Name(s)	Project Number
Sarah Abel; Sara Koehring	**S0601**

Project Title

Biomonitoring: Using Benthic Macroinvertebrates to Determine the Health of the San Lorenzo River

Abstract

Objectives/Goals

To determine the water quality of the San Lorenzo River by analyzing the benthic macroinvertebrates, their diversity, and by finding good, middle, or poor water quality indicator organisms.

Methods/Materials

In the field we collected Benthic Macroinvertebrates, (BMI's) from one riffle at three diferrent transections with kick nets. In the lab we stored our samples in an ethanol glycerine solution. We counted and sorted our 100 bug sample using microscopes and numerous taxonomic references. Working as a team, and with our mentors, we were able to conduct an in-depth analysis of our sample. We found that over ninety percent of our sample was made-up of BMI's that are indicators of good water quality.

Results

Insect, Number, Eating Habits ,Niche:

Blue Caddisflies 2 scavengers scavengers

Heptageniidae (Mayfly) 1 range from predaceous to plant(algae) feeders omnivores

Perlidae (Stonefly) 5 range from predaceous to plant(algae) feeders omnivores

Tabanida (Deer Fly) 2 very predacious, eats other aquatic bugs carnivores

Aquatic Nematodes 3 algae, ditritus herbivores

Lepidostoma larval cases (Caddisfly) 2 eat algae, decaying plant matter and microorganisms omnivores

Amphipoda (Scuds) 5 anything, including larger organisms omnivores

Apatania larval cases (Caddisfly) 1 algae, decaying plant matter and microorganisms omnivores

Optioservus (Riffle Beetle Larvae) 9 diatoms and algae herbivores

Optioservus (Riffle Beetle Adult) 1 diatoms and algae herbivores

Simuliidae (Black Fly Larvae) 1 algae herbivores

Coenagrionidae Arval larva (Narrow-winged Damselfly) 1 very predacious, eats other aquatic bugs carnivores

Hydropsychidae (Caddisfly) 67 small aquatic organisms and various plants omnivores

Conclusions/Discussion

91% of the BMI#s were indicators of good water quality: caddisflies(72%), stoneflies(5%), mayflies(1%), damselflies(1%), and deerflies(2%). Due to the vast amount of good water indicators, it is plausible to assume that the river is in good health; this is also supported by the lack of moderate and poor water indicators. A mere 5% of our sample was comprised of moderate water quality indictors, solely scuds. This left us with only 4% of our sample composed of indicators of poor water quality, including aquatic

Summary Statement

Our project was designed to collect, sort, and count Benthic Macroinvertebrates, (which are indicator species of water quality) to determine the health of the San Lorenzo River.

Help Received

Our mentor, Tamara Clinard Doan, helped with field and lab procedures and gave us numerous references; Our teacher, Jane Orbuch, offered various support, supervision, references, and materials.

Name(s)	Project Number
Rikki R. Ackerman	**S0602**

Project Title

The Effects of Different Speeds of Off-Road Vehicles and PM10s

Abstract

Objectives/Goals

To determine which speed creates the most dust in the air.I drove a farm truck through the desert and used a vaccumm cleaner to collect the dust that was stirred into the air.My hypothesis proved to be correct.

Summary Statement

To determine which speed creates the most dust in the air.

Help Received

Father and Uncle helped come up with the design of equipment and drove the truck.

Name(s) Christine Austin; Amy Rice	Project Number **S0603**

Project Title

The San Joaquin River: A Three Year Study

Abstract

Objectives/Goals
Our objective was to find out how the chemical and biological factors are affected by golf courses along the San Joaquin River.

Methods/Materials
Chemical Test Materials/Methods: 1)We used a sterile glass jar to collect a water sample from set testing sites. 2)Conduct phosphorous (phosphates) test using procedure from, A Qualitative Introduction to Water Pollution Guide, with sample water and chemicals. 3)Conduct nitrate (nitrogen) test using procedure from the guide booklet with sample water and chemicals. 4)Conduct ammonia nitrogen test using procedure from guide booklet with the sample water and chemicals. 5)Conduct pH test using chemicals and procedure stated in guide booklet for the sample water.
Biological Test Materials/Methods: 1)Using fishing waders and kick net, wade four feet out from bank of river at each site. 2) Face upstream and collect biologic sample with kick net. 3)Separate and identify micro-invertebrates using pollution intolerant, pollution moderately tolerant, and pollution tolerant identification keys.
The results from the chemical and biological tests will indicate what kind of affect golf courses have on a river. We will test for biologic and chemical factors above, along, and below a series of golf courses. The chemical tests show specific health levels, while the biological tests show whether the river is healthy enough to support a wide range of micro-invertebrates. Together both tests indicate the effect of golf courses along the river.

Results
Our experiment indicated that the golf courses along the San Joaquin River have affected it in sites next to or below a golf course. The biological results showed runoff from golf courses made the river less healthy, but that the river could still support a healthy variety of micro-invertebrates. The chemical results showed increased levels of phosphates, nitrates, and ammonia, by and below the golf courses.

Conclusions/Discussion
From our biological and chemical results we conclude that golf courses along the river, affect it slightly. Our hypothesis was partially correct, because the level of healthiness lowered due to golf courses, but it did not lower to an unhealthy level. Although the river still shows signs of healthiness, golf courses and other development will pollute the river if precautions are not taken. Testing the health of a river is the first step to restoring it.

Summary Statement
Our project is testing how golf courses affect biological and chemical factors of the San Joaquin River.

Help Received
Teacher provided chemicals ; Mothers drove to river sites and bought science board; Borrowed biological supplies from 7 grade teacher; Got expert advice from Betty Yee and Cat Croshelle.

Name(s)	Project Number
Maral E. DerSarkissian	**S0604**

Project Title

The Effect of Solar Activity on Earth's Magnetic Field

Abstract

Objectives/Goals

To determine if and how solar activities affect the Earth's magnetic field. The independent variable is the degree of solar activity. Dependant variables are the changes in the Earth's magnetic field. I predicted that as the amount of solar activity increased, changes in the Earth's magnetic field would become more frequent.

Methods/Materials

A magnetometer was built to observe changes in the Earth's magnetic field. I attached a quartz fiber to a piece of glass that had spacers attached to it at the ends. I then glued two rare earth magnets (back to back) to the quartz fiber, ensuring that the fiber was completely centered between them. I did the same with two small mirrors, gluing them back-to-back with the quartz fiber between them, making sure they were in contact with the magnets. A second piece of glass was glued to the first, and the sides left open were sealed off with electrical tape, to protect the magnetometer from air currents. I shined a laser beam at the mirror, so that the beam was reflected onto a target on a distant wall. Four doughnut shaped magnets were used to null the magnetometer. A camcorder on a near table recorded the activity of the reflected beam.

The rare earth magnets attached to the fiber moved with earth's changing magnetic field. Since the mirrors are attached to the magnet, they move with the magnets, reflecting the laser beam on the target at different places in correspondence with the magnetic field.

Results

After recording a reflected laser beam and watching the tapes, I discovered that there are general fluctuations that occur throughout the day. The reflected laser beam moved steadily throughout the various days during which I recorded the reflected beam. However, on March 26, 2002, there were extreme high frequency movements on the target between 1:52 PM and 1:54 PM. I correlated my results with a graph generated by a magnetometer on satelites GOES 8 and GOES 10, and corresponded the movement with solar activity observed from the same satelites.

Conclusions/Discussion

Through research and my experiments, I learned solar activity does in fact affect the Earth's magnetic field. Solar wind and solar flares release charged particles into space that create their own magnetic field. Their magnetic fields interact with the Earth's, causing small changes as a result. With my experiment I also learned that the magnetic field fluctuates daily.

Summary Statement

My project demonstrates the impact solar activity has on Earth's magnetic field.

Help Received

My advisor assisted me throughout the Science Fair process.

Name(s)	Project Number
Katie A. Dolence	**S0605**

Project Title

The Thermal Induction of Atmospheric and Marine Currents

Abstract

Objectives/Goals

The thermal induction of atmospheric and marine currents is a project designed to illustrate how complex currents can be generated between two standing bodies of water or air at different temperatures. Such atmospheric currents have profound affects on the weather. Such marine currents in nature have profound affects on the weather.

Methods/Materials

To demonstrate atmospheric currents, I utilized our spa to simulate a large warm water mass heating the air above it, causing convection currents (an updraft of warm air in a cooler over layer). To simulate the cooler upper atmosphere a 10lb block of dry ice was placed 2 meters above the water#s surface. I gradually heated the spa to a temperature of 110 degrees Fahrenheit. I then recorded the results using a digital camera.To demonstrate marine currents, I utilized our pool and spa to demonstrate the forces driving the induction of thermal currents. Our swimming pool is connected to a spa. The water level was raised to 1 inch above the wall dividing the pool and spa creating an interface. I blocked the connection between the pool and spa using bricks. The pool temperature at the time of this experiment remained a constant 67.4 degrees F. I gradually heated the spa and performed the experiment, made observations and recorded the results at three different temperatures, 79.7, 88.3, and 104.1 degrees F. To conduct the experiment one brick was removed to create a connection. I used algaecide as an indicator and observed the connection for evidence of movement of water.

Results

Atmospheric Observations: I observed that the colder sublimated CO_2 flowed down to the water#s surface, while the very warm air heated by the spa rose vertically to form convection currents. Marine Observations: I observed that colder water from the pool flowed over the shelf and plunged into the spa. The colder pool water displaced the warmer water causing it to flow over the top of the pool in a plume and creating a displacement current.

Conclusions/Discussion

Atmospheric and Marine Conclusions: 1.When air/water is warmed it rises, conversely cold air sinks to the earth#s surface.
2.A current is spontaneously generated between masses of different temperatures.
3.The larger the difference in temperature, the stronger the current generated.
4. When the air/water temperatures equalize the current stops flowing.

Summary Statement

The simulation of Ocean and air currents

Help Received

Father helped with Pictures, Mother helped edit report

Name(s)	Project Number
Jennifer L. Eggers	**S0606**

Project Title

What Are the Physical and Chemical Properties of the Soil in Front of Riverside Cement in Oro Grande?

Abstract

Objectives/Goals

I did this project because I was curious to know how different the soil in front of Riverside Cement Company was and why. My goal was to find the physical and chemical properties of the soil.

Methods/Materials

1. Took 2 samples at two depths at 5 locations, each a quarter of a mile downwind from the plant
2. Ran each sample through a ASTM #10- 2mm sieve, anything above this size was considered gravel and therefore not a part of the experiment
3. Took a digital measurement for the pH of each sample
4. Measured 1/3 of a gram of each sample and set up a test using hydrochloric acid at 10% to check the volume of CO_2 that was released from each sample
5. Used these numbers to relate the volume of CO_2 and the temperature of the lab to the percentage of $CaCO_3$ that was in each sample
6. Mixed 50g of soil, 150ml of distilled H20, and 100ml of HMP (Sodium Hexametaphosphate) solution in flasks and placed on a shaker table
7. Cleaned each solution on a sieve in order to rid the soil of the HMP solution and baked this new group
8. Took each sample and sent it through 6 sieves in a sieve shaker for one minute and measured amounts of soil at each sieve level
9. Ran the $CaCO_3$ tests again this time only using the soil taken off the #18 sieve on each sample
10. Ran a test on the electrical conductivity of each soil sample.
11. Came to a conclusion about what was occurring outside the Riverside Cement Company

Results

The pH levels ranged from 8.33 to 11.08. The $CaCO_3$ content ranged from 8% to 40%. The electrical conductivity ranged from .4 to 6.7.

Conclusions/Discussion

I came to the conclusion that there is something unusual happening outside the Riverside Cement Company. The normal soil range is 3-10 and for this area the average soil pH, according to the US Department of Agriculture Soil Survey, is 7.4-8.4 which most of my soil samples didn#t run under 8.4. It is true that the white film will cause the stomata to get clogged and stunt growth of the plant life of the area. Even from observation I could tell that the topsoil was very thick, hardly breakable, and that water was going to have a hard time seeping into the soil. These are likely related to the fact that there is a high percentage of $CaCO_3$. It is the $CaCO_3$ that causes the cement properties.

Summary Statement

The project shows a variety of tests that express different properties and I attempt to find distinctions about the soil particularly around the Riverside Cement Company.

Help Received

Father helped with graphs; Carrie Ann Houdeshell and Peter Fahnestock, soil scientists for the US Department of Agriculture, Soil Conservation Service supervised lab work in the Department of Agriculture lab

Name(s)	Project Number
Dana A. Hawk	**S0607**

Project Title

Are Two-Stroke Motors Endangering Lakes?

Abstract

Objectives/Goals

This investigation was designed to determine if two-stroke motors will cause pollution harmful to waterlife in our local lakes.

Methods/Materials

Ten minnows were put into seven dilutions of lake water which had been exposed to the exhaust products from a two-stoke outboard motor. The dilutions ranged from two-to-one lake water to [exhaust products] to a ratio of sixty four-to-one lake water [exhaust products]. The oxygen levels of each of the seven countainers were measured and recorded periodically. Results show that [exhaust products] in high ratios are harmful to waterlife.

Results

Results show that higher quantities of exhaust products have harmful effects to waterlife even though fish were not exposed to compromised water for 48 hours after water had first been exposed to the exhaust products. These results have implications for the future protection of our lakes. Some California lakes have already outlawed two stroke motors. This has impact on boaters, fishermen, and other recreational uses. Although the results would have been interesting, the process of testing for MTBE is complicated and expensive and could not be accomplished in this project. MTBE is being replaced with a different and safer additive. Results of two stroke engines being harmful to waterlife are already causing manufactures to stop producing two stroke engines and instead are switching to a cleaner burning engine, the four stroke.

Conclusions/Discussion

Two stroke outboard motors do cause pollution harmful to waterlife in our local lakes. For further experimentation water could be tested for specific types of contaminates such as MTBE (Methyl Tertiary Butyl Ether). Another conclusion could be formed by determining the number of two stroke motors needed to produce the same deadly ratios in a given lake. Further conclusions could be drawn if the fish were given a much longer period of time, such as 6 months, to be exposed to slow acting chemicals.

Summary Statement

My project was to determine if the exhaust products from a two stroke outboard motor are harmful to to waterlife in our local lakes.

Help Received

Mother helped me construct the backboard, Father helped me collect and transport lake water and arranged for the use of a friend`s two stroke motor

Name(s)	Project Number
Brandon S. Kandarian	**S0608**

Project Title

A Study of the Effects of Fire-Retardants on Oncorynchnus mykiss in a Stream or Watershed Environment

Abstract

Objectives/Goals
The objectives in this experiment are to determine which companies fire-retardants, when dropped aerially,will be the least toxic to rainbow trout,and at what coverage level should these retardants be used to be the most effective,based on the maximum amount of retardant with the maximum survival rate.The goal of this experiment is to preserve aquatic life in and around streams and waterways by using oncorynchus mykiss as an indicator of harmful pollution for stream dwelling organisms.

Methods/Materials
A stream environment was created with all the specifications of a real stream,based on research and interviews.A holding tank was built and maintained to create a stable environment for the organisms.This was to eliminate the shock and other variables. Once all the specifications were met,the fish were added to the test and control stream.The amount of retardant to drop into the test streams was based on the proportion created between coverage levels used in real life compared to the area of the stream currently being used. The retardants were then added using aluminum wire (same metal used is planes that drop the retardants) and plexi-glass to create the rain drop effect,to simulate the way the retardants would be dropped at in real life.The fish were left in this environment for an allotted period of time(based on research done on chemicals in retardants as well as the amount of time the retardant would be left in the stream for).A total of 285 fish were used in this experiment.

Results
D75 fire-retardant proved to have a much higher survival rate than GTS fire-retardant. D75 fire retardant at coverage level 5 proved to be the most effective coverage level for this retardant. GTS at coverage level 6 proved to be the most effective coverage level for this retardant.

Conclusions/Discussion
With the results I acquired, I recommend D75 and GTS fire-retardants be dropped at their most effective level(found in my research).This can allow for aquatic environments to be preserved and give organisms dwelling in the stream a much better chance at surviving. These recommendations should be used when retardants are dropped in any area that has a possibility of getting into a waterway.I am recommending D75 retardant,as well as the other retardants manufactured by the company that made D75,be used in place of GTS. I also recommend that GTS fire retardant either be removed from the market, or have its formulation reworked.

Summary Statement

The effects of fire-retardants on rainbow trout (indicator of pollution) are being tested in stream and water-shed environments to help adjust procedures used in dropping the retardants, to assist preservation of aquatic lif

Help Received

In this experiment, I designed and built all the environments and equations used. I did receive help getting research through interviews and acquiring some measuring equipment through the Forest Service. I also received help through Fish and Game in acquiring a permit

Name(s)	Project Number
Michael D. Malecek	**S0609**

Project Title

The Pollution Waterslide: The Degradation of Storm Drain Water Quality As It Flows Down a Pipeline

Abstract

Objectives/Goals

The purpose of my project is to explore whether or not pollution accumulates in storm drain water as it flows down a storm drain pipeline system.

Methods/Materials

I conducted this experiment by taking water quality samples at different places in two seperate pipelines. I tested these samples for their water quality by using test kits that indicated the pH level, the chlorine content, the copper content, the dissolved oxygen content, the iron content, and the nitrogen content. I also used another test kit to discover if the samples contained coliform bacteria in them.

Results

All of the water samples had a copper content of 0ppm and a dissolved oxygen content of 8ppm. Most of the samples had a pH level of seven and a chlorine content of 0ppm. The majority of the water samples also had a nitrogen content of 0ppm and an iron content of 0.5ppm. All of the samples tested positive for coliform bacteria except for the control.

Conclusions/Discussion

There are a few anomalies present in the data, but the over all experiment ended up refuting my hypothesis. After conducting an ANOVA test on my data, which showed it was statistically significant, I had no other choice, but to accept that my hypothesis was not proven in this experiment. However, I feel that my hypothesis was not proven because of some flaws in the experimental design. The problem was that all of my water samples were good, quality water and there was no pollution present in any of them. This factor threw off my data and fouled up this experiment. However, if this experiment was modified and done in a highly polluted area, I believe that my hypothesis would be supported by that data. At least I know that the area where I collected my samples does not have a storm drain water pollution problem.

Summary Statement

My project invetigates whether or not pollution accumulates in storm drain water as it flows down a storm drain pipeline system.

Help Received

My sister helped me sterilize some of the sample containers and collect some of the samples.

Name(s)	Project Number
William S. Man	**S0610**

Project Title

Stable Oxygen Isotope Paleothermometry using CaCO3 Shells of Fossil Plankton: SST Reconstructions of the Western Pacific

Abstract

Objectives/Goals

The objective is to map out a record of sea surface temperature during the past through oxygen isotope analysis of the shells of fossil plankton foraminifera.

Methods/Materials

1500 samples of a 3000 cm deep ocean sediment core was obtained from ODP (Ocean Drilling Program). All samples were washed, filtered, weighed, and cleaned before individual fossil forams of the species g. ruber were hand-picked under a microscope. Samples were run through a dual-inlet mass spectrometer which calculated the ratio of oxygen 16 to oxygen 18 within the sample. Ratio values are graphed on the computer to provide a visual representation of the relative sea surface temperature of the ocean.

Results

My entire core sample shows striking similarities with the sawtooth pattern graph even though it is only one section of many sawtooth patterns documented by previous research. The values of the samples from 0-500 cm range from negative 2.5 to negative 3.5, which represents the peak of the graph. These negative values show the relative abundance of oxygen 16 in the water during this time, which tells me that this is an example of a warming trend which we are currently in.

Conclusions/Discussion

The logic behind stable oxygen isotope analysis can be
described in the following manner: We understand that oxygen 16 is the lighter isotope as opposed to oxygen 18; thus oxygen 16 is more easily evaporated from the ocean than its counterpart. During periods of cool climate or #mini ice-ages#, the easily-evaporated oxygen 16 is usually trapped on land in the form of ice or other reservoirs of water on land, thus the ratio of oxygen 16 to 18 is more closer to a 1:1 ratio. During warm climates, the melting of the ice will result in a mixing of the water and the ratios might reach 3:1. My results support the idea of global warming and that it#s truly happening. If the warming trend doesn#t drop in the next 1000 years, then it will further confirm our suspicions, however it will be too late by then.

Summary Statement

By looking at the ratio of oxygen isotope 16 to 18 in the calcium carbonate shells of fossil plankton, we can document the relative sea surface temperature at a certain time, which gives us an idea of what the climate was like in the past.

Help Received

Core samples obtained from ODP; mass spectrometer and other laboratory equipment used at the University of Southern California Geological Sciences Dept. under the guidance of Dr. Lowell Stott

Name(s)	Project Number
Michelle Marjares; Bryan Wheeler	**S0611**

Project Title

Got Water? What Is the State of the Santa Ana River?

Abstract

Objectives/Goals

Our project's purpose was to determine if the water quality of the Santa Ana River was being affected by the presence of dairy farms and if Prado Dam was effective in reversing some of its affects, therefore providing suitable water for Orange County.

Methods/Materials

We tested 10 sites along the Santa Ana River in the Norco area (two times) for nitrate, phosphate, ph, and sulfide, as well as coliform.

Results

Our results show increased levels of nitrate, phosphate and sulfide in areas passed the dairy farms in sites 3 through 6. Coliform levels were also present in these sites. Sites 1 and 2 were taken after the Prado Dam wetlands and showed a decrease in nitrates, phosphates, sulfide, and no traces of coliform.

Conclusions/Discussion

We concluded that although dairy farms may not be the only contributors in the Norco area, it cannot be ignored that they are a major contributor to water contamination as shown by our data, in which nitrate levels reach 15ppm and are considered a hazard by the EPA.

Summary Statement

We attempted to analyze the water quality of the Santa Ana River as affected by dairy farms.

Help Received

Name(s)	Project Number
Hermes G. Penuelas	**S0612**

Project Title

Effect on Pond Life to the Exposure of Selected Algae Controllers in a Simulated Environment

Abstract

Objectives/Goals

The purpose of this study was to determine the effects of three selected chemicals on pond life, which are used to treat algae blooms in ponds. The best cheimcal was to be, the one which could eliminate the algae without harming any other organisms fundamental for the development of life in a fresh water pond.

Methods/Materials

Four tanks, in which plants and diverse organisms were introduced equally, simulated the natural environment. Tank A was treated with Clear Pond#. In tank B Accu-Clear# was introduced. Tank C was dozed with an algaecide called Algae Destroyer#. Tank D stayed as the control of the experiment. The tanks were dozed according to the directions of their respective chemicals.

The plants were weighed every 15 days. Water Quality Tests were made every 10 days and respective obsevations of each tank were done as well.

Results

In tank A algae died and most of the plants and guppies survived. Flora and fauna increased in tank B and great bio-diversity of microorganisms was also found. In tank C the algae was eliminated, but so were most of the other plants. Dead fish was found at the end of the testing period due to an increment in the biochemical oxygen demand.

Conclusions/Discussion

According to the data and observations from each tank, the most successful chemical was Accu-Clear#, because it killed the algae without harming other organisms fundamental for the pond life. The worst chemical was AlgaeDestroyer#. Clear Pond# did not have a beneficial or a harmful effect on pond life.

Summary Statement

The harmful effects that some algae controllers may have on your pond without even leting you know about them.

Help Received

Used lab equipement at Santa Ana High School. Stephen Clayton assisted along the testing period.

Name(s)	Project Number
Andrew Pham	**S0613**

Project Title

The Skin of the Earth

Abstract

Objectives/Goals

My objective is to find out which type of soil will hold in the most moisture over a period of time: Potting, Sand, Clay, or Mixed soil. I believe that potting soil will retain the most water over a period of time.

Methods/Materials

4 large containers
4 tiny containers
4 types of soil
1 weighting scale
+ water

Results

Potting soil held the most amount of water, clay held the second most amount of water, mixed soil held the third most amount of water and sand held the least amount of water over a span of 18 days.

Conclusions/Discussion

My conclusion is that the size of the pores in the soil plays an important part in the soil's ability to hold moisture. The soil with the biggest pore size will be able to hold the most amount of water in it.

Summary Statement

My project was to evaluate which type of soil would hold the most moisture over time.

Help Received

Parents and teachers helped to get my materials but I performed the experiment on my own.

Name(s)	Project Number
Jarrett M. Sexton	**S0614**

Project Title

Tide Pool Traffic: A Study of Human Effects on Lower Intertidal Biodiversity

Abstract

Objectives/Goals
The tide pools of Monterey Bay are an important aspect of the coastal ecosystem. Tourists visit the beaches and explore the tide pools on a regular basis. Occasionally tourists are not aware of the laws that protect the ecosystem in Monterey. They will collect live organisms or approach marine mammals. There has been a lot of debate over how much damage the tourists do to the lower intertidal zone. This project monitored the damage that is done to biodiversity by studying the species variation in plants and animals that reside in the lower intertidal zone. The goals for this project were to find out if human presence effects the biodiversity of the lower intertidal zone.

Methods/Materials
Six different tide pools at two seperate locations were monitored; Lover's Point,which is heavily trafficked by tourists and the tide pools off of Coral Drive, which is not. The two locations are the same in substrate type, wave exposure, etc. A quarter of a square meter quadrant was placed over the tide pool and the different plant and animal species were counted.

Results
At Coral Drive there was an average of 10 different species. At Lover's Point there was an average of 7.33 species.In both plant and animal species there was more diversity at the tide pools at Coral Drive, the low traffic location.

Conclusions/Discussion
The tide pools near Coral Drive had a greater biodiversity than the tide pools at Lover's Point. This is because humans have a direct impact on the environment they live in or have access to. They disturb the environment the intertidal organisms live in by illegal collecting, trampling or moving habitat components(i.e.: rocks). Further study of this problem is needed. A study on what percent of tourists actually go down by the tide pools could be of use. This same project could be replicated in numerous places with different intertidal habitat types. Covering the different habitats and specific selection of tide pools is important for further study.

Summary Statement
Determining if humans effect lower intertidal biodiversity

Help Received

Name(s)	Project Number
Robyn N. Strumpf	**S0615**

Project Title

Effect of Nitrate, Phosphate, and Hydrogen Ion Concentration on Synedra ulna: Diatoms as Indicators of Water Composition

Abstract

Objectives/Goals
Can an artificial environment be designed to determine if the pennate and epilithic diatom, Synedra ulna, can be used as an indicator of changing water conditions such as nitrate, phosphate, and hydrogen ion concentration.

Methods/Materials
Substrate, rocks, and stream water were taken from Limekiln Creek and distributed into control and treatment containers. Levels of nitrate, phosphate, and hydrogen ion concentrations were altered in the treatment containers using standard solutions. The percentage of Synedra ulna was determined at baseline, and 6 days after altering the treatment sample.

Results
Increased nitrate concentrations affected the reproduction of Synedra ulna when compared to controls. There was no change in reproduction with alteration of the phosphate and hydrogen ion concentrations. An unexpected observation in pH treatment samples was that creek water pH reverted from an altered pH of 6.6 back to a baseline pH of 8.3.

Conclusions/Discussion
Synedra ulna was demonstrated to be a durable organism, able to survive in a variety of environments, within the following ranges: a nitrate concentration of 4.4 mg/l to 17.6 mg/l, a phosphate concentration of 0.5 mg/l to 1 mg/l, and pH of 6.6 to 8.7. An artificial environment was successfully developed to study the effects of changing water conditions on Synedra ulna.

Summary Statement

An artificial environment was developed to study the effects of nitrate, phosphate, and hydrogen ion concentration on Synedra ulna, an organism used as an indicator of water quality.

Help Received

Mentors: Craig Campbell, Sarah Spauling, Mark Abramson; Kaiser Permanente - equipment; Parents - support and encouragement