

Contents

| | |
|---|-----------|
| 2023 LEBAF LARGE RIVER Maumee River Analysis | 2 |
| Maumee River: Providence Metropark, CWAT- 6..... | 22 |
| Maumee River: Farnsworth Metropark, CWAT- 7 | 24 |
| Maumee River: Sidecut Metropark, CWAT- 8 | 26 |
| Maumee River: Walbridge Park, CWAT- 9 | 28 |
| Maumee River: Middlegrounds Metropark, CWAT- 9 | 30 |
| Maumee River: Glass City Metropark, CWAT- 10 | 32 |

2023 LEBAF LARGE RIVER Maumee River 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

LEBAF Monitoring at all stations began in 2023; where noted with (*), Metroparks Toledo has been monitoring for macroinvertebrate data since 2021.

*CWAT-6: Providence Metropark, (13827 S River Rd, Grand Rapids, OH 43522)

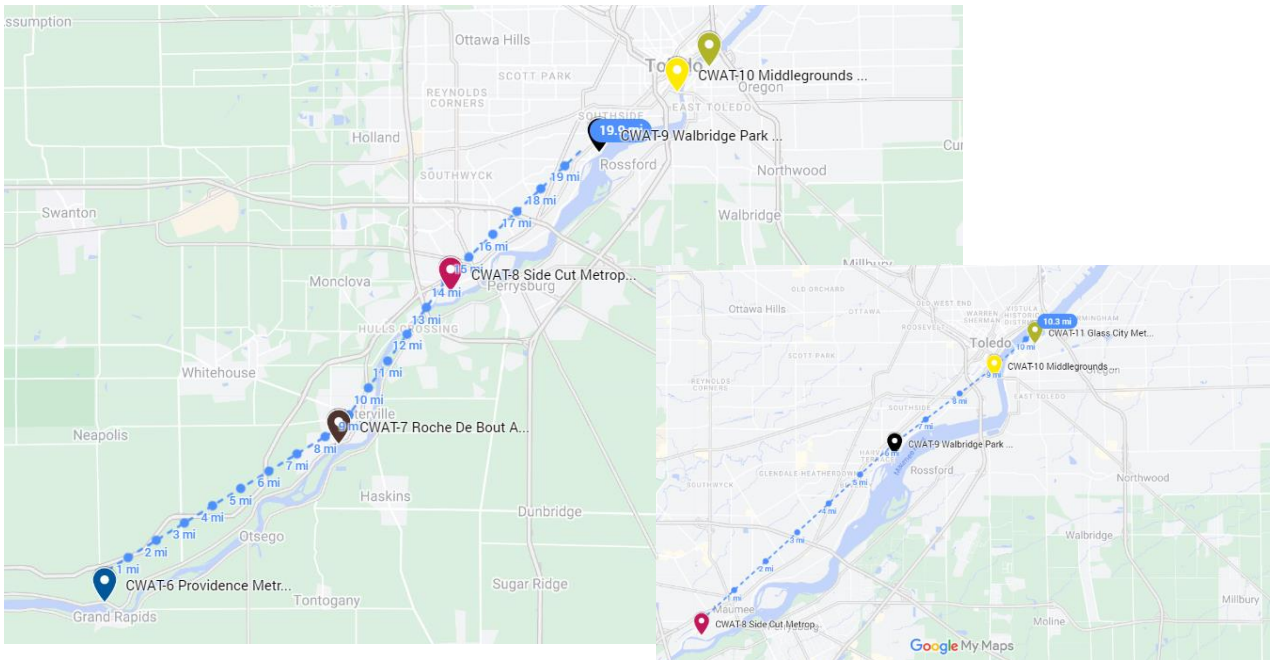
*CWAT-7: Farnsworth Metropark (670 S River Rd, Waterville, OH 43566)

*CWAT-8: Side Cut Metropark (1025 W River Rd, Maumee, OH 43537)

CWAT-9: Walbridge Park (2761 Broadway St, Toledo, OH 43609)

CWAT-10: Middlegrounds Metropark (111 Ottawa St, Toledo, OH 43604)

CWAT-11: Glass City Metropark (983 Front St, Toledo, OH 43605)



Map shows approximate distances between stations and station locations relative to each other. Lake Erie influence on the Maumee River starts just past CWAT-8; data at CWAT-9, CWAT-10, and CWAT-11 could be influenced by lacustrine dynamics.

Land Use Information from OEPA 2014 Report for the Lower Maumee:

“Aggregated land use across the Lower Maumee River watershed is approximately 75.82% agricultural and 14.64% developed for urban or residential use. Other land uses

include 6.61% forest, 1.36% open water, 0.94% grassland, 0.50% wetland, and 0.13% other (United States Department of Agriculture, 2012). The 2010 census data including census blocks wholly or partially in the watershed specifies that the Lower Maumee River watershed in Ohio supports a resident population of approximately 343,024 (US Department of Commerce, et. al, 2010).”

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 | Concern for Biota | 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, 10.53% | August 25, September 12, September 18 | CWAT-10 Middlegrounds, CWAT-11 Glass City |
| pH, 8.93% | July 11, August 15, September 12, September 24 October 28 | CWAT-8 Sidecut CWAT-6 Providence |
| Water temperature, 12.28% | May 10, May 28, June 20, 2023, July 11, July 25, October 3 | CWAT-6 Providence CWAT-7 Farnsworth CWAT-8 Sidecut CWAT-9 Walbridge CWAT-10 Middlegrounds |

- c. **Key Metadata reviewed or to consider for interpretation: Metadata reviewed for interpretation: Upstream and adjacent land use, Ohio EPA reports for the Maumee River, LEBAF parameter thresholds and metadata tables, Metroparks Toledo 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 Maumee River from April – October 2023. Conductivity/Biocondition exceeded the benchmarks with a 96.36% 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; continue 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:

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 of Exceedances by Waterbody and Parameter

| Basin | Sample Run | Parameter | Mean Reading | Median Reading | Min. Reading | Max. Reading | Sample Count | N. Exceeded | Pct Exceeded |
|--------------|------------|---------------------------|--------------|----------------|--------------|--------------|--------------|-------------|--------------|
| Maumee River | 2023 | Chloride | 29.99 | 27.74 | 14.46 | 54.31 | 57.00 | 0.00 | 0.00 |
| | | Conductivity Biocondition | 608.67 | 563.00 | 293.50 | 1,102.00 | 57.00 | 53.00 | 96.36 |
| | | Conductivity TDS | 323.02 | 308.55 | 0.00 | 606.10 | 57.00 | 0.00 | 0.00 |
| | | Dissolved Oxygen | 10.19 | 9.70 | 3.42 | 24.31 | 57.00 | 6.00 | 10.53 |
| | | pH | 8.32 | 8.42 | 7.15 | 10.12 | 57.00 | 5.00 | 8.93 |
| | | Salinity | 499.92 | 457.99 | 225.48 | 950.90 | 57.00 | 0.00 | 0.00 |
| | | Water Temperature | 21.65 | 22.70 | 8.80 | 30.00 | 57.00 | 7.00 | 12.28 |

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

N/A, first year sampling.

7. Summary for pH

- a. pH: 57 samples, 5 # exceedances, 8.93 % 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:

July 11, August 15, September 12, September 24 (Sidecut) October 28 (Providence)

- 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:

Only alkaline exceedances, July-September at Sidecut, single exceedance at Providence.

- c. Does pH behave daily, seasonally, etc. as you would expect? Are there patterns upstream to downstream? Do you see an expected pattern, unexpected?

Answer:

Yes- per OEPA alkalinity in the basin can be expected due to the geology of the watershed. It can also reflect variations in productivity, which would be expected to be higher in Summer months. High readings at Sidecut are in the middle of our sampling area- no clear upstream/downstream differences, but in general this is all "downstream" for the River. Sidecut sampling occurs in a side channel from the main stem of the River, where low-flow conditions more common the summer.

pH: The geology of the Maumee River watershed results in the river having high alkalinity. The high alkalinity buffers the systems pH resulting in stable pH's that meet Ohio's water quality criteria. However, the system's productivity (more clearly expressed in the dissolved oxygen data) is reflected in pH fluctuations. The range was as high as 1.37 SU/day in July 2012 and represents depletion of carbon dioxide by photosynthesis.

- 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 Maumee River is acceptable for the 2023 LEBAF field season.

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

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 Maumee River 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 Maumee River cannot be made given a limited dataset. To further support the current 2023 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

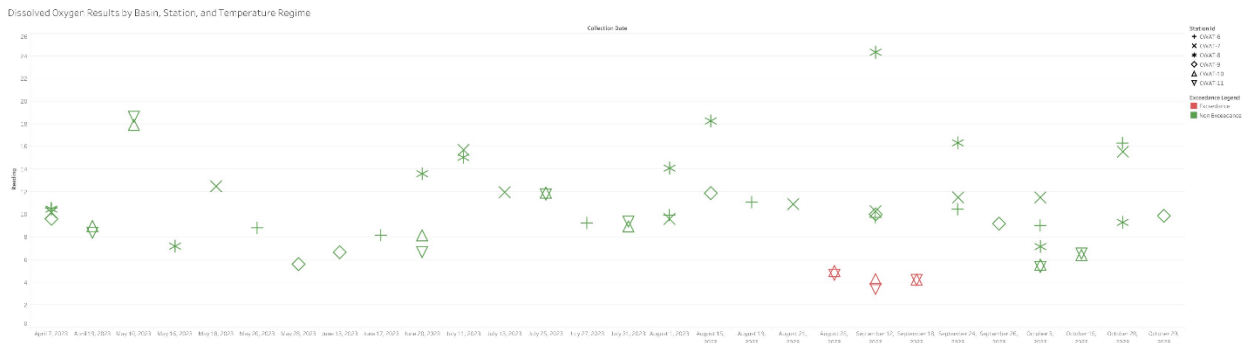
a. DO: 57 samples, __6__ # exceedances, __10.53__ % exceedance rate.

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:

August 25, September 12, September 18 (Middlegrounds and Glass City)

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



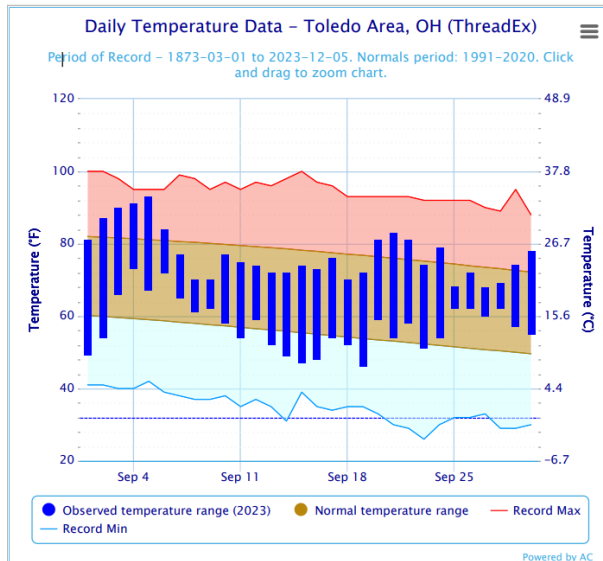
e. Make a statement about the magnitude, frequency and duration of any exceedances:

Low readings for Glass City and Middlegrounds, sustained end of August-September.

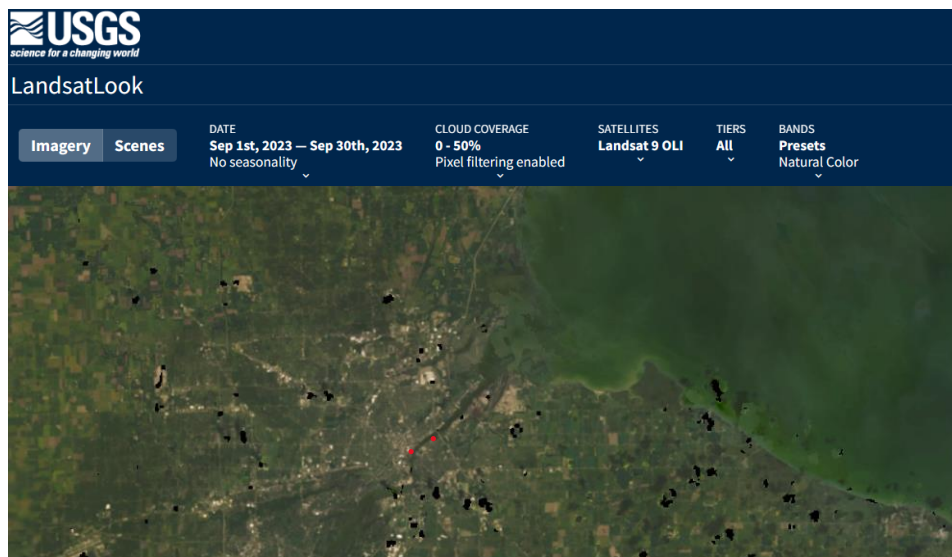
f. Does DO behave daily, seasonally, etc. as you would expect? Are there patterns upstream to downstream? Do you see an expected pattern, unexpected?

Answer: Overall, DO varies as expected seasonally/temporally. High levels could be an indicator of excess productivity, a known issue given nutrient pollution in the Maumee. Low levels at the most downstream sites in late Summer could reflect the influence of algal blooms from the Lake.

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



Large rain event (2.4") August 24th. Sustained dry conditions after that into September. Temperature in normal range through end of August, high in early September.



Satellite image composite of September 2023 conditions in Toledo Harbor and the Maumee river, showing indications of algal bloom influence. Red dots note approximate locations of CWAT-10 and CWAT-11.

- 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 the Maumee River.

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

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:

90% of DO values recorded on the Maumee River during the 2023 season were within the LEBAF analytical benchmark of ≤ 5 mg/L. Based on this, we can expect that during most of the sampled dates and times the DO levels in the river 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 in the Maumee 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*: 57 samples, 7 # exceedances, 12.28 % exceedance rate.

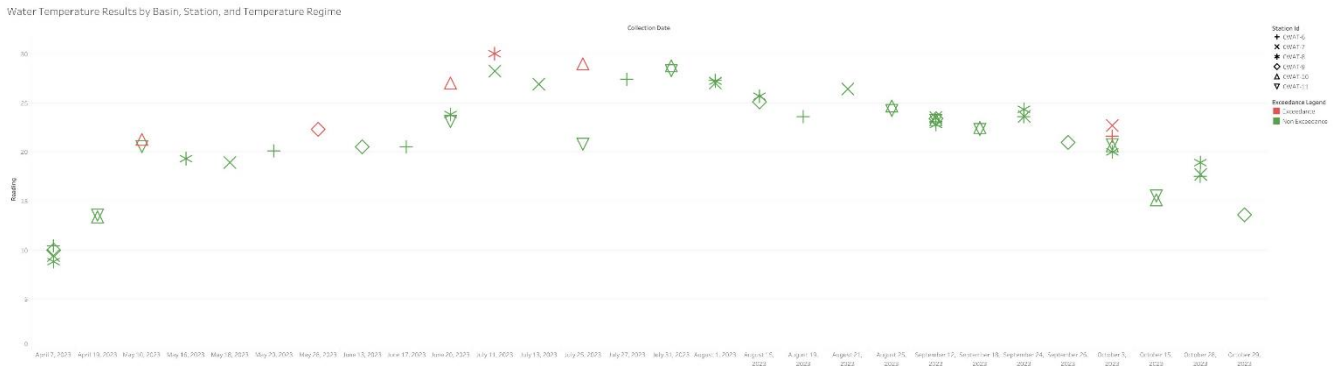
b. Is map illustration of station Temperature #/% exceedances the same as table: Y
N

Yes

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

May 10, May 28, June 20, 2023, July 11, July 25, October 3

- 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:
All exceedances except October 3 occurred at a single station while other stations sampled that day had temperatures within range. No consecutive exceedances at the same stations. All exceedances are close to the threshold limit (low magnitude. All exceedances are above benchmark (vs. below).
- 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- no clear upstream/downstream pattern. Middlegrounds had the highest

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 |

number of exceedances- could be due to sampling location off concrete fishing pier/shallower water level in area.

- ~~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 Maumee River.
- i. Limitations, assumptions, qualifications, if none record NONE:
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.
- j. Temperature Recommendations + limitations statement:
88% of temperature values recorded on the Maumee River during the 2023 season were within the LEBAF analytical benchmarks. Based on this, we can expect that during most of 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 health 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

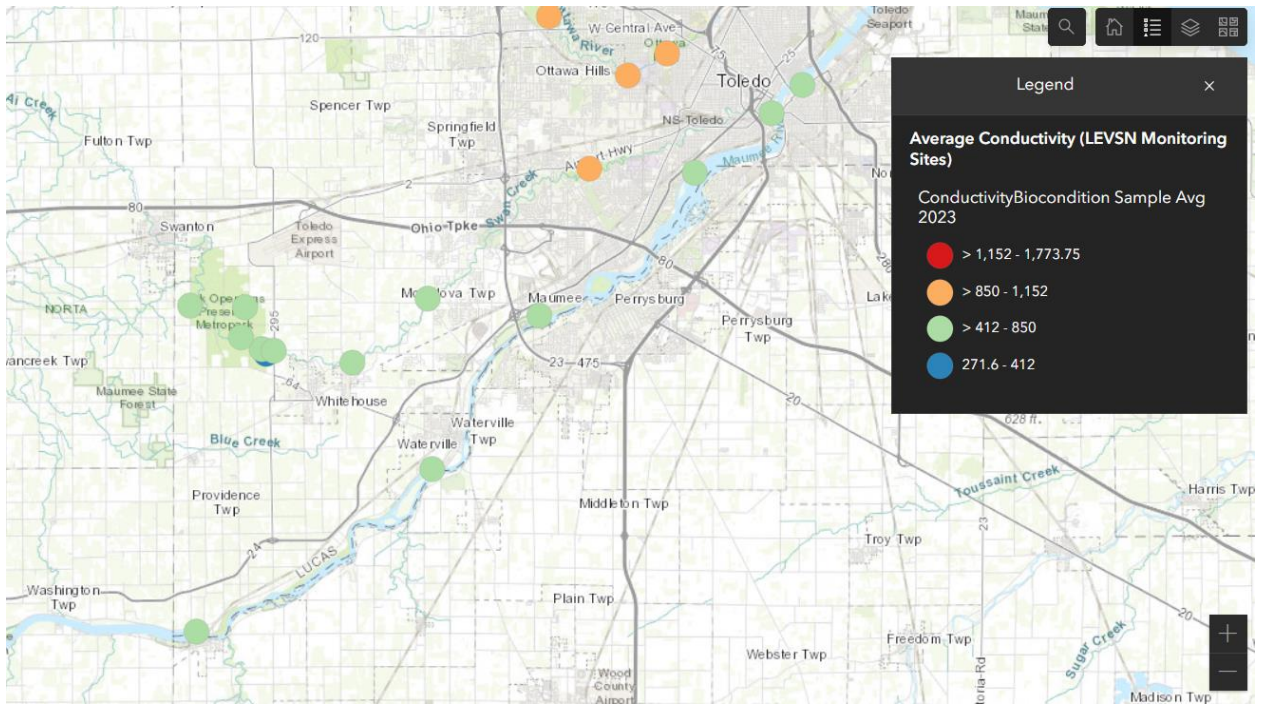
| Basin | Sample Run.. | Parameter | Mean Reading | Median Reading | Min. Reading | Max. Reading | Sample Count | N. Exceeded | Pct Exceeded |
|--------------|--------------|---------------------------|--------------|----------------|--------------|--------------|--------------|-------------|--------------|
| Maumee River | 2023 | Conductivity Biocondition | 608.67 | 563.00 | 293.50 | 1,102.00 | 57.00 | 53.00 | 96.36 |

- 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 below reference/survey data maximums. Mean and Median values approach median reference/survey values. Data has good overlap and comparability.

11. Summary for Average Conductivity Combined Criteria Analyzes

- a. Average overall conductivity is: **608.67**
- b. Average conductivity condition bin: excellent/healthy, concern for biota, likely threats, impacts or likely impaired average: **Concern for biota**
- 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 Maumee River, average conductivity is consistently under 800 with no clear variation upstream/downstream.

- e. Add or adjusted and findings, patterns, etc. after review Conductivity table of meta and ancillary information:
 Increased loading of salts, nutrients, and sediments from agricultural sources is a known issue in the Northwest Ohio Lake Erie basin. Leaching from septic systems/influence of groundwater can also contribute and is a known issue in this region. Urban and residential inputs, as well as wastewater and industry release, can also contribute to high values. Conductivity varies based on environmental factors, such as water temperature and precipitation.
- f. Limitations, assumptions, qualifications, if none record NONE:
 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 trends on the Maumee river indicate that macroinvertebrate communities could be under stress due to this parameter.
- h. Was Average Conductivity >851 **No** 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 |
|--------------|--------------|-----------|--------------|----------------|--------------|--------------|--------------|-------------|--------------|
| Maumee River | 2023 | Chloride | 29.99 | 27.74 | 14.46 | 54.31 | 57.00 | 0.00 | 0.00 |
| | | Salinity | 499.92 | 457.99 | 225.48 | 950.90 | 57.00 | 0.00 | 0.00 |

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

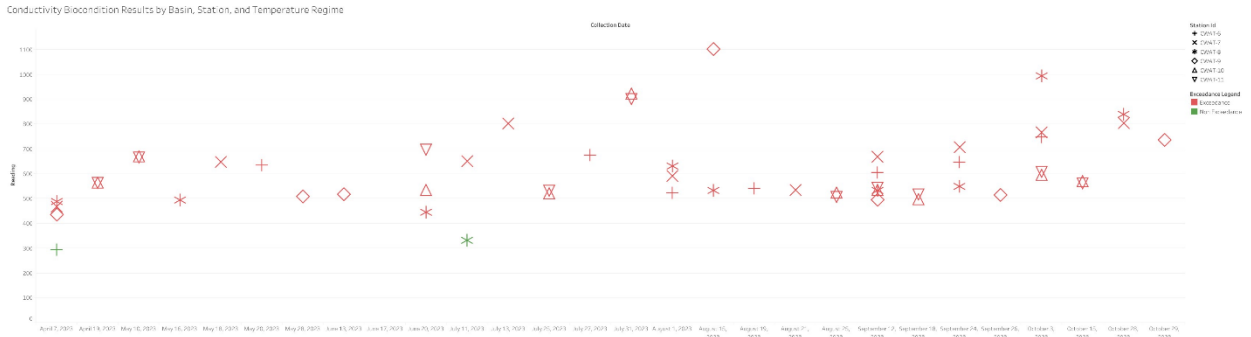
| Recommended thresholds for average or median Conductivity in uS/cm | | |
|--|-------------------------|---|
| Threshold | Condition | Action |
| < =412 | Excellent, healthy | Protection activities |
| 413-850 | Concern for biota | Investigate biota diversity. Identify potential sources. |
| 851-2000 | 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: 57 samples, 53 # exceedances, 96.36 % exceedance rate.
exceedances <412, 413-654 or >655:
i. # <412, healthy/functioning: 2
ii. # >412 but <655 =degrading: 39
iii. >655= degraded: 16
- 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. Maximum range 808.50, but majority of data in the 412-655 range.
- 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:

| Date Collected | CIV Index | Station Name |
|----------------|-----------|-------------------------|
| 8/9/2021 | 24 | Maumee River Farnsworth |
| 9/11/2021 | 21 | Maumee River Farnsworth |
| 7/14/2022 | 24 | Maumee River Farnsworth |
| 8/25/2022 | 19 | Maumee River Farnsworth |
| 9/8/2022 | 24 | Maumee River Farnsworth |
| 5/18/2023 | 26 | Maumee River Farnsworth |
| 6/15/2023 | 33 | Maumee River Farnsworth |
| 7/13/2023 | 29 | Maumee River Farnsworth |
| 9/7/2023 | 29 | Maumee River Farnsworth |
| 8/28/2021 | 7 | Maumee River Providence |
| 8/16/2022 | 23 | Maumee River Providence |
| 9/10/2022 | 23 | Maumee River Providence |
| 5/20/2023 | 33 | Maumee River Providence |
| 6/17/2023 | 23 | Maumee River Providence |
| 8/18/2023 | 26 | Maumee River Providence |
| 9/9/2023 | 22 | Maumee River Providence |
| 6/11/2021 | 11 | Maumee River Side Cut |
| 8/30/2021 | 20 | Maumee River Side Cut |
| 6/17/2022 | 23 | Maumee River Side Cut |
| 8/9/2022 | 23 | Maumee River Side Cut |
| 9/6/2022 | 23 | Maumee River Side Cut |
| 5/16/2023 | 33 | Maumee River Side Cut |
| 7/11/2023 | 26 | Maumee River Side Cut |
| 8/15/2023 | 21 | Maumee River Side Cut |
| 9/5/2023 | 25 | Maumee River Side Cut |

Macroinvertebrate data collected by Metroparks Toledo at CWAT-8, CWAT-9, and CWAT-10. Qualitative method using kick seine nets and natural substrates in streams.

- >22 = Excellent
- 17-21 = Good
- 11-16 = Fair
- <11 = Poor

- 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:

Table 39. Summary of macroinvertebrate data collected from artificial substrates (quantitative sampling) and natural substrates (qualitative sampling) in the Maumee and Auglaize Rivers, June to October, 2012/2013. Impounded sampling locations are indicated by blue shading. Yellow fill indicates sites assessed with lacustrine metrics and breakpoints; biocriteria are not applicable so community condition is based on a narrative determination of the designated use.

| Stream RM | Dr. Area (mi ²) | Total Taxa | | EPT Taxa | | Sensitive Taxa | | Density | | Predominant Organisms on the Natural Substrates With Tolerance Category(ies) | ICI | Narrative Evaluation |
|-----------------------------------|-----------------------------|------------|-----|----------|-------|----------------|-------|---------|-------|---|------|----------------------|
| | | Ql. | Qt. | Ql. | Total | Ql. | Total | Ql. | Qt. | | | |
| Maumee River (04-001) 2012 | | | | | | | | | | | | |
| 52.10 | 5578 | 39 | 25 | 7 | 9 | 2 | 3 | L | 5357 | Midges (F) | (14) | Fair |
| 47.10 | 5649 | 45 | 15 | 5 | 6 | 4 | 6 | L | 5588 | Midges (F) | (10) | Fair |
| 41.24 | 5693 | 15 | 10 | 3 | 4 | 1 | 1 | L | 10386 | Aquatic worms (T), Midges (F) | (4) | Fair |
| 32.60 | 6054 | 29 | 12 | 5 | 6 | 2 | 2 | M | 4985 | Midges (F,T) | (10) | Fair |
| 31.64 | 6058 | 50 | 27 | 11 | 12 | 6 | 8 | H | 10946 | Aquatic worms (T), Caddisflies (F,MI) Midges (F) | 24 | Fair |
| 26.70 | 6264 | 46 | 26 | 10 | 13 | 8 | 12 | M | 6234 | Hydropsychid Caddisflies (F, MI) Midges (F) | 30 | Marginally Good |
| 20.68 | 6330 | 43 | 31 | 12 | 14 | 9 | 12 | M | 1848 | Hydropsychid Caddisflies (F, MI), Midges (F), River Snails (MI) | 38 | Good |
| 16.52 | 6340 | 41 | 26 | 14 | 16 | 12 | 16 | M | 2946 | Hydropsychid Caddisflies (F,MI), Midges (F), Baetid Mayflies (F), River Snails (MI) | 34 | Good |
| 13.30 | 6367 | 24 | 13 | 6 | 8 | 5 | 6 | H | 3744 | Midges(MT) | (12) | Poor |
| 9.40 | 6389 | 15 | 10 | 1 | 3 | 0 | 1 | M | 6245 | Midges(MT) | (6) | Poor |
| 5.80 | 6397 | 22 | 14 | 2 | 4 | 0 | 1 | H | 3968 | Aquatic worms (T), Midges(MT) | (14) | Poor |
| 3.60 | 6602 | 15 | 13 | 1 | 3 | 1 | 2 | H | 2659 | Midges(MT,T) | (14) | Poor |
| 0.50 | 6606 | 24 | 23 | 2 | 4 | 2 | 2 | H | 4073 | Zebra mussels (F) | (18) | Poor |

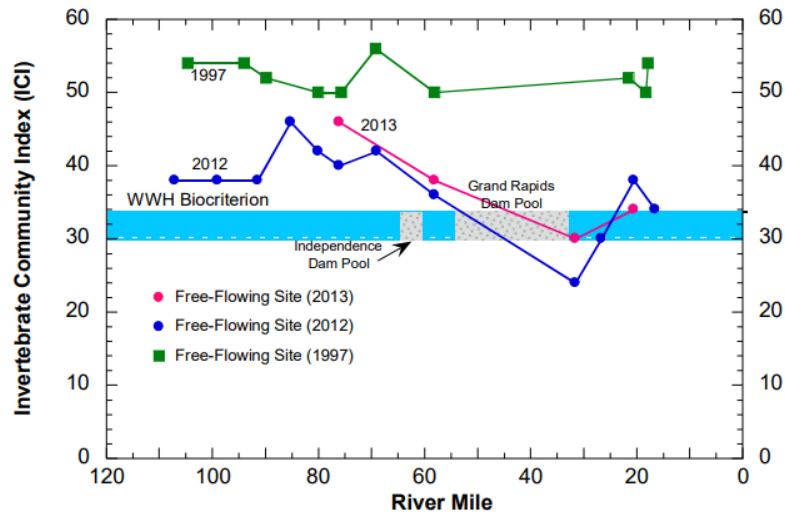


Figure 44. Longitudinal performance of Invertebrate Community Index (ICI) scores in the Maumee River, 1997, 2012 and 2013.

- h. Overall condition of this river this year **Acceptable (<20%) Concerning (20-50%) Degrading (>50%)**: A 96.36% exceedance rate for Conductivity/Biocondition LEBAF benchmarks on the Maumee River at sampled locations indicate that this river is degrading for macroinvertebrate communities.
- i. Limitations, assumptions, qualifications, if none record NONE:
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 with a 96.36% exceedance rate indicate that macroinvertebrate communities could be under stress due to this parameter in the Maumee River.

- k. Conductivity/Biocondition Recommendations + limitations statement:
Recommend continuing macros sampling on the Maumee River; 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: 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 Maumee River.

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

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 Maumee River 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 Maumee River for the 2023 LEBAF field season.

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

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

15. Summary for Salinity

- a. Overall Salinity: samples, 0 # exceedances, 0 % 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:
NONE
- d. ~~Insert graph of Salinity exceedances is below. If no exceedances skip graph export.~~
- e. ~~Make a statement about the magnitude, frequency and duration of any 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:~~
- 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 Salinity levels are acceptable in the Maumee River for the 2023 LEBAF field season.
- i. Limitations, assumptions, qualifications, if none record NONE:
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:
All Salinity 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. 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, 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%):**~~

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 Criteria Recommendations + limitations statement:~~

l. ~~Statement from comparing previous years to this year:~~

Maumee River: Providence Metropark, CWAT- 6

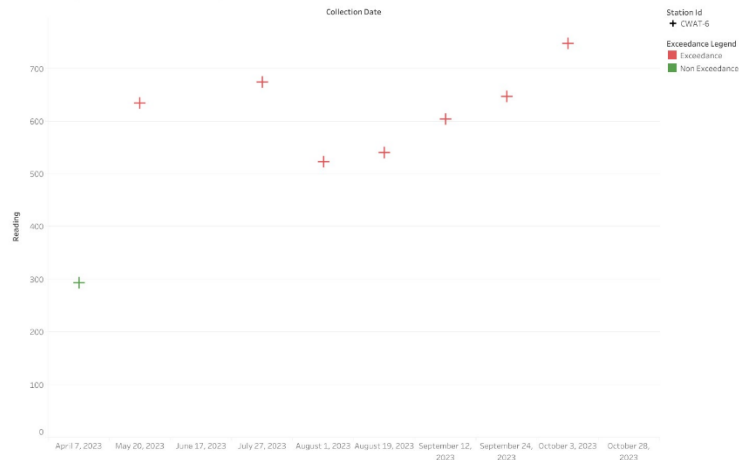
Monitoring Since: 2023

| Site Characteristics | | Adjacent Landuse Category | | Dominant Upstream Landuse | |
|----------------------|------------------------|---------------------------|------------------------|---------------------------|--------------------------------|
| Drainage size | 6030 | | Wooded | | Urban – high density |
| Ecoregion | Huron-Lake Erie Plains | | Non-wooded | | Urban – low density |
| | | x | Agricultural- row crop | | Commercial/Industrial |
| Aq. Habitat Type | Warm | | Agricultural - pasture | x | Agriculture – row crop |
| Geology/Bedrock | Dolomite | | Residential | | Agriculture – pasture lands |
| Buffer width | >50 m | | Commercial/Industrial | | Natural - woods, wetlands, etc |
| Buffer Type | Wooded | | | | |

| CURRENT Water Quality Data Summary | Summary Statistics and Exceedances Basin - Maumee River | | | | | | | | | |
|------------------------------------|---|-------------|---------------------------|--------------|----------------|--------------|--------------|--------------|---------------|--------------|
| | Station Id | Station Na. | Parameter | Mean Reading | Median Reading | Min. Reading | Max. Reading | Sample Count | N. Exceedance | Pct Exceeded |
| | CWAT-6 | Providence | Chloride | 28.73 | 30.51 | 14.46 | 36.86 | 10.00 | 0.0 | 0.0 |
| | | | Conductivity/TDS | 256.55 | 314.60 | 0.00 | 411.40 | 10.00 | 0.0 | 0.0 |
| | | | Conductivity/Biocondition | 583.06 | 619.00 | 293.50 | 748.00 | 10.00 | 7.0 | 87.5 |
| | | | Dissolved Oxygen | 10.32 | 9.82 | 8.14 | 16.28 | 10.00 | 0.0 | 0.0 |
| | | | pH | 8.39 | 8.55 | 7.15 | 9.04 | 10.00 | 1.0 | 10.0 |
| | | | Salinity | 476.99 | 507.77 | 225.48 | 623.85 | 10.00 | 0.0 | 0.0 |
| | | | Water Temperature | 21.51 | 22.35 | 10.40 | 27.40 | 10.00 | 1.0 | 10.0 |

Graphs of Current Year

ConductivityBiocondition Results by Basin, Station, and Temperature Regime



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, 90%; pH, 10%; Water temperature, 10%

Dates exceedances occurred: Conductivity/biocondition: 5/20/23, 6/17/23, 7/27/23, 8/1/23, 8/19/23, 9/12/23, 9/24/23, 10/3/23, 10/28/23. pH: 10/228/23. Water temperature: 10/03/23

Metadata reviewed for interpretation: Upstream and adjacent landuse, OEPA reports for Maumee River, LEBAF parameter thresholds and metadata tables, Metroparks Toledo Macroinvertebrate Data.

Analysis statement: For the purposes of screening most of the measured LEBAF parameters indicate acceptable or healthy stream conditions. Conductivity/Biocondition exceeded the benchmarks, with Conductivity/Biocondition at 90% 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 healthy waterway.

Recommendations & Conclusions

| Parameter | Recommended Action(s) |
|---------------------------------------|--|
| Temperature | Continue monitoring. |
| pH | Continue monitoring. |
| DO | Continue monitoring. |
| Conductivity TDS AQL, Biocondition | Continue monitoring; continue 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 | |

Maumee River: Farnsworth Metropark, CWAT- 7

Monitoring Since: 2023

| Site Characteristics | | Adjacent Landuse Category | | Dominant Upstream Landuse | |
|----------------------|------------------------|---------------------------|------------------------|---------------------------|--------------------------------|
| Drainage size | 6290 | | Wooded | | Urban – high density |
| Ecoregion | Huron-Lake Erie Plains | | Non-wooded | | Urban – low density |
| | | x | Agricultural- row crop | | Commercial/Industrial |
| Aq. Habitat Type | Warm | | Agricultural - pasture | x | Agriculture – row crop |
| Geology/Bedrock | Dolomite | | 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 - Maumee River

| Station Id | Station Na. | Parameter | Mean Reading | Median Reading | Min. Reading | Max. Reading | Sample Count | N. Exceedance | Pct Exceeded |
|------------|-------------|---------------------------|--------------|----------------|--------------|--------------|--------------|---------------|--------------|
| CWAT-7 | Farnsworth | Chloride | 32.73 | 32.48 | 23.04 | 39.67 | 10.00 | 0.0 | 0.0 |
| | | Conductivity/TDS | 365.29 | 362.45 | 257.18 | 442.75 | 10.00 | 0.0 | 0.0 |
| | | Conductivity/Biocondition | 664.16 | 659.00 | 467.60 | 805.00 | 10.00 | 10.0 | 100.0 |
| | | Dissolved Oxygen | 11.95 | 11.50 | 9.58 | 15.69 | 10.00 | 0.0 | 0.0 |
| | | pH | 8.56 | 8.55 | 7.93 | 8.98 | 10.00 | 0.0 | 0.0 |
| | | Salinity | 548.86 | 543.55 | 374.23 | 675.73 | 10.00 | 0.0 | 0.0 |
| | | Water Temperature | 22.43 | 23.55 | 9.40 | 28.20 | 10.00 | 1.0 | 10.0 |

Graphs of Current Year

Conductivity/Biocondition Results by Basin, Station, and Temperature Regime



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; Temperature, 10% exceedance

Dates exceedances occurred:

Conductivity/biocondition: 4/7/23, 5/18/23, 7/11/23, 7/13/23, 8/1/23, 8/21/23, 9/12/23, 9/24/23, 10/3/23, 10/28/23. Water temperature: 10/03/23

Metadata reviewed for interpretation: Upstream and adjacent landuse, OEPA reports for Maumee River, LEBAF parameter thresholds and metadata tables, Macros data from Metroparks Toledo.

Analysis statement: For the purposes of screening most of the measured LEBAF parameters indicate acceptable or healthy stream conditions. Conductivity/Biocondition exceeded the benchmarks, with Conductivity/Biocondition at 90% 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 healthy waterway.

Recommendations & Conclusions

| Parameter | Recommended Action(s) |
|---------------------------------------|--|
| Temperature | Continue monitoring. |
| pH | Continue monitoring. |
| DO | Continue monitoring. |
| Conductivity TDS AQL, Biocondition | Continue monitoring; continue 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 | |

Maumee River: Sidecut Metropark, CWAT- 8

Monitoring Since: 2023

| Site Characteristics | | Adjacent Landuse Category | | Dominant Upstream Landuse | |
|----------------------|------------------------|---------------------------|------------------------|---------------------------|---------------------------------|
| Drainage size | 6340 | | 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 | >50 m | | Commercial/Industrial | | Natural - woods, wetlands, etc. |
| Buffer Type | Wooded | | | | |

CURRENT Water Quality Data Summary

Summary Statistics and Exceedances Basin - Maumee River

| Station Id | Station Na.. | Parameter | Mean Reading | Median Reading | Min. Reading | Max. Reading | Sample Count | N. Exceedance |
|------------|--------------|---------------------------|--------------|----------------|--------------|--------------|--------------|---------------|
| CWAT-8 | Sidecut | Chloride | 28.77 | 26.27 | 16.33 | 48.98 | 10.00 | 0.00 |
| | | Conductivity Bioconditi.. | 583.74 | 533.00 | 331.40 | 994.00 | 10.00 | 9.00 |
| | | Conductivity TDS | 321.06 | 293.15 | 182.27 | 546.70 | 10.00 | 0.00 |
| | | Dissolved Oxygen | 13.57 | 13.85 | 7.16 | 24.31 | 10.00 | 0.00 |
| | | pH | 8.83 | 8.64 | 7.74 | 10.12 | 10.00 | 4.00 |
| | | Salinity | 478.52 | 431.50 | 257.33 | 849.98 | 10.00 | 0.00 |
| | | Water Temperature | 22.08 | 23.30 | 8.80 | 30.00 | 10.00 | 1.00 |

Graphs of Current Year

Conductivity Biocondition Results by Basin, Station, and Temperature Regime



pH Results by Basin, Station, and Temperature Regime



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 | Concerning | Acceptable | Concern for biota | Degraded | Acceptable |
| Chloride | Salinity | | | | |
| Acceptable | Acceptable | | | | |

Parameter Exceedance/Metadata Interpretation

Exceeded parameter & percentage: Conductivity/Biocondition, 90% exceedance; pH, 40% exceedance; Temperature, 10% exceedance

Dates exceedances occurred: Conductivity/biocondition: 4/7/23, 5/16/23, 6/20/23, 8/1/23, 8/15/23, 9/12/23, 9/24/23, 10/3/23, 10/28/23. pH: 7/11/23, 8/15/23, 9/12/23, 9/24/23. Water temperature: 7/11/23

Metadata reviewed for interpretation: Upstream and adjacent landuse, OEPA reports for Maumee River, LEBAF parameter thresholds and metadata tables, Macros data from Metroparks Toledo.

Analysis statement: For the purposes of screening most of the measured LEBAF parameters indicate acceptable or healthy stream conditions. Conductivity/Biocondition exceeded the benchmarks, with Conductivity/Biocondition at 90% exceedance. pH exceeded the benchmarks at a 40% rate, indicating this is an area of concern for this waterway. This indicates that based on the collected data as whole, conductivity and pH may degrade this stream at this station during the summer and fall. Overall, all other collected data indicates a healthy waterway.

Recommendations & Conclusions

| Parameter | Recommended Action(s) |
|---------------------------------------|--|
| Temperature | Continue monitoring. |
| pH | Continue monitoring. |
| DO | Continue monitoring. |
| Conductivity TDS AQL, Biocondition | Continue monitoring; continue 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 | |

Maumee River: Walbridge Park, CWAT- 9

Monitoring Since: 2023

| Site Characteristics | | Adjacent Landuse Category | | Dominant Upstream Landuse | |
|----------------------|------------------------|---------------------------|------------------------|---------------------------|---------------------------------|
| Drainage size | 6370 | | 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 | None | | Commercial/Industrial | | Natural - woods, wetlands, etc. |
| Buffer Type | None | | | | |

CURRENT Water Quality Data Summary

Summary Statistics and Exceedances Basin - Maumee River

| Station Id | Station Na.. | Parameter | Mean Reading | Median Reading | Min. Reading | Max. Reading | Sample Count | N. Exceedance |
|------------|----------------|---------------------------|--------------|----------------|--------------|--------------|--------------|---------------|
| CWAT-9 | Walbridge Park | Chloride | 30.34 | 25.33 | 21.47 | 54.31 | 7.00 | 0.00 |
| | | Conductivity Bioconditi.. | 615.57 | 514.00 | 435.70 | 1,102.00 | 7.00 | 7.00 |
| | | Conductivity TDS | 338.57 | 282.70 | 239.64 | 606.10 | 7.00 | 0.00 |
| | | Dissolved Oxygen | 8.95 | 9.59 | 5.60 | 11.87 | 7.00 | 0.00 |
| | | pH | 8.32 | 8.44 | 7.88 | 8.86 | 7.00 | 0.00 |
| | | Salinity | 507.35 | 414.80 | 346.55 | 950.90 | 7.00 | 0.00 |
| | | Total Dissolved Solids | 338.57 | 282.70 | 239.64 | 606.10 | 7.00 | 7.00 |
| | | Water Temperature | 19.41 | 21.00 | 10.00 | 25.10 | 7.00 | 1.00 |

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; Temperature, 14% exceedance

Dates exceedances occurred: Conductivity/biocondition: 4/7/23, 5/28/23, 6/13/23, 8/15/23, 9/12/23, 9/26/23, 10/29/23. Water temperature: 5/28/23

Metadata reviewed for interpretation: Upstream and adjacent landuse, OEPA reports for Maumee River, LEBAF parameter thresholds and metadata tables

Analysis statement: For the purposes of screening most of the measured LEBAF parameters indicate acceptable or healthy stream conditions. Conductivity/Biocondition 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 healthy waterway.

Recommendations & Conclusions

| Parameter | Recommended Action(s) |
|---------------------------------------|--|
| Temperature | Continue monitoring. |
| pH | Continue monitoring. |
| DO | Continue monitoring. |
| Conductivity TDS AQL, Biocondition | Continue monitoring; continue 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 | |

| Site Characteristics | | Adjacent Landuse Category | | Dominant Upstream Landuse | |
|----------------------|------------------------|---------------------------|------------------------|---------------------------|--------------------------------|
| Drainage size | 6380 | | Wooded | | Urban – high density |
| Ecoregion | Huron-Lake Erie Plains | | Non-wooded | x | Urban – low density |
| | | | Agricultural- row crop | | Commercial/Industrial |
| Aq. Habitat Type | Warm | | Agricultural - pasture | | Agriculture – row crop |
| Geology/Bedrock | Dolomite | | Residential | | Agriculture – pasture lands |
| Buffer width | 5-10 m | x | Commercial/Industrial | | Natural - woods, wetlands, etc |
| Buffer Type | Wooded | | | | |

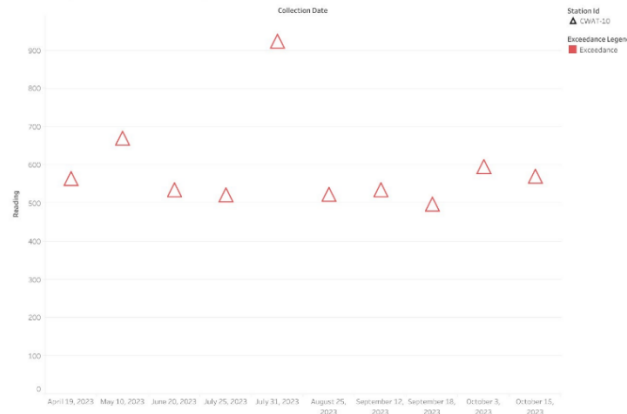
CURRENT Water Quality Data Summary

Summary Statistics and Exceedances Basin - Maumee River

| Station Id | Station Name (..) | Parameter | Mean Reading | Median Reading | Min. Reading | Max. Reading | Sample Count | N. Exceedance |
|------------|-------------------|---------------------------|--------------|----------------|--------------|--------------|--------------|---------------|
| CWAT-10 | Middlegrounds | Chloride | 29.24 | 27.08 | 24.51 | 45.53 | 10.00 | 0.00 |
| | | Conductivity Bioconditi.. | 593.34 | 549.50 | 497.40 | 924.00 | 10.00 | 10.00 |
| | | Conductivity TDS | 326.34 | 302.23 | 273.57 | 508.20 | 10.00 | 0.00 |
| | | Dissolved Oxygen | 8.12 | 7.26 | 4.23 | 17.91 | 10.00 | 3.00 |
| | | pH | 7.90 | 7.60 | 7.41 | 8.89 | 10.00 | 0.00 |
| | | Salinity | 485.75 | 446.07 | 400.25 | 785.07 | 10.00 | 0.00 |
| | | Water Temperature | 22.57 | 22.90 | 13.40 | 29.00 | 10.00 | 3.00 |

Graphs of Current Year

Conductivity Biocondition Results by Basin, Station, and Temperature Regime



Dissolved Oxygen Results by Basin, Station, and Temperature Regime



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 |
|------------|------------|------------|-------------------|-----------------------|-------------|
| Concerning | Acceptable | Concerning | Concern for biota | Degrading | Acceptable |
| Chloride | Salinity | | | | |
| Acceptable | Acceptable | | | | |

Parameter Exceedance/Metadata Interpretation

Exceeded parameter & percentage: Conductivity/Biocondition, 100% exceedance; Temperature, 30% exceedance; Dissolved Oxygen, 30% exceedance

Dates exceedances occurred: Conductivity/biocondition: 4/19/23, 5/10/23, 6/20/23, 7/31/23, 8/25/23, 9/12/23, 9/18/23, 10/3/23, 10/15/23. DO: 8/25/23, 9/12/23, 9/18/23. Water temperature: 5/10/23, 6/20/23, 7/31/23

Metadata reviewed for interpretation: Upstream and adjacent landuse, OEPA reports for Maumee River, LEBAF parameter thresholds and metadata tables, Lake Erie algal bloom satellite imagery from Landsat.

Analysis statement: For the purposes of screening most of the measured LEBAF parameters indicate acceptable or healthy stream conditions. Conductivity/Biocondition 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. Temperature and DO exceeded LEBAF benchmarks at 30%; this indicates that these parameters may stress aquatic life at this station during the summer and fall. Overall, other collected data indicates a healthy 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/if 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 | |

Maumee River: Glass City Metropark, CWAT- 10

Monitoring Since: 2023

| Site Characteristics | | Adjacent Landuse Category | | Dominant Upstream Landuse | |
|----------------------|------------------------|---------------------------|------------------------|---------------------------|--------------------------------|
| Drainage size | 6570 | | Wooded | | Urban – high density |
| Ecoregion | Huron-Lake Erie Plains | | Non-wooded | x | Urban – low density |
| | | | Agricultural- row crop | | Commercial/Industrial |
| Aq. Habitat Type | Warm | | Agricultural - pasture | | Agriculture – row crop |
| Geology/Bedrock | Dolomite | | Residential | | Agriculture – pasture lands |
| Buffer width | N/A | x | Commercial/Industrial | | Natural - woods, wetlands, etc |
| Buffer Type | N/A | | | | |

CURRENT Water Quality Data Summary

Summary Statistics and Exceedances Basin - Maumee River

| Station Id | Station Na.. | Parameter | Mean Reading | Median Reading | Min. Reading | Max. Reading | Sample Count | N. Exceedance |
|------------|--------------|---------------------------|--------------|----------------|--------------|--------------|--------------|---------------|
| CWAT-11 | Glass City | Chloride | 30.02 | 27.70 | 24.98 | 44.40 | 10.00 | 0.00 |
| | | Conductivity Bioconditi.. | 609.10 | 562.00 | 507.00 | 901.00 | 10.00 | 10.00 |
| | | Conductivity TDS | 335.01 | 309.10 | 278.85 | 495.55 | 10.00 | 0.00 |
| | | Dissolved Oxygen | 7.88 | 6.59 | 3.42 | 18.59 | 10.00 | 3.00 |
| | | pH | 7.96 | 7.85 | 7.31 | 8.94 | 10.00 | 0.00 |
| | | Salinity | 499.70 | 457.11 | 408.66 | 763.84 | 10.00 | 0.00 |
| | | Water Temperature | 21.22 | 21.55 | 13.60 | 28.30 | 10.00 | 0.00 |

Graphs of Current Year

Conductivity Biocondition Results by Basin, Station, and Temperature Regime



Dissolved Oxygen Results by Basin, Station, and Temperature Regime



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 | Concerning | Concern for biota | Degrading | Acceptable |
| Chloride | Salinity | | | | |
| Acceptable | Acceptable | | | | |

Parameter Exceedance/Metadata Interpretation

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

Dates exceedances occurred: Conductivity/biocondition: 4/19/23, 5/10/23, 6/20/23, 7/25/23, 7/31/23, 8/25/23, 9/12/23, 9/18/23, 10/3/23, 10/15/23. DO: 8/25/23, 9/12/23, 9/18/23

Metadata reviewed for interpretation: Upstream and adjacent landuse, OEPA reports for Maumee River, LEBAF parameter thresholds and metadata tables, Lake Erie algal bloom satellite imagery from Landsat.

Analysis statement: For the purposes of screening most of the measured LEBAF parameters indicate acceptable or healthy stream conditions. Conductivity/Biocondition exceeded the benchmarks, with a 100% exceedance rate. This indicates that based on the collected data as whole, conductivity may degrade this stream at this station during the summer and fall. Temperature and DO exceeded LEBAF benchmarks at 30%; this indicates that DO may stress aquatic life at this station during the summer and fall. Overall, other collected data indicates a healthy waterway.

Recommendations & Conclusions

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| Chloride | Continue monitoring. |
| TDS | Continue monitoring. |
| Additional Comments | |