

# **The 2nd Annual Stream Analysis of the Alplaus Kill**

**The Environmental Study Team  
Niskayuna High School  
November 26, 2007**

**Authors: Haley Sive and Katie Nottke**

## **Abstract:**

The Niskayuna High School Environmental Study Team returned to the Alplaus Kill for a second year to continue a long-term monitoring program. The goal of the long-term monitoring program is to detect any possible negative impacts to the stream due to residential or commercial encroachment on its drainage basin. Our monitoring program includes physical, chemical and biological measurements. The chemical test results were similar to last year's data, showing that the stream remains healthy and only slightly affected by human activities in the area. The physical test results differed from last year's; the water level, current velocity, and discharge decreased a great deal. The biological data also differed, as this year the team improved its collection techniques and retrieved a greater number of the smaller macro invertebrates.

## **Background:**

The Environmental Study Team of Niskayuna High School monitors the Alplaus Kill, a waterway located within the Niskayuna Central School District, to study the impact of the surrounding residential/commercial area on the stream's drainage basin. This is the second year of the study on the Alplaus Kill, after a previous study on the Lisha Kill in Niskayuna.

The study site on Alplaus Kill is located in the recently designated Glenville Natural Area, about 100 yards from Glenridge Road in Glenville, New York. The Alplaus Kill is a tributary of the Mohawk River and is a NYS DEC class B waterway, which enters the Mohawk River about one mile west of Rexford.

## **Results:**

### **Physical Parameters: (see Figure 1)**

When compared to last year's data, this year's physical results are similar. The Alplaus Kill has a healthy streambed with cobbles of 10–25 cm in size and a sandy bottom. The cobbles create an ideal habitat for macro-invertebrate species that live on the underside of rocks. The cobbles also create riffle areas that provide dissolved oxygen in the water.

While the average depth of 0.9 feet is the same as last year's study, the current velocity and discharge have greatly decreased this year. The velocity measured last year was 0.41 ft/sec while this year it was 0.18 ft/sec. The discharge also decreased from last year's 16.5 ft<sup>3</sup>/sec to this year's 6.1 ft<sup>3</sup>/sec. This decrease is due to decreased precipitation during the latter half of August and the month of September.

## **Chemical Parameters: (see Figure 2)**

- ***pH***

The pH test indicates the hydrogen ion concentration of the sample, and therefore, its acidity. As the acidity of a substance increases, it has a greater concentration of hydrogen ions. Our test for pH showed a pH of 7.9 (on average). This is slightly acidic, but within the accepted range of values for the pH of this body of water.

- ***Alkalinity***

Alkalinity measures the water's ability to deal with fluctuations in pH. A high alkalinity means the water is very capable of neutralizing acid rainfall, or acidic or basic substances deposited by humans in the river. A low alkalinity means it is more susceptible to human or natural impacts on pH. Alkalinity is usually measured in parts per million of bicarbonate or carbonate anions; these are the chemicals that neutralize acids and bases.

The measured amount of alkalinity of the Alplaus Kill this September was >200 ppm, this is within the accepted range of values.

- ***Phosphates***

Phosphates in a stream can come from any number of places, normally from phosphate rock, in other instances it comes from fertilizers, detergents, or human sewage. An excess of phosphates results in oxygen depletion because phosphates promote growth of algae which use oxygen. The phosphate level in the Alplaus Kill is 0 ppm. This is a healthy value for our stream and within the accepted range.

- ***Nitrates***

Nitrates are a form of combined nitrogen and oxygen. Nitrates come from farm waste, like manure, and other fertilizer deposits. An excess of nitrates in the stream would have the same effects as excess phosphates because both of these chemicals promote plant growth in a water body, they would both lead to decreases in oxygen levels for other life in the water. Our nitrate levels both measured zero, a healthy level for the stream.

- ***Dissolved Oxygen***

Dissolved oxygen is essential for aquatic organisms. Oxygen sustains the life of the macro-invertebrates in our stream. Dissolved oxygen is affected by phosphate and nitrate levels, due to their ability to sustain algae, also, human waste and temperature. The measured dissolved oxygen levels were 7.4 and 7.2, both accepted values for a healthy stream.

### **Biological Parameters: (see Figure 3)**

This year in our collections at the stream we improved our accuracy in picking up small bugs, like mayflies. This improved our data slightly, giving us a higher (better) score for both taxa richness and EPT richness. Our biotic index remained very good, with an average value of 3.4, illustrating that the quantity of different species in the stream is “not impacted.” The only value in our biological data that has the rating, “moderately impacted,” is the Percent Model Affinity and that has improved since last year, due to our improved collecting abilities. There was a strong presence of ephemeroptera and plecoptera in our stream. Compared to the NYS DEC Model Community there was a difference of +8.5% and +29.4% for the mayfly and stonefly macro-invertebrates that are generally the most sensitive to changes in environment. Their strong presence in our stream indicates that the stream does not experience rapid fluctuations in environment or pollution levels and that it is an overall healthy place for aquatic organisms.

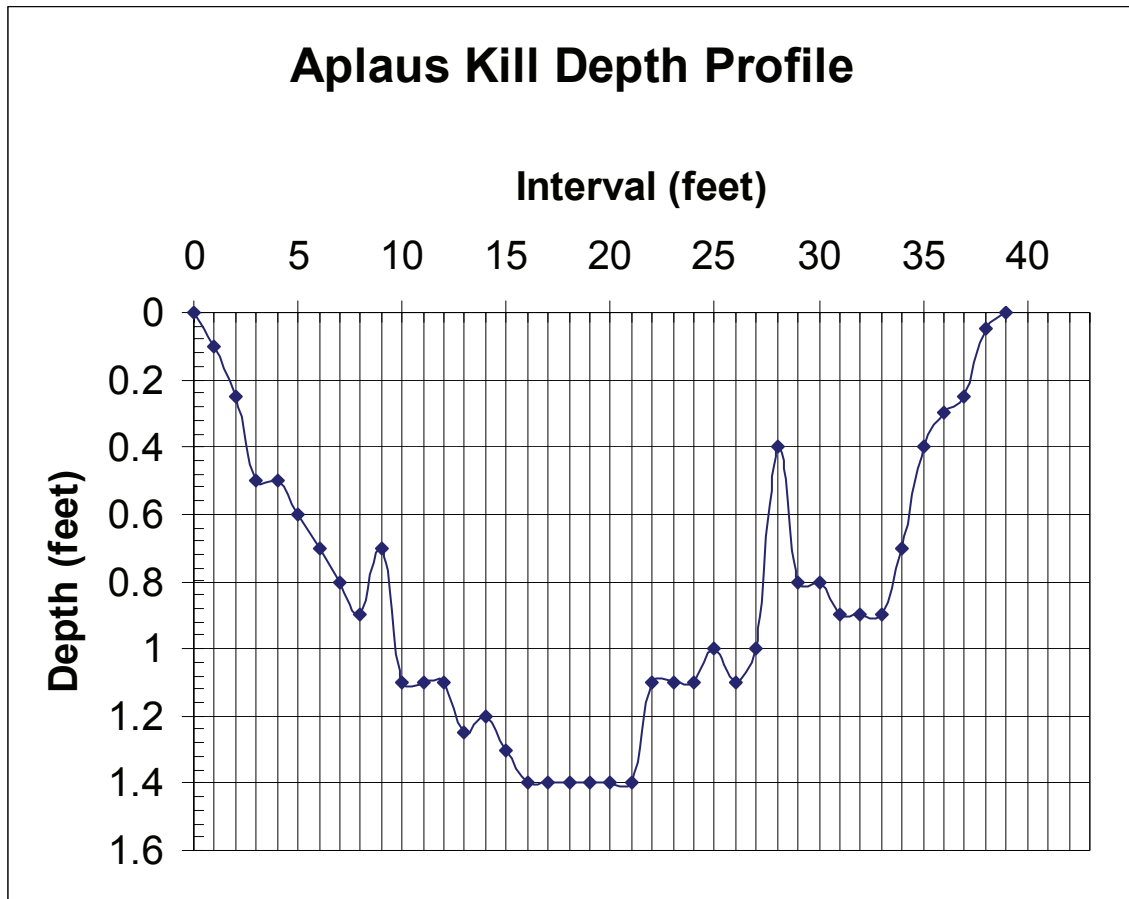
### **Discussion:**

Based on all of the data (physical, chemical and biological), the Alplaus Kill is “slightly impacted” by the humans that live around it. The biological data saw some improvement from last year, which we believe is due to improvements in our collection from the D-nets. The chemical results for phosphates and nitrates decreased, for the better. Through the chemical data, we discovered a decreasing impact of humans on the stream in the way of nitrates and phosphates, this could be partly due to the new small nature preserve around the Alplaus Kill area that we test, or simply because last year’s data was taken directly after heavy rainfall.

### **Conclusion:**

Alplaus Kill remains a moderately healthy stream that is only slightly impacted by human activities in the surrounding area. The Environmental Study Team will continue to monitor the stream to build a database of measurements and compare the results with previous years’ data to detect any possible negative impacts on the waterway.

**Figure 1: Depth Profile**







**Figure 2: Chemical Data**

	<b>2006</b>		<b>2007</b>	
<b>Temperature (°F)</b>	60.5	60.0	53.9	53.5
<b>pH</b>	7.75	7.85	8.0	7.8
<b>Dissolved Oxygen (ppm)</b>	7.9	8.1	7.4	7.0
<b>Alkalinity (ppm)</b>	220	160		
<b>Nitrates (ppm)</b>	1.0	0.8	0	0
<b>Phosphates (ppm)</b>	0.5	0.5	0	0

**Figure 3: Biological Data**

	2006		2007	
<b>Biotic Index</b>	3.7	3.4	3.6	3.2
<b>Taxa Richness</b>	11	13	16	11
<b>EPT Richness</b>	5	5	6	6
<b>Percent Model Affinity</b>	48.7	42.8	46	60.5

	Non-impacted
	Slightly impacted
	Moderately impacted
	Severely impacted