**CONCLUSION**

After conducting our population experiment we concluded that it is true that not too many animals have adapted the abilities to survive in an aquatic environment, mixed with both fresh and salt water. To achieve this we took salinity test in four locations along the Creek. In site four upstream by the still pool of the Pescadero Creek the salinity was 1. In site three, under the bridge the salinity was an average of 3.375. In site 2, the bend of the creek the salinity was an average of 10.625. In site one, where the creek and ocean collide the salinity was an average of 13.625. Last in the ocean the salinity was 21. The organisms we observed in the higher salinity concentrated water (California Mussels, barnacles, and seaweed) disappeared as the salinity concentration dropped. All except for the barnacles which we found to be one of the hardiest organisms in the Pescadero Creek. The barnacles were located from test site 4 (the still pool of the creek with a salinity concentration of one), all the way to test site one (where the creek meets the pacific ocean with a salinity concentration of 13.625). Even in the pure ocean, where the salinity concentration was 21. All the other salt water tested organisms (California Mussels, seaweed) declined in numbers, virtually disappearing when moving up into sites 3 and 4. In site two the salinity was 10.625 and at this site muscles and seaweed were found in large quantities. Most of the bordering rocks were home to seagrass thriving off of the salinitated stream, with really no other similar species to compete with. The muscles were not as common but we spotted four large clusters of them in site two boundaries. In site one, however, where the salinity is 13.625, because the creek is meeting the ocean the seagrass flourished even more and even introduced a different species of seaweed into the territory. The California mussels here at site one absolutely had conquered a large rock that occupied most of the sites boundaries. Last, in the ocean tide pools the California mussels and the sea grasses continued to thrive on the oceanic rocks and shoreline. The population numbers of sampled organisms were equally as dense as the mussel and seaweed populations at site one. We were able to conclude form this study that it is true that most salt water organisms will not survive in an environment with significantly lower salinity concentrations. Even though the Pacific Oceans salt water is meeting the Pescadero Creeks fresh water in a tightly knit environment most species we studied have not adapted to survive in both the salt and fresh water. That is not to say there are no species that can achieve this adaptation because through research of other biologist we learned that their are many species that have adapted. The Bull shark has adapted to survive fresh water streams around the world including California’s delta, and right in the Pescadero Creek the Steelhead Trout has adapted to survive in both environments.

The other half of our experiment was counting the fresh water species we found upstream in the Pescadero, closer towards the ocean in the higher salinity water. In the fresh water we selected crabs, squaw fish, and aquatic potato bugs. All in which we found thriving in test site four upstream. The crabs, though we only found 3 alive, were scattered in abundance all over test site four, and were constantly being ∂eaten by the flock of seagulls patrolling the area. The underground boroughs in which they live in were also in abundance throughout test site four. We counted 37 boroughs in a four by four meter area, using our wooden square. To further support that crabs were surviving here the banks of the Pescadero Creek, test site four was white like snow, due to so many crab shells and bodies. With the crabs we never saw a live one anywhere downstream from site 4, however there were bodies all the way to the ocean. Not in as large of sums as the population of crab shells found around site 4, but there were plenty none the less. There were plenty of bodies in test site 3, although there was only 11 burrows that we found in our four by four meter area. We didn’t see any boroughs in sites 1 or 2. This unfortunately was not enough evidence to support the fact that the crabs had adapted to live in the more salinitated water, because the bodies could have been carried by currents, blown in the wind, or as spread by predators. One interesting thing we noticed about the crabs dispersal is that as we traveled closer towards the ocean the crab shells we found got larger. Which led us to believe that possibly the crabs laid their eggs upstream in site four. Because there is not as much of a current and fewer natural predators, and as the crabs mature they make their way towards the ocean and thus that is why we found the larger crabs closer to the ocean and a lot of babies upstream in site four.

With the squaw fish we found 9 mature fish in different locations around sites 4,3, and 2. They however were most abundant in site 3. In site three we also found a large number of some kind of larva. We believe they are possibly squaw fish hatchlings because they were in little pools on a island in the middle of where we saw the most squaw fish. We weren’t able to catch any squaw fish, but we got some very good looks at a few, and with proper resources and help from a Pescadero National Reserve photographer we were able to confidently classify the fish as Squaw fish. The squaw fish were definitely the most densely populated in site three, under the bridge. However there was no sign of them in site one. In site 4 we found 3 fish swimming around just in the areas we could clearly see in. In site 3 we saw 5 squaw fish around the little island under the bridge, and in site 2 we found saw 1 squaw fish which led us to believe that that species is getting closer to adapting to higher salintated waters.

With the aquatic potato bugs we spotted them all over the rocks and debris upstream at sight 4. These bugs had conquered every underwater rock we checked in site four. However in sites 1,2, and 3 they were non existent, which led us to believe that the aquatic potato bug can only survive in a fresh water environment.

In conclusion from this experiment we learned that most animals in the Pescadero Creek have not evolved and adapted to be able to survive in both fresh water and salt water environments. The barnacle is the hardiest of the organisms we found and the crabs may be surviving both environments for breeding purposes. But in every organisms population if they were found in salt water their numbers were dramatically higher in the salt water and almost diminished in the fresh water. If the organism was native to fresh water, its population numbers were condensed mostly in the fresh water sites. Where the two waters mix doesn’t seem to have too much of an effect as long as it is mostly salt water or mostly fresh water. The sites that demonstrate that are 2 and 3, and they both housed organisms. Two being home to mostly the fresh water species with scattered salt water species, and site three housing large quantities of salt water organisms with few fresh water species.

**PROBLEMS WITH RESEARCH**

In our experiment we came across a few problems with our design. For one we conducted an experiment in a Creek without having all the proper tools to fully study some of the more intriguing organisms, such as the Steelhead Trout. We also had an experiment that was limited and controlled by the conditions mother nature gave us. Two out of our five trips to the Pescadero Creek we had to work in cold stormy weather and life in the creek was not as abundant. Making the graphs based on a population study was difficult to achieve, because there was multible species being counted. Another problem was that our counting techniques were not very accurate. We simply used our eyes.

We were. only sampling certain areas of the Pescadero Creek in this experiment, so in the areas we did not count due to depth, visibility, or lack of resources, there may have been different proprtions of organisms. Tides had a effect on our work as well affecting the depth, and visibilty of our test sites every time we tested.

There could have been outside factors we do not know about affecting the types of organisms present. Such as the water flow rate, ph, and temperture. The time of year may have played a dramatic rloe in what we saw. For example during the crabs or steelhead trouts breeding season there would likely be different numbers present.

Despite a few natural problems this project turned out very good and was fun to do. We both learned a lot about intertidal marine communties and adaptations.