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Quaker Run Watershed Analysis

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Mashpee High School, Mashpee, Massachusetts (2006). *Quaker Run Watershed Analysis*. In Watershed Access Lab Projects. Project 51.

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Quaker Run Watershed Analysis

**By: Kerrin McDonough, Larissa Macedo,
and Amber Rogers**

Educational Objectives

- 1. To learn about the ecological system and the way it works.
- 2. To better understand the processes that affect water quality and to learn how to make the water better for our use.

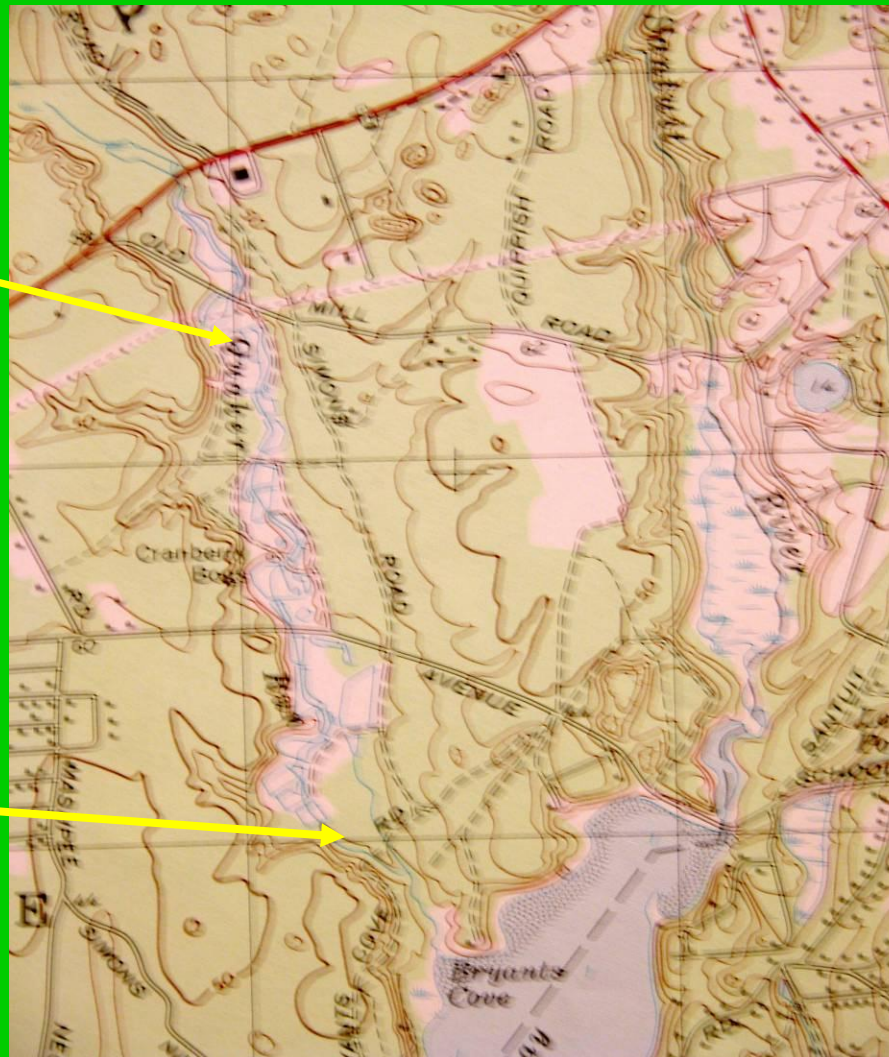
Environmental Objective

- 1. To get accurate information on our water quality in our town to help town officials better handle our water.
- 2. The information we collected would help us understand how to prevent potential threats, hazards, and stressors to and in our water.

Watershed Map; Quaker Run

Willowbend 1

Mouth



Quaker Run is a small coastal stream that begins as fresh water springs emerge in a valley. The surface water in Quaker Run is utilized very soon after it shows up to irrigate cranberry bogs and a 27 hole golf course called Willowbend. Our two sample sites bracket the bogs and golf course. Hence differences between the sites may very well be associated with those two land uses.

Willowbend 1 Upper Site

- Open canopy
- Sand to mud substrate
- Narrow and Shallow
- Banks were vegetated with shrubs and grasses
- It was located along a golf course

Mouth Lower Site

- *Well shaded River, overstory of trees, with overhanging branches
- *Wider and Deeper than upper site
- *Abundant Leaf Packs
- *Sand, gravel and mud substrate
- *Stable Banks held together by roots
- *Adjacent spring fed wetlands feed into the main-stream of the river

Stream Discharge Material

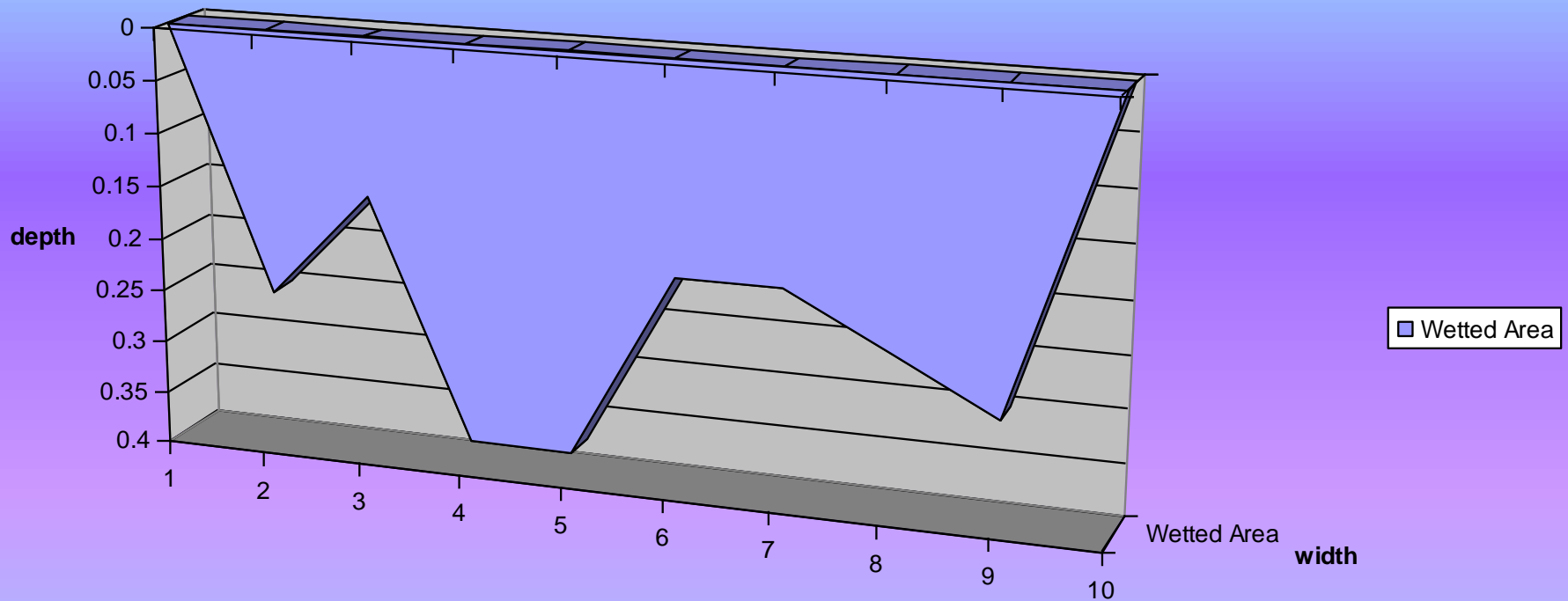


Flow Meter and Stadia Rod

Use of Stream Discharge Equipment

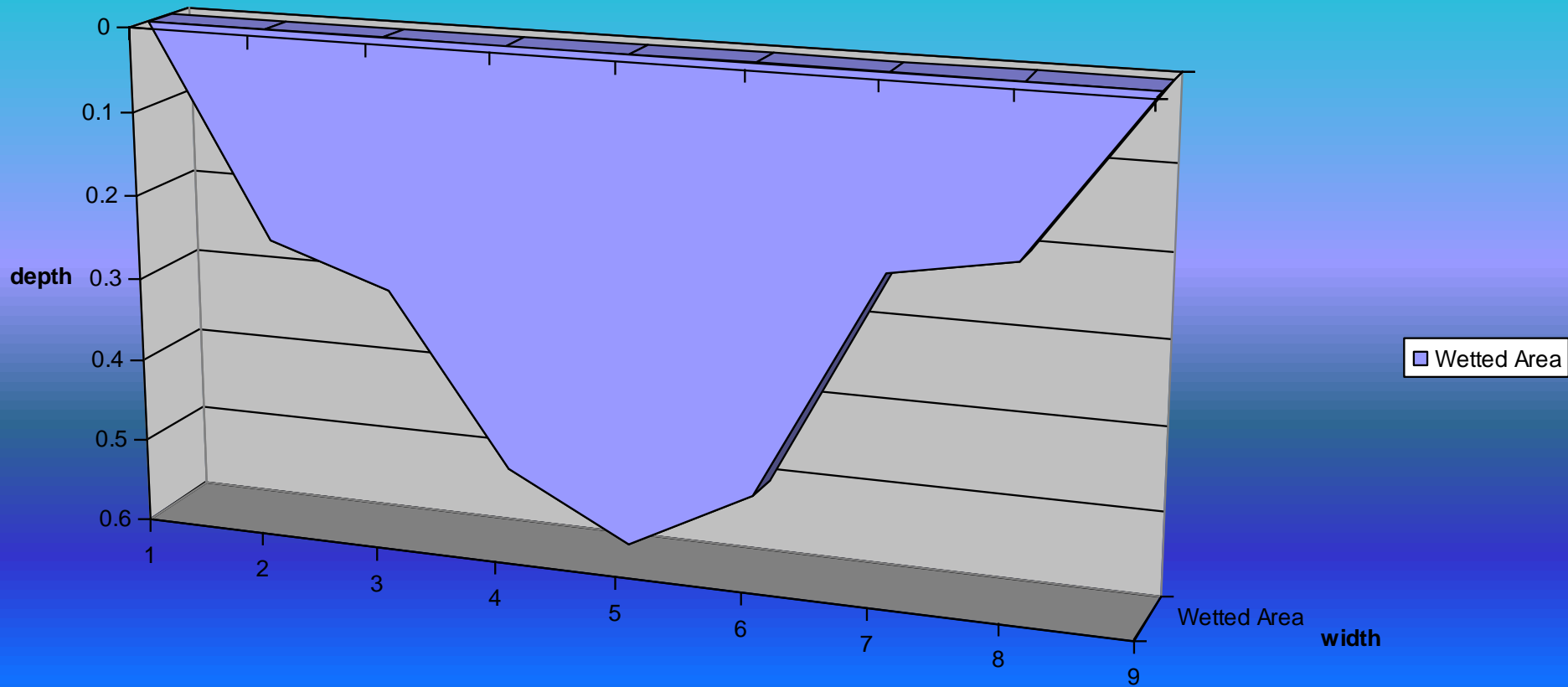
- We used a Flowmate 2000 flow meter to find the velocity or flow of the water
- A calibrated stadia rod and tape measure were used to find the wetted area at each site
- Those tools were borrowed from the Watershed Access Lab at Bridgewater State College – Thank you!

Profile at Willowbend

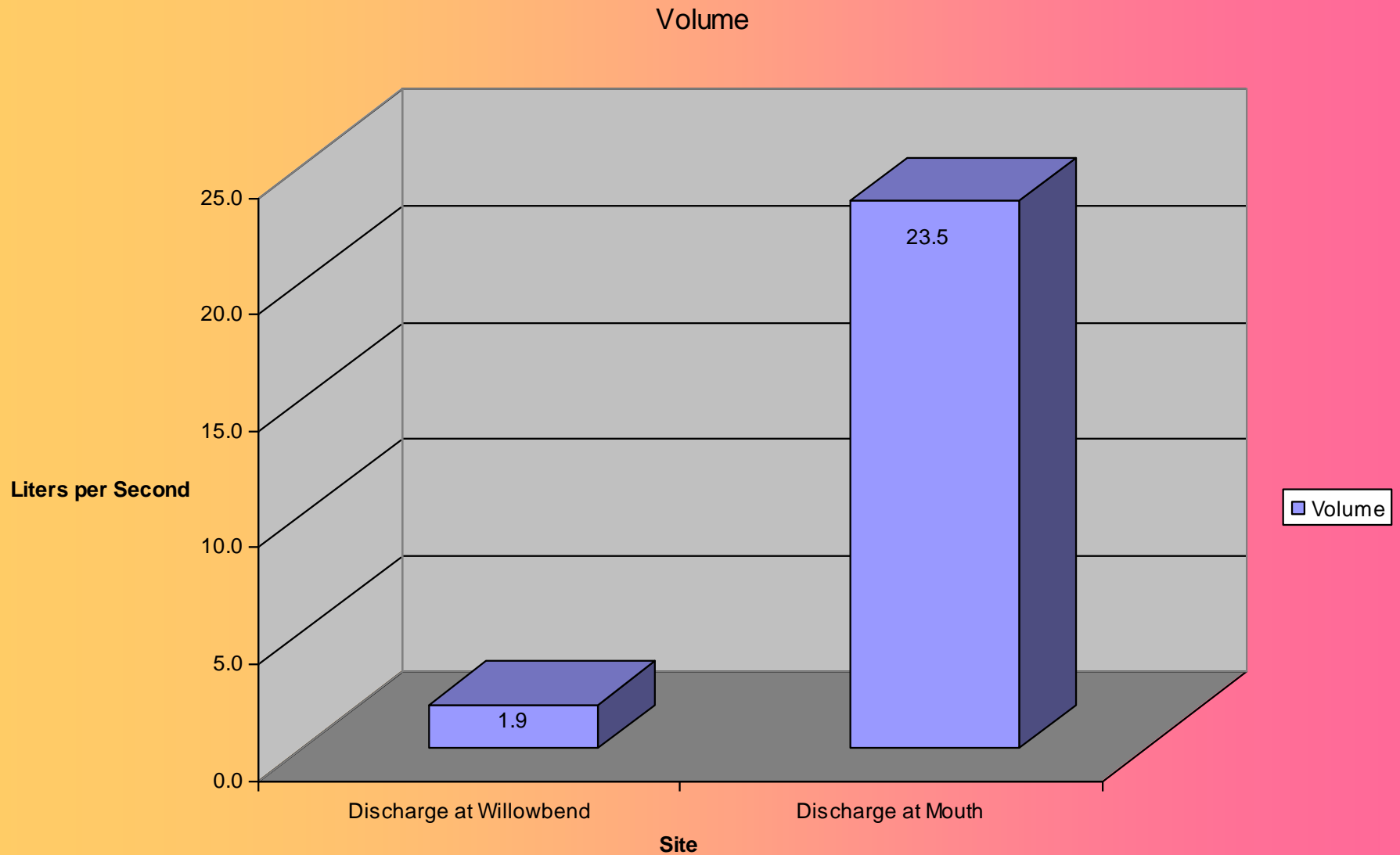


The average depth at this upstream site was 0.2 feet and its width was about 8 feet

Profile of Mouth



This downstream site had an average depth of 0.38 feet and a width of about 7 feet.



Because of the increased wetted area and water velocity, the downstream site carried over 12 times as much water as the upriver site.

Use of Water Chemistry Equipment

- We used the YSI Dissolved Oxygen Meter to see how much dissolved oxygen was in the water. This tool provided instant information about DO as well as temperature.
- We used the HACH 820 Colormeter to test the turbidity and nitrates. The process required us to follow specific directions to receive the information.
- We used the Lamotte pH Meter to test the pH in the water. This was similar to the YSI meter and made it easy for us to collect our data.

Water Chemistry Materials



YSI DISSOLVED
OXYGEN METER

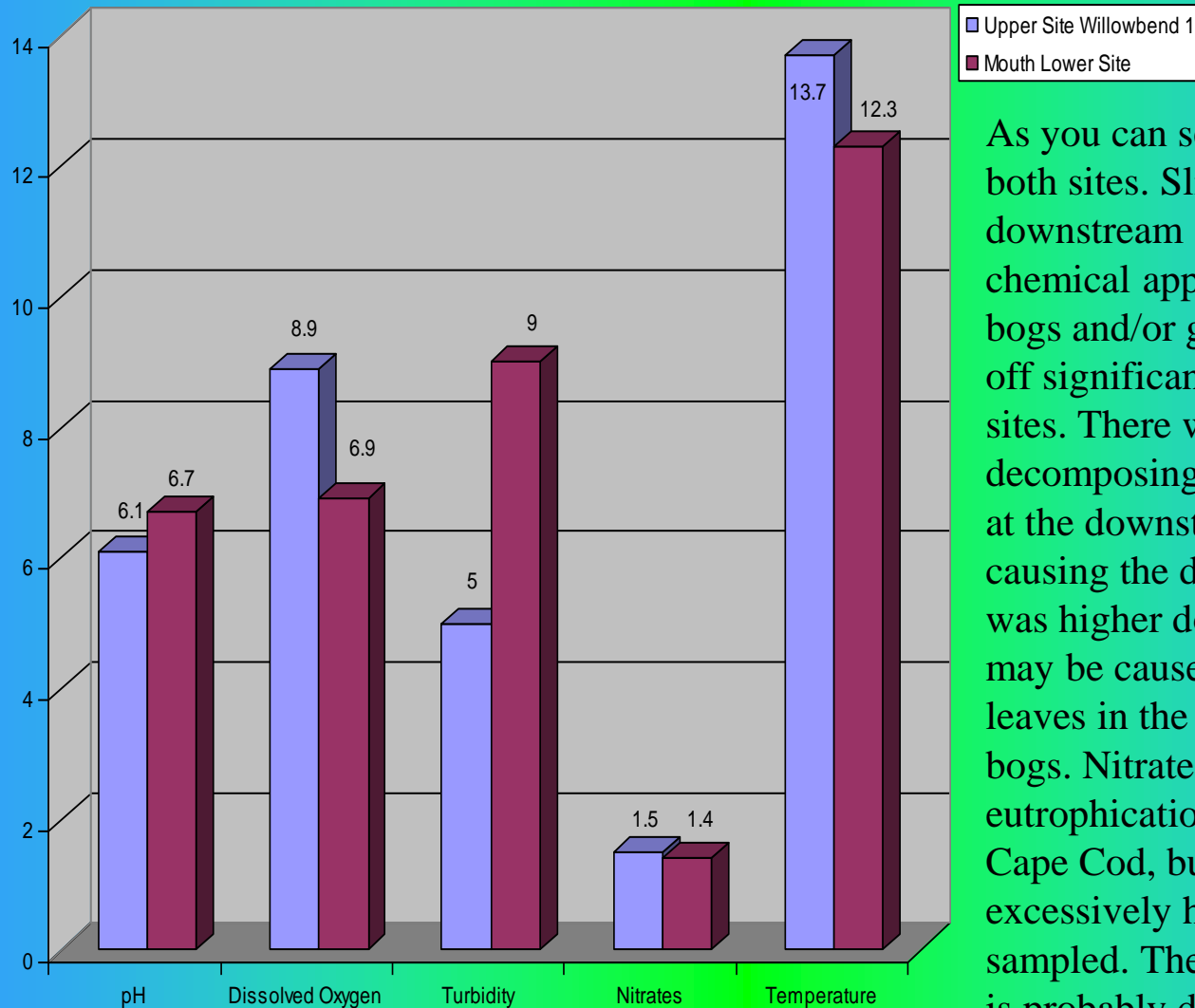


HACH 820
COLORIMETER



LAMOTTE pH METER

Some chemical and physical characteristics of Quaker Run



As you can see, the pH was similar at both sites. Slight increases in the downstream site may be due to chemical applications in the upstream bogs and/or golf course. DO drops off significantly between the two sites. There were a lot of decomposing plant packs in the water at the downstream site, that may be causing the decrease in DO. Turbidity was higher downstream. Again this may be caused by decomposition of leaves in the river and or upstream bogs. Nitrates stimulate eutrophication and are a problem on Cape Cod, but do not seem excessively high on the day we sampled. The temperature difference is probably due to sampling time and/or solar exposure; the upriver site was fully exposed to sunlight.

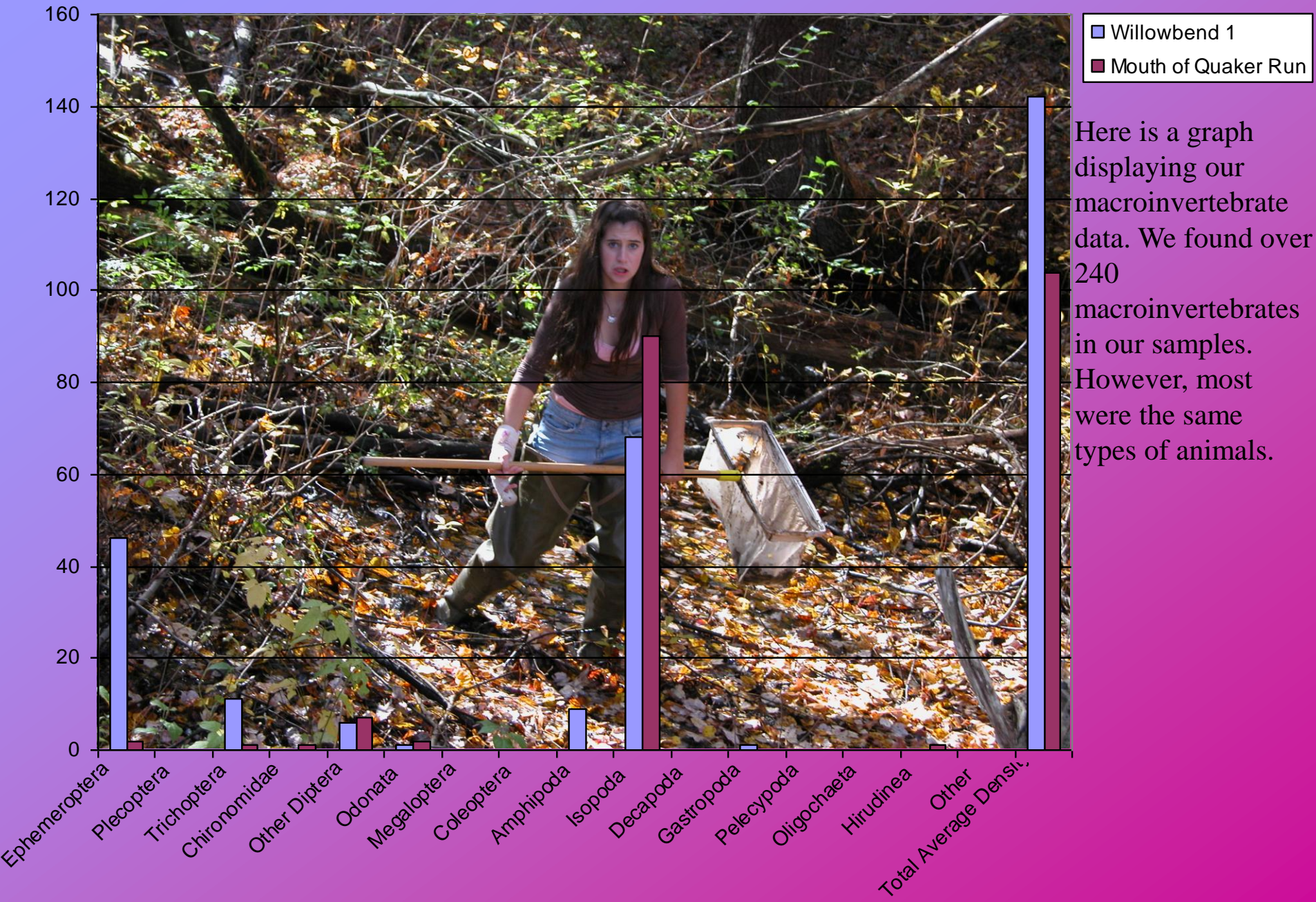
Macroinvertebrate Materials



- *Sorting bins
- *Magnifying Glass
- *Tweezers
- *Gloves
- *Boots
- *Buckets

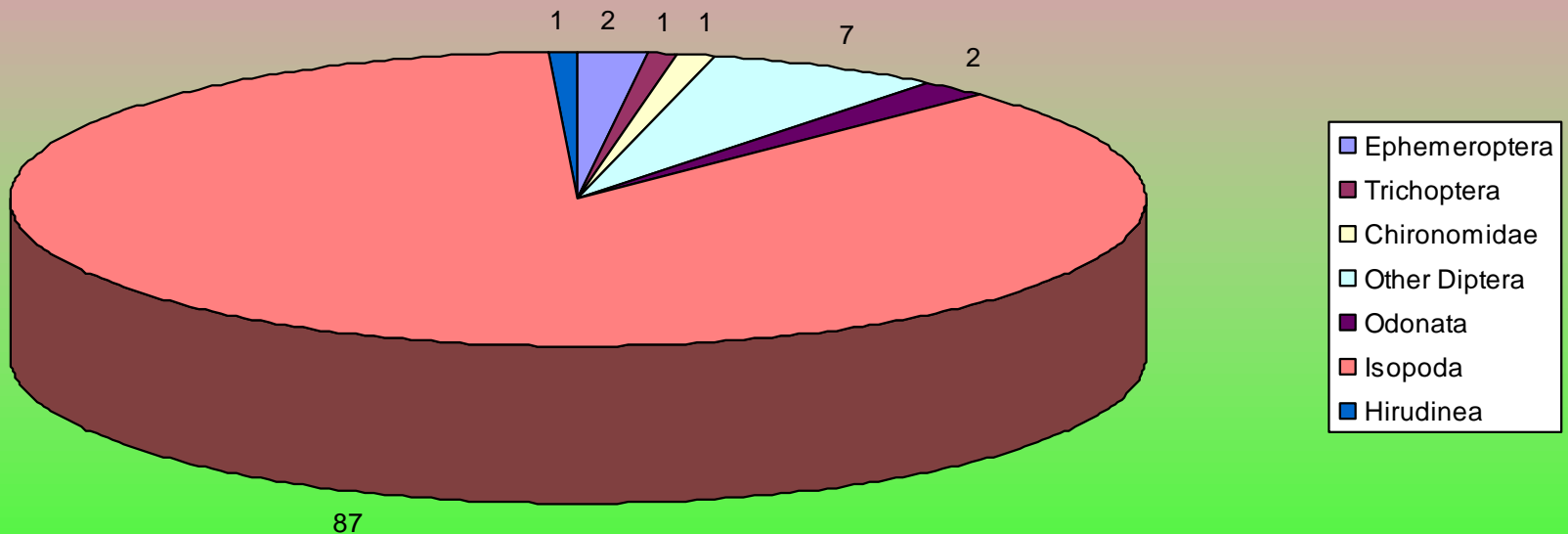
Use of Macroinvertebrate Equipment

- The net was used to catch bugs and other debris as a person upstream stirred the bottom habitat with their boots and hands.
- All captured material was then transferred to a bucket and sorting tray for thorough examination and streamside collection.
- We used tweezers to pick up the bugs from the tray and placed them in large collection bottles to bring back to the lab.
- Once in the lab, we used microscopes and identification keys to count and sort our macroinvertebrates. We identified everything that we found.



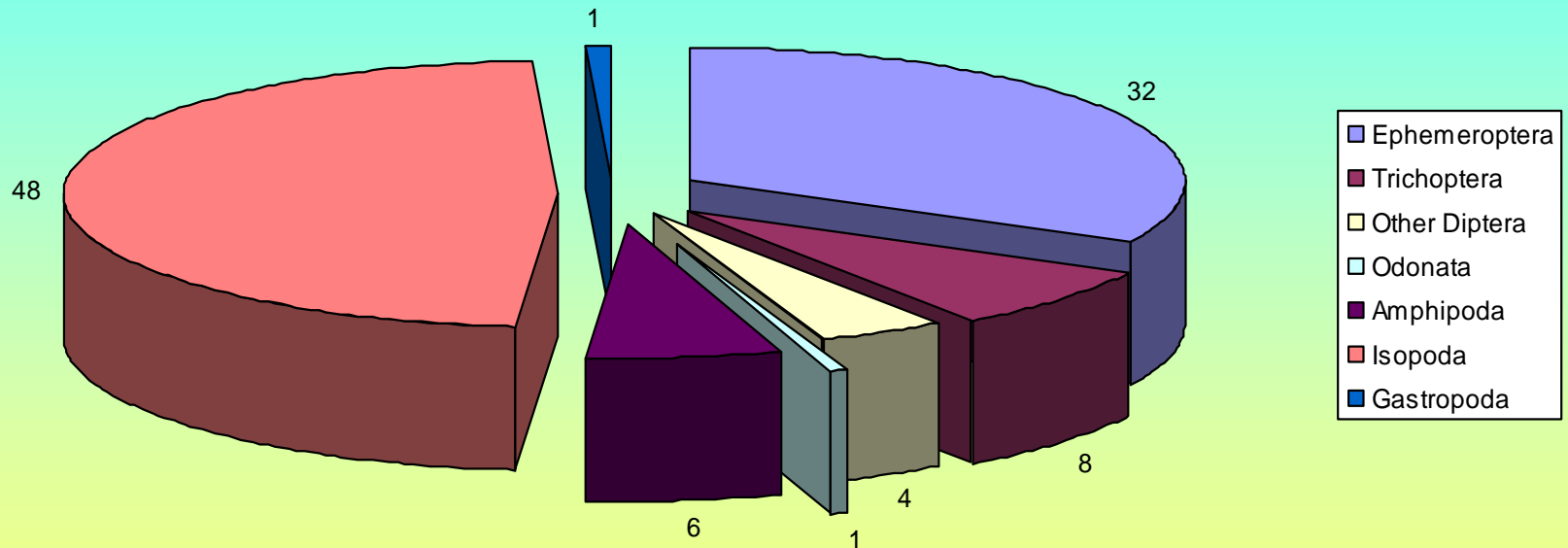
Here is a graph displaying our macroinvertebrate data. We found over 240 macroinvertebrates in our samples. However, most were the same types of animals.

% Major Group Composition at Lower Site



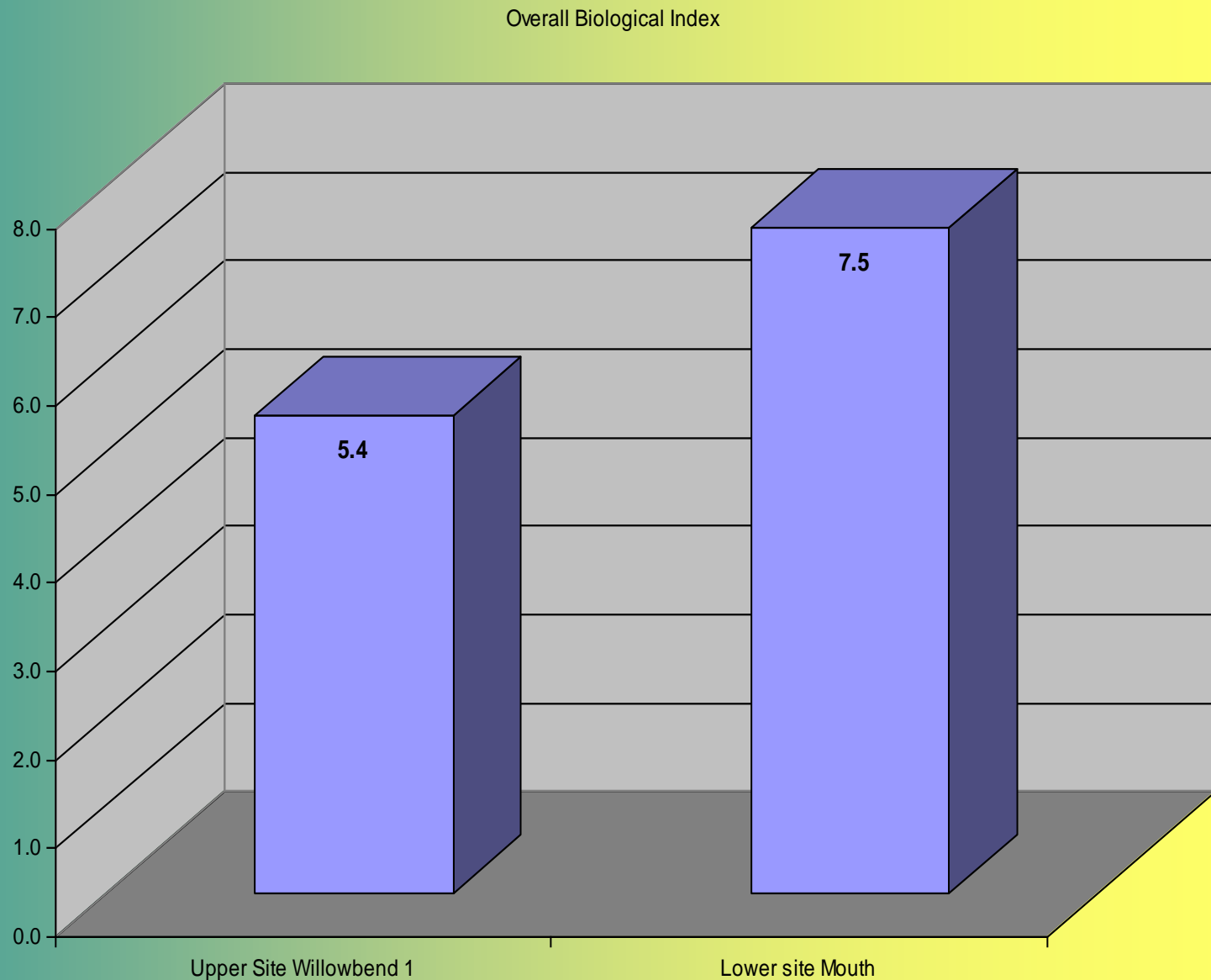
This site supported a high abundance of isopods which are pollution tolerant

Willowbend 1 % comp.



The upper site, Willowbend 1, appears to support a greater diversity of macroinvertebrates including a number of Ephemeroptera and Trichoptera both of which are relatively sensitive species.

The biotic indices suggest that the quality of the water in Quaker Run is substandard. Most of the organisms that we found are considered relatively tolerant of pollution. Because of that the indices were high.



Conclusions

- Upper site was completely exposed to sunlight. The lower site was not, so it likely had more in-stream productivity.
- Turbidity was higher in the lower site perhaps because of increased volume and siltation associated with cranberry bog and golf course management or roads.
- Nitrates were slightly higher at the upper site. This could be because they were being used by plants as the water flowed through open bogs between the two sites.
- Because of all these differences, and maybe due to management practices in the cranberry bogs and on the golf course, there was a negative change in macroinvertebrate populations.

Additional Questions

- I wonder what would happen if we compared it to other rivers/streams in different towns?
- What would happen if we used different materials?
- Would the results change if we sampled in summer?
- Would the results change if we sampled at night?
- Would we get different results if we sampled for longer?
- Was are equipment good?

THE END

The image features the words "THE END" in a large, bold, sans-serif font. The text is rendered in a 3D style, with each letter having a distinct color and a white outline. The colors follow a rainbow spectrum: 'T' is red, 'H' is orange, 'E' is yellow, 'T' is green, 'H' is blue, 'E' is purple, and 'D' is pink. The text is tilted at an angle, and a shadow is cast beneath it. The background is a vibrant, multi-colored gradient that transitions from blue on the left to yellow in the center, and then back to blue on the right.