

Water Quality Report for the Marengo River Inflow to Marengo Lake and Marengo Lake

The Marengo River is listed as a Class II trout stream* and has an Outstanding Resource Water classification** by the State of Wisconsin upstream of Marengo Lake in the Town of Lincoln. These classifications identify the Marengo River upstream of the lake as one of Wisconsin's highest quality waters, with no changes in baseline water quality allowed. Marengo Lake itself is not classified as an Outstanding or Exceptional Resource Water and does not have a trout classification. The lake is classified as a naturally reproducing walleye lake by the Wisconsin Department of Natural Resources.

*Trout Stream Classification (State of Wisconsin)

Class 1: Highest quality trout waters. No stocking needed to maintain populations.

Class 2: Some natural reproduction, but stocking is needed to maintain a desirable sport fishery.

Class 3: No natural reproduction. Populations maintained by stocking.



Brook Trout *Salvelinus fontinalis*

Sampling at the Marengo River inflow to Marengo Lake began during the summer of 2010, so very limited data are available at this time to characterize water quality at this site. Available data are summarized below. Continued monitoring will help establish baseline conditions. In addition to recent sampling at the inflow to Marengo Lake, a BRWA volunteer has collected several *Escherichia coli*, (*E. coli*) bacteria samples from Marengo Lake itself. The following is a summary of volunteer *E. coli* and water chemistry data collected from these sites through 2010. We will be presenting these data compared to other volunteer data in the Bad River Watershed at a public meeting later in 2011.

**Water Classification

Wisconsin's highest quality surface waters are classified as:
Outstanding Resource Waters (ORW): Highest quality waters, typically no human point sources of pollution exist, no changes in baseline water quality allowed.

Exceptional Resource Waters (ERW): Similar to ORW but some human point sources of pollution exist. No changes in baseline water quality allowed.

Water Chemistry Data Summary

BRWA uses the first four years of water chemistry data collected at a site to establish baseline conditions. Five samples have been collected from the Marengo River at the inflow to Marengo Lake, so another 3.5 years of data are needed to conduct a baseline assessment of water quality at this site. Results to date are summarized in Table 1 as an overall average and standard deviation (measure of how much results vary) for each parameter. If you would like more detail on how we summarize the data, please contact Matt at (715) 682-2661.

pH: A measurement of water acidity. A pH of 7.0 is neutral. pH affects what type of organisms can live in a stream. State of Wisconsin criteria indicate natural waters must maintain a pH between 6.0 and 9.0, with no change greater than 0.5 units outside the estimated natural seasonal maximum and minimum. So far, pH at this site has remained within the Wisconsin criteria, indicating good water quality.

Dissolved Oxygen: Dissolved oxygen (DO), which is critical for sustaining aquatic life, is a gas found in water. State of Wisconsin criteria indicates that DO content in most lakes may not be artificially lowered to less than 5.0 mg/L at any time. To date, DO at this site has remained above 6.0 mg/L, indicating good water quality.

Chloride and Turbidity: Chloride is a measure of salt in water. It occurs naturally but can also indicate human influences from things such as failing septic systems, road salt use, and agricultural runoff. Turbidity is a measure of sediment suspended in water, indicating areas where erosion may be a problem. Wisconsin's chronic toxicity criterion for chloride is 395 mg/L. There is currently no criterion

for turbidity. BRWA monitoring will establish baselines for both parameters from which future data can be compared.

Chloride results at this site have been high to date. It is not expected that chloride would be high at this site because of a lack of human influence upstream. The first thing to ensure is that the volunteer is correctly reading the endpoint of the chloride test. The most common error is to overshoot the endpoint, which would give artificially high results. The end point is the drop at which the solution is no longer yellow. Once it has turned an orange/brown color, no matter how pale, that is the endpoint and results should be read. If chloride results continue to be high at this site, a side-by-side test with BRWA staff should be done. Turbidity has been low, which is what we would expect at a remote site like this.

Nutrients: Phosphate and nitrate are nutrients critical for plant growth and occur naturally in water. Elevated nutrients may indicate pollution such as agricultural runoff, failing septic systems, and storm water runoff. Until criteria for Wisconsin’s Lake Superior region are developed, BRWA compares its data to U.S. Geological Survey (USGS) surface water benchmarks for phosphate (0.1 mg/L) and nitrate (1.0 mg/L). These benchmarks are not regulatory criteria, but they provide an indication of where nutrients may be a problem. By looking at the percent of sample events where the benchmarks are exceeded, BRWA can determine where testing with more sensitive methods may be needed.

Nutrients have not been detected to date, which is what we would expect at a remote site like this.

Table 1. *Water chemistry results for the Marengo River at the inflow to Marengo Lake.*

| Site | # samples | pH | Std. Dev. | Dissolved Oxygen (mg/L) | Std. Dev. | Turbidity (JTU) | Std. Dev. | Chloride (mg/L) | Std. Dev. | Phosphate % of samples >0.1 | Nitrate % of samples >1.0 |
|---------------------|-----------|-----|-----------|-------------------------|-----------|-----------------|-----------|-----------------|-----------|-----------------------------|---------------------------|
| Marengo Lake Inflow | 5 | 6.6 | 0.4 | 6.9 | 0.8 | 3.0 | 2.7 | 88.0 | 52.6 | 0% | 0% |

E. coli Data Summary and Conclusion

Escherichia coli (*E. coli*) are a type of fecal coliform bacteria found in the intestines of all warm-blooded animals, including humans. The presence of *E. coli* in water may indicate contamination from sewage or animal waste. During rain events or snow melts, *E. coli* may be washed into streams. BRWA compares its *E. coli* data to the United States Environmental Protection Agency (EPA) criterion of 235 CFU/100mL (colony forming units per 100 mL). Colony counts above this number may indicate water that is unsafe for drinking and swimming.

A total of seven triplicate samples were collected from Marengo Lake as part of a larger study to document the comparability of volunteer-collected *E. coli* data to laboratory data in 2006. One sample was collected in 2007 and two in 2010 from the same location.

The average of one of the triplicate samples from 2006 was above EPA’s criteria. All other samples have been well below EPA’s criteria. Wildlife populations can also be sources of *E. coli*, especially in remote areas like this, so it’s difficult to conclude much from one group of samples exceeding the criteria. However, occasional monitoring at this site should continue because the lake is used for recreation activities and the Marengo Lake Association may want to look into doing a more detailed *E. coli* monitoring program such is done at many public beaches in the State of Wisconsin if there is more interest in learning about bacteria in the lake.

Thanks to Henry Gradillas for collecting data at the Marengo Lake inflow and Jack Wichita for collecting *E. coli* data from Marengo Lake!