**Introduction**

For an aquatic organism to be able to survive water of both high and low salinity it must be able to adapt to the changing conditions. We know that some organisms have the ability to do this from observing the habits of North American Salmon who hatch in the fresh water streams and then live their lives in the ocean before returning back to the fresh water to reproduce.

We decided to do a research project on populations in an intertidal zone where a fresh water creek meets the Pacific Ocean. We wanted to see what effect the salinity of the water would have on the number and types of organisms present.

We chose to do our research at Pescadero State beach, where the Pescadero Creek flows into the ocean. The Pescadero Creek starts in the Santa Cruz Mountains and flows into the Pescadero Marsh. The Pescadero Marsh is a California State Park Preserve. We conducted our study and collected data in spots ranging from the ocean itself all the way back to a large pool that is filled by the creek. From that large pool, the water flows under a bridge that is California State Highway 1, and then the creek takes a few bends and empties into the ocean.

The varied characteristics of the Pescadero Creek lead us to believe that we will find quite a variety of organisms to do our study on. The creek has fast moving water as well as slow moving water. There are a variety of water depths in the creek that should be able to provide a variety of organisms a home. The landscape of the area is also quite diverse. There is a rocky cliff on one side and a sandy beach on the other. Rocks litter the creek bed in some spots while in others it is smooth sand.

On our arrival to Pescadero, we found a sign that was posted by the state describing in detail the migrating patterns of some of the trout that live in the area. The trout that migrate out into the Pacific Ocean are called Steelhead Trout. They take on a steel color to camouflage themselves in the ocean, hence the name steelhead. These organisms have the ability to adjust their inner salt levels when changing their habitat from salt water to fresh water. While not expecting to find many trout in the creek, we hoped to find organisms that exist in either in mainly fresh water or salt water habitats, living in water that had higher salinity than the fresh water, and lower than the ocean.

Organisms that live in intertidal ecosystems have had to develop ways to survive changes in salinity even when a fresh water creek isn't affecting the water supply. When the tide is out, water that is suspended in pools can begin to evaporate. Since salt cannot evaporate, the water left may have a higher salt concentration than the tide water itself. Such environmental factors as rain can have the reverse effect, saturating organisms with fresh rainwater also when the tide is out.

Organisms that cannot adapt themselves to changing levels of salinity might have a difficult time surviving in an ecosystem such as the Pescadero Creek. Anyone with some biological background knows that if the salinity inside an animal cell is too high, than the cell becomes hypertonic, and water will enter that cell, increasing osmotic pressure until the cell bursts. Think of it like filling a water balloon until it bursts. An organism can also be in an area of too high salinity. When the salinity levels of the surrounding water is higher than that of the cell, the water in the cell moves out into the surrounding liquid. A cell in this condition is said to be hypotonic. The water in a hypotonic cell will move out of the cell and into the surrounding liquid. If too much water is lost the cell will no longer be able to perform its functions and it will die.

Organisms such as mussels have the ability to close up their shells, sealing the water with the desired salinity inside. Other animals such as the Steelhead Trout and other species of fish can change the salt concentration in their bodies to survive the changing environmental conditions.

Being able to survive changes in salinity would be beneficial to other organisms occupying ecosystems other than just an intertidal estuary. The Bull Shark is an example of a large marine animal that has been able to tolerate changing levels of salinity when it travels up into the Delta region of California. Here, water from the San Francisco Bay mixes with fresh water from California's rivers. There are many other organisms that are able to survive and adapt themselves to changes in salinity.

Plants and algae have also been able to adapt to changing salt concentrations. A plant, although not susceptible to bursting, like an animal cell, still has a certain level of solutes that need to be present for it to survive. Some plants and algae that live in intertidal areas have been able to survive the rapidly changing conditions in salinity that happens at low tide. Sea grass that grows abundantly at Pescadero is one of these examples. Sea grass, or Laminaria Andersonii, is "Abundant between the .5 and 1.5 foot tide levels," (Smith, 137). This species has been able to survive even when exposed to fresh water during low tide rainy conditions. These organisms also have to survive the "Tearing force of the current." (Gutnik, 66)

In our project we are going to study the number of organisms present in four test sites and their surrounding areas, spaced approximately 30 meters apart. Each different test site has unique features that should be able to provide a variety of organisms a home. Test site one is at the end of the creek where it dumps its water into the ocean. To one side of this site is a sandy beach where the running water has cut a cliff in the sand about 2 feet high. The other side is a rocky area where a cliff rises up into the air to the beach parking lot. The water moves quite fast in this spot. Test site two, is at a bend in the creek. On one side is the beach, and on the other is a rocky area where the raised rocks provide pool areas of still water. The water moves fast in this area. Test site three is right underneath highway 1. There is a concrete bridge overhead. The water speed is slower here than at the previous two sites. Test site four is a large pool area that is fed by the creek from the mountains. Here the water is relatively still before it empties into the faster water. The beach surrounds this spot on one side and the rocky cliff is on the other side.

We will take salinity tests at each of these locations. We believe that the water salinity will be the determining factor as to what kinds of organisms are present. We believe that the numbers of the types of organisms seen at site one will decrease as we move up stream. And we believe that the numbers of types of organisms seen at site four will decrease as we move downstream.

We believe that there are very few organisms that can "Escape change." (Gutnik, 58). This is the basic reasoning for our belief that the number and types of organisms will change as we move to areas with different salinity.