Bagaduce Watershed Report

Molly Jennings

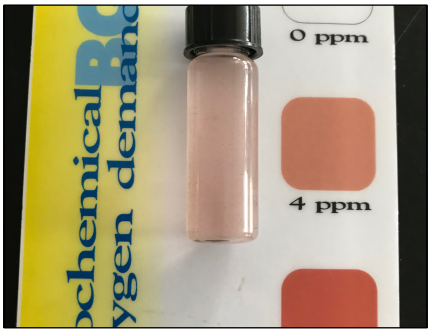
April 30, 2018~ May 9, 2018

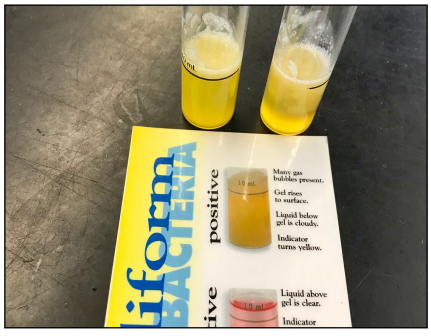
Introduction

During April and May of 2018, the 8th graders of BHCS tested the water quality of three different sites on the Bagaduce Watershed. On April 30, we tested the water of Snow Natural Area. On May 1, we went to Ferry Landing and on May 9, we did the testing at Sherm Perkins Memorial Park. At each of these sites, we did 8 different water tests: temperature; dissolved oxygen; coliform bacteria; biochemical oxygen demand; pH; turbidity; phosphate; and nitrate. All of the 8th graders split up into 7 groups and each group conducted different water tests. We did these different kinds of tests to determine the quality of the water in the Bagaduce Watershed.

The temperature of each sample helped us learn more about dissolved oxygen in the water. Colder water holds more oxygen. We did the dissolved oxygen test to find how much oxygen is in the water. Dissolved oxygen is important to the health of aquatic ecosystems. Waters that have high levels of dissolved oxygen are healthier and more stable environments, where many aquatic organisms can be supported. We also did a coliform bacteria test. This test helps us know if there is any fecal contamination in the water. We also did a biochemical oxygen demand test. This test helps us figure out the amount of dissolved oxygen needed by aerobic organisms to break down organic material.

We also tested the pH of the water at the three different sites to determine how acidic or basic the water is. We want to know the pH because if it changes slightly, the aquatic organisms may die. A turbidity test was performed to help us find the clarity of the water. We also tested how much phosphate is our samples. Phosphate is a nutrient that helps plants and animals grow, but high levels of phosphate can cause over growth of plants, leading to decreased levels of dissolved oxygen. Lastly, we tested the water for nitrate. Nitrate, just like phosphate is a needed nutrient for aquatic plants and animals. But if there is to much nitrate, it results in less oxygen in the water.





I expected that the water quality of the Bagaduce River would be ok. I thought that it would not be very bad, but not really good either. I thought this because the area we live in has a low population density. I also expected the water quality would be ok because we don't have any factories, which reduces the pollution. I expected that the temperature would be cold, that there would be high levels of dissolved oxygen, and there would be low levels of coliform bacteria. In all, I expected that there will be around 5ppm of biochemical oxygen demand, the pH will be neutral, the water will not be turbid, and that there would be little phosphate and nitrate present in the water.

Data Table

Tests	Snow Natural Area 4/30/18	Ferry Landing 5/1/18	Sherm Perkins Memorial Park 5/9/18
Temperature	57°F ~ 14°C	57°F ~ 14 °C	48°F ~ 9°C
Dissolved Oxygen	8 ppm ~ 78% Saturation	4 ppm ~ 39% Saturation	3 ppm ~ 35% Saturation
Coliform Bacteria (48 hours)	Positive	Positive	Positive
Biochemical Oxygen Demand (5 days)	2.5 ppm	4 ppm	8 ppm
pH	6.5 (slightly acidic)	7 (neutral)	7 (neutral)
Turbidity	10 JTU	20 JTU	20 JTU
Phosphate	4 ppm	1 ppm	1.5 ppm
Nitrate	5 ppm	5 ppm	5 ppm

Observations

Snow Natural Area 4/30/18-

At Snow Natural Area the water was somewhat clear and it had a brownish, greenish tint. It smelled like seaweed and had a sulfur smell. We did not see any fish, but there was a lot of algae, plants, and rock weed. There was also a lot of mud and we did not see any presence of wildlife.

Ferry Landing 5/1/18-

At Ferry Landing the water was fairly clear, but it was a little turbid. There was a lot of rock weed and kelp. It had a cleaner salty smell, it did not have a strong sulfur smell. We did not see fish, but we did see two eels.

Sherm Perkins Memorial Park 5/9/18-

At Sherm Perkins Memorial Park the water was clear and had a brownish, greenish tint. It had a smell like salt and mud. We saw a group of minnows, and an osprey. There was a lot of kelp, algae, seaweed, and plants. The beach was not rocky, but it had a lot of grass.

Green Crabs

Green crabs (*Carcinus maenas)* are an invasive species. They are native to Europe and Northern Africa. They were brought to North America by ships and discovered on the east coast of North America in early 1800s. Green crabs feed on different types of organisms, bivalve molluscs (clams, oysters), and small crustaceans. Green crabs have a shell that is dark brown to dark green and it has small yellow patches. A characteristic that separates green crabs from other crabs is

that green crabs have 5 spines on either side of their eye. Green crabs prefer sheltered areas and are found in a variety of habitats, including sand flats, rocky shores, and salt marshes. Green crabs are a problem because they can be a serious threat to marine ecosystems because they are voracious predators that feed on many intertidal animals, like mussels, oysters, clams, and small crabs. This is a problem because they can eat and outcompete native crab species for food. Green crabs also can destroy eelgrass, where many juvenile fish live, and they can destroy beds where bivalve shellfish live. For these reasons, green crabs are a threat to biodiversity. They often change an ecosystem's services and functions, they can eat native species, and can cause economic damage to human livelihoods. During our three trips that we took to the Bagaduce River, we saw green crabs only at Ferry Landing and Sherm Perkins Memorial Park, but we did not see any at Snow Natural Area. At Ferry Landing we saw a total of 53 green crabs and at Sherm Perkins Memorial Park we saw 6 green crabs.

Conclusion

During our different tests that we performed at Snow Natural Area, Ferry Landing, and Sherm Perkins Memorial Park, we discovered a lot of information about the Bagaduce River. We found that the water temperature is cool, although we did the temperature test in April and May of 2018. I think if we did the temperature test in the summer we might get different result and it might also change the results of the other seven tests. We discovered that one out of the three sites had a good level of dissolved oxygen but the other two were not so good. Sadly, we found that all three sites had some coliform bacteria. We are not sure where the source of the bacteria is coming from, but hopefully we will find it, because it can cause problems to aquatic animals and it can contaminate our drinking water. At Snow Natural Area and at Ferry Landing, we discovered that the biochemical oxygen demand was fair, but at Sherm Perkins Memorial Park we discovered that the BOD level of the water was fair, meaning it was somewhat polluted. The pH of all three sites were around neutral. Snow Natural Area was slightly acidic, but the other two were neutral. The turbidity of the Bagaduce River was somewhat clear, and we found that the phosphate levels of Ferry Landing and Sherm Perkins Memorial Park were good. But there was a lot of phosphate in the water at Snow Natural Area. All three sites had a fair level of nitrate present in the water. Overall, I think that the Bagaduce River is not as healthy as it could be. It's not excellent, but it is not the worst. The water quality of the Bagaduce River could improve. There were some things that I found that really surprised me. I wasn't really aware of how much coliform

bacteria was in the water. I think that it would be interesting and important to find the sources of this pollution. Another thing that surprised me is the number of crabs at each site. It was surprising that we found no green crabs at Snow Natural Area, but we found 53 green green crabs at Ferry Landing and then 6 green crabs at Sherm Perkins Memorial Park.

In sum, I was surprised by the data that we found. I expected that the water quality would be ok, but it turned out to be poor. Things we can do with the findings of our investigation could be to share the data with the community, family, and friends. I think by sharing our information it could inform them about how fragile the Bagaduce Watershed is and it could motivate them to try and keep the watershed healthy. We will send our data to scientists at the Gulf of Maine Research Institute for them to use to monitor the Bagaduce Watershed. Overall, this was a interesting and informative experience and it was fun to test the water quality of the three different sites. It helped us learn about the water quality of the Bagaduce River and our findings will help educate others about the health of our watershed.