# CALIFORNIA STATE SCIENCE FAIR
## 2011 PROJECT SUMMARY

**Name(s)**
Michael W. Aling

**Project Number**
**J1101**

**Project Title**
## Plants and Their Environment

**Abstract**

**Objectives/Goals**
The goal of my project was to determine how different plants respond to different extreme conditions, specifically whether or not natural disasters play a role in the invasion of non-native species into the California ecosystem.

**Methods/Materials**
I set up the aftermath of two natural disasters (wildfire and flooding), in addition to a control test. The fire aftermath consisted of heated, dried soil with ash on the surface. The flooded environment plants experienced a mock-flood soon after the experiment began.

I used four species for my experiment. Two were native to California (Phacelia campanularia [California bluebell] and Eschscholzia californica [California poppy]), and two were invasive (Lobularia maritime [alyssum] and fountain grass [Pennisetum alopecuroides]). I used 300 seeds for each species (100 for each environment), for a total of 1,200 seeds.

The testing period took place over two months, during which I recorded plant growth regularly. This data can be found in the binder. Additional observations are contained in the project logbook.

The fire test produced very few specimens. I thought that perhaps this was due to the heating of the seeds, so I repeated the test without said step.

**Results**
In very few instances did the performance of the flooded plants exceed that of the control plants. As stated earlier, the initial fire test did not produce accurate data. In the second fire test, more plants began to grow, but that test was cut short because of the deadline for the project. Overall, the invasive species proved far hardier than the natives.

**Conclusions/Discussion**
My experiment showed how effective invasive species are at survival, even in harsh conditions. This, coupled with their overproduction of seeds, is why they are such a threat to our biodiversity. The native species simply can't compete. Southern California is one of the most bio diverse areas on earth, with the exception of rainforests, and invasive species are becoming a problem.

As this was not an ideal period for growing plants, the weather somewhat interfered with the experiment, especially during the December rains. However, this weather also showed how the plants could survive in a natural setting, where, in reality, the weather is not always fair.

The experiment demonstrated both the power of invasive species and the ability of all (or at least, most) plants to adapt to their surroundings, whatever they may be.

**Summary Statement**
My project was about discovering how different plant species respond to different environments, and finding out if invasive plants can beat native plants in conditions that native plants have had thousands of years to adapt to.

**Help Received**
Mother helped in assembly of presentation board.

# CALIFORNIA STATE SCIENCE FAIR
# 2011 PROJECT SUMMARY

**Name(s)**

**Anusuya Arjavalingam; Meera R. Rachamallu**

**Project Number**

**J1102**

**Project Title**

## The Oil Spill: The Effect of Mineral Oil on the Photosynthesis of Scenedesmus Algae

**Abstract**

**Objectives/Goals**

Last year, the Bp oil rig in the Gulf of Mexico exploded, devastating wildlife. The purpose of our experiment was to determine how mineral oil affected the photosynthesis of Scenedesmus algae. We hypothesized that if more mineral oil was added to the algae, then less photosynthesis would occur.

**Methods/Materials**

We first took the algae and made them into algal balls with different concentrations of oil in them (0%, 1%, and 2%). Then we made a hydrocarbonate indicator that turned a darker color when the level of carbon dioxide decreased. This showed us that photosynthesis was occurring.

We put 10 algal balls into each of the 12 vials filled with indicator. At various time points, we took readings of the color of the indicator in a spectrometer and recorded our data.

**Results**

At the end of 23.5 hours, the algal balls with 1% oil had turned the indicator 14% lighter than the 0% oil algal balls. The algal balls with 2% oil had turned the indicator 27% lighter than the 0% oil algal balls.

**Conclusions/Discussion**

Our final results supported our hypothesis. The algal balls containing oil performed less photosynthesis than the algal balls without oil, a. However, photosynthesis still occured in all of the samples.

Our next steps are to test this experiment with different kinds of oil and algae, leading us to further understand the effects of oil spills.

**Summary Statement**

Our project, inspired by the Gulf oil spill, is on the effect of mineral oil on the photosynthesis of Scenedesmus algae.

**Help Received**

Dr. Germeraad provided and assisted us with materials, answered our questioons, and edited final drafts.
Mr. Robert Kucer lent us the spectrometer.

# CALIFORNIA STATE SCIENCE FAIR
## 2011 PROJECT SUMMARY

**Name(s)**
Michael J. Chang

**Project Number**
**J1103**

**Project Title**
## The Effect of Low Tire Pressure on Rolling Resistance and Its Contribution to Environmental Pollution

**Abstract**

**Objectives/Goals**
My science project is to determine if low tire pressure will lead to more rolling resistance which means an increase in fuel comsumption and contributing more pollution to the environment.

**Methods/Materials**
First, I went to the gas station to prepare for the experiment by filling the gas tank, and filling the tires with 45 Pounds per Square Inches (PSI) which is 5 PSI over the recommended PSI on this car. Next I went to a remote area and tested my experiment 15 times for every PSI I tested. Every time, the adult would drive the car for 24 km at the speed of 24kmph and then put the car into neutral. Then I would measure how far the car had coasted with a rola tape and recorded it in my log book. After, I would let 5 PSI of air out of the tires, repeating the process till I reached 25 PSI.

**Results**
My results were that the less air you put in your tires, the less you were going to coast, thus making you lose more money on gas and contribute 19 pounds of CO2 for every gallon of gasoline you burn.

**Conclusions/Discussion**
In conclusion, I found my hypothesis to be correct. As i inferred from my experiment data and research, low tire pressure did lead to more environental pollution.

**Summary Statement**
My science project is to determine if low tire pressure leads to more rolling resistance which means an increase in fuel consumption and an increase environmental pollution.

**Help Received**
My parents and tutor helped me with my project experiement by driving the car and with my board.

# CALIFORNIA STATE SCIENCE FAIR
# 2011 PROJECT SUMMARY

**Name(s)**
Talia K. Cohen

**Project Number**
**J1104**

**Project Title**
## Is Your Dirt Healthy? The Effect of Additives on the Microbial Balance in Soil

**Abstract**

**Objectives/Goals**
The objective of this work was to determine the effect of common soil treatments, such as fertilizer, herbicide, and compost, on the microbial count of healthy soil.

**Methods/Materials**
Four identical soil samples were taken and treated with fertilizer, herbicide, compost, and sterilization, and a fifth sample was left untreated. Samples of each parameter were diluted in Phosphate Buffered Saline and applied to agar plates. The colony forming units (CFUs) were counted using a microscope. Samples were taken on day one and day 23 after treatment.

**Results**
The CFU counts of the untreated, compost, and fertilizer-treated soils stayed relatively low and constant. The counts of the herbicide-treated soil were very high in the first test. In the second test, the herbicide counts were lower, but still definitely above the untreated soil. The soil that was sterilized had no CFUs after the first day, but in the second test it had extremely high counts.

**Conclusions/Discussion**
The results of this experiment suggest that treatments such as herbicide and sterilization eliminate types of bacteria that allow other, fast-growing bacteria to flourish.
These results are relevant to people working with soil health and content. This could include farmers, particularly those interested in sustainability, and developers working with soil treatments and agricultural techniques. They are also significant for average citizens; it is good for gardeners and homeowners with lawns to know how products will affect their plants.

**Summary Statement**
In this project, I determined the effect of various treatments on the bacterial count of soil.

**Help Received**
Used lab equipment at the NRI-MCDB Microscopy Lab (University of California, Santa Barbara) with the help of Dr. Mary Raven; Laurie Constable (Avalon Farms, Santa Barbara) provided soil; father helped edit report

# CALIFORNIA STATE SCIENCE FAIR
# 2011 PROJECT SUMMARY

**Name(s)**
Monica M. Criley

**Project Number**
**J1105**

**Project Title**
## Greywater vs. Tap Water

**Abstract**

**Objectives/Goals**
The purpose of my project was to find out if greywater benefits plant growth and health more than tap water.

**Methods/Materials**
Methods/Procedures: Select 3 different types of garden plants, 10 of each. Put each seed in a ziploc bag with a moist paper towel soaked in designated water. Place all of the plants into a partially sunny area. Water 5 of each type of plant with tap water and 5 of each type with greywater (depending on plants, equal amounts for each variety). Observe the growth of the plants for 30 days and record their heights every 5 days.
Materials: Container of tap water and container of greywater, 30 plants, 3 varieties, 10 seeds each- radish, sweet pea, bean plant (15 total for tap water, 15 total for greywater), sunlit area for plants to grow, 30 ziploc bags, eye dropper, metric ruler.

**Results**
Overall, two out of three of the plant varieties being fed greywater benefited more than the plants being fed tap water. (The radish plants did not fair as well from greywater and died perhaps from being over-watered, even though it was being watered the same amount as the other plants.) From what I saw, it appeared that the greywater had no negative effects on the plants and they even looked as though they were healthier than the tap water plants.

**Conclusions/Discussion**
My conclusion is that greywater fed plants will benefit equally if not more in the growth of tap water fed plants. I also noticed less mold growth in the greywater plants which could be a source for another investigation.

**Summary Statement**
My project is about the effects of greywater and tap water on vegetation.

**Help Received**
My father helped me select the seed types and provided me with two books on greywater by Art Ludwig. My mom helped me with board layout.

# CALIFORNIA STATE SCIENCE FAIR
## 2011 PROJECT SUMMARY

**Name(s)**
Emily K. Denny

**Project Number**
**J1106**

**Project Title**
# The Percolation of Motor Oil through Fine, Medium, and Coarse Grained Sands

**Abstract**

**Objectives/Goals**
My project is to determine if the size of the sand grain, fine, medium, or coarse, affects how motor oil percolates through the sand.

**Methods/Materials**
Sand was sorted into three sizes of sand grains: fine, medium, and coarse. Three graduated cylinders were filled with 100 ml of each grain sized sand. I added 30 ml of motor oil (10W-40) and watched how the motor oil percolated through the sand. I measured the depth of percolation every 15 minutes for three hours.

**Results**
The motor oil percolated fastest through the coarse grain sand. The fine and medium grain sand had about the same percolation rate.

**Conclusions/Discussion**
Since motor oil percolates faster through coarse grain sand, then it would be harder to clean up an oil spill on a coarse grain sand beach. However, on a beach that has fine or medium grain sand, the oil will only percolate a couple centimeters down which is where most wildlife lives.

**Summary Statement**
How motor oil percolates through fine, medium, and coarse grained sands.

**Help Received**
My Dad helped me organize my procedure. My teacher helped me stay on track. My Mom proofread my backboard.

# CALIFORNIA STATE SCIENCE FAIR
## 2011 PROJECT SUMMARY

**Name(s)**
Daniel J. Feeny

**Project Number**
**J1107**

**Project Title**
# Forcing Diversity: Are Waves the Dominant Force Driving Biodiversity in the Intertidal Zone?

**Abstract**

**Objectives/Goals**
The purpose is to develop a device to quantify wave force and, using this device, determine if wave forces affect the diversity of algae and invertebrates in the intertidal zone.

**Methods/Materials**
A force meter was designed that consisted of a spring attached to a lightweight ball that was pulled on by wave action. A transect going from low tide to high tide had five quadrants, three meters apart, and an additional force meter adjacent to one quadrant. The diversity of organisms was recorded in each quadrant and the Shannon Diversity Index calculated. Force meters were anchored in each quadrant for twenty-four hours. A spring constant was calculated and used to determine wave force. Wave forces were plotted as a function of the Shannon Index.

**Results**
Wave forces varied randomly both parallel and perpendicular to the shore; surprisingly there was no correlation between wave force and distance from low tide zone. Meters placed horizontally and within two feet of each other had forces that varied by 40%. The highest wave force was three times the lowest. Wave forces could not be correlated to diversity. The largest force at the low tide zone had an abundance of life and lowest force closest to the high tide zone had mostly encrusting sponge. Diversity as a function of wave force also did not follow the Intermediate Disturbance Hypothesis.

**Conclusions/Discussion**
Wave force is not the largest determining factor in the diversity of organisms in the intertidal zone. Rather than one factor, such as wave force, driving diversity, the situation is more complicated and probably a function of several things, such as terrain, which affects wave force, and desiccation.

**Summary Statement**
This project determines if diversity in the intertidal zone is a function of wave force.

**Help Received**
My mother drove me to the ocean, my siter tuaght me to use Excel, people from the hardware store explained how to drill holes in bedrock and with some technical aspects of my force meter.

# CALIFORNIA STATE SCIENCE FAIR
# 2011 PROJECT SUMMARY

**Name(s)**
Isaac A. Felix

**Project Number**
**J1108**

**Project Title**
## Green Cleans

**Abstract**

**Objectives/Goals**
Does environmental soap have a harmful effect on brine shrimp?
Regular soap will have a more harmful effect on the brine shrimp compared to the ecological brands.
First, I prepared a spring water and non-iodized salt solution. Then I added a half-teaspoon of brine shrimp eggs to the salt water and let them hatch for 24 hours. After they hatched, I placed 3mL of brine shrimp in 5 different Petri dishes. Then, I added the solutions to the brine shrimp. Then I let them sit in a table for 48 hours. After 48 hours, I recorded my data.
After analyzing my data, it turned out that the regular and one of the environmental soaps actually killed the brine shrimp. The other environmental brand didn#t affect the shrimp.
My results partially supported my hypothesis; it turned out that Simple Green# actually killed the brine shrimp.
If I were to repeat my experiment I would test detergents and shampoos.

**Methods/Materials**
Petri dishes (15), 1 pipette (10 mL), magnifying lens.
Regular dish soaps: Palmolive (green one) = Brand S-P, Pine Sol = Brand P.
Eco friendly dish soaps: Seventh Generation = Brand G, Simple green = Brand S.
Brine shrimp (20-30 oz. or a bag), Beaker (500-1000mL), Non-Iodized Salt, Spring mountain water, Bubbler, Lamp, Regular tap water.

**Results**
My results partially supported my hypothesis. I hypothesized that the normal brands would impact the shrimp. This part of my hypothesis was true, for the average number of shrimp dead for the regular brands were: Palm Olive# 64 and Pine-Sol# 59. But, Simple Green# turns out to kill an average of 62 shrimp. On the other hand, 7th Generation# only killed 2 shrimp and in the control brand only 1 shrimp died. I think my hypothesis came out partially right because I assumed that the environmental brands were eco-friendly.

**Conclusions/Discussion**
In conclusion,my results partially supported my hypothesis. I hypothesized that the normal brands would impact the shrimp. This part of my hypothesis was true, for the average number of shrimp dead for the regular brands were: Palm Olive# 64 and Pine-Sol# 59. But, Simple Green# turns out to kill an average of 62 shrimp. On the other hand, 7th Generation# only killed 2 shrimp and in the control brand only 1 shrimp died. I think my hypothesis came out partially right because I assumed that the environmental brands were

**Summary Statement**
My project is about the secondary effects that soaps have on the oceans.

**Help Received**
Ms.Arstill helped me receive my materials.

# CALIFORNIA STATE SCIENCE FAIR
# 2011 PROJECT SUMMARY

**Name(s)**
Alessandro Ginella; Rafael Rivas

**Project Number**
**J1109**

**Project Title**
## How You Affect the Slough

**Abstract**

**Objectives/Goals**
By studying micro-invertebrates as bio-indicators and measuring water quality indices we want to determine the health of our local wetland in order to determine the effect that human activity has on the wetlands.

**Methods/Materials**
Materials: Boots and waders, two dippers, sample jars, Estuary Marine Monitoring Kit, notebooks, microscope.
Methods: We visited Harkins Slough in Watsonville. We took 3 samples (Two weeks apart)from 3 different areas of the slough: West Branch, Struve and Hanson. Westbranch was the control as it is more isolated. Hanson is surrounded by some houses and organic farms and Struve is surrounded by many houses and a bridge. We got our samples and identified creatures swimming in the water.We also tested the water for water quality indices: phosphates, salinity, PH, nitrates and dissolved oxygen.

**Results**
Our results from the Estuary Water Quality Kit ranking shows that West Branch Site (control) is the healthiest with the rank of 14 points for its water quality indices then comes Hanson site, surrounded by organic fields, with 13 points and last but not least, Struve site, surrounded by roads, houses and commercial strawberry fields, with 11 points.

**Conclusions/Discussion**
In conclusion, our hypothesis was partly correct; however,Hanson wasn't the best environment of them all. Westbranch was the best environment because it had more dissolved oxygen and less phosphates. We also found more aquatic invertebrates at Westbranch site which has a lot of plants, animals and ground squirrels.There are fewer houses and roads. Struve is surrounded by houses, roads and commercial strawberry fields. We are still wondering, as you can see on the nitrate chart, the third time we visited the three sites, we strangely had much lower results. Maybe it's because the first two samples were taken after the rain, and maybe there was more run-off.

**Summary Statement**
Examining the health of our local slough, we observed the effect that human activity has on the wetlands.

**Help Received**
SC Vector Control Specialists showed dipping techniques, suggested contol site; Mothers ordered Water Quality kit, helped with some typing, took picturees and drove to the sites

# CALIFORNIA STATE SCIENCE FAIR
## 2011 PROJECT SUMMARY

**Name(s)**
Leslie T. Gobel

**Project Number**
**J1110**

**Project Title**
## How Does Acid Rain Affect Aquatic Plants?

**Abstract**

**Objectives/Goals**
My objective was to determine the survival rate of aquatic plants after an acidic rain.
My hypothesis was that the greater amount of acid in the tanks, the lower the survival rate of the organisms.

**Methods/Materials**
I added 10 duckweed and 10 elodea to 4 tanks with 2 liters of water in each of them. I added .5M nitric acid to each tank until tank #2 had a pH of 6.0, tank #5 had a pH of 5.0, and tank #4 had a pH of 4.0. Tank #1 remained as a control with a pH of 7.0. While I added the acid, I monitored the pH with a pH meter. I added the organisms to the tanks after all of the acid had dissolved into the water. I observed and recorded the survival rates every hour for 10 days. I analyzed the data to determine how acid rain affects the survival rate of aquatic plants and animals.

**Results**
My graph shows that when the pH dropped, the survival rate of the plants dropped, too. The duckweed graph shows that after 98 hours, only 4 duckweed were left in the pH 4 water, 6 in the pH 5 water, and 7 in both the pH 6 and 7 water. Also, the elodea graph shows that only 4 elodea were left in the pH 4 and 5 water, 6 were left in the pH 6, and 7 were left in the pH 7. My data seems to indicate that my hypothesis is correct. As the acidity increased and the pH dropped, more of the plants died. My experiment indicates that when acid rain occurs, it affects many of the plants that live in the area it rains on. I think I got the results I got because when the plants use the oxygen in the water they get the acid too, which causes them to die. Duckweed and elodea can generally survive in pH levels as low as 5. This experiment is important because it helps people understand what the effect of these natural and manmade gases are. When people are aware of the effect they have on plants and animals, it gives them a chance to try to come up with a way to decrease the release of nitrogen compounds into the air. They can come up with ways to keep the gas levels low, so acid rain does not occur as much. Not many people know what acid rain is and how it affects our environment, and my experiment will make others aware of what happens when acid rain comes.

**Summary Statement**
I experimented to determine how acid rain affects aquatic plants.

**Help Received**
teacher helped me with the acid

# CALIFORNIA STATE SCIENCE FAIR
## 2011 PROJECT SUMMARY

**Name(s)**
Mathew Hartounian

**Project Number**
J1111

**Project Title**
## Los Angeles River Pollution

**Abstract**

**Objectives/Goals**
The objective of my project was to determine the changes in pH,turbidity,ammonia and dissolved oxygen along the Los Angeles River water upstream and downstream of the Glendale Water Reclamation Treatment Plant.

**Methods/Materials**
At various locations along the Los Angeles River water samples were taken upstream and downstream of the Glendale Water Reclamation Treatment Plant (Zoo Dr, Sonora Ave, Bob Hope Dr, Woodman Ave, Sepulveda Blvd upstream and Los Feliz Blvd, Glendale Blvd, Fletcher Dr, Dallas St and Hardwood St downstream) and tested for pH, turbidity, ammonia and dissolved oxygen using a pH meter, a turbidity meter (colorimeter), Hach ammonia test strip kit,and dissolved oxygen meter. The averaged results for each dependent variable (pH,turbidity,ammonia and dissolved oxygen)upstream and downstream were compared.

**Results**
It was found that the average of all samples taken had higher pH, turbidity and dissolved oxygen and lower ammonia values upstream of the Glendale Reclamation Water Treatment Plant than downstream.

**Conclusions/Discussion**
The results confirmed my hypothesis that the pollutants along the Los Angeles River water downstream of the Glendale Water Reclamation Treatment Plant had decreased.

**Summary Statement**
Researching the quality of the Los Angeles River water.

**Help Received**
My father supplied me the materials for the project.

# CALIFORNIA STATE SCIENCE FAIR
# 2011 PROJECT SUMMARY

**Name(s)**
Nicholas K. Ida

**Project Number**
**J1112**

**Project Title**
## A Study of Lead Contamination in Areas Surrounding Shotgun Shooting Ranges

**Abstract**

**Objectives/Goals**
The objective of this study was to determine whether large deposits of lead found in shotgun shooting ranges escape into the surrounding soil and water.

**Methods/Materials**
Methods: 1. Collect 15 soil and 3 water samples per shooting range. 2. Plot & record location of each sample using a handheld GPS. 3. Test samples according to the Lead Inspector Test Method. 4. Compare the color of the treated samples with the Lead Inspector Color Guide to obtain lead concentrations in ppm. 5.Transfer the sample sites from the handheld GPS onto the Google Earth satellite maps.

Materials: power drill, Lead Inspector Lead Test Kit, white vinegar, measuring spoons, range maps, soil/water samples, glass vials, plastic bottles, plastic cups with tops, funnel, Coffee Filters, Handheld GPS unit, Pocket Fishing pole

**Results**
Twenty-eight out of the 30 soil samples from the perimeter of shooting ranges were below the EPA safety guidelines of 400 ppm. Thus, these 28 samples contained a safe level of lead. Five of the 6 water samples were found to be lead-free.

**Conclusions/Discussion**
The results of the study showed that lead does not escape from shotgun shooting ranges into the surrounding soil and water. This study confirms that lead pellets are inert and immobile once they are deposited into the soil and water.

**Summary Statement**
This study looks at lead deposits found in shooting ranges and its impact on surrounding soil and water.

**Help Received**
Father helped obtain samples and run lead testing. Teacher reviewed project proposal.

# CALIFORNIA STATE SCIENCE FAIR
## 2011 PROJECT SUMMARY

**Name(s)**
Sawyer L. Judge

**Project Number**
**J1113**

**Project Title**
# An Oily Matter: Does Crude Oil Affect Decomposition and Fossilization?

**Abstract**

**Objectives/Goals**
The Gulf of Mexico oil spill was a hot topic in the news this past year. There are many concerns about the lasting effects of the spill on the Gulf and surrounding area's precious ecosystem. Crude oil caused the deaths of many animals and settled to the bottom of the ocean floor. The objective of my experiment was to create and examine several Gulf-like environments to discover if crude oil altered decomposition and/or specimen imprints.

**Methods/Materials**
To begin my experiment, I predicted that adding crude oil to an environment similar to the Gulf would slow decomposition rates and yield better imprints. I tested this using fifty jars. My variables included combinations of dirt, sand, crude oil, and ocean water. The idea was to simulate an environment similar to the Gulf of Mexico area. I conducted three trials across eight environments using orange peels and chicken bones. Observational and quantitative measurements were taken in my experiment. The jars were set on a shelf exposed to the outside light from 14 November until 12 December. After four weeks, I carefully removed each specimen and logged my data. I measured pH levels weekly to ensure normal levels existed.

**Results**
After analyzing my data tables, charts, and graphs, I found that the presence of crude oil in an environment tended to slow decomposition. If all other factors are favorable, it is possible that such an environment could form a clear imprint and eventual fossil.

**Conclusions/Discussion**
All other conditions willing, introducing crude oil to an environment could decrease decomposition rates and increase the chances of creating an imprint in dirt or sand. This information may suggest that areas with past oil spills may be rich in developing fossils.

**Summary Statement**
This experiment simply shows that the presence of 100% crude oil slows decomposition and may improve imprints (start fossilization) in certain environments.

**Help Received**
Feedback from parents, science teacher, school judges, and county judges.

# CALIFORNIA STATE SCIENCE FAIR
# 2011 PROJECT SUMMARY

**Name(s)**
Nathan C. Le

**Project Number**
**J1115**

**Project Title**
## Which Aquatic Plant Will Reduce the Most Amount of Nitrate?

**Abstract**

**Objectives/Goals**
The purpose of this experiment was to see which aquatic plant would absorb the most Nitrate in a one-day cycle. This would help to find out which water plant would be best to put in ponds to purify and absorb pollutants such as fertilizer runoffs from farms and houses. My hypothesis was that Vallisneria would absorb the most Nitrate.

**Methods/Materials**
I used four 7.2 liter glass containers with an under-gravel filter system to provide oxygen for the bacteria to convert the ammonia to nitrite, and nitrite to nitrate. Then I used one container for the control which had no added Ammonium Nitrate. In the other three I put three different plants: Hornwort, Anacharis, and Vallisneria. Two Vernier probes (Ammonium and Nitrate Ion-Selective Electrodes) were used to collect and graph the data.

**Results**
Hornwort was the plant that absorbed the most nitrates in 50 mg/L of nitrate concentration, while Anacharis was the one that absorbed the most nitrates in the 2.5 mg/L concentration. There were some rainy days that did not have any sunlight, so the data were not used for those days.

**Conclusions/Discussion**
Based on the results, my hypothesis was not supported. I forgot to consider that Hornwort and Anacharis (the plants that absorbed the most Nitrate) had many small, spiky leaves, while Vallisneria had few long bladed leaves. The small leaves had more surface area, and would absorb more Nitrate. Hornwort was the plant that absorbed the most Nitrate in 50 mg/L of Nitrate concentration (18.72 mg/L in a day), while Anacharis was the one that absorbed the most Nitrate in 2.5 mg/L of Nitrate (1.32 mg/L in a day).
In this experiment, I found out what pollution can do to a plant. At first, I tried to weigh the Ammonium Nitrate with the Pelouze RCX 5 scale, and there was too much Nitrate, so some plants died because they were dehydrated, even though they were in water.

**Summary Statement**
To see which aquatic plant would reduce the most amount of nitrate contamination from bodies of water.

**Help Received**
Science teacher ordered Ammonium Nitrate; brother showed me Vernier and how to use sensors and the software; and dad ordered necessary materials.

# CALIFORNIA STATE SCIENCE FAIR
## 2011 PROJECT SUMMARY

**Name(s)**
Primavera Leal-Martinez

**Project Number**
**J1116**

**Project Title**
# Investigating the Effects of Inland Contamination Rate of Oil in Various Soil Types

**Abstract**

**Objectives/Goals**
My objective was to investigate the effects of the inland contamination rate of oil in various soil types. My goal was to determine how far inland an oil spill will affect plant growth. I believe the highest harmful inland contamination rate of oil will be in the sandy soil. The least harmful inland contamination rate of oil will be in the top soil.

**Methods/Materials**
I used sponges to simulate a body of water. I placed 2 1/2 sponges in the center of 6 plastic containers. I poured 2 dry quarts of soil from 3 sample types including sand, top soil, and clay on each side of the sponges. I then planted radish seeds every two centimeters on both sides of the sponges. I poured 400 milliliters of water onto the sponges in each of the three trays. Water was my control. I poured 400 milliliters of oil/water onto the sponges in each of the 3 trays. I then covered the trays and recorded sprouts on day 2, 4, 6, and 8.

**Results**
The results of my investigation on the effects of the inland contamination rate of oil in various soil types indicate that the Sandy Soil had the least inland radish seed germination. The inland radish seed germination stayed at 0. The average number of seed germination was 0.

**Conclusions/Discussion**
After completing my investigation on the inland contamination rate of oil in various soil types, I found that my hypothesis for the highest harmful inland contamination rate of oil was correct. My hypothesis for the highest harmful inland contamination rate of oil stated that sandy soil would be the most harmful to the seed germination. The inland radish seed germination distance in centimeters with oil contamination started at 0 centimeters, and remained at 0 centimeters. The average number of sprouts that grew was 0. My hypothesis for the least harmful inland contamination rate of oil was also correct. My hypothesis stated that the least harmful rate of oil contamination to seed germination would be in the top soil. The inland radish seed germination distance in centimeters with oil contamination started at 6 centimeters and went up to 22 centimeters. The average number of sprouts that grew was 6.36.

**Summary Statement**
I investigated the inland contamination rate of oil in sandy, clay, and top soil and its effect on seed germination

**Help Received**

# CALIFORNIA STATE SCIENCE FAIR
# 2011 PROJECT SUMMARY

**Name(s)**

**Rebecca G. Maglieiri**

**Project Number**

**J1117**

**Project Title**

## Investigating the Amount of Concrete in Cities Affecting Global Warming

**Abstract**

**Objectives/Goals**

The purpose of my science investigation is to determine if the use of concrete in cities is contributing to global warming. The reason that I am doing this experiment is to find out if the concrete that is used in city streets, buildings, bridges, airports, and tunnels has an effect on the increase in temperature on earth.

**Methods/Materials**

I plan on testing five different environments, each with varying amounts of concrete. The environments will be in 5 20 gallon terrariums. The first terrarium will have no concrete, the second one will have 25% concrete, the third one will have 50% concrete, the fourth one will have 75% concrete, and the fifth one will have 100% concrete. I will use a heat lamp set on the terrarium and heat the terrarium to 110 degrees Fahrenheit. I will use a thermometer and record the drop in temperature in each terrarium over a 10 hour period of time. I plan on repeating the procedures ten times per terrarium and taking an average of the times and drops in temperature. I will figure out which concrete environment retains the most heat for the longest period of time.

**Results**

The average temperature increased in 7.3 minutes in the container with 100% concrete. The average temperature decrease was in 304.1 minutes.

Discussion: The concrete retained the temperature for the longest time. The container was completely covered in concrete therefore concrete retains more heat.

**Conclusions/Discussion**

After completing my investigation on the amount of concrete in cities and the effect of global warming, I found that my hypothesis was correct. My hypothesis stated that the container with one hundred percent concrete would heat up the fastest and return to the original temperature in the slowest amount of time. It took an average of 7.3 minutes for the container to heat up to 110 degrees, and the temperature returned to the starting temperature in an average of 304.1 minutes. In the control container the temperature increased to 110 degrees in an average of 11.8 minutes and returned to the starting temperature in an average of 10.5 minutes.

**Summary Statement**

My project will determine if a concrete environment retains the most heat for the longest period of time therefore linking global warming with the amount of concrete in cities.

**Help Received**

# CALIFORNIA STATE SCIENCE FAIR
# 2011 PROJECT SUMMARY

**Name(s)**
Erin M. Miller

**Project Number**
**J1118**

**Project Title**
## As Pure As Rain: Testing the Purity of Rainwater from the San Mateo Coast to Sacramento

**Abstract**

**Objectives/Goals**
My hypothesis is that rainwater will be less pure (more acidic, more biological materials and other impurities) the further you get from the coast.

**Methods/Materials**
Between 12/31 and 2/26 I collected three clean catch rainwater samples at six locations from El Granada to Sacramento. I analyzed the samples four ways: (1) measured the rainwater (2) grew it in Petri dishes (3) chemically tested it (4) filtered it.

**Results**
Rainwater is normally mildly acidic (<7). Coastal pH averaged 6.467 and inland samples were LESS acidic than the coast. Filtrate at El Granada (coast) and on Kings Mountain were measurable at 4 grams and 2.5 grams per liter respectively. The other sites had almost no filtrate. Biological Activity: generally, rainwater collected further inland (Dublin, Sacramento) had fewer colonies and less biological diversity than other regions, although Milpitas (next to the SF Bay) along with areas closer to the coast had many species of bacteria, yeasts and other microorganisms.

**Conclusions/Discussion**
My hypothesis is incorrect. Coastal rainwater has more solids and is very biologically diverse, more so than rain collected further inland. Unexpectedly, inland rainwater is slightly less acidic. So, do not drink the rainwater unless you are at least 30 miles inland.

**Summary Statement**
I collected three clean rainwater catches (12/31 to 2/26) at 6 locations between the San Mateo Coast and Sacramento and analyzed them, concluding that rainwater falling at least 30 miles inland is purer than coastal rainwater.

**Help Received**
Rainwater Collecters: G. Jug, D. Miller, K. Kennedy, H. Smith, D. Buserwini, H. Wood. Equipment: T. Koos of Stanford Earth Science Lab (pH meters), R. Ferber (microscope, laser pen, Autoclave), Science teacher T. Joi (gram scale, second group of Petri dishes), D. Doran who gave me two chemical testing

# CALIFORNIA STATE SCIENCE FAIR
# 2011 PROJECT SUMMARY

**Name(s)**
Alexandra R. Nordyke

**Project Number**
**J1119**

**Project Title**
## The Effect of Wildfires on Grass Regrowth

**Abstract**

**Methods/Materials**
- â#¢ About 2 kg of Brush Ash
- â#¢ About 2 kg of Wood Ash
- â#¢ One Fire pit to create ash
- â#¢ One Oven
- â#¢ 2 large Pyrex casserole pans
- â#¢ 27 ZiplocA# 500 mL containers
- â#¢ One packet of native California Fescue grass

**Results**

The 5 day rain in December 2010 washed out the first run of the experiment. The experiment was completely restarted. Results of experiment begin in Figure 1 which shows that grass seed that was baked did not germinate. These trials were therefore not included in the remaining analyses. The complete results for Ash Type and Baking Time are reported in Tables 1 and 2. These results are explored in detail in Figures 2 and 3.

Figure 2 compares growth characteristics of grass grown in the two ash types versus controls for the three weeks measured. The left panel shows that for all three weeks, the average grass height of both ash types was less than controls. There were no significant differences in the average height of the two ash types. The Right panel in Fig. 2 shows that there may have been better germination in the wood and brush ash trials.

Figure 3 compares growth characteristics of grass grown in soil that was baked for 10 and 30 minutes versus controls for the three weeks measured. The left panel shows that for all three weeks, the average grass height of both bake times was less than controls. There were no significant differences in the average height of the two bake times. The Right panel in Fig. 2 shows that there may have been better germination in the soil that was baked. Linear regression was used to determine whether, when considered together, the ash or the bake time had a greater effect on grass height. This showed that the ash had perhaps a greater effect on limiting grass height.

**Conclusions/Discussion**

The results showed clearly that simulated fire keeps grass seed from germinating. For unbaked seeds, germination seemed to be better in soil with ash. This may have been because the ash provided protection for the seeds and kept them more moist. However, the findings also suggest that grass growth was stunted by ash and if the soil was baked. The seeds grew the best with out any simulated fire effects.

**Summary Statement**

This experiment is testing how the characteristics of a fire; time duration, ash composition, and the effect of the heat on seeds, would effect the soil and how the grass regrows.

**Help Received**

Father supervised the burning of the wood and ash. Mother helped with STATA program.

# CALIFORNIA STATE SCIENCE FAIR
# 2011 PROJECT SUMMARY

**Name(s)**
Stevie A. O'Connor

**Project Number**
**J1120**

**Project Title**
## Worm vs. Warm: Yogurtland, Lazy Acres, or Bamboo Studios?

**Abstract**

**Objectives/Goals**
The purpose of this experiment is to show companies how effective biodegradable/compostable utensils really are and how much smaller their impact on the world is. The purpose is also to show which compost system is most effective and to show people that composting is a good, effective idea that is worthy of their time and energy. My hypothesis for this project was, if I plant three different biodegradable/ compostable spoons in two different compost piles/bins, then the Bamboo spoons will break down faster than the Yogurtland and Lazy Acres spoons.

**Methods/Materials**
Materials: Eight Yogurtland, Lazy Acres and Bamboo spoons, Aerobic and Vermiculture compost, triple Beam Balance, graph Paper, bright duct tape and a camera. Procedures: Divide spoons into two piles (four of each in each pile), keep spoons separated. Label the spoons with different numbers, up to four (Yogurtland 1,2,3,4, etc.). Measure mass of all spoons. Record on paper. Calculate total mass (Yogurtland bin #1&#2, etc.). Trace each spoon on graph paper to determine $cm^2$ (surface area). Photograph each group of spoons. Date pictures accordingly. Wrap one piece of bright green duct tape around each spoons, to aid in finding them. Bury one group of spoons in each bin. Next week, dig up spoons from both composts bins, keeping groups separate. Finally, repeat all steps for seven weeks starting at step three.

**Results**
Since there was not enough time to complete the testing, my results are unknown. I was able to make an educated guess about the results. My guess was that the Bamboo spoon would break down the fastest because it was the one showing signs of deterioration and one beginning to fall apart. I guessed that the Aerobic compost bin would break down the Bamboo spoon the fastest because the bamboo spoons in the Aerobic compost bin were showing more signs of deterioration compared to the Vermiculture compost bin.

**Conclusions/Discussion**
It was too early to tell the exact and accurate result of my experiment. I did realize some interesting things during my experiment. One of the things I realized was that he fluctuation in the spoons weight may have been due to the amount of moisture they absorbed each week and may have varied depending on how much moister was in the compost each week. Given a sufficient amount of time, I would have been able to conclude the full results of my experiment.

**Summary Statement**
My project was comparing the rate at which three different biodegradable spoons (Yogurtland, Lazy Acres and Bamboo Studios) will break down in two different compost bins (Aerobic Compost Bin and Vermiculture Compost Bin).

**Help Received**
Mother and Father helped with digging up spoons from compost bins. Mentor answered questions through email for me, to help with project.

# CALIFORNIA STATE SCIENCE FAIR
## 2011 PROJECT SUMMARY

**Name(s)**
James G. Oury

**Project Number**
**J1121**

**Project Title**
## Escondido Creek: A Water Quality Study

**Abstract**

**Objectives/Goals**
The Escondido Creek is surrounded by semi-urban development and agriculture. My hypothesis was that coliforms, including E. coli, from the horse barns nearby might be present in excessive concentrations in the Escondido Creek. I hypothesized that the constant hosing down of the barns at the horse farms might create an influx of bacteria due to runoff even in times of no rain. I decided to test water samples during dry times to see if bacteria levels decreased as more time passed since the last rain event.

**Methods/Materials**
I rode my bicycle to the creek and obtained water samples on multiple days, 7 days, 14 days, and 21 days after the last rain event. I refrigerated the samples immediately each time. I then cultured samples in a lab with adult supervision, but I did all of the work myself. I cultured the samples using sterile procedures and ColiScan Easygel.I mixed the ColiScan with 2 milliliters of sample water, and put the mixture in labeled Petri dishes in each trial. I also had made 0.1 and 0.001 dilution samples which were mixed with sterile water. The plates were placed in an incubator at 36 degrees C for 48 hours. I then returned to the lab, read the samples and recorded the results.

**Results**
Excessive levels of bacteria were found in abundance in my samples. In sample one, most of the coliform levels were too numerous to count, seeming to indicate contamination from the horse barns Even 14 or 21 days since the last rain event, my samples continued to reveal high levels of bacteria. For each sample cultured, there were coliform and E.coli lawns. There were also multiple lawns of non-coliform colonies in many plates. I also had other concerns regarding water quality due to some of my results from other measures of water quality testing. The pH level in the Escondido Creek was 8.5 on one day with an ammonia level of 0.25ppm. At a level of pH 8.5, even 0.25 ppm ammonia may be toxic to fish and aquatic life. Phosphate levels in my water samples were also too high (5 ppm -8 ppm). Iron levels were excessive (1 ppm # 5 ppm) and copper levels ranged up to 1.5 ppm. Chromium tested at 0.2 ppm which may indicate industrial waste.

**Conclusions/Discussion**
I would like to continue collecting more samples over an extended period of time. It appears the Escondido Creek in the area of Olivenhain remains contaminated with excessive loads of bacteria even during dry weather.

**Summary Statement**
My project tested creek water quality in an area surrounded by semi-urban develpment and agricuture.

**Help Received**
Thanks to my teacher who provided equipment and scientific guidance. Thanks to my mother who helped edit my report and also provided guidance.

# CALIFORNIA STATE SCIENCE FAIR
## 2011 PROJECT SUMMARY

**Name(s)**
Titus M. Patton

**Project Number**
**J1122**

**Project Title**
## Poop Power: What Types of Biomass Produce the Most Gas?

**Abstract**

**Objectives/Goals**
My objective is to determine which biomass produces the most gas (manure and apple, manure and banana, or manure). My hypothesis states that I believe that manure plus apple will produce the most gas.

**Methods/Materials**
I conducted two experiments using 9 identical 2 liter soda bottles, electrical tape, and balloons to create biogas generators. I had a total of 18 bottles acting as generators. In each experiment, three bottles were filled with cow manure and apple plus distilled water, three bottles were filled with cow manure and banana plus distilled water, and three were filled with just manure plus distilled water. I placed the bottles at room temperature for 18 days. I measured the circumference of the each balloon in millimeters (mm) every day.

**Results**
The biomass of manure and apple produced the most gas, producing on average 113.33 mm. The bottles with banana and manure produced some gas, on average 73.33 mm. The bottles with plain manure (control) produced 36.67 mm.

**Conclusions/Discussion**
My conclusion is that the production of biomass energy is possible by using manure and biomass. This energy can be transformed into a useful energy source. Using the fermentation process to turn the manure and biomass, such as apple, into methane causes the generator to produce gas.

**Summary Statement**
My project explores the production of biomass gas using cow manure, apples, and bananas; which is a great alternative renewable energy source for the future.

**Help Received**
My parents supervised the set up, handling, and clean up of materials.

# CALIFORNIA STATE SCIENCE FAIR
# 2011 PROJECT SUMMARY

**Name(s)**

Triston Pigg; Owen Reiss

**Project Number**

**J1123**

**Project Title**

## Effects of Native Dune Flora on Mammalian Diversity

**Abstract**

**Objectives/Goals**

Our objective is to determine whether abundance of native floral species, and/or floral diversity (Simpson's diversity index), has a significant correlation with mammal signs (tracks, burrows, etc.) per square meter.

**Methods/Materials**

Three six by twelve meter plots were flagged at three sample sites on three different beaches, ranging in native species dominance, determined by conducting preliminary surveys. Six randomly-selected quadrats (meter square plot divisions) were surveyed for floral basal coverage as well as quantity; the entire plot was surveyed for mammal signs using a mammal field guide.

**Results**

Native species abundance had a significant negative correlation with mammal signs per square meter. Overall plot basal coverage had a significant positive correlation with mammal sign quantity.

**Conclusions/Discussion**

Our conclusion is that mammal species, esp. small mice-like mammals, need high grasses (e.g. Ammophila arenaria) to survive; these high grasses are often invasive, accounting for the positive correlation between invasive species abundance and mammal sign quantity. Without adequate shelter, the large population of small mammals are hunted by larger predators (e.g. birds), reducing the population of mammals.

**Summary Statement**

We investigated dune habitats to see if native (vs. introduced) plants affected mammal populations.

**Help Received**

Dad lent me an ecology textbook; Parents drove us around to beaches

# CALIFORNIA STATE SCIENCE FAIR
## 2011 PROJECT SUMMARY

**Name(s)**
Angela N. Pogson

**Project Number**
**J1124**

**Project Title**
# Biochar and Acid Rain

**Abstract**

**Objectives/Goals**
Biochar is the porous carbon residue left over from burning biomass by pyrolysis, a low oxygen, high temperature process. When added to the soil, biochar helps retain nutrients and enhances plant growth. Acid rain, or acidic precipitation, leeches nutrients out of the soil and decreases plant growth. My objective was to learn if biochar mitigates the harmful effects of acid rain.

**Methods/Materials**
I used hydrochloric acid and sodium acetate to make my acidic solution. For my biochar, I crushed charcoal made by pyrolysis. I set up an experiment with four different treatments: potting soil watered with H2O, potting soil watered with my acidic solution (pH 4.3), biochar with H2O, and biochar with the acidic solution. I grew plants in these treatments for approximately one month. I also took the nutrient and pH levels at the beginning and end of the experiment.

**Results**
I discovered that the acid treatment had a negative effect and reduced the final biomass and the pH of the potting soil. The biochar (no acid) treatment had a positive effect and increased both the pH of the soil and the plant biomass. The acid plus biochar treatment did not have as reduced biomass as caused by the acid alone.

**Conclusions/Discussion**
Overall, biochar alone had a positive effect and, as expected, enhanced plant growth. My results also indicate that biochar did slightly mitigate the effects of acid on plant growth. The biochar plus acid treatment also retained a lot of nutrients, but curiously, lowered soil pH more than acid alone. I also found that the root weight was the exact opposite of the results for plant biomass, with potting soil and acid having the largest roots and biochar with H2O having the smallest. I concluded that this was because the roots had to go deeper into the soil to access the nutrients the acid was leeching out.

The pyrolysis process is carbon negative, meaning that the biomass that is burned retains the carbon that it collected while the plant was alive, instead of releasing it back into the atmosphere. Biochar is an excellent way to sequester carbon dioxide in the ground, and, if it is made on an industrial scale, biochar could help fight climate change. Biochar, as shown in this experiment may also help mitigate the effects of acid rain.

**Summary Statement**
I conducted an experiment to examine whether biochar could mitigate the effects of acid rain on plant growth.

**Help Received**
To conduct this experiment, I used Professor Grant Pogson's lab at UC Santa Cruz. He helped me with making my acidic solution and let me use his pH meter and scale.

# CALIFORNIA STATE SCIENCE FAIR
# 2011 PROJECT SUMMARY

**Name(s)**
Daoud I. Qamar

**Project Number**
**J1125**

**Project Title**
## How Does Acid Rain Affect a Building?

**Abstract**

**Objectives/Goals**

To conduct my investigation, I will use multiple liquids (acids, bases, and neutrals) to simulate rain. The liquids will represent the independent variable as it will be changed. I will use a common brick to represent a building#s stereotypical exterior. The brick will be my dependant variable.

Investigative question: How does acid rain affect a building?

I hope to answer a few questions with this experiment:
1 Does acid rain erode buildings?
2 If so, how does it erode a building?
3 Does an acid erode faster?
4 Does a base help preserve buildings?

**Methods/Materials**

MATERIALS: 1 Stds bricks 10; 2 Med droppers 5; 3 Containers 5 - 20 oz; 4 Bleach 16 oz ea. liquid; 5 Milk; 6 Water; 7 Coke; 8 Vinegar; 9 Planter to house bricks.

PROCEDURES
1. Place bricks in planter vertically. 2. Fill ea glass w/ ea liquid. 3. Place 3 drops on brick to start. Add 3 drops on the next day (adding 3 more drops to amount ea. day). 4. Observe for 15 days. 5. Tally up your observations. 6. Chart how each liquid did using a point system.

Point System for effect & discoloration: 1st=5pts, 2nd=4pts, 3rd=3pts, 4th=2pts, 5th=1pt. Add up pts & make final rankings. Convert rankings into chart.

**Results**

TRIAL RESULTS - POINT SYSTEM

| Trials | Brick 1 | Brick 2 | Tot | Ave |
|---|---|---|---|---|
| Bleach | 10 | 10 | 20 | 10 |
| Milk | 6 | 4 | 10 | 5 |
| Water | 4 | 5 | 9 | 4.5 |
| Vinegar | 6 | 5 | 11 | 5.5 |
| Coke | 6.5 | 5.5 | 12 | 6 |

**Summary Statement**

Study the affects of acid rain by using multiple liquids to simulate acid rain on common brick.

**Help Received**

Dad helped buy materials and type this application. Mom reminded to do trials daily.

# CALIFORNIA STATE SCIENCE FAIR
## 2011 PROJECT SUMMARY

**Name(s)**
D. (Tre') Risk, III

**Project Number**
**J1126**

**Project Title**
## Comparing Environmental Pollution across the Coachella Valley

**Abstract**

**Objectives/Goals**
Two prominent feature of the Coachella Valley are golf courses and naturally occurring oases along the San Andreas Fault. I will test six bodies of water for biological (E. Coli and general coliform) pollutants and chemical contaminants to test if golf courses are more polluted than a natural oasis.

**Methods/Materials**
Select three sample sites at the natural oasis and three sample sites at the golf club. The sample sites were selected to represent standing water and running water for each location. Using test kits and a test meter for Dissolved Oxygen (DO), test six different bodies of water for Dissolved Oxygen saturation, nitrates, nitrites, turbidity, pH, alkalinity, hardness, phosphates. Filter samples and culture for total coliform, and E coli. Measure latitude, longitude, elevation for each sample. Repeat tests over a four month period of time to see if any significant differences occur.

**Results**
I took a total of 27 samples and performed 270 tests. Less desirable Dissolved Oxygen, pH, turbidity, alkalinity, and general coliform levels were measured at the natural oasis. E.coli samples were similar between the similar water body types at each location. Nitrate levels were minimally higher at one water source at the golf club, but within acceptable limits.

**Conclusions/Discussion**
When properly managed, a golf course may not be a major source of pollutants; in fact, it may be more conducive to a favorable environment for life than a naturally occurring spring.

**Summary Statement**
Are golf courses by their nature, a source of environmental pollution?

**Help Received**
Dad took me to collect water samples; Mom helped with graphs; access to water samples provided by Tradition Golf Course.

# CALIFORNIA STATE SCIENCE FAIR
# 2011 PROJECT SUMMARY

**Name(s)**
Allysun R. Robie

**Project Number**
**J1127**

**Project Title**
## Jolly Giant Creek Watershed: Solve the Dissolve

**Abstract**

**Objectives/Goals**
The purpose of this project is to determine if different sites on the Jolly Giant Creek are consistently healthy enough to sustain aquatic life forms by measuring the viability of the fish habitat in this creek.

**Methods/Materials**
Two sites on Jolly Giant Creek in Arcata were established. Site #1 is located on 17th Street/Alliance Road in the rural area of Shay Park near a small bridge. Site #2 is located on K Street/9th Street in an urban area. Both sites were tested at the same time each day, over a seven day period of time. Each test was repeated a total of three trials each day at site #1 and site #2, to establish validity. Dissolved oxygen was measured using a Hach Dissolved Oxygen kit, according to the test kit procedure. A control group was measured by obtaining three 1 liter container specimens at the site. One container was heated to 30 C and dissolved oxygen was measured. Another container was chilled to 5 C and dissolved oxygen was measured. All measured data was recorded on a chart for analysis.

**Results**
The site #1 (17th Street/Alliance Rd) total mean for water temperature was 9.6 C. The measured DO mean was 10.5 mg/L and the mean for % saturation was 93.7%. The site #2 (K Street/9th Street) total mean for water temperature was 9.86 C. The measured DO mean was 10.34 mg/L and the mean for % saturation was 91.9%. The DO fluctuated daily more at site #2 than site #1. The overall mean DO over 7 days at site #2 was a similar level to site #1. The lowest DO measured at site #2 was on 2/7/11 measuring 9.3 mg/L and the % saturation was 83%.

**Conclusions/Discussion**
The results of my data indicate that Jolly Giant Creek has adequate dissolved oxygen levels to sustain aquatic life forms. Dissolved oxygen levels in water that have a measurement 9 mg/L or greater supports abundant fish populations and does not impair production in salmonid waters. Site #1 and site #2 had mean dissolved oxygen levels greater than 10 mg/L. The measured dissolved oxygen at site #2 fluctuated more than site #1, however, the dissolved oxygen measurement at site #2 measured greater than 9 mg/L. These results indicate that Jolly Giant Creek can support a healthy fish habitat at the rural and urban sites. These results verify that my hypothesis is correct.

**Summary Statement**
This experiment measured dissolved oxygen, temperature and saturation at two different sites in the Jolly Giant Creek to determine if the creek was consistently healthy enough to sustain aquatic life forms.

**Help Received**
Parents ordered equipment needed for this project and assisted me in getting to the testing site each day; Science advisor Greg Ennes provided guidance with MSDS.

# CALIFORNIA STATE SCIENCE FAIR
## 2011 PROJECT SUMMARY

**Name(s)**
Brissa G. Rodriguez

**Project Number**
**J1128**

**Project Title**
## Determining the Harmful Effects of Battery Acid on Plant Growth

**Abstract**

**Objectives/Goals**
My objective is to determine if planting seeds/plants in soil contaminated by battery acid will decrease the germination/growth process. I believe that planting seeds and plants in soil contaminated by battery acid will inhibit their growth.

**Methods/Materials**
Radish seeds were planted into 10 eight ounce cups safely filled with soil contaminated by old batteries with visible acid leakage. A set of 10 small radish plants were planted in soil contaminated with battery acid. The seeds and plants were watered as needed with tap water which was also contaminated with battery acid. The growth of both seeds and plants were measured with a centimeter ruler and recorded over a period of 20 days.

**Results**
Seeds in contaminated soil grew 1.42 centimeters over a period of 20 days. The average germination rate of radish seeds was 19% more than the germination rate of the control group. The Radish Plants steadily increased in growth over a period of 20 days growing an average of 1.37 centimeters.

**Conclusions/Discussion**
Battery acid does have an effect on plant growth. Based on my experiment, germinating radish seeds and growing radish plants in soil contaminated by battery acid might actually increase the growth process rather than decrease it. Although my hypotheses were incorrect, the soil is still contaminated with toxic battery acid that might have other effects on the plants that did not show in my experiment.

**Summary Statement**
The purpose of my science project is to investigate whether battery acid will contaminate soil enough to inhibit the growth of plants.

**Help Received**
Mother helped type report; Father helped glue title on board

# CALIFORNIA STATE SCIENCE FAIR
# 2011 PROJECT SUMMARY

**Name(s)**
Kaitlyn A. Russo

**Project Number**
**J1129**

**Project Title**
## Determining the Level of Contamination in Storm Water

**Abstract**

**Objectives/Goals**
After collecting rainwater and stormwater samples for three separate rainy days and testing them for nitrates, ammonia-nitrogen, sulfide, phosphate, total dissolved solids, and pH, the stormwater collected will...
1) be more contaminated than rainwater, and
2) show an overall decrease in level of contamination per rainy day. The first rainy day will be found to have the most contaminates. Then, the second rainy day water will have the second highest level of contaminates. The water samples from the third rainy day collection will have the least amount of contaminates.

**Methods/Materials**
(Materials: collection cups, duct tape, sample bottles with lids, transportation, La Motte Water Pollution Detection Kit, distilled water, map, flashlight, timer, Internet) First, when it began to rain, I used duct tape to attach the cups outside to catch rainwater. Then I waited and checked the gutters until they were one inch in depth. I labeled my bottles one through six. Then, I got the red cups, bottles, and distilled water and had my mom take me to my locations around Clovis. At each location, I dipped the red cup into the stormwater, and then I poured the stormwater into the labeled bottle. I did this for all six locations. After collecting, I went home and collected the red cups from my backyard and poured them into one bottle labeled as the control. Next, I tested my samples for each of the contaminants with the La Motte Water Pollution Detection Kit. I recorded all of my data. When I was done testing, I used distilled water and rinsed the sample bottles thoroughly and let them air dry. I then repeated both parts of my experiment two more times.

**Results**
For rainwater versus stormwater, my hypothesis was supported. Stormwater was more contaminated. However, my results did not show a decreasing pattern over the three collection days and did not support my hypothesis.

**Conclusions/Discussion**
Rainwater, once it reached the ground, became contaminated with nitrates, total dissolved solids, ammonia-nitrogen, and phosphate. Sulphide, though, showed only a little difference. In most locations, the pH level decreased to a level lower than normal. Each contaminate affects our environment in a different way and needs to be cleaned properly before given to the public. People need to be more careful about what chemicals and cleaning products they use outside that may end up in the gutters.

**Summary Statement**
I compared rainwater and stormwater during three different rains to determine the level of contamination that enters our water system due to oils, chemicals, and other garbage on the streets of Clovis.

**Help Received**
My mother drove me to the water collection locations and helped type my report, my older sister helped me use the cutting board

# CALIFORNIA STATE SCIENCE FAIR
## 2011 PROJECT SUMMARY

**Name(s)**
Alicia M.J. Sadowski

**Project Number**
**J1130**

**Project Title**
## Oil Spills and Dispersants: A Deadly Duo?

**Abstract**

**Objectives/Goals**
The objective of my experiment was to simulate the use of dispersant by British Petroleum (BP) to clean up oil in the Gulf of Mexico Oil Spill. The experiment tested whether the amount of dispersant put into oil contaminated water affected dissolved oxygen levels and health of rotifers. My hypothesis was, "If the concentration of dispersant is increased in salt water, then the dissolved oxygen (DO) levels will decrease and the number of live rotifers will decrease."

**Methods/Materials**
A hypothetical dispersant was made based on information publicly available because the dispersant used by BP was not commercially available. A control of salt water was tested against water containing only oil and water containing oil and different concentrations of oil and dispersant varying from 1/10 to 10 times the amount of dispersant BP claimed to have used in the Gulf of Mexico. DO measurements were taken with a dissolved oxygen probe at various times for 22 hours. The second part of the experiment used live rotifers, microorganisms at the bottom of the food chain in the Gulf of Mexico, to study the effects of oil and dispersant on marine microorganisms. Rotifers were added to each jar under the same conditions as the first part of the experiment and the DO levels were taken immediately and for 3 days thereafter.

**Results**
Results from the first part of the experiment showed that the dispersant helped maintain DO levels because the jars with the highest dispersant concentration had DO levels closest to the control. In the second part of the experiment, the DO levels significantly dropped over time for all conditions. Upon inspection under a microscope, the only jar in which live rotifers were found was in the sea water control.

**Conclusions/Discussion**
The data in the first part of the experiment supported the hypothesis, but DO levels did not decrease significantly as more dispersant was added. The amount of dispersant used by BP seems reasonable because low (1/10x) or high (10x) concentrations of dispersant did not significantly affect DO levels. The data in the second part of the experiment confirmed the hypothesis. The rotifers in jars with oil and dispersant did not carry out cellular respiration to the same degree as seen in the control. Based on the results, regardless of DO levels, the use of dispersants seems to negatively impact the survival of marine organisms in oil contaminated water.

**Summary Statement**
To determine whether the use of dispersants in the Gulf of Mexico Oil Spill negatively affected water quality and marine life

**Help Received**
Used dissolved oxygen probe and microscope from La Reina High School; Father helped arrange presentation on poster board

# CALIFORNIA STATE SCIENCE FAIR
## 2011 PROJECT SUMMARY

**Name(s)**
Taylor J. Salmons

**Project Number**
**J1131**

**Project Title**
## Rooftop Gardens: Cool Idea?

**Abstract**

**Objectives/Goals**
My objective was to find the function of rooftop gardens, if they are insulators or coolers, and how they insulate and/or cool the internal temperature of a structure.

**Methods/Materials**
I got two equally sized boxes and put typical roofing on top of one, roofing and sod on another, a thermometer within each one, and an external thermometer on the outside. I then measured and recorded all the temperatures after 30 minutes inside, after one hour outside (varying conditions), and after two sets of 15 minutes back inside.

**Results**
My results were remarkable. My data supported the statement that rooftop gardens insulate the structure which they are on, therefore, under about 65 degrees the internal temperature of the rooftop garden box house rose somewhat substantially above both the external temperature and the internal temperature of the traditional box house. On the contrary, when circumstances were 65 degrees and above, the internal temperature of the rooftop garden box house dropped below the other thermometers acting as a cooler in this case and not as a heater. Again, the sod was an insulator.

**Conclusions/Discussion**
I did 20 trials and 4 tests within each trial, a total of 80 tests. I found, as previously stated that the sod upon the rooftop garden box model acted as an insulator, it both heated and cooled. Now the question is: is there a scientific explanation for how this happened? How can I more accurately harvest this insulating ability in further experiments? For in depth answers and discussions, I will see you at judging.

**Summary Statement**
I tested to find the function of rooftop gardens, and I found that they function as insulators.

**Help Received**
Father helped cut grass; close friend helped to analyze data

# CALIFORNIA STATE SCIENCE FAIR
# 2011 PROJECT SUMMARY

**Name(s)**
Anjana Srinivas

**Project Number**
**J1132**

**Project Title**
## What's in Our Water? A Comparison of Raw Water Quality in Three Countries

**Abstract**

**Objectives/Goals**
The objective of this experiment is to compare the quality of reservoir water in three cities located in three different countries, namely, San Diego, USA, Singapore, and Chennai, India.

**Methods/Materials**
The most important reservoirs in these three cities were selected for water sampling. Three samples were collected from each reservoir. Eight important qualities of the water were tested. These are temperature, pH, dissolved oxygen, bio oxygen demand, nitrates, turbidity, total dissolved solids, and hardness. The results of these tests were then calculated into weighted averages using the National Sanitation Foundations Water Quality Index for comparison.

**Results**
The results of the different tests were computed into water quality index values. The index values range from 0-100, 100 being excellent water. A total of 11 reservoirs, with 3 samples from each reservoir were tested in the three countries. The results were then calculated into a weighted average to arrive at an overall composite water quality index for each city. Singapore and Chennai, India both had a water quality index of 71, and San Diego, USA had a water quality index of 70.

**Conclusions/Discussion**
All three cities had comparable water quality. But water quality was only in the medium range, indicating that there is a lot more that can be done to further improve the water quality at the source and bring the level to excellent quality. This will help reduce water treatment cost and at the same time improve the fresh water eco-system and the environment at large. It is common fact that the water quality at the tap is poorer in developing countries like India, compared to developed countries like Singapore and USA. But the results of this project indicate that water quality at the source in these countries is similar, suggesting that countries like India should pay more attention to their treatment and transportation methods to improve the quality of drinking water at the tap.

**Summary Statement**
This experiment tested the quality of reservoir water in three cities located in three different countries, and did a comparison between them.

**Help Received**
Mrs. Erin Schumacher and Mrs. Elaine Gillum guided me through this project, and helped me gather my testing materials; Professional Geologist Mr. Brian Oram mentored me on this project; parents drove me to the reservoirs and proof read my work.

# CALIFORNIA STATE SCIENCE FAIR
# 2011 PROJECT SUMMARY

**Name(s)**

Catherine K. Takata

**Project Number**

**J1133**

**Project Title**

## Classroom Air Quality: An Investigation of CO(2) and Ventilation in a Classroom

**Abstract**

**Objectives/Goals**

Is the carbon dioxide concentration in a St. Anne School classroom consistent with optimum interior air standards? CO2 is the best measurable indicator of interior air quality and performance of the ventilation system. Standards for interior air specify that CO2 not exceed 1000 ppm. Academic performance of students is optimized at CO2 levels less than 1000 ppm. (Shaughnessy, 2010)

Hypothesis: I predict that the carbon dixide concentration will increase in a St. Anne Middle School classroom from the lowest concentration in Period 1, at the start of the day, to the highest in Period 7, at the end of the day.

**Methods/Materials**

Vernier CO2 sensor set at low range: 0 to 10,000 ppm CO2; Go!Link cable; Logger Pro 3.5 Computer Software (2007), www.vernier.com; Dell netbook 10" - Latitude 2100, Intel Atom processor, St. Anne School server, www.dell.com; Classroom B213, Mrs. Michelle Brooks, mathematics (grades 6-8), St. Anne School; Wall thermostat for temperature readings; functioning HVAC system, room B213; School bell - to signal time of data gathering per class period; Students enrolled (per class period) present in classroom; Pencil & notebook for recording.

**Results**

62 out of 80 class periods, or 77.5%, recorded averages greater than 1000 ppm CO2. The average % increase of CO2 per day among all the trials was 900.17 ppm or 155.5%. CO2 was lower after the teacher's prep period in each trial because Mrs. Brooks turned the thermostat down two degrees, which activated the HVAC system. She turned the thermostat back to its original temperature when her next period started. This is her prep period routine.

**Conclusions/Discussion**

CO2 increased from the start of the day to the end of the day in each trial by an average of 900.17 ppm or 155.5%, which supported the hypothesis that CO2 would increase through the day in a St. Anne Middle School classroom. Two classes benefited from optimum indoor air quality, less than 1000 ppm, the start of the day Period 1 (7th grade students) and Period 5 (6th grade students) who each day followed Mrs. Brooks's prep period. The remaining class periods had poor classroom air quality, greater than 1000 ppm.

**Summary Statement**

Academic performance of students is optimized at CO(2) levels less than 1000 ppm (Shaughnessy, 2010) and Mrs. Brook's period 1 and period 5 are the only periods with optimum CO(2) levels.

**Help Received**

Thank you, Mrs. Brooks for the use of her classroom and to my mom and dad and Mrs. Rivero, my science teacher, for their support.

# CALIFORNIA STATE SCIENCE FAIR
# 2011 PROJECT SUMMARY

**Name(s)**
Ryan M. Traynor

**Project Number**
**J1134**

**Project Title**
## The Effect of Acid Rain on Marigold Plants

**Abstract**

**Objectives/Goals**

The objective was to determine the effect increased acidity in watering solutions would have on the growth, flowers and sprouts, and health of marigold plants so that inferences could be made about the effect acid rain is having on our environment.

Research led to my hypothesis that the change in height of the plant would decrease by 25% from the control for each 1pH level, the flowers and sprouts growth would decrease by 10% for each 1pH change and the observed health of the plant would decline.

**Methods/Materials**

Six acidic watering solutions were made by adding vinegar to distilled water, with differing levels of acidity ranging from pH3.2 to pH6.0. The solutions were used to water 29 similar marigold plants (replanted to create identical conditions) in groups of 5 for 10 days. Each day, the plants' heights were measured, the number of flowers and sprouts were counted and general observations of the plants' health were completed.

**Results**

Growth rate declined from the control (pH6), beginning at an 8.3% decline at pH5.5 and ending in 1252.8% at pH3.2. The change in number of flowers increased, then declined at below pH 3.75 leading to a decrease from pH6 in flower growth by 34.37% at pH3.2. The change in number of buds or sprouts compared to pH6 dropped by 26.7% at pH 5.5 to a decline of 475% at pH3.2. Combining the increase in buds/sprouts and flowers, there was a decline in growth compared to pH6 at lower than pH 5.5. The counts declined by 66.7% at pH4.3 to 298% at pH3.2. The higher acidity levels led to the unhealthy appearance of plants beginning on day 10 with pH 4.3 and earlier with more acidity, resulting in day 4 with pH 3.2.

Increased acidity had a negative effect on the health and growth of plants. The growth rate and rate of flower and sprout growth combined declined. The observed health of the plants declined immediately.

**Conclusions/Discussion**

Increased acidity had a negative effect on the health and growth of plants. The growth rate, the rate of flower and sprout growth combined, and the observed health of the plants all declined with the addition of acid solutions. The effect of acid rain on plants needs to be communicated to the public immediately so that we can implement solutions or curb behaviors that will save our Earth!

**Summary Statement**

To replicate the detrimental effects on plant health by acid rain, I duplicated various region's acidic watering solutions and added them to plants causing the growth rate and health of plants to decline with increased acidity levels.

**Help Received**

My mother taught me how to use the graphing feature in Excel, but I did all the input, formatting and analysis.

# CALIFORNIA STATE SCIENCE FAIR
# 2011 PROJECT SUMMARY

**Name(s)**
Jem H. Unger Hicks

**Project Number**
**J1135**

**Project Title**
## The Question of Cattle

**Abstract**

**Objectives/Goals**
My project will determine whether cattle grazing affects the ratio of native to nonnative plant species on the Santa Rosa Plateau.

**Methods/Materials**
Materials:
1.Herd of cattle
2.50 meter long measuring tape
3.6 transects 1m x 50m each
4.GPS system
5.Clipboard, pen, and paper
6.Native plants
7.Nonnative plants

Method:
1.Locate transect areas to study the three plant communities.
2.Follow GPS to transect point. (metal post previously placed in ground by researchers)
3.Locate adjacent post, and spread 50m tape between the two posts.
4.Find first quad selected for study. Place yardstick on the tape at the number of the quad, and on the number subsequent to the first.
5.Identify the native and nonnative plants in the quad, and count each plant species in the quad. Record data. Repeat three times in each plant community, in each control group area.

**Results**
My results show that the cattle had different effects on different plant community transects. There was a #mixed review# in the individual transects, but overall the cattle had a positive effect on the ratio of native to nonnative plant species.

**Conclusions/Discussion**
My hypothesis was generally supported by my data, in that the cattle positively affected the ratio of native to nonnative plant species on the Santa Rosa Plateau. If you look in detail at the original transect graphs, you can see that there is a mixed outcome, in terms of the ratio of native to nonnative plant species. But by looking at the two general graphs, you can see that there is a bigger percentage of native plant species than nonnative in the grazed transects than in the not grazed.

**Summary Statement**
My project determines whether cattle grazing affects the ratio of native to nonnative plant species on the Santa Rosa Plateau.

**Help Received**
Kay Madore (Volunteer Docent and plant expert at SRP) for helping me carry out all my experiments. Carole Bell (Reserve Manager at SRP) for getting my project started. Suzanne Unger (my mom) for helping me with all my graphing and calculations, and for helping me with my display board format.