

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
 WATER RESOURCES DIVISION
 DECEMBER 2014

STAFF REPORT

ARSENIC SAMPLING IN AN UNNAMED TRIBUTARY TO PLATTE LAKE
 BENZIE COUNTY, MICHIGAN
 JUNE-SEPTEMBER 2014

SUMMARY

Staff of the Surface Water Assessment Section (SWAS) collected water samples monthly from June-September 2014 from an unnamed tributary to Platte Lake in Benzie County. Results indicated that the water from the west branch of the unnamed tributary did not meet the chronic water quality standard (WQS) of 10 parts per billion (ppb) for arsenic in September 2014 and was detected in all of the samples. In contrast, arsenic was never detected in water samples collected from the east branch of the unnamed tributary. Unnatural color, bacterial slimes, and odor still remain a problem for the west branch.

BACKGROUND AND RECENT WATER QUALITY STUDIES

In 2003, staff from the Cadillac District Office and SWAS conducted a chemical and biological survey of a small unnamed tributary to Platte Lake in response to a water quality complaint of strong odors and an unnatural orange color on the streambed. It was determined that the west branch of this groundwater-fed stream was impacted by contaminated groundwater venting from an illicit fruit waste disposal to a gravel pit located up-gradient of the stream (Walker, 2003).

Due to the results of the study, the unnamed tributary (Assessment Unit Identification number 040601040206-02 [west branch]), is currently on the 2014 Section 303(d) list (Goodwin et al., 2014) for not attaining the coldwater fishery designated use due to low dissolved oxygen (DO) and the Other Indigenous Aquatic Life and Wildlife designated use due to low DO, bacterial slimes, and organic enrichment.

In 2013, SWAS staff conducted in-stream DO, ammonia, and biological oxygen demand monitoring (Figure 1). Results indicated that the DO was not meeting the 7 milligrams per liter minimum WQS in the west branch of the unnamed tributary. Ammonia was detected in both water samples taken from the west branch and the level increased upstream towards the illicit disposal site (Carpenter, 2013).

A second 2013 study compared the biological and physical habitat conditions in the east branch (control reach) of the unnamed tributary (the reach that is not impaired) with those in the west branch (impaired reach). The study concluded that several metrics indicate a difference in the macroinvertebrate community between the impaired and control reaches of the unnamed tributary to Platte Lake. There is a significant difference in the amount of bacterial slimes (Lipseley, 2014).

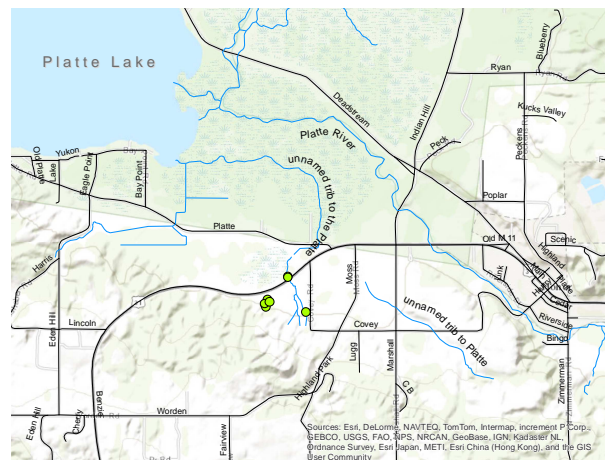


Figure 1. 2013 DO Sampling Locations.

In addition to the studies noted above, annual surface water chemical monitoring, conducted by the responsible parties of the illicit discharge, is required to comply with Section 6.4.c of the Consent Judgment in Case No. 08-8279-CE, executed on July 17, 2008. Arsenic was detected in all water samples collected from the west branch of the unnamed tributary upstream of US-31 from 2009-2013, and several samples exceeded the WQS of 10 ppb, the most recent exceedance occurring in 2013 (Station 1A; Fishbeck, Thompson, Carr, and Huber, Inc., 2013). As a result, additional water chemistry samples were collected by the DEQ in 2014.

FIELD METHODS, OBSERVATIONS, AND RESULTS

All water samples (including duplicates and blanks) were collected, preserved, and transported according to the procedures in the Quality Assurance Manual (Michigan Department of Natural Resources (MDNR), 1994). Chemical analysis was conducted at the Michigan Department of Environmental Quality (MDEQ), Environmental Laboratory, using United States Environmental Protection Agency-approved methods. Quality Assurance samples (field blank, and duplicates) were collected and analyzed as well. Latitude and longitude coordinates were determined using GPS technology and recorded for all monitoring sites.

Samples were collected at one site in the east branch (control reach) and at three sites in the impaired west branch (Table 1). In September, two additional samples were collected in the impaired reach upstream of the I-2 and I-4 sampling locations, respectively (Figure 2). As can be seen in Table 1, the water samples collected in September from Stations 3 and 4 were above the chronic WQS of 10 ppb for arsenic. It should be noted that the September sampling event occurred after a heavy rainfall.

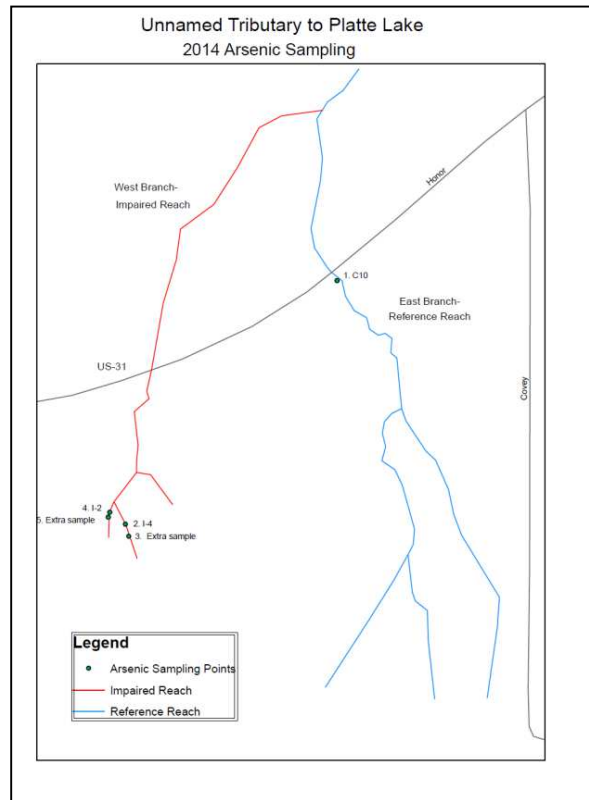


Figure 2. 2014 Arsenic Sampling Locations.

Table 1. 2014 Arsenic Sampling Results.

Station	Tributary and Location	Jun-14	Jul-14	Aug-14	Sep-14	Latitude	Longitude
1	C-10 East Branch	ND	ND	ND	ND	44.66496	-86.05152
2	I-4 West Branch	5.8	4.9	4.7	4.5	44.66265	-86.05435
3	West Branch (just upstream of Station 2)				63	44.66254	-86.05439
4	I-2 West Branch	9.3	6.9	3.0	15	44.66276	-86.05456
5	West Branch (just upstream of Station 4)				7.6	44.66275	-86.05462
	Duplicate East Branch	ND					
	Blank East Branch			ND			

CONCLUSION

The west branch of the unnamed tributary to Platte Lake is still not attaining Michigan's WQS for DO. Arsenic was detected in all samples collected in the west branch of the unnamed tributary and did not meet the chronic WQS in September 2014. Unnatural color, bacterial slimes, and odor still remain a problem for the impaired reach. These impairments are not occurring in the east branch of the unnamed tributary. These facts, along with the results found from the 2013 studies (Carpenter, 2013; Lipsey, 2014), lead us to conclude that the illicit fruit waste disposal, which occurred over a decade ago, is still causing WQS attainment issues in the west branch of the unnamed tributary. Furthermore, the west branch is unlikely to meet WQS for several years unless active remediation is undertaken to restore water quality.

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REFERENCES

- Carpenter, K. 2013. Unnamed Tributary to Platte Lake Dissolved Oxygen Study, August 2013. MDEQ Staff Report #MI/DEQ/WRD-13/033.
- Fishbeck, Thompson, Carr, and Huber, Inc. 2013. 2013 Groundwater and Surface Water Monitoring Report. Bonney Pit Disposal Area, Homestead Township, Benzie County, Michigan. Prepared for Graceland Fruit, Inc. November 26, 2013. Project No. G06510.
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