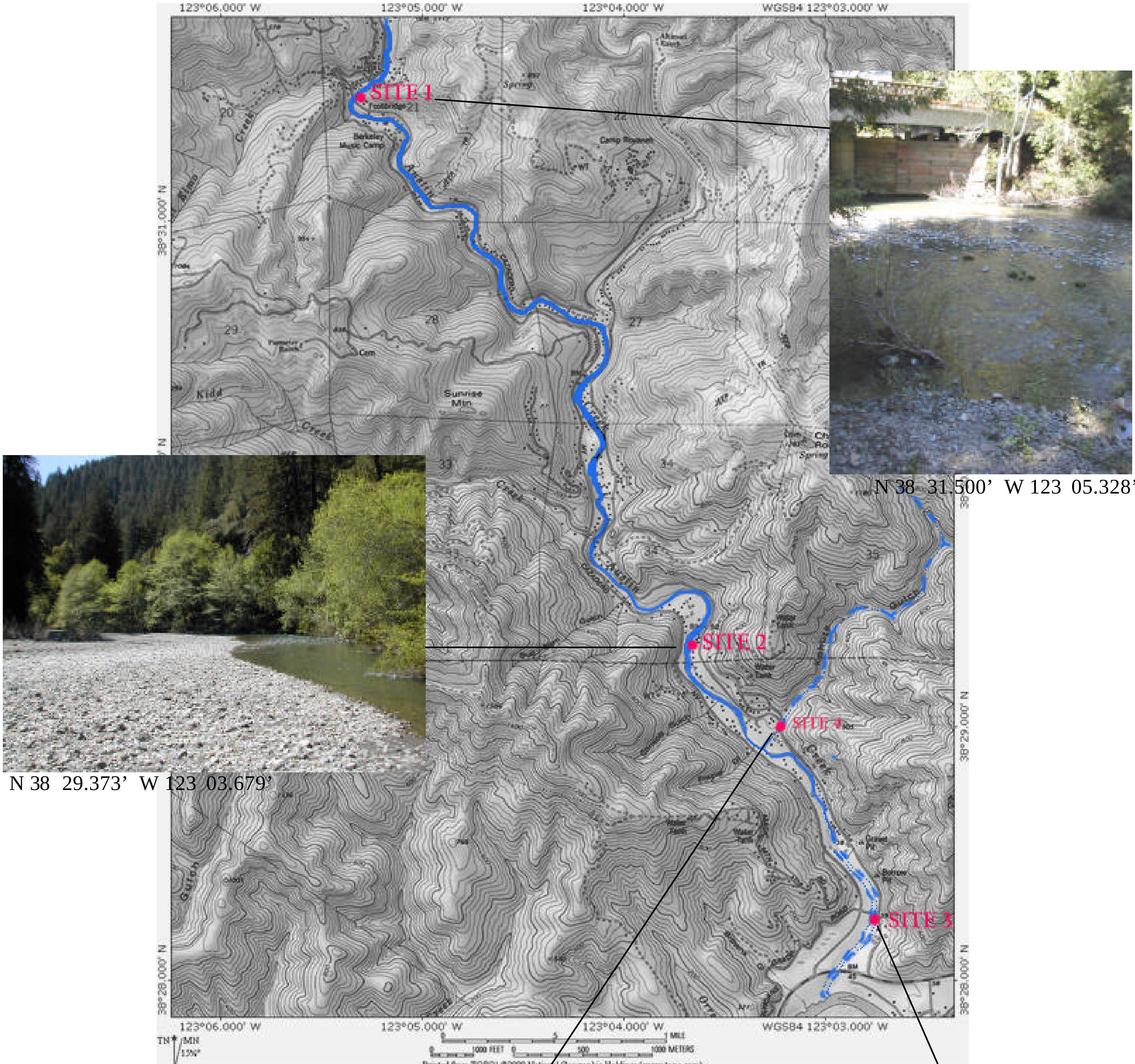
# Austin Creek

2002 Community Clean Water Institute Water Quality Results




N 38 31.500' W 123 05.328'

N 38 29.373' W 123 03.679'

N 38 28.272' W 123 02.793

N 38 29.024' W 123 03.213'

**SITE DESCRIPTIONS:** Austin Creek is a large tributary to the Lower Russian River in Sonoma County. Land uses are rural housing, timber harvest, and gravel mining 1,000 feet from the mouth. This stream is experiencing an overload of gravel deposition, and does support salmonids. During the summer, the mouth spits over, and parts of the stream are intermittent.


Citizen Monitor Dennis Beall at Site 2, 10/18

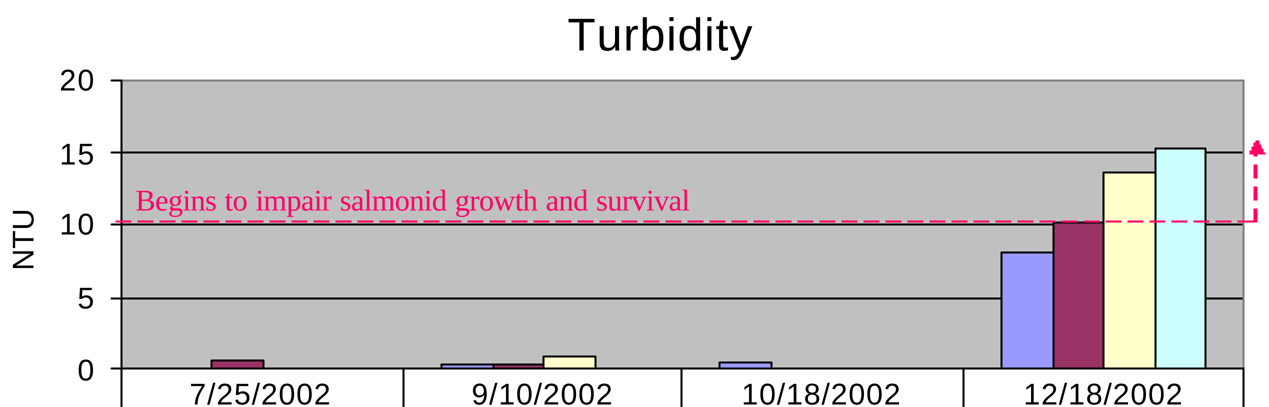
**UPSTREAM TO DOWNSTREAM:**

**Site 1:** East side of bank approximately 50 yards from the 4th bridge off Cazadero Highway, near bakery. Access from a minor road along creek off the Highway. During the summer, it was a large pool with many small fish under the bridge on the west side. Winter flows found it a wide, shallow riffle run with numerous pockets and gravel bars.

**Site 2:** Here the channel is much narrower, although the gravel bed extends much farther to the east of the wetted width. Access is through an adjacent property. The stream meanders here and is cutting into the west bank. The vegetation overhangs much of the channel, and the habitat appears to be shallow, fast riffle run.

**Site 3:** Downstream of Green Bridge, the first bridge accessible from Old Cazadero Hwy. The west side of stream can be reached by a gravel trail in drier times, wetter weather requires sampling from bridge. During summer, this site becomes isolated stagnant pools all the way to the mouth. The channel is more narrow, and the water deeper during high flows than the other sites. This site is skimmed for gravel throughout the summer.

**Site 4:** Kahute Gulch, 30 yards upstream of Old Cazadero Hwy. culvert. Small tributary to Austin Creek, Kahute recently underwent a timber harvest, so turbidity and temperature are of particular interest.



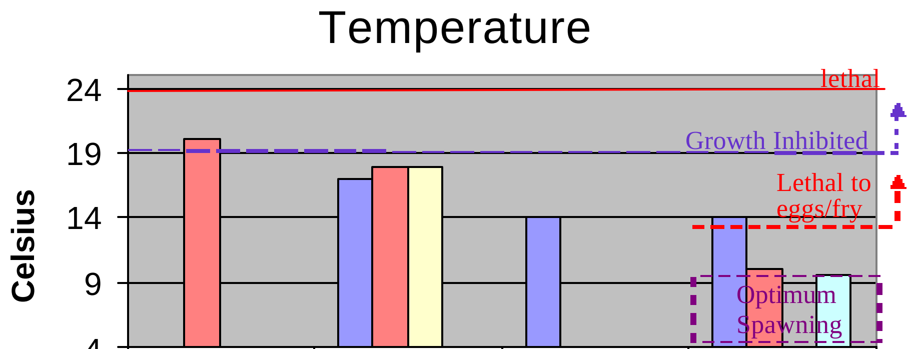

| | 7/25/2002 | 9/10/2002 | 10/18/2002 | 12/18/2002 |
|---|---|---|---|---|
| Site 1 | No Data | 0.24 | 0.36 | 8.15 |
| Site 2 | 0.6 | 0.28 | No Data | 10.2 |
| Site 3 | No Data | 0.99 | No Data | 13.6 |
| Site 4 | No Data | No Data | No Data | 15.2 |

*Instument: Hach 2100P Turbidimeter*

**Turbidity** can loosely be described as suspended solids. Erosion caused by winter rains will spike Turbidity readings temporarily, but ambient and summer levels should remain below 10 NTU's for optimum salmonid survival. Chronic high turbidity creates an unhealthy environment in North Coast cold water streams. Phosphates and other unwanted substances will adhere to particles in the water column. Turbid water also absorbs sunlight, warming waters. When particles settle out, they may smother salmonid embryos and macroinvertebrates. For adult and juvenile fish, gills can become clogged and decreased visibility reduces their feeding success. Soil erosion from timber harvesting, construction, agricultural clearing and poor range management can contribute to high Turbidity. Algae is also a culprit, as is natural soil erosion.

Austin Creek is a cold water stream, and supports the corresponding flora and fauna. Factors that affect temperature include canopy cover, seasonal changes, and stream velocity. Suspended solids absorb sunlight, heating the water, while groundwater seepage usually cools it. Deeper water stays cooler, as does water shaded from the sun by canopy cover. Summer brings hot sun and no replenishing rain, creating naturally higher temperatures. Also, afternoon temperatures will be higher than in early morning.

Salmon are poikilotherms, so ambient temperature determines internal temperature and metabolism. Chronic temperatures out of optimum range cause stress, disease, inhibit growth , and throw off migration and smultification. Migration is delayed or limited at 21 , adults and juveniles die at 24 , and embryonic and fry stages will not survive in temperatures upwards of 13 . Austin Creek appears to have adequate temperatures for salmon, taking into account that sampling sites may not always be the preferred microhabitat for each lifestage. Summer temperatures may be a little higher than what salmon prefer,(10-15 ), however testing sites were not chosen for summer habitat suitablilty.*



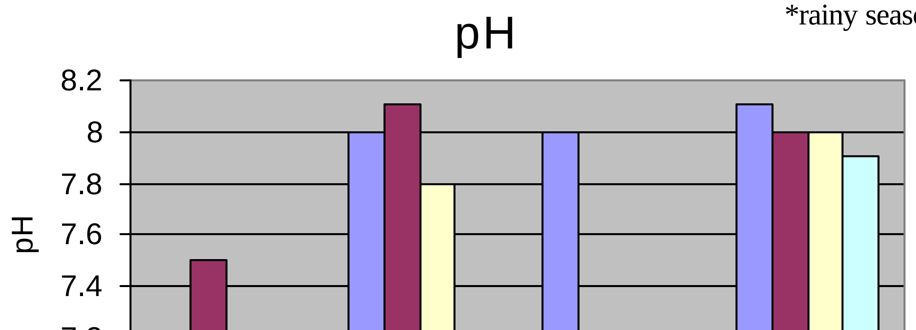

| | 7/25/2002 | 9/10/2002 | 10/18/2002 | 12/18/2002 |
|---|---|---|---|---|
| Site 1 | No Data | 17 | 14 | 14 |
| Site 2 | 20 | 18 | No Data | 10 |
| Site 3 | No Data | 18 | No Data | No Data |
| Site 4 | No Data | No Data | No Data | 9.5 |

*Bulb Thermometer*

## Sampling Conditions

| Date | Time | Weather |
|---|---|---|
| 7/25/02 | 12:40 | sunny |
| 9/10/02 | 10:50-12:15 | sunny |
| 10/18/02 | 12:50 | sunny |
| 12/18/02 | 14:20-16:00 | Overcast, recent rain |

*rainy season began mid-November



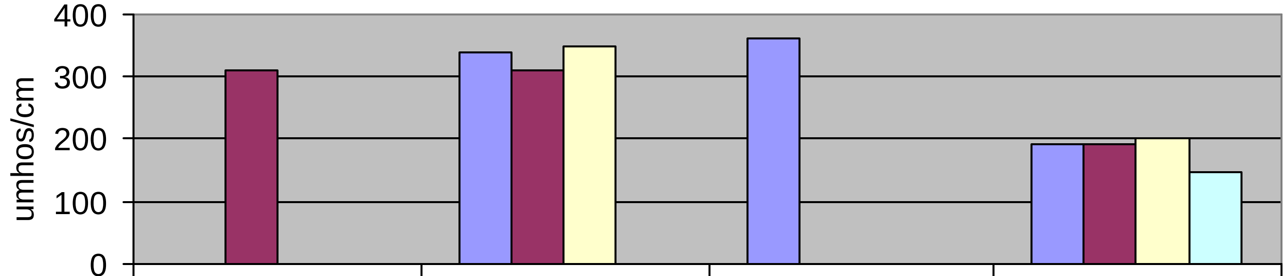

| | 7/25/2002 | 9/10/2002 | 10/18/2002 | 12/18/2002 |
|---|---|---|---|---|
| Site 1 | No Data | 8.0 | 8.0 | 8.1 |
| Site 2 | 7.5 | 8.1 | No Data | 8.0 |
| Site 3 | No Data | 7.8 | No Data | 8.0 |
| Site 4 | No Data | No Data | No Data | 7.9 |

*Instrument: Oakton double-junction pHTestr 2*

pH is the concentration of Hydrogen ions. Most life forms tolerate a narrow range of pH, usually between 6.5 and 8.5. Factors that increase pH, or make it more basic, are limestone bedrock, algae growth, and nutrients (ammonia is at 11 on the pH scale). Factors decreasing pH making water more acidic are redwood needles, acid rain as well as normal rain (pH 5.8), carbon dioxide from plant decomposition and respiration, sulfur fertilizers, industrial discharges, and high temperatures. Acidic water poses further risk because acids often make other substances more toxic.

[a]*EPA Office of Water: Volunteer Stream Monitoring: A Methods Manual*
**Navarro River Watershed Technical Support Document:NCRWQCBfor the TMDL for sediment and Temperature. July 28,2000*
*All other information gathered from SWRCB fact sheets.*

## Conductivity



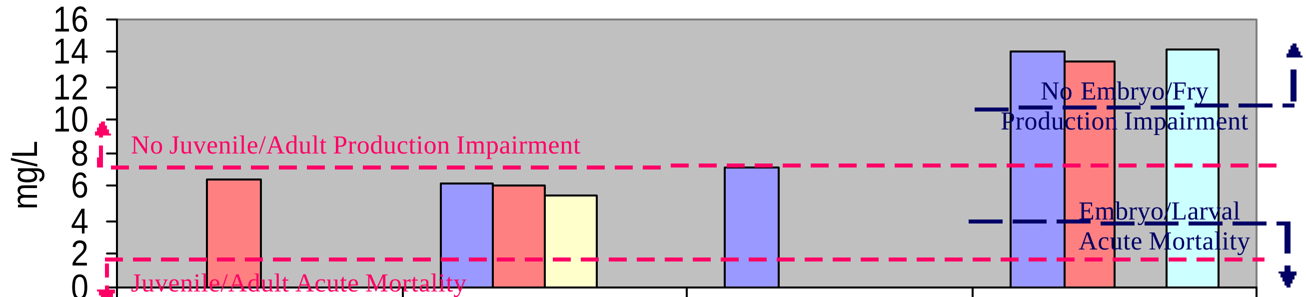

| | 7/25/2002 | 9/10/2002 | 10/18/2002 | 12/18/2002 |
|---|---|---|---|---|
| Site 1 | No Data | 340 | 360 | 190 |
| Site 2 | 310 | 310 | No Data | 190 |
| Site 3 | No Data | 350 | No Data | 200 |
| Site 4 | No Data | No Data | No Data | 150 |

*Instrument: Oakton ECTestr*

Conductivity is the measure of water's ability to conduct an electrical current. Dissolved ions, or salts, conduct easily, so as ions increase, so does conductivity. The higher the conductivity, the faster electricity travels. It is measured in microsiemens per centimeter.

Objectives vary widely for each stream, but a general guideline for good mixed fisheries is between 100 and 500umhos/cm. Factors increasing conductivity are high temperatures, nutrients, clay soils, wastewater, and agricultural runoff which is high in salts. Also, in low flows and heat of summer, evaporation causes concentration of ions. During winter conductivity will fall as rain dilutes ions. Dilution can also make a mainstem, larger body appear cleaner than the tributaries, so volume must be taken into account as well. Oil, phenol, alcohol, and sugars found in urban runoff will decrease conductivity as they do not carry a current well.

## Dissolved Oxygen

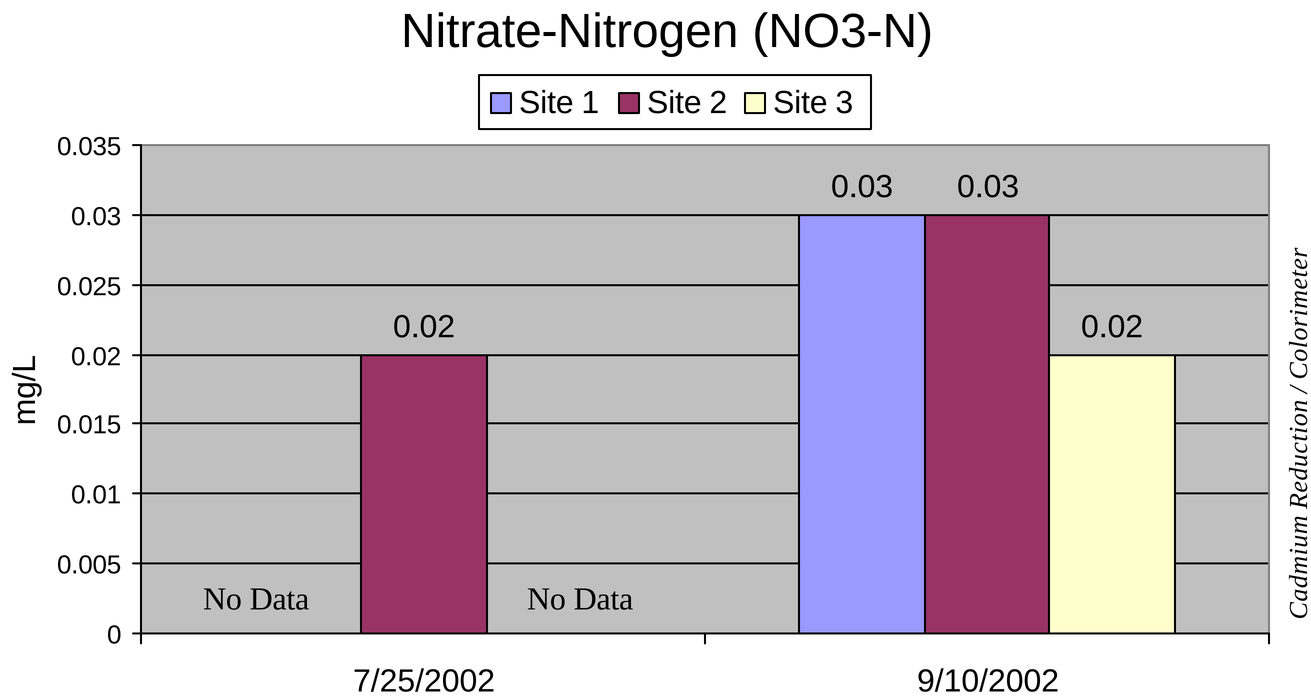



| | 7/25/2002 | 9/10/2002 | 10/18/2002 | 12/18/2002 |
|---|---|---|---|---|
| Site 1 | No Data | 6.2 | 7.1 | 14 |
| Site 2 | 6.4 | 6 | No Data | 13.5 |
| Site 3 | No Data | 5.5 | No Data | |
| Site 4 | No Data | No Data | No Data | 14.2 |

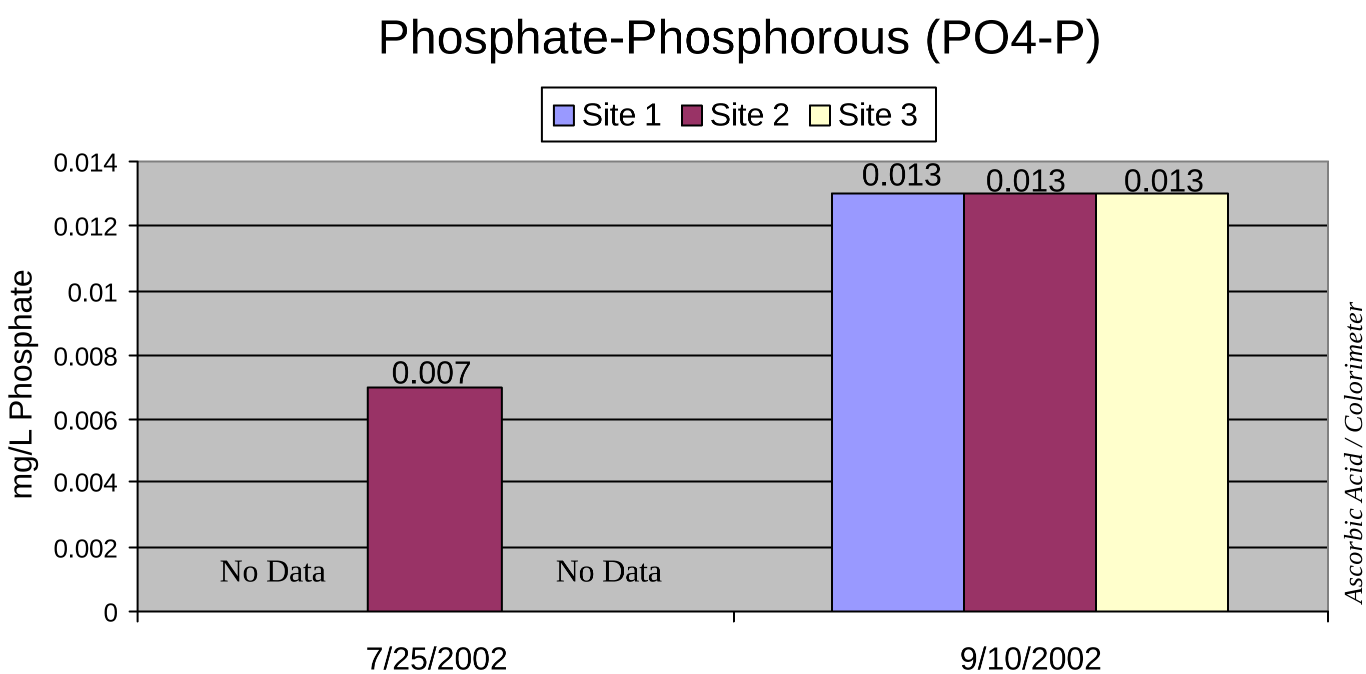
*Instrument: ICM Portable Dissolved Oxygen Meter*

Reduced oxygen supply will negatively affect nearly every organism in the stream. The North Coast Water Quality Control Board Objective for Dissolved Oxygen requires at least 6mg/L for adults and 8mg/L for developmental stages, however larval and embryonic stages do best at levels above 11mg/L.

Dissolved Oxygen levels increase inversely with temperature, conductivity (minerals and salts), and nutrients. Since oxygen enters water through contact with air, turbulent waters such as riffles and waterfalls, as well as high flows, will have higher oxygen contents than calm pools. Salmonids spawn in riffles where oxygen is higher, and spend time in pools later as adults and juveniles when lower oxygen levels are tolerated. Note that salmon spawn and hatch fall through spring, when oxygen levels are higher with low temperatures and high flows. Another factor is plant respiration, which depletes dissolved oxygen during early morning hours, and increase it in the afternoon.




**Nitrates** are typically found as less than 1mg/L in surface waters of the US, although our local authorities has not set specific regulations for nutrients. It becomes toxic to infants and pregnant women and cause miscarriages in animals at 10mg/L[a], the SWRCB Maximum Contaminant Level for Drinking Water. Nitrates come from soil erosion, groundwater, decaying organic matter, fertilizers, wastewater, industrial discharge, and animal waste. Eutrophication can occur at high levels, and dissolved oxygen decreases. Nitrogen cycles from ammonia nitrate (NH4), to nitrate (NO3), to nitrite (NO2). All of these forms are toxic at relatively low levels, especially ammonia and nitrite. Austin Creek appears from this data to have a healthy nitrogen balance.




The USEPA makes a general phosphate recommendation for streams of below 0.1mg/L. Phosphates enter streams through natural erosion, fertilizers and pesticides, wastewater, household and industrial cleaning products, and animal waste. Organic pesticides and fertilizers also manifest as phosphate in streams. This nutrient is the limiting factor for growth in the stream, because it is much scarcer than other nutrients like potassium and nitrogen. Therefore, phosphorus availability dictates the amount of biological growth . If a natural stream suddenly receives a large dose of phosphorus, harmful algae blooms will likely occur. While too little phosphate leads to decreased production, too much leads to over production and eutrophication. Phosphate is not directly toxic to organisms, but can indirectly devastate a stream ecosystem.