

# 2008 Water Sampling: Analysis of Conductivity

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## Introduction

The group members involved in this year's honors project were assigned various ponds to sample. The sampling consisted of testing various ponds on Calvin's campus for dissolved oxygen, pH, temperature, conductivity, and the presence of dissolved solids (fluoride, nitrate, chloride, phosphate, and sulphate). The sites sampled by this group were sites 2, 3, and 7. These three ponds are located near each other, so it can be intriguing to compare and contrast their data to see how the water varies among them.

## 2008 Data for Sites 2, 3, and 7

Site ID	Avg pH	Avg DO (mg/L)	Avg. Temp (°C)	Avg Cond. (micro-Siemens)	Ion Chromatography - Avg Ion Concentrations			
					F (mg/L)	Cl (mg/L)	N (mg/L)	S (mg/L)
2	8.26	9.80	14.57	400.00	0.32	37.68	0.46	0.00
3	8.04	6.04	14.03	1110.00	0.54	142.06	7.85	0.00
7	8.36	10.17	12.79	434.29	0.35	44.31	0.50	9.79

Figure 1.

## Individual Ponds in 2008

### Site Two: President Pond Outlet

Site two is an outlet for Ravenswood pond (Site Seven) on the northeastern part of campus. The pH and dissolved oxygen slightly dropped with the colder temperatures and the conductivity rose slightly. Branches overhanging the pond gradually lost their leaves over the course of sampling. See Figure 1.

### Site Three: Inlet from EGR

This is the inlet from east Grand Rapids. It is a small pool fed by a small stream of consistently trickling water. Accessing this sample was a bit of a challenge because the only way down to it is to climb off a small bridge that spans the pool. Our data showed no significant change with regards to pH and conductivity; however, there was a sharp drop in dissolved oxygen as the temperature dropped. See Figure 1.

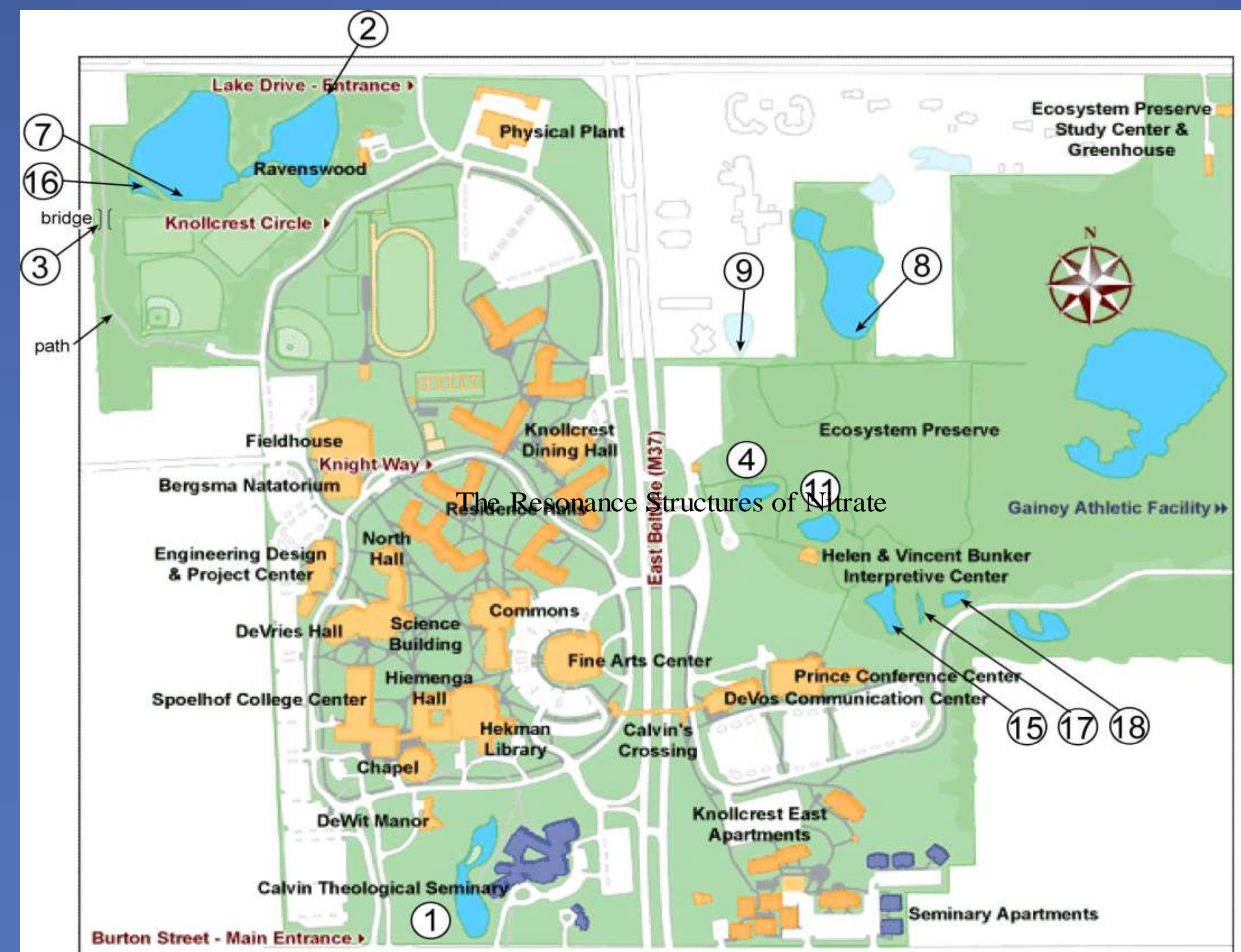
### Site Seven: Ravenswood Pond

The Ravenswood Pond is a large pond located on northeast campus. The data on this pond showed no conclusive trends during this autumn season. Dissolved oxygen, pH, and conductivity fluctuated slightly, without relation to the progress through the semester. The branches overhanging the pond did not change, other than losing their foliage. See Figure 1.

## Comparison to Drinking Water Standards

According to the Environmental Protection Agency, the secondary standard (recommended to avoid health problems) for total dissolved solids is 500 mg/L, which is equal to 500 ppm. Figure 3 can provide some quick comparisons. Looking at data from this year, sites 2, 4, 7, 8, and 15 are all safe to drink. Site 3 exceeds this value, and would not be recommended by the EPA to drink.

## Map of the Ponds at Calvin College



## Service Learning

Service learning is an important part of student life. Everyone participates in service learning during orientation, and this project was one way to participate again. This project contributes to the Calvin Environmental Assessment Program, which "encourages an ethic of service and caretaking," according to the Calvin website. Through this project, students gain knowledge of the creation of which they are called to be stewards. It also serves to highlight Calvin's connection with the local community. For this project in particular, this is demonstrated in the quality of water that enters and leaves the campus, and how Calvin and its surrounding communities affect it.

## Conductivity for All Sites in 2008

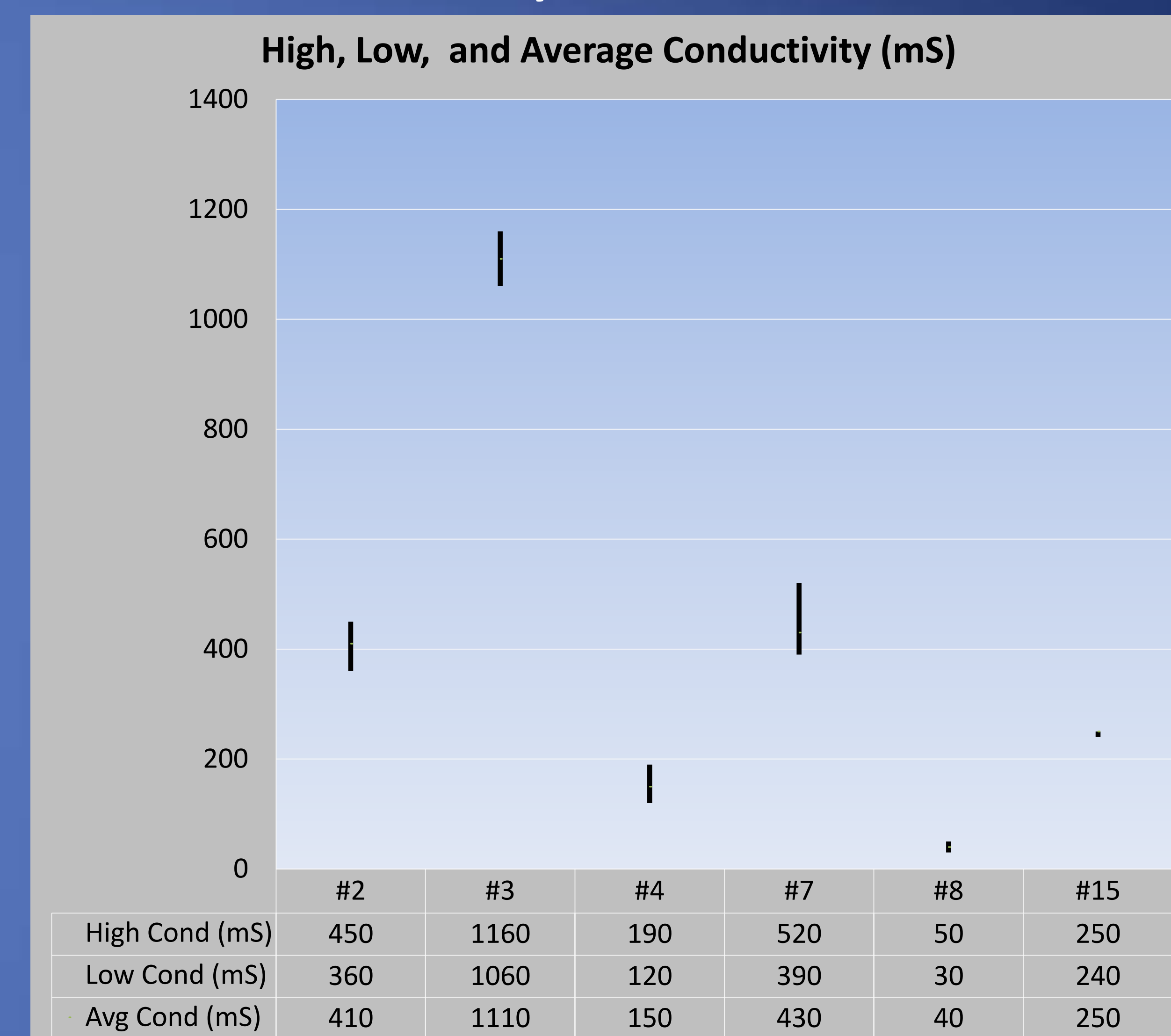


Figure 2.

## Conductivity from 1997 to 2008

Over the years, there has been a good deal of fluctuation in the data for total dissolved solids (TDS). The students wanted to avoid gaps in the graph, so the sites represented in Figure 3 were chosen because they had data for nearly every year of testing. This allows better observation of the data over the years. Site 3 has had large dips and peaks. Overall, the trend has been downward since 1997. Sites 4 and 8 and in the same zone, which means that they are located near each other and therefore display similar data. They both have peaks and falls at the same time. Their overall trends have been the same, and they have stayed relatively constant since 1997. In previous years, conductivity samples were not taken, but total dissolved data were taken. The conversion from conductivity in microSiemens is  $2 \mu S = 1 \text{ ppm}$  of total dissolved solids. Data from this year was converted to TDS. See Figure 3.

## Total Dissolved Solids from 1997 to 2008

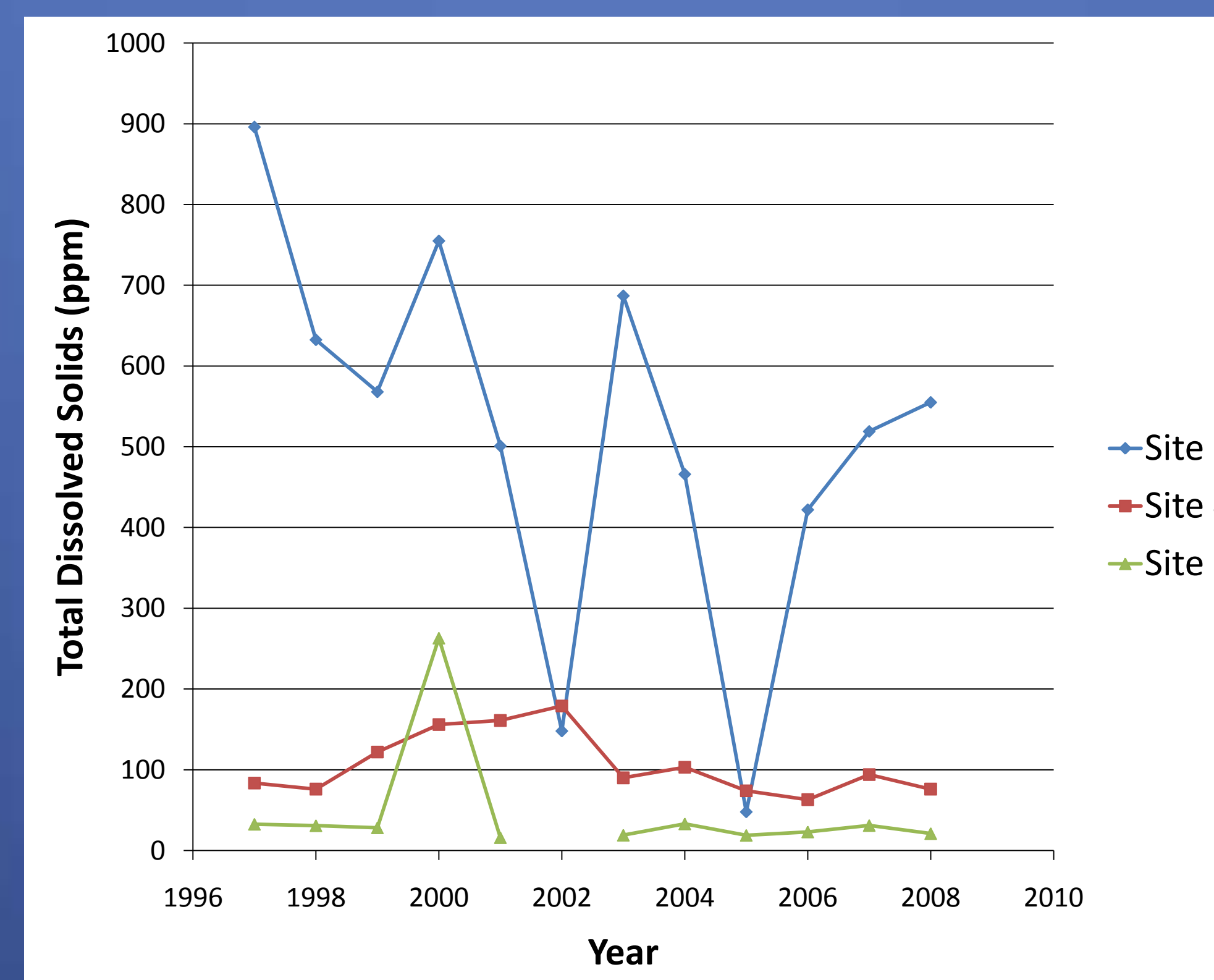


Figure 3.

## All Sites in 2008

This year Site 3 has the highest average conductivity level at 1110mS. Site 8 has the lowest average conductivity level at 40mS. Sites 2, 4, 7, and 15 have average conductivities of 410, 150, 430, 250mS respectively. Overall, the average conductivity of the 6 sites sampled in 2008 is 440mS. See Figure 2.

## References

<http://www.epa.gov/safewater/contaminants/index.html#listmcl>

<http://www.calvin.edu/admin/provost/ceap/nants/index.html#listmcl>



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