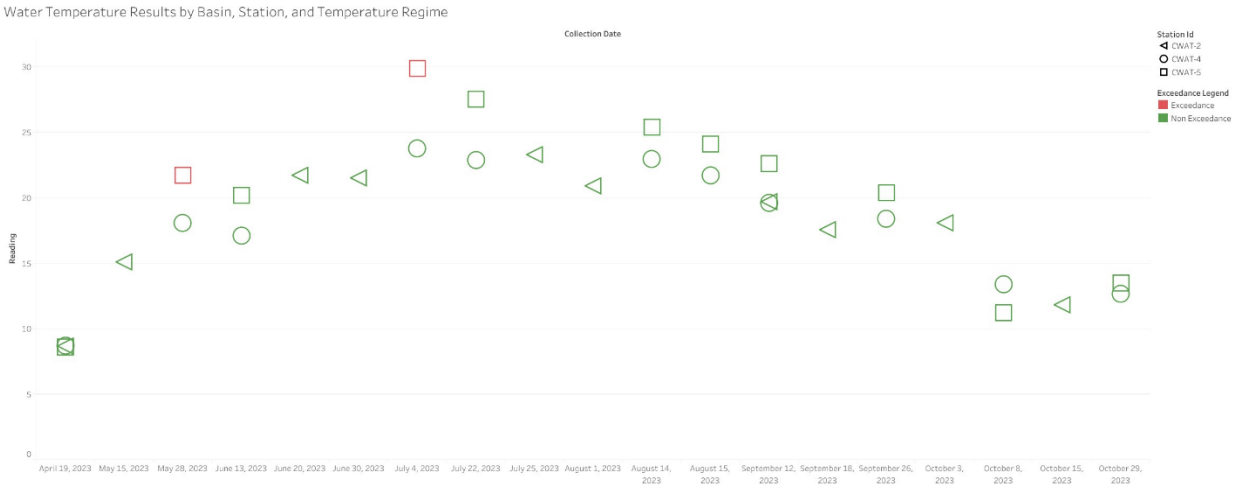
b. Is map illustration of station Temperature #/% exceedances the same as table: Y N

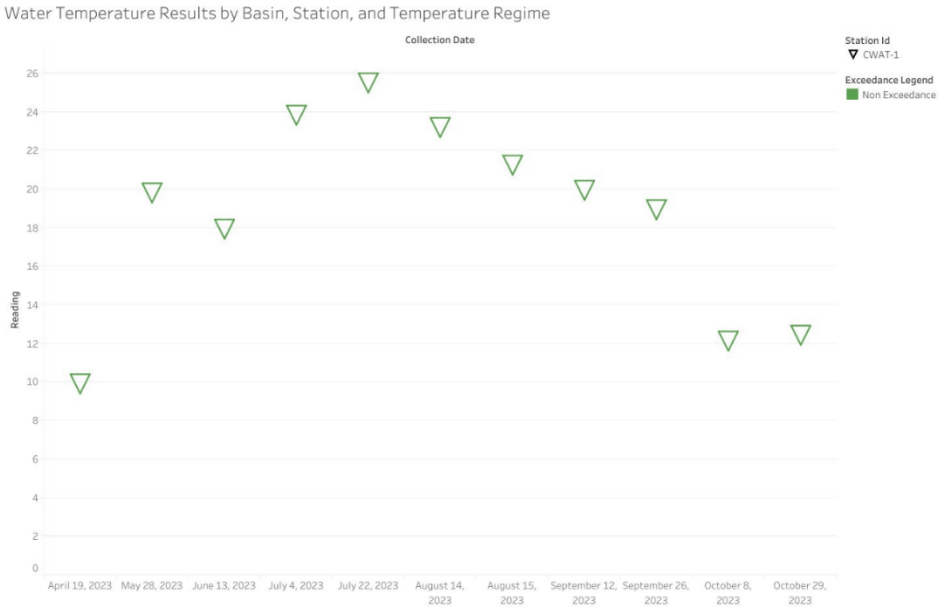
Yes

c. Dates of exceedances: If none record NONE, do # of exceedances on graph match table Y N:

May 28, 2023; July 4, 2023

d. Insert graph of Temperature exceedances is below. If no exceedances skip graph export.





e. Make a statement about the magnitude, frequency and duration of any exceedances:
Two exceedances, at Howard Pinkley Station but the magnitude is not great, non-consecutive, in context of other stations/graph over season, they are not dramatic.

f. Does Temperature behave daily, seasonally, etc. as you would expect? Are there patterns upstream to downstream? Do you see an expected pattern, unexpected? Answer:
Yes.

Table X. LEBAF Temperature Standards, Cold and Warm Water (F/C)

April	May	June	July	August	September	October
52 F	58 F	64 F	66 F	66 F	63 F	54 F
11 C	14 C	17 C	18 C	18 C	17 C	12 C
April	**May**	**June**	**July**	**August**	**September**	**October**
61 F	70 F	82 F	85 F	85 F	82 F	70 F
16 C	21 C	27 C	29 C	29 C	27 C	21 C

~~g. Add or adjusted and findings, patterns, etc. after review Temperature table of meta and ancillary information:~~

h. Overall condition of this river, this year Acceptable (<20%) Concerning (20-50%) Degrading (>50%): According to LEBAF thresholds, the temperature is acceptable for the 2023 LEBAF field season on the sampled areas of the Ottawa River/Ten Mile Creek.

i. Limitations, assumptions, qualifications, if none record NONE:
2 samples were included from CWAT-3, a station that was not fully monitored according to LEBAF standards. All data was collected this season with trained staff members present. Meters were calibrated throughout the field season. Limitations include sampling frequency (1-2 times monthly). LEBAF temperature benchmarks include both high and low exceedance values within an accepted range. Temperature Findings Statement:

j. Temperature Recommendations + limitations statement:

95.6% of temperature values recorded on the Ottawa River/Ten Mile Creek during the 2023 season were within the LEBAF analytical benchmarks. Based on this, we can expect that during the sampled dates and times the water temperature in the stream supported aquatic life, and this is an indicator of stream health. However, a conclusive statement about the water quality/stream he+alth cannot be made given a limited dataset.

k. Statement from comparing previous years to this year:
N/A; first season sampling.

10. ***Summary for Conductivity Verification against Reference / Survey***

a. Placeholder for the table for your station/river from the *Conductivity Results by Ohio EPA:* HELP River

Ecoregion	Stream Size	Stream Type	Min	x.25%	x.50%	x.75%	x.90%	x.95%
HELP	Headwaters	**Reference**	**510**	588	707	875	1119	1151
HELP	Streams	**Reference**	**166**	529	653	778	952	1107
HELP	Rivers	**Reference**	**142**	543	659	744	877	1043
HELP	Headwaters	Survey	**500**	570	680	821	1074	1345
HELP	Streams	Survey	248	491	633	740	836	959
HELP	Rivers	Survey	152	573	679	808	1039	1275

b. **Review** Min, 50th/Median and max conductivity

Summary of Exceedances by Waterbody and Parameter

Basin	Sample Run..	Parameter	Mean Reading	Median Reading	Min. Reading	Max. Reading	Sample Count	N. Exceeded	Pct Exceeded
Ottawa River	2023	Conductivity Biocondition	953.32	984.50	584.00	1,384.00	34.00	34.00	100.00
Ten Mile Creek	2023	Conductivity Biocondition	1,039.91	1,119.00	656.00	1,351.00	11.00	11.00	100.00

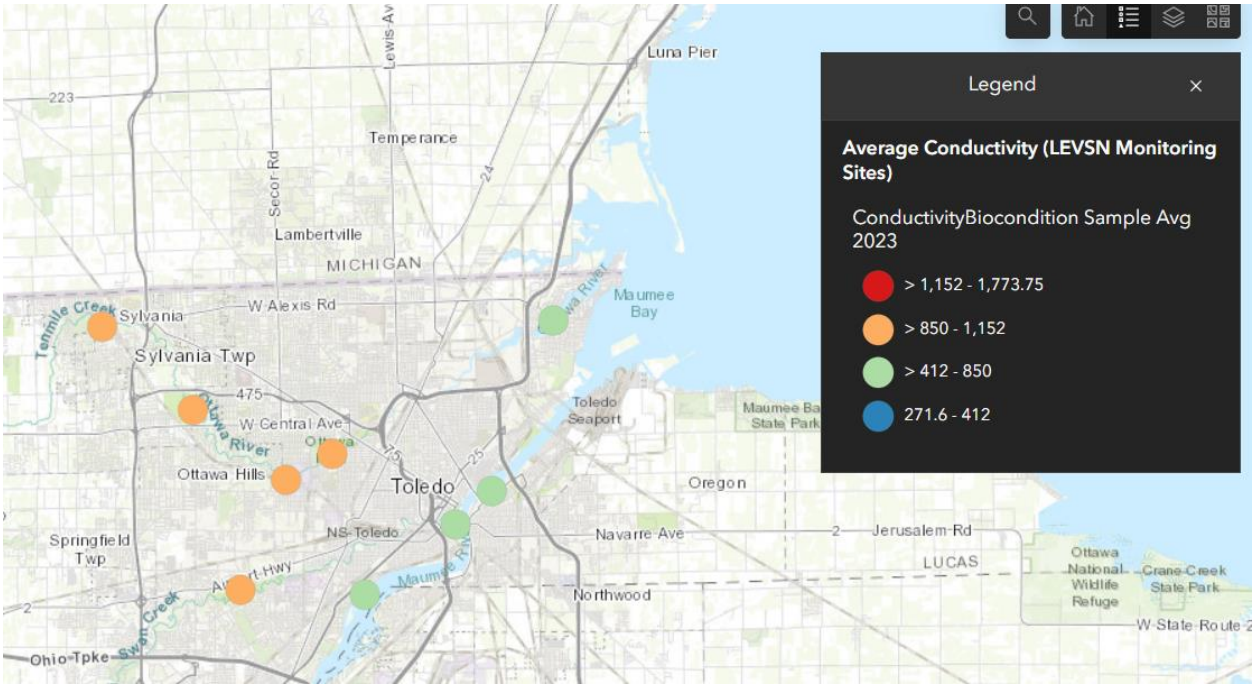
c. After comparing overlap for both reference and survey, min, max and median, difference between median and average characterize findings, qualify any information known about the site, record representativeness and comparability findings statement here:

Collected data overlaps the top 50% of reference and survey data, with Max values exceeding reference/survey data. Mean and Median values approach maximum reference/survey values. Data has overlap and comparability, but Ottawa River/Ten Mile Creek has high conductivity in comparison to reference/survey.

11. ***Summary for Average Conductivity Combined Criteria Analyzes***

a. *Average overall conductivity is:* 974.63 (average over Ottawa River and Ten Mile Creek)
b. Average conductivity condition bin: excellent/healthy, concern for biota, likely threats, impacts or likely impaired average: Likely Threats, Impacts

c. Placeholder for view of average conductivity map if desired



d. Does conductivity behave daily, seasonally, etc. as you would expect? Are there patterns upstream to downstream? Do you see an expected pattern, unexpected? Answer:
Conductivity can be expected to be higher in Winter and Spring months due to runoff from road salts. High flow/storm events can cause spikes in conductivity due to increased runoff from urban, agricultural, or wastewater input sources. On the Ottawa River/Ten Mile Creek, average conductivity is consistently in the 850-1152 range with no clear variation upstream/downstream.

e. Add or adjusted and findings, patterns, etc. after review Conductivity table of meta and ancillary information:
Per DSW/EAS2008-3-6 (ohio.gov) pages 55-61, in 2011 similar values were seen for Sp. Conductance at this site- attributed to influence of groundwater from Oak Openings Sands, proximity of large quarry in Sylvania. Comparing to detailed macros data from this report- had good ICI values, but was low in EPT and sensitive taxa, associated with better QHEI scores in this area- but they noted that conductivity was high enough to stress aquatic life, they didn't note large

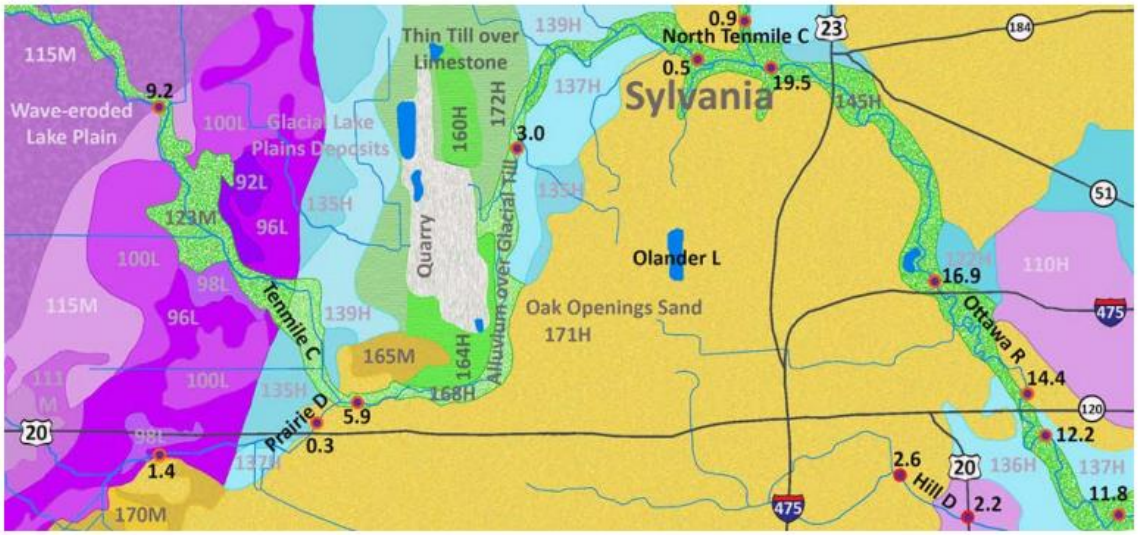


Figure 9. Hydrogeologic settings adjacent to Tenmile Creek and the Ottawa River near Sylvania with sampling sites indicated by river miles (e.g. RM 19.5). High (H=300-700 gpd/ft^2), medium (M=100-300 gpd/ft^2) or low (L=1-100 gpd/ft^2) hydraulic conductivity is noted as a suffix to general ground water pollution potential ratings (DRASTIC index values). Increased specific conductance was associated with ground water influence from the Oak Openings Sand setting. High total dissolved solids (TDS>1000 mg/l) were associated with ground water influence from the Thin Till over Limestone setting. Figure based on Sprowls, K. 2012. after M. Hallfrisch, 2002. Ground Water Pollution Potential of Lucas County. Ohio Division of Soil and Water Resources. Columbus, OH.

community composition changes.

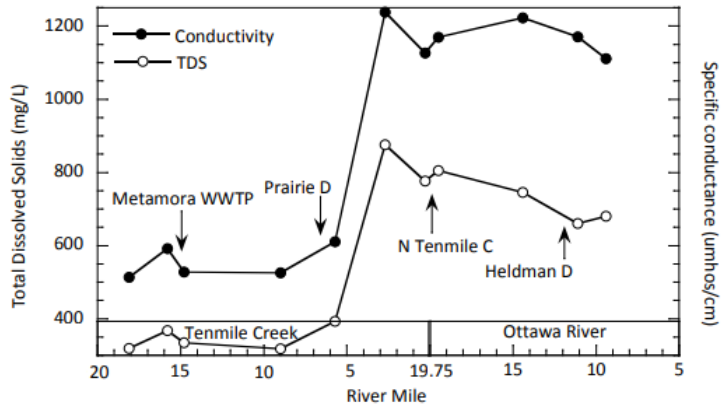


Figure 10. Mean total dissolved solids (TDS) concentrations and specific conductance values at Tenmile Creek and Ottawa River sampling sites, 2011.

f. Limitations, assumptions, qualifications, if none record NONE:

2 samples were included from CWAT-3, a station that was not fully monitored according to LEBAF standards. All data was collected this season with trained staff members present. Meters were calibrated for conductivity monthly throughout the field season. Limitations include sampling frequency (1-2 times monthly). As a result, conclusions about stream health are not possible, but looking at trends can give us a picture of possible stream and aquatic community health.

g. Conductivity Findings Statement:

Conductivity/Biocondition trends on the Ottawa River/Ten Mile Creek indicate that macroinvertebrate communities could be under stress due to this parameter.

h. Was Average Conductivity >851 Yes N, placeholder for chloride, salinity, TDS/DW exceedance table below. Did you conduct chloride, salinity or ~~TDS/DW~~ analyzes, Y N? If desired, put condition of Chloride, Salinity and/or TDS/DW in fact sheet condition summary.

Summary of Exceedances by Waterbody and Parameter

Basin	Sample Run..	Parameter	Mean Reading	Median Reading	Min. Reading	Max. Reading	Sample Count	N. Exceeded	Pct Exceeded
Ottawa River	2023	Chloride	46.98	48.52	28.78	68.20	34.00	0.00	0.00
		Conductivity TDS	524.33	541.48	321.20	761.20	34.00	0.00	0.00
		Salinity	814.03	841.15	476.60	1,218.37	34.00	5.00	14.71
Ten Mile Creek	2023	Chloride	51.25	55.14	32.33	66.58	11.00	0.00	0.00
		Conductivity TDS	571.95	615.45	360.80	743.05	11.00	0.00	0.00
		Salinity	894.45	966.87	540.85	1,186.80	11.00	3.00	27.27

i. Conductivity Recommendations + limitations statement (use language in conductivity criteria table):

Recommended thresholds for average or median Conductivity in uS/cm		
Threshold	**Condition**	**Action**
< =412	Excellent, healthy	Protection activities

413-850	Concern for biota	Investigate biota diversity. Identify potential sources.
851-2000	Likely threats, impacts	Investigate chloride and salinity, and possibly other contaminants. Identify and investigate potential sources. Remediate sources
> =2001	Likely impaired	Work with state agency to determine further actions.

j. Statement from comparing previous years to this year:
N/A; first year sampling.

12. ***Summary for Conductivity / Biocondition***

a. *Overall Conductivity/Biocondition:* samples, _45__ # exceedances,_100___ % exceedance rate.
exceedances <412, 413-654 or >655:
i. # <412, healthy/functioning:_____
ii. # >412 but <655 =degrading:____4_____
iii. >655= degraded:_____41_____

b. Is map illustration of station C/Biocondition #/% exceedances the same as table:
Y N Yes

c. Dates of exceedances: If none record NONE, do # of exceedances on graph match table Y N: All.

d. Insert graph of C/Biocondition exceedances is below. If no exceedances skip graph export.

e. Make a statement about the magnitude, frequency and duration of any exceedances:
Exceedances for this parameter are consistent across the sampling season; there is no clear pattern present in the data- no apparent pattern upstream vs. downstream.

f. What do you know about the macroinvertebrate community structure, function, habitat, from previous data, others data, etc. Are there patterns upstream to downstream? Answer:

Table 12 (continued). Summary of macroinvertebrate data collected in the Tenmile Creek and Ottawa River study area, 2011. Taxa numbers are from natural substrate (qualitative) sampling. If applicable, the second EPT and sensitive taxa values include those from artificial substrates (quantitative sampling). Organism density is reported by natural (Qualitative Density) and if applicable, artificial substrates (HD).

RM	mi^2	Flow	Taxa	EPT	Sensitive Taxa	Qual. Density	HD	CW	ICI[a]	Narrative
	Predominant natural substrate organisms (tolerance)									
Ottawa River (continued)										
14.4	131.6	-	27	4/ 6	2/ 2	Moderate	222	-	28*	Fair
	baetid mayflies (F)									
12.2	133.0	-	27	5/ 7	1/ 1	Moderate	650	-	30^{ns}	M Good
	baetid mayflies (F)									
11.8	133.0	-	29	5/ 7	1/ 3	Moderate	959	-	36	Good
	hydropsychid caddisflies (F)									
11.6	154.0	-	24	4/ 4	1/ 2	Moderate	245	-	22*	Fair
	hydropsychid caddisflies (F)									
11.1	154.0	-	25	4/ 6	0/ 1	Moderate	816	-	28*	Fair
	hydropsychid caddisflies (F)									
10.9	155.0	*SF*	16	0/ 1	0/ 1	Low	206	-	16*	Fair
	midges (MT,F)									
9.4	155.6	-	18	4/ 4	1/ 1	Moderate	515	-	24*	Fair
	baetid mayflies (F)									

Per DSW/EAS2008-3-6 (ohio.gov) pages 55-61, in 2011 similar values were seen for Sp. Conductance.

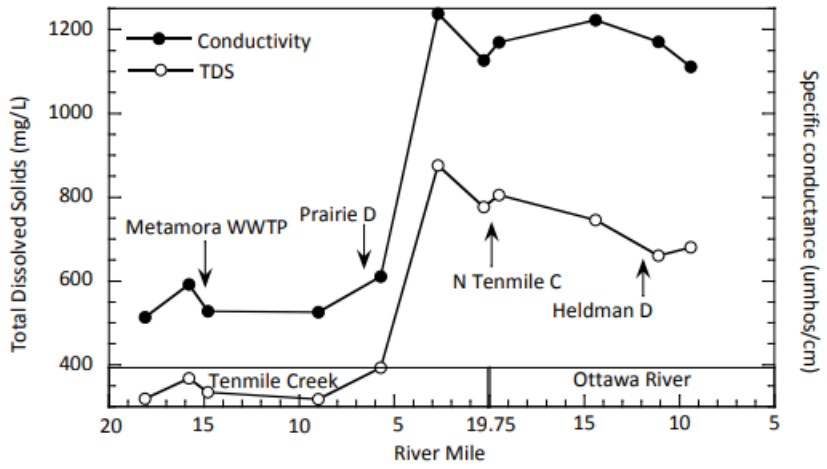


Figure 10. Mean total dissolved solids (TDS) concentrations and specific conductance values at Tenmile Creek and Ottawa River sampling sites, 2011.

g. Add or adjusted and findings, patterns, etc. after review of Conductivity table of meta and ancillary information OR what you know about macroinvertebrate conditions:

h. Overall condition of this river this year Acceptable (<20%) Concerning (20-50%) Degrading (>50%): An 100% exceedance rate for Conductivity/Biocondition on the Ottawa River/Ten Mile Creek indicate that this river is degrading for macroinvertebrate communities.

i. Limitations, assumptions, qualifications, if none record NONE:
2 samples were included from CWAT-3, a station that was not fully monitored according to LEBAF standards. All data was collected this season with trained staff members present. Meters were calibrated for conductivity monthly throughout the field season. Limitations include sampling frequency (1-2 times monthly). As a result, conclusions about stream health are not possible, but looking at trends can give us a picture of possible stream and aquatic community health.

j. Conductivity/Biocondition Findings Statement :
Conductivity/Biocondition trends indicate that macroinvertebrate communities could be under stress due to this parameter in the Ten Mile Creek/Ottawa River.

k. Conductivity/Biocondition Recommendations + limitations statement:
Recommend macros sampling on the Ottawa River/Ten Mile Creek; potentially as an additional LEBAF standard, or several times a season as a CWAT addition for sites with sustained high conductivity values. Salinity, Chloride, and TDS aquatic life analysis did not provide clear direction on the source of the exceedance; metadata and other chemical water quality parameters likewise do not indicate a clear source. A conclusive statement about stream health at this station cannot be made given a limited dataset. To further support the current 2023 conductivity/biocondition field season findings and prevent exceedances, we recommend the continuation of further monitoring of conductivity data on the river and qualification all readings with site images, day of chemistry sampling metadata, and site metadata.

l. Statement from comparing previous years to this year:
N/A; first year sampling.

13. ***Summary for Conductivity/ TDS Aquatic Life Criteria***

a. *Overall Conductivity/TDS AQ Life:* 45 samples, _0___ # exceedances,__0__ % exceedance rate.

b. Is map illustration of station C/TDS AQ Life #/% exceedances the same as table:
Y N
Yes

c. Dates of exceedances: If none record NONE, do # of exceedances on graph match table Y N:
NOne

~~d. Insert graph of C/TDS AQ Life exceedances is below. If no exceedances skip graph export.~~

~~e. Make a statement about the magnitude, frequency and duration of any exceedances:~~

~~f. Does C/TDS AQ Life behave daily, seasonally, etc. as you would expect? Are there patterns upstream to downstream? Do you see an expected pattern, unexpected? Answer:~~

~~g. Add or adjusted and findings, patterns, etc. after review of Conductivity table of meta and ancillary information:~~

h. Overall condition of this river, this year Acceptable (<20%) Concerning (20-50%) Degrading (>50%): According to LEBAF thresholds, the Conductivity/TDS aquatic life criteria is acceptable for the 2023 LEBAF field season on the Ottawa River/Ten Mile Creek.

i. Limitations, assumptions, qualifications, if none record NONE:
2 samples were included from CWAT-3, a station that was not fully monitored according to LEBAF standards. This is a calculated metric that is not directly measured, based on conductivity values. All data were collected this season with trained staff members present. Meters were calibrated for conductivity monthly throughout the field season. Limitations include sampling frequency (1-2 times monthly). As a result, conclusions about stream health are not possible, but looking at trends can give us a picture of possible stream and aquatic community health.

j. Conductivity/TDS AQ Life Findings Statement:
All Conductivity/TDS AQ Life values calculated for the Ottawa River/Ten Mile Creek during the 2023 season were within the LEBAF analytical benchmarks. Based on this, we can expect that during the sampled dates and times this parameter in this stream supported aquatic life, and this is an indicator of stream health. However, a conclusive statement about the water quality/stream health cannot be made given a limited dataset.

k. Conductivity/TDS AQ Life Recommendations + limitations statement:

A conclusive statement about stream health at this station cannot be made given a limited dataset. To further support the current 2023 conductivity TDS LEBAF field season findings and prevent exceedances, we recommend the continuation of further monitoring conductivity data at the site and qualification all conductivity readings with site images, day of chemistry sampling metadata, and site metadata.

l. Statement from comparing previous years to this year:
N/A; first season sampling.

14. ***Summary for Chloride***

a. *Overall Chloride:* 45 samples, __0__ # exceedances,_0__ % exceedance rate.
b. Is map illustration of station Chloride #/% exceedances the same as table: Y N
Yes
c. Dates of exceedances: If none record NONE, do # of exceedances on graph match table Y N: NONE
~~d. Insert graph of Chloride exceedances is below. If no exceedances skip graph export.~~
~~e. Make a statement about the magnitude, frequency and duration of any exceedances:~~
~~f. Does Chloride behave daily, seasonally, etc. as you would expect? Are there patterns upstream to downstream? Do you see an expected pattern, unexpected? Answer:~~
~~g. Add or adjusted and findings, patterns, etc. after review of Conductivity table of meta and ancillary information:~~
h. Overall condition of this river, this year Acceptable (<20%) Concerning (20-50%) Degrading (>50%):

According to LEBAF thresholds, chloride levels are acceptable in the Ottawa River/Ten Mile Creek for the 2023 LEBAF field season.

i. Limitations, assumptions, qualifications, if none record NONE:
2 samples were included from CWAT-3, a station that was not fully monitored according to LEBAF standards. This is a calculated metric that is not directly measured, based on conductivity values. All data were collected this season with trained staff members present. Meters were calibrated for conductivity monthly throughout the field season. Limitations include sampling frequency (1-2 times monthly). As a result, conclusions about stream health are not possible, but looking at trends can give us a picture of possible stream and aquatic community health.

j. Chloride Findings Statement:

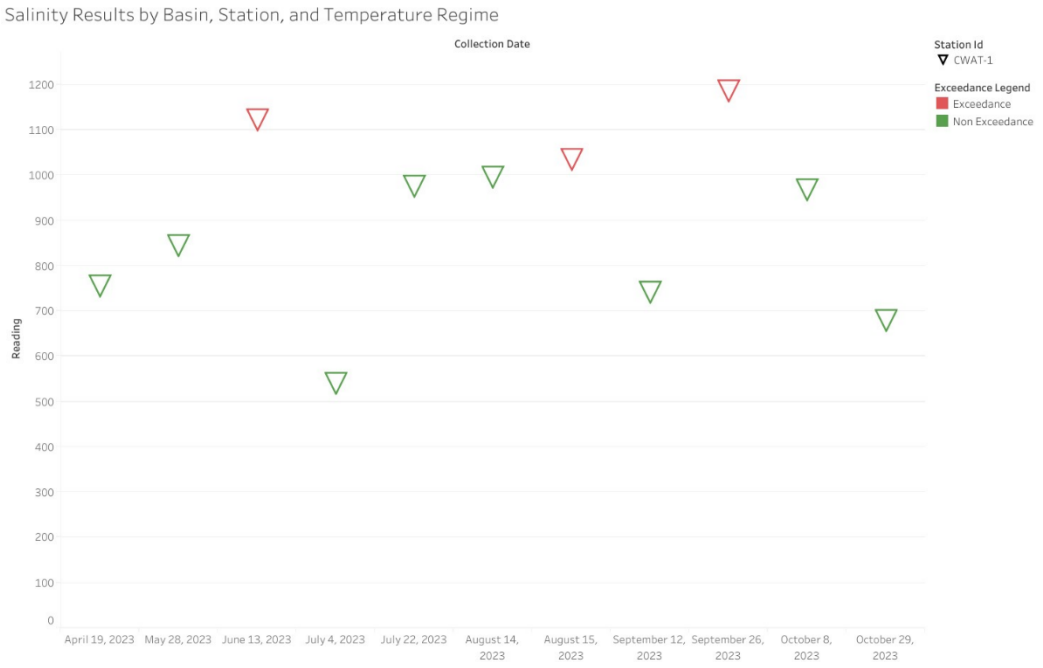
All Chloride values calculated for this station during the 2023 season were within the LEBAF analytical benchmarks. Based on this, we can expect that during the sampled dates and times this parameter in this stream at this station supported aquatic life, and this is an indicator of stream health. However, a conclusive statement about the water quality/stream health cannot be made given a limited dataset.

k. Chloride Recommendations + limitations statement:
A conclusive statement about stream health at this station cannot be made given a limited dataset. To further support the current 2023 chloride field season findings and prevent exceedances, we recommend the continuation of further monitoring conductivity data at the site and qualification all conductivity readings with site images, day of chemistry sampling metadata, and site metadata. At sites with average conductivity exceeding 851 microsiemens/cm, there may be value in testing directly for chloride. Monitoring during the November-March season may also be of value at these sites to capture exceedance values throughout the year.

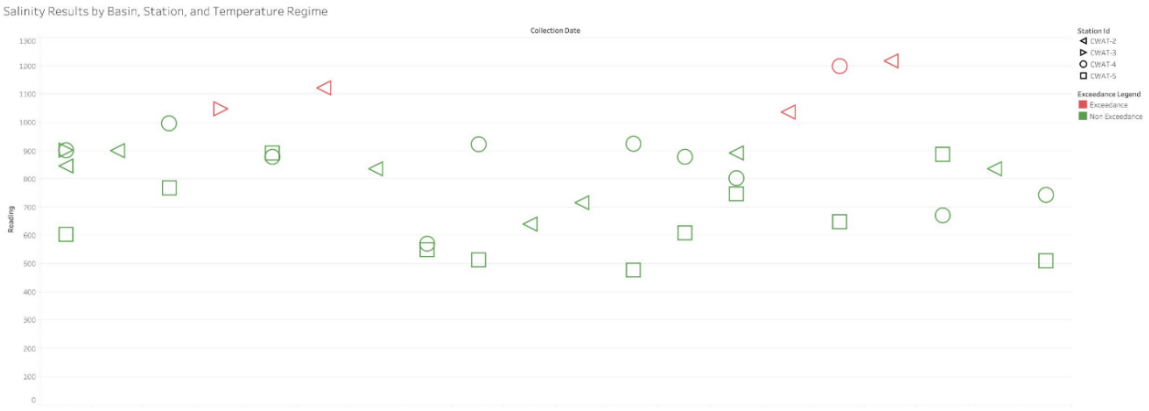
l. Statement from comparing previous years to this year:
N/A; first season sampling.

15. ***Summary for Salinity***

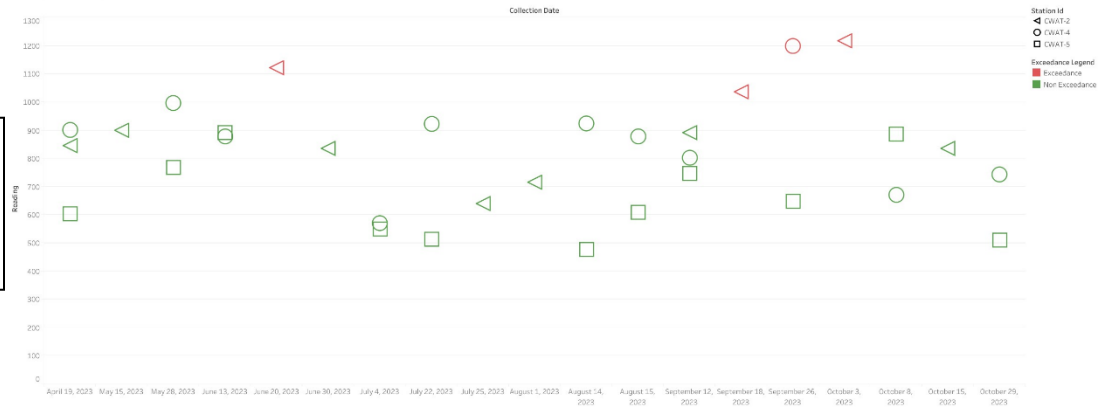
a. *Overall Salinity:* 45 samples, _8___ # exceedances,_17.7__ % exceedance rate.
b. Is map illustration of station Salinity #/% exceedances the same as table: Y N
Yes
c. Dates of exceedances: If none record NONE, do # of exceedances on graph match table Y N:
June 13, August 15, September 26 (CWAT-1 Ten Mile Creek), May 30, June 20, Sep. 18, Oct 3 (CWAT-2 Wildwood), June 20 (CWAT-3 Ottawa Park), Sep 26 (CWAT-4 Howard Pinkley)
d. Insert graph of Salinity exceedances is below. If no exceedances skip graph export.



Ottawa River including 2 samples from CWAT-3



Ottawa River without CWAT-3 samples

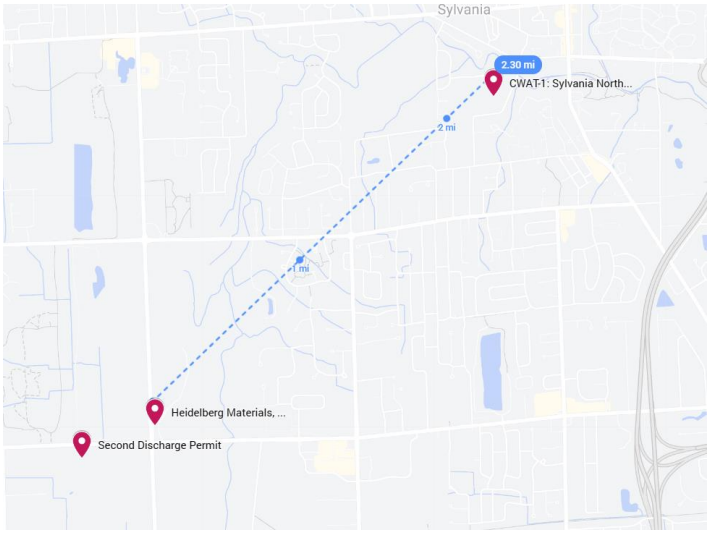


e. Make a statement about the magnitude, frequency and duration of any exceedances:

Clustered in June and September. Not high magnitude exceedances.

f. Does Salinity behave daily, seasonally, etc. as you would expect? Are there patterns upstream to downstream? Do you see an expected pattern, unexpected? Answer:

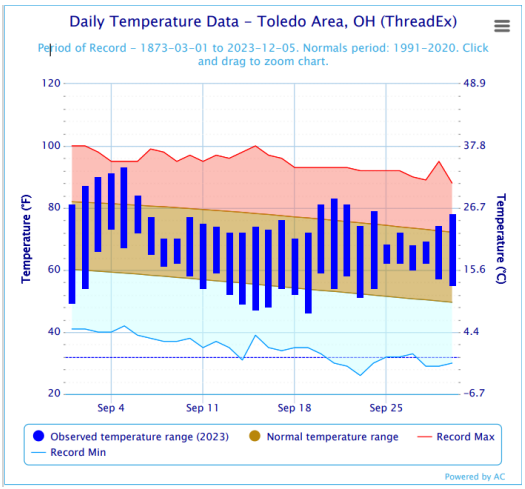
Most exceedances upstream at CWAT-1 – consider influence of discharge from Quarry

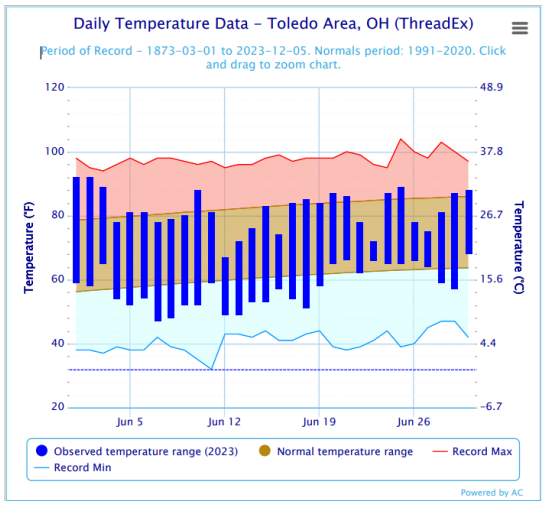


Limestone quarry ~2.5 miles from sampling location, NPDES permitted ditch discharges into Ten Mile Creek – data from OEPA ECHO

Facility Multi-Year Loading Report
OH0003506 (NPDES ID) - HANSON AGGREGATES SYLVANIA QUARRY, SYLVANIA, OH 43560

Chemical Group ID	Chemical Group	2019 DMR (lbs/yr)	2020 DMR (lbs/yr)	2021 DMR (lbs/yr)	2022 DMR (lbs/yr)	2023 DMR (lbs/yr)
D00584	Solids, total dissolved	7365511.539	6735172.678	7686710.009	6995119.96	6343763.982
D00587	Solids, total suspended	35385.84	41234.30182	84404.754	46454.94	46321.758





Looking at temperature and precipitation data- most exceedances coincide with a prolonged dry period/lack of precipitation. Some (September, Late may/early- mid June) also coincide with abnormally high temperatures in the lead up to the sampling dates.

g. Add or adjusted and findings, patterns, etc. after review of Conductivity table of meta and ancillary information:

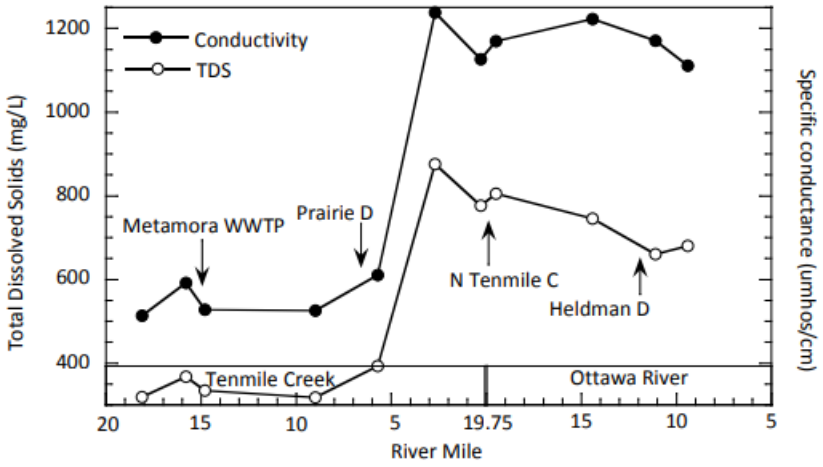


Figure 10. Mean total dissolved solids (TDS) concentrations and specific conductance values at Tenmile Creek and Ottawa River sampling sites, 2011.

h. Overall condition of this river, this year Acceptable (<20%) Concerning (20-50%) Degrading (>50%):
According to LEBAF thresholds, the Salinity levels are acceptable in the Ottawa River/Ten Mile Creek for the 2023 LEBAF field season.

i. Limitations, assumptions, qualifications, if none record NONE:
2 samples were included from CWAT-3, a station that was not fully monitored according to LEBAF standards. This is a calculated metric that is not directly

measured, based on conductivity values. All data were collected this season with trained staff members present. Meters were calibrated for conductivity monthly throughout the field season. Limitations include sampling frequency (1-2 times monthly). As a result, conclusions about stream health are not possible, but looking at trends can give us a picture of possible stream and aquatic community health.

j. Salinity Findings Statement:
17% of Salinity values calculated for this river during the 2023 season were above the LEBAF analytical benchmarks. This is approaching the 20% benchmark. The majority of values fell within an acceptable range. Based on this, we can expect that during some of the sampled dates and times this parameter in this stream at this station stressed aquatic life. However, a conclusive statement about the water quality/stream health cannot be made given a limited dataset.

k. Salinity Recommendations + limitations statement:
A conclusive statement about stream health at this station cannot be made given a limited dataset. To further support the current salinity field season findings and prevent exceedances, we recommend the continuation of further monitoring conductivity data at the site and qualification all conductivity readings with site images, day of chemistry sampling metadata, and site metadata. At sites with average conductivity exceeding 851 microsiemens/cm, there may be value in testing directly for salinity. Monitoring during the November-March season may also be of value at these sites to capture exceedance values throughout the year.

l. Statement from comparing previous years to this year:
N/A; first season sampling.

~~16. ***Summary for TDS/ Drinking Water Criteria***~~

~~a. *Overall Conductivity/TDS DW Criteria:* samples, _____ # exceedances,_____ % exceedance rate.~~

~~b. Is map illustration of station C/TDS DW Criteria #/% exceedances the same as table: Y N~~

~~c. Dates of exceedances: If none record NONE, do # of exceedances on graph match table Y N:~~

~~d. Insert graph of C/TDS DW Criteria exceedances is below. If no exceedances skip graph export.~~

~~e. Make a statement about the magnitude, frequency and duration of any exceedances:~~

f. Does C/TDS DW Criteria behave daily, seasonally, etc. as you would expect? re there patterns upstream to downstream? Do you see an expected pattern, nexpected? Answer:
g. Add or adjusted and findings, patterns, etc. after review of Conductivity table of meta and ancillary information:
h. Overall condition of this river, this year Acceptable (<20%) Concerning (20-50%) Degrading (>50%):

i. Limitations, assumptions, qualifications, if none record NONE: Note no one expects to be able to drink water from rivers without treatment, so DW criteria exceedances are expected, and do provide a continuum of conditions for screening, for example TDS low enough to support AQ life but not DW, or perhaps supports both or neither.
j. C/TDS DW Criteria Findings Statement:
k. C/TDS DW CriteriaRecommendations + limitations statement:
l. Statement from comparing previous years to this year:

Ten Mile Creek: Sylvania Northview, CWAT-1 **Monitoring Since: 2023**

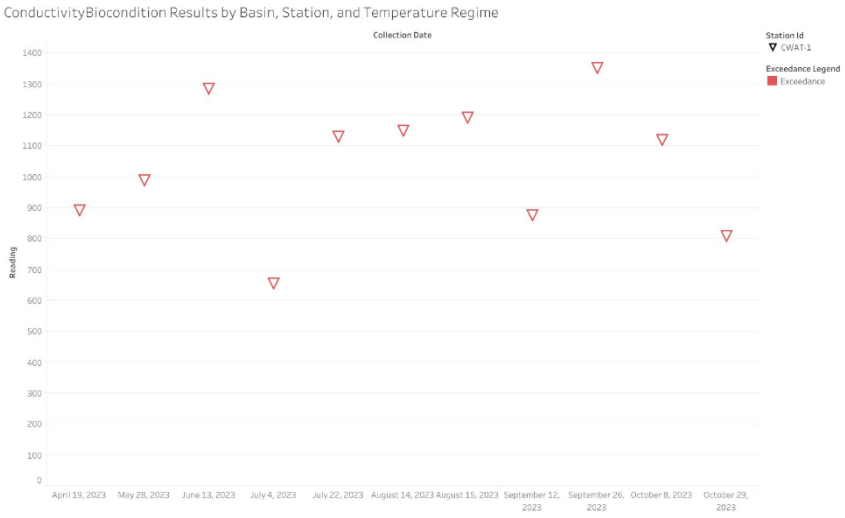
Site Characteristics		Adjacent Landuse Category		Dominant Upstream Landuse	
Drainage size	80.9		Wooded		Urban – high density
Ecoregion	E. Corn Belt Plains		Non-wooded		Urban – low density
Aq. Habitat Type	Warm		Agricultural- row crop		Commercial/Industrial
Geology/Bedrock	Dolomite		Agricultural - pasture	x	Agriculture – row crop
Buffer width	10-50 m	x	Residential		Agriculture – pasture lands
Buffer Type	Herbaceous		Commercial/Industrial		Natural - woods, wetlands, etc

CURRENT Water Quality Data Summary

Summary Statistics and Exceedances Basin - Ten Mile Creek

Station Id	Station Na..	Parameter	Mean Reading	Median Reading	Min. Reading	Max. Reading	Sample Count	N. Exceedance	Pct Exceeded
CWAT-1	Sylvania Northview; Ten Mile Creek	Chloride	51.25	55.14	32.33	66.58	11.00	0	0
		Conductivity	1,039.91	1,119.00	656.00	1,351.00	11.00	0	0
		Conductivity/TDS	571.95	615.45	360.80	743.05	11.00	0	0
		ConductivityBiocondition	1,039.91	1,119.00	656.00	1,351.00	11.00	11	100
		Dissolved Oxygen	10.71	10.66	7.21	14.02	11.00	0	0
		pH	8.20	8.15	7.60	8.72	11.00	0	0
		Salinity	894.45	966.87	540.85	1,186.80	11.00	3	27
		TDS	571.95	615.45	360.80	743.05	11.00	11	100
		Water Temperature	18.60	19.80	9.90	25.50	11.00	0	0

Graphs of Current Year



OVERALL WATER QUALITY SCREENING STATEMENT

support for aquatic life equals - Acceptable (<20%) Concerning (20-50%) Degrading (>50%) based on the percent exceedance of each parameter, based on 2023 data, *Avg Conductivity has 4 different bins

Temp	pH	DO	Avg Conductivity*	Biocondition Gradient	TDS AQ Life
Acceptable	Acceptable	Acceptable	Likely threats/impacts	Degraded	Acceptable

Chloride	Salinity
Acceptable	Concerning

Parameter Exceedance/Metadata Interpretation

Exceeded parameter & percentage: Conductivity/Biocondition, 100% exceedance

Dates exceedances occurred: 4/19/23, 5/28/23, 6/13/23, 7/4/23, 7/22/23, 8/14/23, 8/15/23, 9/12/23, 9/26/23, 10/8/23, 10/29/23

Metadata reviewed for interpretation:
Agricultural upstream land use, quarry upstream, and urban/suburban development adjacent to the site could contribute to high conductivity. In addition, geologic influence of Oak Openings sands, groundwater, and shallow depth to limestone bedrock could contribute to higher conductivity readings.

Analysis statement:
For the purposes of screening most of the measured LEBAF parameters indicate acceptable or healthy stream conditions. Conductivity/Biocondition and Salinity parameters exceeded the benchmarks, with 100% exceedance rate for Conductivity/Biocondition. This indicates that based on the collected data as whole, Conductivity may degrade this stream at this station during the summer and fall. Overall, all other collected data indicates a heathy waterway.

Recommendations & Conclusions

Parameter	Recommended Action(s)
Temperature	Continue monitoring.
pH	Continue monitoring.
DO	Continue monitoring.
Conductivity TDS AQL, Biocondition	Continue monitoring; add macroinvertebrate monitoring when able, investigate sources of contamination and collaborate with other groups to aggregate more data.
Salinity	Continue monitoring, consider adding Salinity specific probe.
Chloride	Continue monitoring.
TDS	Continue monitoring.
Additional Comments	

Ottawa River: Wildwood, CWAT-2 Monitoring Since: 2023

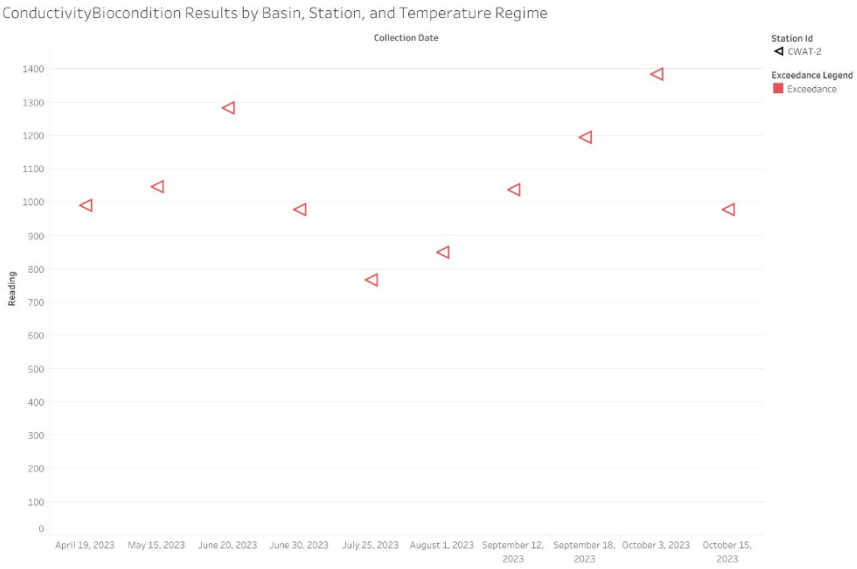
Site Characteristics		Adjacent Landuse Category		Dominant Upstream Landuse	
Drainage size	130	x	Wooded		Urban – high density
Ecoregion	Huron/Erie Plains		Non-wooded		Urban – low density
Aq. Habitat Type	Warm		Agricultural- row crop		Commercial/Industrial
Geology/Bedrock	Dolomite		Agricultural - pasture	x	Agriculture – row crop
Buffer width	>50 m		Residential		Agriculture – pasture lands
Buffer Type	Wooded		Commercial/Industrial		Natural - woods, wetlands, etc

CURRENT Water Quality Data Summary

Summary Statistics and Exceedances Basin - Ottawa River

Station Id	Station Na..	Parameter	Mean Reading	Median Reading	Min. Reading	Max. Reading	Sample Count	N. Exceedance	Pct Exceeded
CWAT-2	Wildwood	Chloride	51.79	49.95	37.70	68.20	10.00	0	0
		Conductivity/TDS	577.94	557.43	420.75	761.20	10.00	0	0
		ConductivityBiocondition	1,050.80	1,013.50	765.00	1,384.00	10.00	10	100
		Dissolved Oxygen	7.32	7.33	5.32	9.96	10.00	0	0
		pH	7.85	7.86	7.60	8.33	10.00	0	0
		Salinity	904.19	868.16	639.29	1,218.37	10.00	3	30
		Water Temperature	17.84	18.90	8.70	23.30	10.00	0	0

Graphs of Current Year



OVERALL WATER QUALITY SCREENING STATEMENT

support for aquatic life equals - Acceptable (<20%) Concerning (20-50%) Degrading (>50%) based on the percent exceedance of each parameter, based on 2023 data, *Avg Conductivity has 4 different bins

Temp	pH	DO	Avg Conductivity*	Biocondition Gradient	TDS AQ Life
Acceptable	Acceptable	Acceptable	Likely threats/impacts	Degraded	Acceptable

Chloride	Salinity
Acceptable	Concerning

Parameter Exceedance/Metadata Interpretation

Exceeded parameter & percentage: Conductivity/Biocondition, 100% exceedance ; Salinity, 30% exceedance

Dates exceedances occurred: 4/19/23, 5/28/23, 6/13/23, 7/4/23, 7/22/23, 8/14/23, 8/15/23, 9/12/23, 9/26/23, 10/8/23, 10/29/23

Metadata reviewed for interpretation:
Agricultural upstream landuse, quarry upstream, and urban/suburban development adjacent to the site could contribute to high conductivity. In addition, geologic influence of Oak Openings sands, groundwater, and shallow depth to limestone bedrock could contribute to higher conductivity readings.

Analysis statement: For the purposes of screening most of the measured LEBAF parameters indicate acceptable or healthy stream conditions. Conductivity/Biocondition and Salinity parameters exceeded the benchmarks, with Conductivity/Biocondition at 100% exceedance. This indicates that based on the collected data as whole, conductivity may degrade this stream at this station during the summer and fall. Overall, all other collected data indicates a heathy waterway.

Recommendations & Conclusions

Parameter	Recommended Action(s)
Temperature	Continue monitoring.
pH	Continue monitoring.
DO	Continue monitoring.
Conductivity TDS AQL, Biocondition	Continue monitoring; add macroinvertebrate monitoring when able, investigate sources of contamination and collaborate with other groups to aggregate more data.
Salinity	Continue monitoring, consider adding Salinity specific probe.
Chloride	Continue monitoring.
TDS	Continue monitoring.
Additional Comments	

Ottawa River: Ottawa Park, CWAT- 4 Monitoring Since: 2023

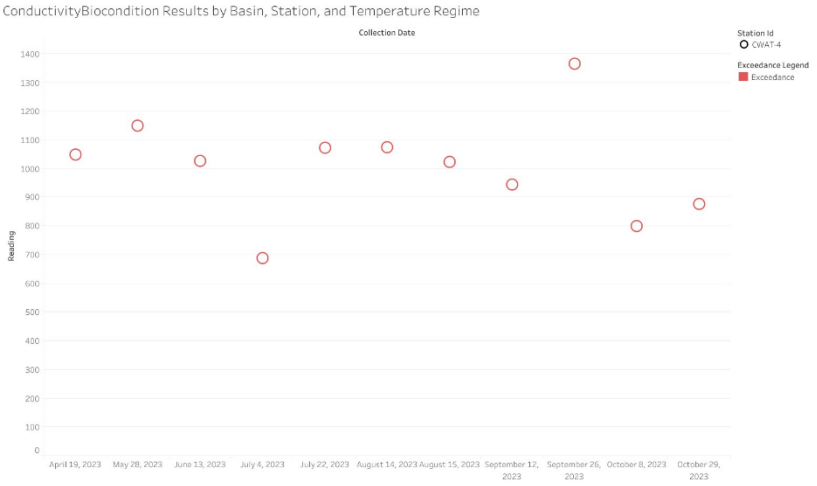
Site Characteristics		Adjacent Landuse Category		Dominant Upstream Landuse	
Drainage size	156		Wooded		Urban – high density
Ecoregion	Huron-Lake Erie Plains		Non-wooded		Urban – low density
			Agricultural- row crop		Commercial/Industrial
Aq. Habitat Type	Warm		Agricultural - pasture	x	Agriculture – row crop
Geology/Bedrock	Dolomite	x	Residential		Agriculture – pasture lands
Buffer width	10-50 m		Commercial/Industrial		Natural - woods, wetlands, etc
Buffer Type	Wooded				

CURRENT Water Quality Data Summary

Summary Statistics and Exceedances Basin - Ottawa River

Station Id	Station Na..	Parameter	Mean Reading	Median Reading	Min. Reading	Max. Reading	Sample Count	N. Exceedance	Pct Exceeded
CWAT-4	Ottawa Park	Chloride	49.57	50.51	33.90	67.22	11.00	0	0
		Conductivity/TDS	553.30	563.75	378.40	750.20	11.00	0	0
		ConductivityBiocondition	1,006.00	1,025.00	688.00	1,364.00	11.00	11	100
		Dissolved Oxygen	7.67	7.46	4.75	10.65	11.00	1	9
		pH	7.82	7.82	7.40	8.28	11.00	0	0
		Salinity	862.35	878.85	569.61	1,199.23	11.00	1	9
		TDS	553.30	563.75	378.40	750.20	11.00	11	100
		Water Temperature	18.13	18.40	8.70	23.80	11.00	0	0

Graphs of Current Year



OVERALL WATER QUALITY SCREENING STATEMENT

support for aquatic life equals - Acceptable (<20%) Concerning (20-50%) Degrading (>50%) based on the percent exceedance of each parameter, based on 2023 data, *Avg Conductivity has 4 different bins

Temp	pH	DO	Avg Conductivity*	Biocondition Gradient	TDS AQ Life
Acceptable	Acceptable	Acceptable	Likely threats/impacts	Degraded	Acceptable

Chloride	Salinity
Acceptable	Acceptable

Parameter Exceedance/Metadata Interpretation

Exceeded parameter & percentage: Conductivity/Biocondition, 100% exceedance; Salinity, 9% exceedance

Dates exceedances occurred: April 19, May 28, June 13, July 4, July 22, August 14, August 15, September 12, September 26, October 8, October 29

Metadata reviewed for interpretation:
Upstream and adjacent landuse, OEPA reports for Ottawa River and Ten Mile Creek, LEBAF parameter thresholds and metadata tables, climate records.

Analysis statement:
For the purposes of screening most of the measured LEBAF parameters indicate acceptable or healthy stream conditions. Conductivity/Biocondition and Salinity parameters exceeded the benchmarks, with Conductivity/Biocondition at 100% exceedance. This indicates that based on the collected data as whole, conductivity may degrade this stream at this station during the summer and fall. Overall, all other collected data indicates a heathy waterway.

Recommendations & Conclusions

Parameter	Recommended Action(s)
Temperature	Continue monitoring.
pH	Continue monitoring.
DO	Continue monitoring.
Conductivity TDS AQL, Biocondition	Continue monitoring; add macroinvertebrate monitoring when able, investigate sources of contamination and collaborate with other groups to aggregate more data.
Salinity	Continue monitoring.
Chloride	Continue monitoring.
TDS	Continue monitoring.
Additional Comments	

Ottawa River: Howard Pinkley Landing, CWAT- 5 **Monitoring Since**: 2023

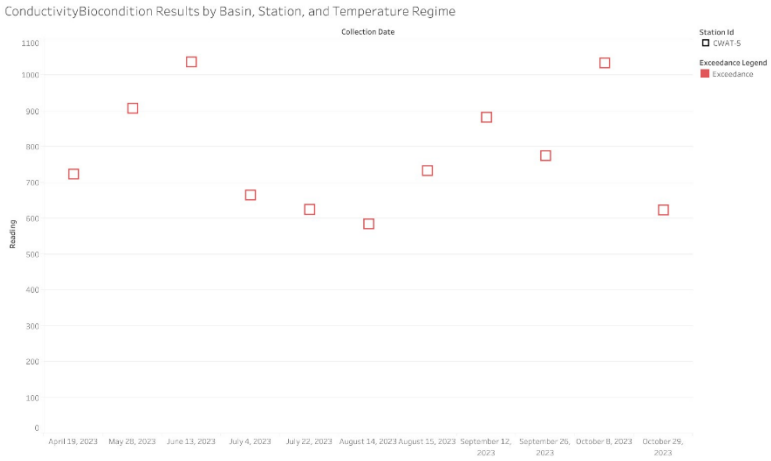
Site Characteristics		Adjacent Landuse Category		Dominant Upstream Landuse	
Drainage size	174		Wooded	x	Urban – high density
Ecoregion	Huron-Lake Erie Plains		Non-wooded		Urban – low density
			Agricultural- row crop		Commercial/Industrial
Aq. Habitat Type	Warm		Agricultural - pasture		Agriculture – row crop
Geology/Bedrock	Dolomite	x	Residential		Agriculture – pasture lands
Buffer width	5 - 10 m		Commercial/Industrial		Natural - woods, wetlands, etc
Buffer Type	Grass				

CURRENT Water Quality Data Summary

Summary Statistics and Exceedances Basin - Ottawa River

Station Id	Station Na..	Parameter	Mean Reading	Median Reading	Min. Reading	Max. Reading	Sample Count	N. Exceedance	Pct Exceeded
CWAT-5	Howard Pinkley Landing	Chloride	38.47	36.07	28.78	51.15	11.00	0	0
		Conductivity/TDS	429.35	402.60	321.20	570.90	11.00	0	0
		ConductivityBiocondition	780.64	732.00	584.00	1,038.00	11.00	11	100
		Dissolved Oxygen	11.55	11.22	8.30	18.14	11.00	0	0
		pH	8.40	8.44	8.00	8.65	11.00	0	0
		Salinity	654.72	609.35	476.60	890.99	11.00	0	0
		TDS	429.35	402.60	321.20	570.90	11.00	11	100
		Water Temperature	20.46	21.70	8.58	29.90	11.00	2	18

Graphs of Current Year



OVERALL WATER QUALITY SCREENING STATEMENT

support for aquatic life equals - Acceptable (<20%) Concerning (20-50%) Degrading (>50%) based on the percent exceedance of each parameter, based on 2023 data, *Avg Conductivity has 4 different bins

Temp	pH	DO	Avg Conductivity*	Biocondition Gradient	TDS AQ Life
Acceptable	Acceptable	Acceptable	Concern for biota	Degraded	Acceptable

Chloride	Salinity
Acceptable	Acceptable

Parameter Exceedance/Metadata Interpretation

Exceeded parameter & percentage: Conductivity/Biocondition, 100% exceedance; Water Temperature 18% exceedance

Dates exceedances occurred: April 19, May 28, June 13, July 4, July 22, August 14, August 15, September 12, September 26, October 8, October 29

Metadata reviewed for interpretation:
Metadata reviewed for interpretation: Upstream and adjacent landuse, OEPA reports for Ottawa River and Ten Mile Creek, LEBAF parameter thresholds and metadata tables, climate data.

Analysis statement: For the purposes of screening most of the measured LEBAF parameters indicate acceptable or healthy stream conditions. Conductivity/Biocondition and Salinity parameters exceeded the benchmarks, with Conductivity/Biocondition at 100% exceedance. This indicates that based on the collected data as whole, conductivity may degrade this stream at this station during the summer and fall. Overall, all other collected data indicates a heathy waterway.

Recommendations & Conclusions

Parameter	Recommended Action(s)
Temperature	Continue monitoring.
pH	Continue monitoring.
DO	Continue monitoring.
Conductivity TDS AQL, Biocondition	Continue monitoring; add macroinvertebrate monitoring if lacustrine methods available; investigate sources of contamination and collaborate with other groups to aggregate more data.
Salinity	Continue monitoring.
Chloride	Continue monitoring.
TDS	Continue monitoring.
Additional Comments	