

Conductivity in Sausal Creek

Conductivity measures how well water passes an electrical charge, which gives us information on the presence of charged particles (ions) in the water. Conductivity is related to salinity, which measures only the dissolved salt content of water and doesn't include things like phosphates and nitrates.

Conductivity in streams is primarily affected by the underlying geology of stream beds. Clay soil tends to increase conductivity because it contributes materials that ionize in the presence of water, while granite remains inert. Conductivity can also be altered by industrial pollution or urban runoff. A sewage leak or fertilizer runoff contains ions such as phosphate and nitrate that increase conductivity, while an oil spill decreases conductivity.

Most aquatic organisms have a relatively narrow range of conductivity in which they can live. The Environmental Protection Agency (EPA) states that a conductivity range between 150 and 500 micro-Siemens (μS) is most healthy for "streams supporting good mixed fisheries." Conductivity measurements in Sausal Creek tend to be between 200 and 1,000 μS ; part of that range is a little higher than is healthy for fish.

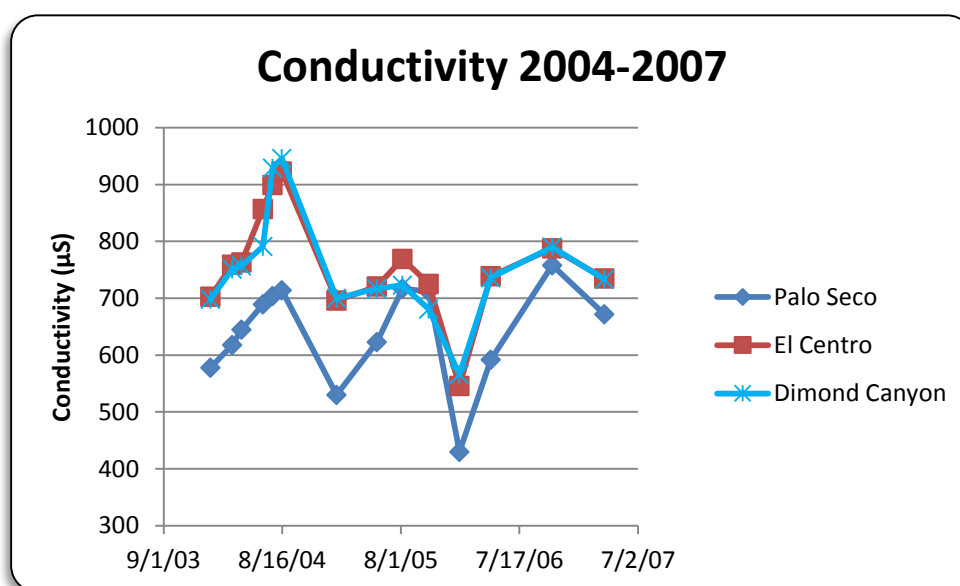


Figure 1. Conductivity measured at three sites from 2004-2007

In the graph above, conductivity stays between 400-1,000 μS . We can also see a couple of patterns. First, upstream sites (like Palo Seco) generally have lower conductivity than downstream sites (like El Centro/Dimond Park). This is likely a result of increased pollution at downstream sites. Second, we see a seasonal cycle, with higher conductivity in the summer and lower in the winter. There are likely two factors behind this pattern: rainfall and temperature.

Generally rain dilutes creeks and increases creek volume, which tend to decrease conductivity during the rainy season (for us, winter). This matches what we see in the above graph. There is also another effect of rainfall, one that is generally not seen unless data is collected shortly after the first rain of the year, called the "first flush." The first flush tends to carry a large amount of pollutants into the creeks because these pollutants have been building up on our streets and other impervious surfaces throughout the dry season. This first rain will generally increase conductivity in the creek, but this increase is not usually detected with monthly monitoring.

Conductivity is also influenced by temperature, as seen in the graph below. Conductivity generally increases with increasing water temperature. Warm water passes an electrical charge better than cold water, so warmer water has higher conductivity. This is another reason behind the seasonal pattern we see in conductivity levels.

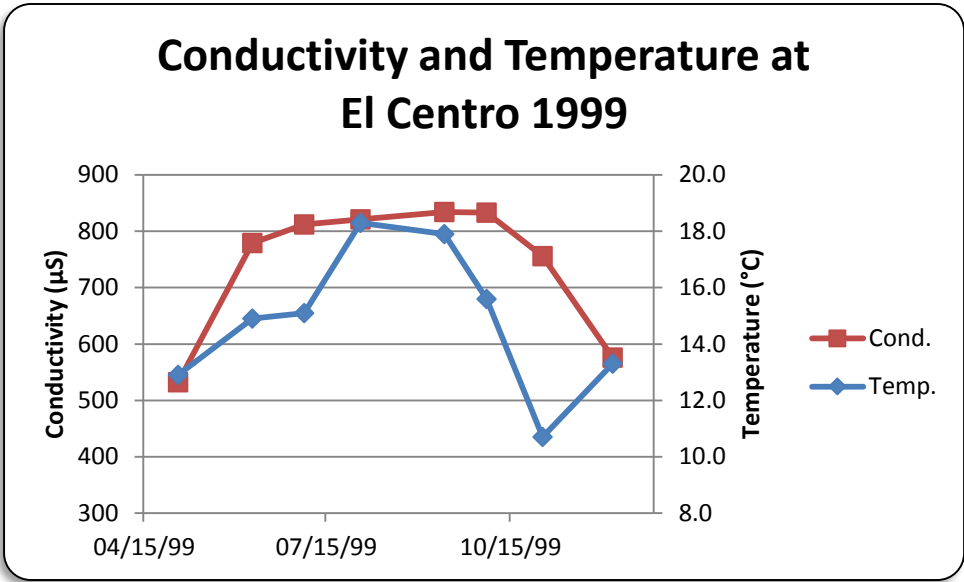


Figure 2. Conductivity and temperature at El Centro in 1999

For more information on conductivity in creek water, please see this publication from the Clean Water Team:

http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/cwt/guidance/3130en.pdf

--Helen Dickson