

A Rapid Bioassessment of Summit
Lake, NY and Heart Lake, Pa
Conducted by the Schoharie River
Center's Environmental Study Team

Conducted August 14th - 15th and October 16th
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Abstract

A rapid bioassessment was completed on two small lakes located in upstate New York and northeastern Pennsylvania by middle and high school age students from the SRC EST. Water chemistries and macroinvertebrates were collected at each lake. Results indicated that both lakes are impacted by human activity, with high levels of Nitrates and decreased dissolved oxygen levels.

Background

The Schoharie River Center's Environmental Study Team performed a rapid bioassessment of Summit Lake on August 14th and 15th with follow up chemistries completed on October 16th 2005.

Summit Lake is located in southwest Schoharie County (42°34'46''N, 74°35'01''W). Located in the town of Summit, it's on the divide between the Susquehanna and Mohawk River watersheds. The lake has an elevation of 2070ft above sea level with a shore length of 1.2 miles. The lake has a surface area of approximately 60 acres. There is reason to believe that the lake was formed by glaciation because it's in a mountainous region. The sources of this secluded lake are fresh water springs and small unknown creeks. Summit lake flows southeast eventually ending up in the Schoharie Creek.

This rapid bioassessment was completed as part of a two day skin diving class. We were also interested in the water quality of

the lake. Conducting water quality assessments of lakes pose different challenges than when assessing flowing streams. For example when collecting macro invertebrates in a stream, it is done by kick nets. However, in a lake, where the water is not moving quickly, they are collected with a Hester-Dendy Sampler or through dredging. A Hester-Dendy Sampler is a set of fourteen three inch square hard board plates that are stacked together with spacers in between them. A Hester-Dendy sampler is used by attaching a rope to the plates and placing them in the lake. Over time macroinvertebrates that live in the lake will populate the plates. Returning after at least a six week period of time the plates are pulled up and the macroinvertebrates are taken off of them to be identified and used for further study.

We also completed a study on another small lake. Heart Lake is located in northeastern Pennsylvania in Susquehanna county. We conducted water chemistries and macroinvertebrate collection. We completed this rapid bioassessment on Heart Lake as a point of comparison to Summit Lake. These lakes have similarities of shape, size, and origin (both were formed by glaciers). Both of these lakes are used for recreational purposes. They are primarily sites for summer cottages and second homes. Heart Lake is about 40 feet deep at its deepest point and contains a submerged island in the center.

Results

In the rapid bioassessment of Summit lake, chemical testing was completed and the Hester-Dendy Samplers were placed in the lake on August 14, 2005. The retesting and removal of the Hester-Dendy Samplers took place on October 16, 2005. It was found on August 14, that the pH level was 8.6 and the Dissolved Oxygen 6.8 mg/l but on the 16th of October the pH dropped to 7.1 and the Dissolved Oxygen measured 3.0 mg/l. The Orthophosphate remained at zero. While the conductivity rose from 308 to 337,

Nitrates were 0.0 on the 14th but 0.5 on the 16th. The water temperature on the 14th was 24.4°C and was 17°C on the 16th of October. There was a significant algae bloom noted in September. The visibility was observed to be six inches but in August the visibility was five to six feet. On the 14th of August the turbidity was 10Fau but on October 16th the turbidity was 44Fau.

The macroinvertebrates that were collected during this Rapid Bioassessment were lower than usual in comparison to our stream collections. There were only thirty-one macroinvertebrates collected and twenty-seven of them were of the Ephemeroptera order and families Heptageniidae (Flathead Mayfly) and Ephemerellidae (Spiny Crawler). We also found one Decapoda, family Astacidae (Crayfish). There was also one Amphipoda, family Crangonyctidae (Scud).

For the purpose of comparison a second rapid bioassessment was also done on October 16 on another lake in Pennsylvania. This lake is also very small and similar to Summit Lake, it was also formed due to glaciation. Heart Lake is located in northeastern Pennsylvania in the Bridgewater township, Susquehanna county. It has a forty three acre surface area. The rapid bioassessment consisted of water chemistries and macroinvertebrate collection through dredging.

The water chemistries on Heart Lake consisted of the testing of pH, Turbidity, Conductivity, Nitrogen, Ortho-Phosphate, and Dissolved Oxygen. The pH was 6.7. Turbidity was 41. the conductivity was 240. Ortho-Phosphate was 0 and Dissolved Oxygen was 2.3. The water temperature at the time of testing was 16° C.

The macroinvertebrates collected though dredging were as follows. We collected 8 macroinvertebrates in all. There was a total of two from the order Diptera family Chironomidae (Midge),

five from the order Amphipoda family Crangonyctidae (Scud), and one Oligochaeta (aquatic worm).

Summit Lake and Heart Lake Chemistries

	Summit 8/14/05	Summit 10/16/05	Heart 10/16/05
Water temperature	25C	17C	16C
PH	8.6	7.1	6.7
DO	6.8mg/L	3.0mg/L	2.3mg/L
Nitrate	0.0mg/L	0.5mg/L	1.5mg/L
Ortho-Phosphate	0.0	0.0	0.0
Conductivity	308	337	241
Turbidity	10Fau	44Fau	41Fau

Discussion

Through our tests we have found different results. This was our first attempt at studying a lake. In comparison to a stream study, it is very different. We didn't have any guidelines for the water quality of these lakes beyond general water quality indicators. By taking these readings we have developed a baseline for future reference. There was a reported algae bloom in a both lakes that might point to the dropping Dissolved Oxygen levels recorded in October and the Nitrate levels in Heart Lake were elevated. This also might explain the elevated Turbidity levels. There was a difference between the macroinvertebrates findings in Heart Lake and Summit lake. In Heart Lake we found mostly scuds and worms while in Summit Lake we found mostly mayflies. If we compare these findings to what you might find in a stream environment it would indicate bad water quality in Heart Lake and

a better water quality in Summit Lake. The fact that there was no Ortho-Phosphate suggests that the phosphate might have been used up during the algae bloom.

Conclusion/Suggestions

- There are key differences between the assessment of streams and lakes.
- There are no guidelines for lakes as there are for streams, therefore you must create a baseline for the assessment of the lake.
- Due to the lack of moving water in lakes, macroinvertebrate collection techniques differ. ie. In streams kick nets are used where as in lakes Hester-Dendy Samplers and dredging apply.
- Looking at our data you can conclude that Summit Lake is less impacted than Heart Lake.
- There were elevated nitrate levels at Heart Lake that might indicate human impact. At Heart Lake there are about one hundred lake front cottages.
- Summit has less than fifty lake front cottages and significantly lower nitrate levels.