



# CALIFORNIA STATE SCIENCE FAIR 2010 PROJECT SUMMARY

<b>Name(s)</b> <b>Evan M. Bozanic</b>	<b>Project Number</b> <b>J1201</b>
<b>Project Title</b> <b>Differential Fish Count: Rebreather vs. Open Circuit</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective was to determine whether a diver would see more Paralabrax clathratus (an overhunted species of sea bass living off the coast of California) with a rebreather or with open circuit scuba. The hypothesis was that one would see more fish using a close circuit rebreather than open circuit scuba.</p> <p><b>Methods/Materials</b> Before diving, it was necessary to build a closed circuit scuba system to accommodate smaller sized individuals. Two weeks was spent building and modifying the rebreather. Open circuit testing was done using standard scuba equipment. Three weeks was spent training to use the rebreather and understanding mixed gas physiology. A team of four divers went to Shaw's Cove in Laguna Beach to do testing. A 50 meter semi-permanent transect line was placed at 6 meters of depth. 34 transects on open circuit scuba and 25 on closed circuit rebreather were conducted in 17 man dives (15 hours). Fish counts were recorded on underwater slates. The data was statistically analyzed looking at mean, median, standard deviation, confidence interval, and student T test.</p> <p><b>Results</b> Data showed that a median of 2 fish was seen on open circuit scuba and 5 fish were seen on closed circuit rebreathers. A standard deviation of one was obtained giving a confidence interval of 95%. Using student T test analysis, a P value less than 0.05 was calculated, showing the means of the two groups were statistically different.</p> <p><b>Conclusions/Discussion</b> More accurate fish counts can be obtained using closed circuit rebreathers instead of open circuit scuba. Differences in fish counts can be explained by disturbance from bubbles generated by open circuit scuba. Closed circuit rebreather technology would be useful for observing elusive fish species, getting accurate counts and ultimately helping to formulate fishing quotas.</p>	
<b>Summary Statement</b> The objective of this project was to ascertain the most accurate method of doing fish counts by using either a closed circuit rebreather or open circuit scuba for the purpose of creating better fishing laws.	
<b>Help Received</b> Dive Team: Brenna Bozanic, Jeff Bozanic, Edward Tu, Debi van Zyl. Rebreather Construction: Al Bane, Jeff Bozanic, Beth Durbin, Web Jessip Titan Dive Gear. Graphics/Editing: Edward Tu, Debi van Zyl.	



# CALIFORNIA STATE SCIENCE FAIR 2010 PROJECT SUMMARY

<b>Name(s)</b> <b>William C. Braymen</b>	<b>Project Number</b> <b>J1202</b>
<b>Project Title</b> <b>Who Turned Out the Stars?</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> In my project I explore if light pollution levels increase the closer you get to large, densely populated cities. The purpose of my project is to raise awareness about the growing threat of light pollution. I think this research question is worthy of study because light pollution is a greatly unknown and underestimated threat. If we can use the already eco-friendly San Diego as a role model for other cities, we can make a big difference in the world.</p> <p><b>Methods/Materials</b> I used time lapse photography to create a star trails photo in three different locations throughout San Diego County. A star trails photo is taken when you set a camera to take one continuous photo for 10 minutes. Because of the rotation of the Earth, the stars appear to streak across the sky. I performed subjective star counts using a star count tube, which is a long, plastic tube which I look through. I chose three stars, Vega, Aldebaran and Cappella as my three main stars. I looked at the main star through the tube and counted the number of stars around it. I also surveyed students at my school about their knowledge of light pollution.</p> <p><b>Results</b> The photos and star counts show that stars are more observable in less populated parts of the county where light pollution is minimal.</p> <p>When asked if they ever look up at the night sky, 12 out of 16 students said that they did. However, when asked if they can see the Milky Way from their house, only 3 out of 16 said they could. Six out of 16 did not know what light pollution was.</p> <p><b>Conclusions/Discussion</b> The data gathered proved my hypothesis to be correct. The survey taken by students at The Grauer School showed that light pollution is greatly underestimated. One possible error in my experimentation may have been that my sample size wasn't large enough. If I had gone to more locations in between Ramona and Encinitas, I would have a broader sample range, making my data more accurate. The main constraints for me were time and weather conditions. I had to make sure that on every night I observed, the moon was new, however, there were only so many nights with new moons and good weather. My experiment was designed to bring light pollution to the attention of residents of San Diego. Although I expected to find more light pollution near San Diego, it really was dramatic to see the lack of stars in Encinitas.</p>	
<b>Summary Statement</b> My project explores whether light pollution levels increase the closer you get to large, densely populated cities.	
<b>Help Received</b> Dr. Stuart Grauer allowed me to use The Grauer School as my Encinitas observation point. My teacher Patricia Wundrow supported and encouraged me throughout the development of the project. My father transported me and my equipment to various locations. My mother and sister helped me with grammar.	



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<b>Name(s)</b> <b>Alessandro P. Cois</b>	<b>Project Number</b> <b>J1203</b>
<b>Project Title</b> <b>Used Motor Oil Spills: Danger!</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The purpose of my experiment is to see how used motor oil affects the growth of plants. I believe the oil will prevent the plants from absorbing the water and nutrients that the plants need to grow from the soil. Also I believe that what the plant will be able to absorb will not be healthy and it will show with stunt growth and wilting of leaves. I believe that at the end of 30 days the Snapdragon in Pot D, watered with more oil, will be the group of plants to show the least growth as a reaction to the oil.</p> <p><b>Methods/Materials</b> I tested two types of plants: Fava beans and Snapdragons. I used four pots for each group of plants, labeled A, B, C, and D in each group. The Fava Beans pots had 5 plants in each pot, the Snapdragon had 4 plants in each pot. I measured each plant and recorded their height with a metric ruler at the beginning of the experiment. I watered each pot every 3 days as follows: Pots A (controls): 200ml of water; Pots B: 200ml water + 20ml of used motor oil; Pots C: 200ml of water + 40ml of oil; Pots D: 200ml of water + 60ml of oil. My constant are the water, the soil, the plants in each group; my variable is the used motor oil.</p> <p><b>Results</b> After 30 days I measured each plant again. I recorded each plant growth in two separate diagrams, one for the Fava Beans and one for the Snapdragons. I also calculated the average growth for each group to make it easier to see the result. My hypothesis was correct: the Snapdragon in Pot D showed the least growth and the most stress. Both Pots A plants were the tallest and healthiest ones.</p> <p><b>Conclusions/Discussion</b> At the end of my experiment I cut a section of one Fava Bean stalk from Pot A and one from Pot D. The difference was clearly visible in the tissue. Also when I pulled the plants out of the soil, the Pot A plant was very difficult to pull while the one in Pot D offered no resistance at all, as if it had no roots. I hope my experiment will make people understand the importance of proper disposal of used motor oil, which is a very toxic substance.</p>	
<b>Summary Statement</b> To see how used motor oil affects the growth of plants.	
<b>Help Received</b> Francesca Cois (mother) helped choosing the plants and materials: Sara Cois (sister) helped with the board set up: librarian helped choosing the books for the research.	



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<b>Name(s)</b> Michael A. Cornacchia	<b>Project Number</b> <b>J1204</b>
<b>Project Title</b> <b>Hard Wood vs. Soft Wood: Do Ashes from Certain Woods Put Higher Amounts of Particulates in Our Air?</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The purpose of my science project is to determine if ashes from different types of woods put different levels of particulates into the air. We know that air pollution is a problem and according to the Harvard School of Public Health about 4% of deaths in the United States can be traced back to air pollution. This is one of the reasons I wanted to see if ashes from different types of wood put more particulates into our air.</p> <p><b>Methods/Materials</b> I collected different types of wood (cherry,oak,redwood/cedar and pine). I burned each wood seperately to collect the ashes and than transferred the ash to my 18x18x36 apparatus. I placed lint roller tape on a removable side piece within the apparatus. I than dropped a 5 pound weight into the ashes and let them scatter for a period of 2 minutes. I removed the tape and repeated this trial 9 more times for each type of ash. I than recorded the color, density and height of ash dispersed for each trial. When I reference density in this project I am referring to the compactness of the ash on the tape. Also when discussing height of dispersement I am referring to the dissemination of ash as it travels upward.</p> <p><b>Results</b> After measuring the density and height of ash dispersed from each trial; a total of 40 trials, 10 for each type of wood. I found that the measurements were different for each type of ash, it didn't seem to matter if the ash came from hardwood or softwood.</p> <p><b>Conclusions/Discussion</b> Through testing I discovered that ashes from each type of wood did put particulates in the air. I also discovered that I couldn't make a general statement that ashes from hardwoods will put more particulates into the air, because the measurements were not the same for each type of ash. I feel further investigation is needed to test different variables that may affect ash dispersement. I also think it is necessary to find a sustainable wood or wood product that leaves little or no particulates in the air, to reduce air pollution and help the environment.</p>	
<b>Summary Statement</b> The objective of this project is to determine if ash from different types of wood put more particulates in the air which can affect our health and the environment.	
<b>Help Received</b> Mr. Carl Gong provided guidance; My parents helped with photographs, building apparatus and burning of wood.	



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<b>Name(s)</b> <b>Isabelle D. de Wood</b>	<b>Project Number</b> <b>J1205</b>
<b>Project Title</b> <b>Disappearing Night: Measuring Streetlight Illuminance (lux) vs. Sky Glow (Light Pollution)</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The purpose of my project is to measure light pollution shining down from streetlights compared to the upward sky glow in Manteca, Ca. Cities across the world have streetlights contributing to sky glow, one of the fastest growing forms of pollution. Levels of inefficient outdoor artificial lighting increase about 20% every year. With data collected, I hope to provide awareness that there are realistic solutions to reform unproductive artificial night lighting practices. It is scientifically important because even though Manteca is a small suburban city, it still contributes to the halo of light polluting our sky.</p> <p><b>Methods/Materials</b> Using a digital light meter, illuminance reflected off the asphalt of 75 random streetlights throughout Manteca was measured including a sample selection of each type of streetlight source: High Pressure Sodium (HPS) 70W, 100W, 150W, 200W, 250W, Mercury Vapor 175W and no light. At each pole, 4 illumination measurements and 8 star counts centered on Orion's Belt were made using a toilet paper tube. Data was recorded and an illuminance/sky glow ratio was calculated to determine overall light pollution.</p> <p><b>Results</b> The illuminance range of all streetlights was from 0.4 to 22.3 lux. The highest output (HPS 250Watt) streetlight illuminance was 32 times greater than no light. The range of star counts of all streetlights was from 2.25 to 8.6 stars. The averaged overall star count for Manteca was calculated to be 4.93 stars which is less than the national average of 6 stars. The average overall light pollution for Manteca was calculated to be 3.2.</p> <p><b>Conclusions/Discussion</b> Based on my result averages, the HPS 250 Watt significantly proves that inefficient lights contribute the most to sky glow light pollution. My data shows a positive correlation that more light output causes more pollution scattered into the night sky. This occurs because light cannot be contained and we put streetlights everywhere for our needs. We have to look at all types of light pollution and propose ways to reduce our contribution to the increasing light pollution.</p>	
<b>Summary Statement</b> This project determines the overall sky glow light pollution from streetlights in Manteca, California based on the illuminance and star counts and shows evidence for a need to reduce our inefficient nighttime lighting practices.	
<b>Help Received</b> To Steve Probst, Superintendent of Public Works, Manteca for advice and direction. To my mom for driving and for her mentoring.	



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<b>Name(s)</b> <b>Phillip R. Downey</b>	<b>Project Number</b> <b>J1206</b>
<b>Project Title</b> <b>Using Enterococcus Bacteria as an Indicator to Determine the Level of Fecal Bacteria in Arroyo Burro Creek</b>	
<b>Abstract</b> <b>Objectives/Goals</b> The object of this experiment was to examine the levels of fecal bacteria in Arroyo Burro Creek using Enterococcus bacteria as the indicator. Theoretically, the water should have the least bacteria upstream before rainfall while the most bacteria should be found downstream during rainfall. <b>Methods/Materials</b> I performed my testing at El Estero Water Treatment Plant using Enterolert products. I diluted my creek water samples with 95 mL. of sterile water and added the Enterolert powder to make the bacteria glow with phosphorescence. That liquid was sealed and incubated for 25 hours and then placed under a UV light to show the most probable number of bacteria per 100 mL. of water. <b>Results</b> After doing thorough testing of the creek water before, during and after rainfall at three locations up and down the creek, I found that the water at the top of the creek before rainfall had the least bacteria while the water downstream during rainfall had the most. <b>Conclusions/Discussion</b> After my testing, I determined that my hypothesis was correct. The water at the top of the creek before rainfall had 9465 MPN per 100 mL. more than the water downstream during rainfall. This was because with the large rainstorms we have had this year; most of the animal feces have been washed from the hillside into the watershed. The water was more contaminated during the rainfall than after the rainfall because the contaminants had not yet flushed out.	
<b>Summary Statement</b> I examined the levels of fecal bacteria in Arroyo Burro Creek using Enterococcus bacteria as the indicator.	
<b>Help Received</b> I used lab equipment at El Estero Water Treatment Plant under the supervision of Dr. John sNielson.	



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<b>Name(s)</b> <b>Jacki S. Edens</b>	<b>Project Number</b> <b>J1207</b>
<b>Project Title</b> <b>Sea Shells by the Sea Shore</b>	
<b>Abstract</b> <b>Objectives/Goals</b> The purpose of my science fair project is to make people more aware of the effects of global warming and how it impacts sea life. I used clamshells, mussel shells, razor clam shells and carbon sand. The carbon sand was given to me to test by David Schwartz, a professor at Cabrillo College. <b>Methods/Materials</b> I measured the density of the shells and carbon sand with a digital scale and graduated cylinder. I put them in simulated ocean water and altered the pH to that of real ocean water. Using vinegar and soda water (carbonated water), I altered the pH levels to demonstrate what will happen to marine life containing carbonate if humans continue to expel as much carbon dioxide into the environment as they do currently. The chemicals that I used were to collaborate the pH meter to find the acidity level. I let these solutions sit for one month and then measured the density of them again to see the percentage difference from before they were put into the acidic environments. This demonstrates what happens to mollusks and coral reefs because of global warming. <b>Results</b> The vinegar and controls on average changed the density an equal amount with 17%. Soda water changed the density the least. It changed by 14%. On average, the controls decreased -5% and soda water pH increased by 2% and the vinegar cause the pH to increase by 42%. <b>Conclusions/Discussion</b> My hypothesis that the densities will decrease as the pH level decreases was partially proven. I thought that the vinegar would decrease the density the most, then the soda water and then the control. On average, the soda water and control switched by having the control decrease the density more than the soda water. The clams had the same order on density changes as the average. The mussel control changed the density the most and then vinegar and then soda water. For the carbon sand, the control and soda water decreased evenly and the vinegar was a little less. For razor clams, the control made the density increase the most and soda water made them increase the second most. Vinegar went as expected	
<b>Summary Statement</b> The replication of ocean acidification by putting different kinds of shells in acidic ocean water.	
<b>Help Received</b> Ms. Q. let me use her room and helped me work the pH meter; David Schwartz gave me carbon sand and information.	



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<b>Name(s)</b> Alayna G. Evans	<b>Project Number</b> <b>J1208</b>
<b>Project Title</b> <b>Which Local Cities or Communities Have the Greatest Number of Airborne Particles?</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective of my project was to determine which local city or community (Oakdale, Stockton, Lathrop, Valley Springs, San Andreas, or Arnold) had the greatest amount of air particle pollution.</p> <p><b>Methods/Materials</b> Six local cities were selected to test for air particle pollution. Using index cards with petroleum jelly to collect samples, data was collected in the same locations on two different trial dates. After the two ten-hour trials, the cards were analyzed and particle matter was counted using a jeweler's loupe and microscope.</p> <p><b>Results</b> The amount of airborne particles varied from city to city. My hypothesis was that Stockton would have the greatest number of airborne particles because of its large urban industries and population. My hypothesis was correct with an average of 180 particles during both trials for Stockton. The data was collected by averaging the particle matter on the surface area of each test card. Results showed the following averages of PM: Stockton (180), Lathrop (120), San Andreas (105), Arnold (90), Oakdale (75), and Valley Springs (75). Particle matter included hair, pollen, soil, dust, bugs, and soot.</p> <p><b>Conclusions/Discussion</b> My conclusion is that the larger, urban cities (Lathrop and Stockton) had the most particle matter. I found that the amount of particle matter was linked to the surrounding environments, elevation, local activities, and population. Analyzing the particle cards under magnification made me realize how many microscopic pollutants we are breathing in on a daily basis that are invisible to the human eye.</p>	
<b>Summary Statement</b> My project compares the amount of airborne particles in six local cities or communities.	
<b>Help Received</b> My mother helped me type the report; relatives helped by hanging cards on their property	





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<b>Name(s)</b> <b>Ian T. Harkness</b>	<b>Project Number</b> <b>J1209</b>
<b>Project Title</b> <b>Which Worm Is the Best Composter?</b>	
<b>Abstract</b> <b>Objectives/Goals</b> The goal of my project was to find which of the two most popular composting worms created the most nutrient rich compost. I did this project in the hopes of making it easier for everyone to have a flourishing garden and to make composting more commonplace, even if it is just slightly. <b>Methods/Materials</b> For my project, I kept each species of worm in a seperate fourteen liter bucket and fed and watered each worm the same amount of food or water as necessary. I tested the soil of the worms environment for pH, Phosphorus, Nitrogen, and Potash roughly once a week, using a test kit that I bought online. I kept everything as controlled as possible. <b>Results</b> It was clear that the Red Wigglers did a better job of enriching the soil, followed by the European Night Crawlers. I also found that the control did surprisingly well, but did not enrich the soil as efficiently as the others. In the end, the Red Wiggler would be the worm of choice when composting. <b>Conclusions/Discussion</b> If I were to place a composter in my home, I would recommend using Red Wigglers instead of European Night Crawlers. However it would not be entirley detrimental to use European Night Crawlers, as most worms will create a more nutrient rich compost.	
<b>Summary Statement</b> I choose to find which composting worm created a more nutrient rich compost, the Red Wiggler ( <i>Eisenia Fotedia</i> ) or the European Night Crawler. ( <i>Eisenia Hortensis</i> )	
<b>Help Received</b> Mother and Father helped test. Father helped make graphs.	



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<b>Name(s)</b> <b>Ryan C. Herron</b>	<b>Project Number</b> <b>J1210</b>
<b>Project Title</b> <b>A CO(2) Overdose</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The main goal of this project was to see how high levels of carbon dioxide affect the stomata in an ice plant. The hypothesis was that the plant exposed to 400 grams of carbon dioxide will have 75% of the stomata closed compared to the plant exposed to 200 grams and the controlled not exposed to the solid Carbon dioxide. This is because the more carbon dioxide is added the more the stomata will die and close up.</p> <p><b>Methods/Materials</b> First, I planted three 4 inch sections of ice plants inside plastic tubs with potting soil. Then I waited 6 hours and measured the carbon dioxide levels and recorded the data. Then I removed the epidermis layer from each ice plant. I made a wet mount slide. To make a wet mount slide, you must add a drop of water and a drop of iodine to the glass slide. Once the slide was prepared the peeled layers were examined under a microscope. While they were examined the numbers of stomata were counted and they were either classified as open or closed.</p> <p><b>Results</b> After waiting six hours, on average the plant exposed to no additional carbon dioxide had 11 stomata and 41 percent of the stomata were closed. On average, the plant exposed to 200 grams of additional carbon dioxide had 13 stomata and 52 percent of those stomata were closed. Then, on average the plant exposed to 400 grams of carbon dioxide had 19 stomata and 61 percent of those stomata were closed.</p> <p><b>Conclusions/Discussion</b> The data collected in the experiment indicates that the carbon dioxide affects the stomata in a minimal way. The hypothesis was that the plant exposed to 400 grams of carbon dioxide will have 75% of the stomata closed compared to the plant exposed to 200 grams and the controlled not exposed to the solid Carbon dioxide. This is because the more carbon dioxide is added the more the stomata will die and close up. This was not supported in the stomata reaction data table. The ice plant exposed to 0 grams of dry ice on average had a low percentage of stomata closed which came out to be 41%. The second ice plant exposed to 200 grams of dry ice on average had 52% of stomata closed. The last ice plant exposed to 400 grams of dry ice on average had 61% of stomata closed. Increased levels of carbon dioxide based off the data collected will not damage stomata function in plants but more research could be done by observing long term effects.</p>	
<b>Summary Statement</b> The main goal of this project was to see how high levels of carbon dioxide affect the stomata in an ice plant.	
<b>Help Received</b> science teacher helped get equipment (microscope, slides, classroom, e.g.) PARENTS HELPED WITH PURCHASING GOODS AND ATTCHING MY BOARDS TOGETHER.	



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<b>Name(s)</b> <b>Sabrina L. Houston</b>	<b>Project Number</b> <b>J1211</b>
<b>Project Title</b> <b>Triple A: Algae, Additives, and Affects</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> My goal is to examine how different types of runoffs from different fertilizers and manure commonly used will effect the levels of dissolved oxygen, nitrite and nitrate in a body of water supporting algal growth; simulating the algal issues in the Sacramento-San Joaquin River Delta. I hypothesized that all the trials would exhibit a constant unchanged dissolved oxygen level throughout the experiment due to the different levels of potassium and phosphorus in the additives which are fast reacting in water, and could adhere to the algae; thus killing the algae before absorption of the dissolved oxygen. Comparatively, the algae treated with the garden fertilizer and manure would reveal a high reading of nitrite and nitrate because of the high levels of nitrogen, and lower levels of potassium and phosphorus contained.</p> <p><b>Methods/Materials</b> Algae samples were obtained from a pond, and divided into twenty one liter jars. The jars were divided into four groups of five; the manure, lawn and garden care fertilizers additive groups and a control group which received no additives. The initial dissolved oxygen, nitrite and nitrate tests were performed using aquarium test kits. Then the samples received their initial half teaspoon fertilizer or manure additive. For 14 days, the water chemistry was evaluated, and the trials received further half teaspoon doses of additives every other day following.</p> <p><b>Results</b> After 14 days, all the trials demonstrated similar oxygen levels collectively; only having a 7 parts per million difference between the averages overall. The nitrite and nitrate levels throughout the experiment barely rose above 1 mg/L. The exception was the group of algae exposed to the garden fertilizer; which increased to an end total of 3 mg/L of nitrite and 30 mg/L of nitrate on the final day.</p> <p><b>Conclusions/Discussion</b> My results partially support my hypothesis. The oxygen levels showed little change throughout the experiment, as expected. However the nitrite and nitrate levels of the algae exposed to the manure did not spike with the fertilizer introduction, as hypothesized. If the results were applied to the Sacramento-San Joaquin River Delta, the delta's fresh water, which serves mainly Southern California, could become tainted. The most significant results came from the group exposed to the garden fertilizer; which resulted in three times the California EPA standard for drinking water.</p>	
<b>Summary Statement</b> The purpose of my experiment was to conclude if adding commercial and organic fertilizers to algae would effect the dissolved oxygen, nitrite and nitrate levels of the surrounding water.	
<b>Help Received</b> Brett Mills helped me to gain basic knowledge about the algae. Samuel Houston drove me to the pond and helped me gather the algae from the pond. Ms. Christina Fisher went over how to format my folder and board. Mrs. Elena Diaz went over how to properly format the research report and annotated bibliography.	



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<b>Name(s)</b> <b>Rachel A. Klose</b>	<b>Project Number</b> <b>J1212</b>
<b>Project Title</b> <b>The Regrowth of Invasive Plants in Comparison to Native Plants in a Coastal Sage Scrub Habitat after a Brush Fire</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The purpose of this experiment was to establish quadrants in three types of land in a burned coastal sage scrub habitat and count the number of each type of plant that regrows. This will help land conservancies to predict the habitual growth of plants in newly burned land.</p> <p>The question of this experiment is: Will a brush fire in a coastal sage scrub habitat make the land more susceptible to invasive plants?</p> <p><b>Methods/Materials</b> The materials used were: 36 sturdy wooden stakes (about 30 cm long with extras just in case any break), a mallet, a spool of twine, scissors, a GPS, 9 neon plastic flags, gloves, hiking boots, a camera, measuring tape in metric system, a data book, a pencil, a percent coverage chart, cardboard, and a box cutter.</p> <p>I hiked down into the Palos Verdes Nature Reserve and located the types of land. In each type, I established three 1 meter by 1 meter quadrants with wooden stakes and twine. Every month I recorded the number of grasses, native, and invasive plants, the site characteristics, and the percent coverage.</p> <p><b>Results</b> The invasive plants took over and had the most plants and were bigger except for in the unburned native land. At first in the native burned area, there was an average of 12 small native plants and only 4 non-natives. Two months later, there was an average of 3 native plants and an average of 493 non-native plants. In the non-native burned area, it started off with an average of 0 natives and an average of 406 non-natives. Two months later, there was an average of 0 natives and 1,467 non-natives.</p> <p><b>Conclusions/Discussion</b> The unburned native land stayed the same because all of the native plants were already full grown and were dominant over the area, though the non-natives took over everywhere else. This was because this experiment took place after large amounts of precipitation, and plants native to a coastal sage scrub habitat use C(4) photosynthesis, where they grow better in harsh weather conditions with little rain and high temperatures. The hypothesis is predicted to be correct by the late spring and summer months.</p>	
<b>Summary Statement</b> My experiment is about what type of plant will win dominance over the others in different types of land after being burned by a wildfire.	
<b>Help Received</b> Received access to nature reserve from the Palos Verdes Land Conservancy; Ann Dalkey, Palos Verdes Land Conservancy Director of Science Programs helped to identify the land and types of plants and how to manage my data	



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<b>Name(s)</b> <b>Conner J. L'Hommedieu</b>	<b>Project Number</b> <b>J1213</b>
<b>Project Title</b> <b>Are Hybrid Cars Really Better for the Environment?</b>	
<b>Abstract</b> <b>Objectives/Goals</b> The purpose of this experiment is to find out which vehicle has a better effect on the environment for the geographical area of the Bay Area, a Toyota Prius Hybrid or a Toyota Corolla. <b>Methods/Materials</b> In this experiment, I will rent a Toyota Hybrid and a Toyota Corolla, and my parents will drive them in the Bay Area. I will record the results of the gas mileage on a piece of paper and later transfer the results onto graphs. I will also record how much each car needs to refuel and the cost of the fuel. I will take the two cars to a smog station and test them to find out how much emissions are produced by each car. I am using these two cars because they have similar engines and are made by the same manufacturer. <b>Results</b> The results were that the Toyota Prius Hybrid consumed less fuel. The gas mileage difference proved to be 40 for the Hybrid and 27 for the Corolla. This would result in a savings of 13 miles per gallon for the average driver in this geographical area. These test vehicles were also submitted to emission testing and it was found that neither vehicle emitted any significant difference in emissions. The Toyota Prius Hybrid consumed less fuel. <b>Conclusions/Discussion</b> A person who purchased a Prius and used it primarily in the city might have been able to achieve higher gas mileage because the motor shut off at stops. The Toyota Prius was advertised at a 51 miles per gallon city; however, if it were used primarily in the city, the number of miles might be limited so that the number of gallons of fuel would also be limited. If the Prius were used primarily highway, the gas mileage would drop and the Corolla's mileage would increase to an average mile per gallon equal to the Prius. This would result in minimal fuel savings for the Prius vs. the Corolla, as reflected on my test.	
<b>Summary Statement</b> Two similar vehicles differing in their final drive, one being a hybrid and one being an automatic transmission, were compared for their effects on the environment concerning gas mileage and emissions.	
<b>Help Received</b> Mother and Father drove the cars; Vehicles were smog checked at a California State Smog Station.	



# CALIFORNIA STATE SCIENCE FAIR 2010 PROJECT SUMMARY

<b>Name(s)</b> <b>Anastasia B. Leopold</b>	<b>Project Number</b> <b>J1214</b>
<b>Project Title</b> <b>Plastic Beach: An Analysis of Marine Debris in the Capitola Beach and Soquel Creek</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> My objective is to determine what is the most prevalent type of marine debris found on Capitola Beach and Soquel Creek and whether the local polystyrene foam ban effectively reduced marine debris.</p> <p><b>Methods/Materials</b> I collected marine debris from Capitola Beach and two sites along the Soquel Creek using plastic garbage bags and latex gloves. I weighed and sorted each collection on a tarp and recorded all materials on a modified Marine Debris Data card. This process was repeated five times.</p> <p><b>Results</b> My results show that the most prevalent type of marine debris are Styrofoam pieces at Capitola Beach; plastic food wrappers at the Soquel School creek site; and smoking items at the Center Street Bridge creek site. Compared to historical data from Save Our Shores, the amount of food containers found at Capitola Beach has gone down, but the amount of polystyrene foam pieces has risen significantly.</p> <p>Total weight of the marine debris: Capitola Beach: 28 pounds; Soquel School creek site: 2 pounds; Center St. Bridge: 3.35 pounds</p> <p><b>Conclusions/Discussion</b> My hypothesis that hard, plastic pieces from bottles, etc. will be the most prevalent was incorrect.</p> <p>My hypothesis that the polystyrene foam ban is working was correct. A polystyrene foam ban for take-out food packaging was established in Santa Cruz in 2007/08. The amount of full polystyrene foam cups, etc. has gone down, but the amount of polystyrene pieces has risen. This makes sense because polystyrene goes through a photodegradation process and breaks down into smaller pieces, yet never goes away. In addition, people often smoke and eat at creeks and their trash enters the creek if not thrown away properly.</p> <p>This is a very important subject because marine debris in the ocean is hurting many organisms. An estimated 80% of plastic in our oceans comes from our watersheds on land. My study shows the ban is working and should be continued. Officials could create more bans on other plastics and find eco-friendly solutions like biodegradable food wrappers and smoking related items.</p>	
<b>Summary Statement</b> My project is an analysis of the marine debris found locally on Capitola Beach and Soquel Creek and whether the local polystyrene foam ban is effective at reducing the local source of plastics entering the ocean.	
<b>Help Received</b> Interview with Emily Glanville from Save Our Shores; Mom drove to sites and helped collect marine debris; sister taught me how to make charts on Excel	



**CALIFORNIA STATE SCIENCE FAIR  
2010 PROJECT SUMMARY**

<b>Name(s)</b> Connor J.K. Lyons	<b>Project Number</b> <b>J1215</b>
<b>Project Title</b> It's Crystal Clear	
<b>Abstract</b> <b>Objectives/Goals</b> The objective of this experiment was to see which of the five collected water sources (pool, lake, tap, bottle, and ocean) was the most contaminated. <b>Methods/Materials</b> There were four trials each conducting eight different tests checking to see if different contaminants were present in each of the five water sources. The eight contaminants that I was testing for were bacteria, lead, pesticide, nitrate, nitrite, pH, hardness, and chlorine. All of the trials were done on consecutive days and results were documented after each test. The humidity or room temperature could not be controlled and could have possibly contributed to variance in the test results on the day they were conducted. <b>Results</b> As expected, the tap and bottle water had the best scores with both of them passing all of the tests. The surprising result was that the pool and ocean water tied the lake water with the lowest average out of all of the five sources. The results showed the pool water had the most inconsistent test results of all the water sources. <b>Conclusions/Discussion</b> My hypothesis was proven both partially correct and incorrect. I predicted that the lake water would be the most contaminated and the tap and bottle water would be the least contaminated and the test results showed that to be true over all four trials. The results also demonstrated that the pool and ocean water tied the lake water with the lowest average and were equally contaminated. The test results validated the research I did that stated all water sources are threatened by many contaminants.	
<b>Summary Statement</b> This project looked at the environmental impact to water sources by testing for the presence of multiple contaminants.	
<b>Help Received</b> My Mother helped me in assembling my display board and my Father helped me with creating graphs.	



**CALIFORNIA STATE SCIENCE FAIR  
2010 PROJECT SUMMARY**

<b>Name(s)</b> <b>Diego J. Magana</b>	<b>Project Number</b> <b>J1216</b>
<b>Project Title</b> <b>World in a Bottle</b>	
<b>Objectives/Goals</b> Objective: I performed this experiment to show how different proportions of animals would affect the overall health in a closed system.	
<b>Abstract</b> <b>Methods/Materials</b> Materials and Methods: Basically I set up three biospheres with various environments in five trials. I named the environments A, B, and C. In the A trial I put one fish and two plants. The B trial obtained two fish and two plants. The C trial had three fish and two plants. I had to keep and observe for 5 days to find the perfect balance. This experiment was like keeping a small world in maintenance. I had to observe the health of the fish and the water clarity and then I gave it a score according to a scale I developed. The scale was: Survival of Fish (SOF): 1/1 = 1.0, 0/1 = 0, 2/2 = 1.0, 1/2 = 0.5, 0/2 = 0 3/3 = 1.0, 2/3 = 0.7, 1/3 = 0.3, 0/3 = 0 Water Clarity (WC): 0= mud colored, 1= coffee colored, 2= black tea colored, 3= apple juice colored, 4= lemonade colored, 5= clear water  Add the SOF and WC points together to give you the overall score of each biosphere (SOF + WC = Overall Health of Biosphere).	
<b>Results</b> Results: I developed an educated hypothesis that states, if I put a goldfish in a jar alone with two plants, then the overall health would prosper. Later, my hypothesis was proven correct. The environment A, which had one fish and two plants resulted in a prosperous biosphere. B resulted as the second best. C was the least in vegetation and growth because the fish were inhaling the oxygen too quickly and the plants couldn't keep up with the cycle.	
<b>Conclusions/Discussion</b> Conclusion: Our earth is like a big jar of life; a biosphere. We all need oxygen and all plants give oxygen by taking in our carbon dioxide that we exhale. It is an efficient cycle, but we cannot survive if the cycle is broken. If living animals were enclosed in a jar alone, they would inhale all the oxygen in the jar and exhale carbon dioxide with no plants to convert the carbon dioxide into oxygen; they would die.	
<b>Summary Statement</b> I constructed miniature worlds in three environments to test how different proportions of plants and animals affect the overall health of a closed system.	
<b>Help Received</b> Mother contributed in gathering the supplies I needed such as the jars and the plants.	





**CALIFORNIA STATE SCIENCE FAIR  
2010 PROJECT SUMMARY**

<b>Name(s)</b> Kyle N. Markfield	<b>Project Number</b> <b>J1217</b>
<b>Project Title</b> Algae Attack	
<b>Objectives/Goals</b> The objective was to determine if a constant increase of fertilizer causes an increase of algae growth, and to determine if a green fertilizer will cause less algae growth than a fertilizer containing nitrogen and phosphate.	
<b>Abstract</b> I added 30 ml. of lake water to 7 Petri dishes. The first dish was labeled #1 and was the control. Petri dishes #2-4 had fertilizer containing nitrogen and phosphate added to them. Dish #2 had 1ml added, dish #3 had 2ml added, and #4 had 4ml added. In dishes #5-7 green fertilizer was added with the same amounts used in dishes #2-4. After 2 weeks I measured the amount of algae growth in each dish. My results led me to perform another experiment. I placed a 2cm algae sample into Petri dish #2, and a 2cm algae sample in a Petri dish with just 30 ml of lake water. I observed the dishes the next day. In my last experiment I put 30 ml of lake water in 3 Petri dishes. The first dish no fertilizer was added. The next Petri dish I added one drop of fertilizer which contained nitrogen and phosphate, and the last Petri dish I added one drop of green fertilizer. After one week I measured the amount of algae growth in each of my Petri dishes.	
<b>Methods/Materials</b> I added 30 ml. of lake water to 7 Petri dishes. The first dish was labeled #1 and was the control. Petri dishes #2-4 had fertilizer containing nitrogen and phosphate added to them. Dish #2 had 1ml added, dish #3 had 2ml added, and #4 had 4ml added. In dishes #5-7 green fertilizer was added with the same amounts used in dishes #2-4. After 2 weeks I measured the amount of algae growth in each dish. My results led me to perform another experiment. I placed a 2cm algae sample into Petri dish #2, and a 2cm algae sample in a Petri dish with just 30 ml of lake water. I observed the dishes the next day. In my last experiment I put 30 ml of lake water in 3 Petri dishes. The first dish no fertilizer was added. The next Petri dish I added one drop of fertilizer which contained nitrogen and phosphate, and the last Petri dish I added one drop of green fertilizer. After one week I measured the amount of algae growth in each of my Petri dishes.	
<b>Results</b> In my first experiment 2% of Petri dish #1 had algae growth. This was my control dish. Petri dishes #2-4, which was the fertilizer with nitrogen and phosphate, had 0% algae growth. In Petri dish #5, 8% of the dish had algae growth. In Petri dish #6, 17% of the dish had algae growth and Petri dish #7, had 24% algae growth. In my second experiment the 2cm algae sample in my control was still green, but the 2cm sample placed in Petri dish #2 was brown and appeared dead. In my final experiment the fertilizer with nitrogen and phosphate had the most algae growth. It had 2% of its dish covered in algae. The green fertilizer and the control both had .5% of their dishes covered in algae.	
<b>Conclusions/Discussion</b> My conclusion is that fertilizer with nitrogen and phosphate does increase algae growth in lake water, but also can kill algae if too much of it is added. I also concluded that fertilizer with nitrogen and phosphate increases more algae growth than green fertilizer does when a small amount is added. Another thing I can conclude is that an increased amount of green fertilizer does produce an increase amount of algae growth. Both fertilizers increased algae growth and can be harmful to the environment.	
<b>Summary Statement</b> My project is the affects traditional and green fertilizers have on algae growth.	
<b>Help Received</b> My mother helped me download pictures, and my father helped me graph my results onto the computer.	



# CALIFORNIA STATE SCIENCE FAIR 2010 PROJECT SUMMARY

<b>Name(s)</b> <b>Maia Moran</b>	<b>Project Number</b> <b>J1218</b>
<b>Project Title</b> <b>The San Diego River and the Factors Affecting Its Water Quality</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective is to determine the presence of Escherichia coli and coliform in the San Diego River and the factors that influence the levels of contamination. The factors studied include water temperature, air temperature, precipitation, and rural versus urban settings.</p> <p><b>Methods/Materials</b> Four sites along the San Diego River were selected for water sampling. Water samples were collected at each site on 15 different days between August 2009 and April 2010. Air and water temperatures were measured, and precipitation within the past 48 hours and wind conditions were noted. The Idexx QuantiTray method was used to determine the approximate level of contamination from coliform and E. coli. The results of the bacterial tests were then calculated using the Most Probable Number (MPN) index for comparison.</p> <p><b>Results</b> The results of this study showed that there is a stable presence of E. coli and coliform in the San Diego River. The E. coli results showed evidence of a correlation between the location (rural vs. urban) and the bacterial count. Rain also impacted the E. coli bacterial levels of the water. There was no apparent association between the water or air temperatures and the bacterial counts. Coliform results did not show any association overall with any of the hypothesized factors.</p> <p><b>Conclusions/Discussion</b> The E. coli data supported the hypothesis that the bacterial count would be different based on geographic location, as well as precipitation. However, the data did not support the hypothesis that the bacterial count would fluctuate with the air or water temperatures. Coliform did not appear to be affected by any of the hypothesized factors. In this study, the most rural location, El Capitan Reservoir, reported the lowest bacteria levels overall of the four sites.</p>	
<b>Summary Statement</b> This project investigates whether there is an association between various environmental factors and the bacterial counts in water samples from the San Diego River.	
<b>Help Received</b> Used equipment at Imperial County Public Health Department Laboratory under the supervision of Lab Director Holly Maag; Mother provided transportation to sampling sites and lab.	



**CALIFORNIA STATE SCIENCE FAIR  
2010 PROJECT SUMMARY**

<b>Name(s)</b> Alyssa C. Mueller	<b>Project Number</b> <b>J1219</b>
<b>Project Title</b> <b>Ocean Acidification and Shell Loss in Marine Calcifying Organisms</b>	
<b>Abstract</b> <b>Objectives/Goals</b> The purpose of this project was to determine if mass loss would occur to the shells of three marine calcifying organisms when the shells were immersed in sea water with pH levels of 8.0, 7.0, 6.0 and 5.0 <b>Methods/Materials</b> Shells were prepared and the mass was measured using a gram scale. The sea water was prepared by mixing tap water, dechlorinator and Instant Ocean salt to achieve the control water of pH 8.0. The sea water for pH levels of 7.0, 6.0 and 5.0 were prepared by adding white vinegar as the acidifying agent. The shells were placed in labeled jars and filled with the prepared sea water. The lids were sealed and the jars were left undisturbed for 21 days. After 21 days the pH level was tested and shell loss was measured with a gram scale. Data was recorded and analyzed for individual shell types. Data was also analyzed by grouping all shell types together by pH level. <b>Results</b> The results show that all types of shells tested had a mass loss as the acidity level increased. At pH level 8.0 average shell loss was 0.15%. At pH level 7.0 average shell loss was 0.55%. At pH level 6.0 average shell loss was 0.93%. At pH level 5.0 average shell loss was 1.13%. <b>Conclusions/Discussion</b> The results of this experiment suggest that ocean acidification is having a harmful effect on the ability of marine calcifying organisms to maintain their shells. Shell loss was greater at lower pH levels. Further studies are needed to predict the long terms consequences and the impacts on the ocean ecosystem.	
<b>Summary Statement</b> This project studied the effect of rising acidity levels in sea water and the corresponding lowering pH levels on the shells of three marine calcifying organisms.	
<b>Help Received</b> Bruce Steele suggested background research and a test procedure. Anna MacPherson and Pauline Yu at UCSB answered questions. Dad taught me how to make graphs in Excel.	



**CALIFORNIA STATE SCIENCE FAIR  
2010 PROJECT SUMMARY**

<b>Name(s)</b> Natalie G. Opalach	<b>Project Number</b> <b>J1220</b>
<b>Project Title</b> <b>Are Invasives Pervasive?</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective was to see if non-native species that occur in a young growth forest can invade an adjacent old growth forest. Background research suggested non-native species would cover twenty-five percent of the young growth forest and invade a short distance into the adjacent old growth.</p> <p><b>Methods/Materials</b> Three sites each consisting of a young growth forest and adjacent old growth forest, were located. A transect was set through each site. Each transect consisted of eleven plots, including five plots straight into the old growth, one plot on the edge between the two forests, and five plots straight into the young growth. Plots along the transects were twelve feet by twelve feet in size, and spaced fifty feet apart. Species names, percentages, and other information were recorded at each plot on a plot card made specifically for this study. Thirty three plot cards total for the thirty-three plots: three transects with eleven plots each.</p> <p><b>Results</b> The average of non-native species on young growth plots was eight percent, the average of non-native species on edge plots was four percent and the average of non-native species on old growth plots was zero percent. I found non-native plants on only five of my thirty-three plots. All five of these plots had pampas grass and one had buttercup as well. Curiously, one old growth plot contained a non-native species, a young pampas grass. The other four plots containing non-natives were either young growth or edge plots. Interestingly, all four of these plots were located on old abandoned logging roads.</p> <p><b>Conclusions/Discussion</b> Non-natives in young growth did not affect non-natives in old growth. The only pattern in non-native species that I found was that non-native species were commonly associated with old logging roads. In fact, these roads were the only places I found non-native species in the young growth and the edge. The canopy above the logging roads was widely open; I think that foresters may be able to reduce the amounts of non-native species in forests by planting trees on the old roads. My hope is that roads would blend into other areas of the forest and would no longer be an ideal area for non-native species within the forest.</p>	
<b>Summary Statement</b> Studying the likelihood of non-native species invading an old growth forest from an adjacent young growth forest.	
<b>Help Received</b> Dad helped identify species and edit board; Tony LaBanca, Botanist, gave me an interview; Mom edited writing; Sister edited writing	



**CALIFORNIA STATE SCIENCE FAIR  
2010 PROJECT SUMMARY**

<b>Name(s)</b> <b>Aashna M. Parekh</b>	<b>Project Number</b> <b>J1221</b>
<b>Project Title</b> <b>Run Kids! The Airborne Particles Are Coming!</b>	
<b>Abstract</b> <b>Objectives/Goals</b> My objective is to ascertain if the distance of the freeway affects air quality in the form of airborne particle pollution on a school campus and to determine how the intensity of blue color in the sky, measured in degrees, is related to airborne particle pollution. How does the distance of the freeway affect air quality on a school campus? <b>Methods/Materials</b> fifteen funnels, fifteen glass slides, popsicle sticks, a source of petroleum jelly such as vaseline, a cyanometer with an included value chart (value chart is optional), a microscope, and duct tape or regular tape, skewers, trays, and beakers if necessary <b>Results</b> In the aspect of taking the average number of airborne particles on the three slides, Preparatory Academy has the most airborne particles in the form of airborne particle pollution. In addition, Preparatory Academy's cyanometer measuring is low compared to other campuses, taking into consideration that as time passes, the sky gradually becomes darker. However, Mable Campus has the most airborne particles considering the field of view results. <b>Conclusions/Discussion</b> My conclusion is that Preparatory Academy has the worst air quality based on the number of airborne particles and the cyanometer measuring, because vehicle emissions on a nearby freeway result in a low quality air on a campus. The cyanometer measuring was low, because the lighter the sky, the more airborne particles there are. Considering the number of airborne particles from the field of view can be deceiving; therefore, it is probable that Mable Campus does not have the worst quality air.	
<b>Summary Statement</b> My project involves finding out how the distance of the freeway affects air quality on a school campus and how the the intensity of blue color in the sky, measured in degrees, is related to airborne particle pollution.	
<b>Help Received</b> My mother assisted in the experimentation by driving me to the five Fairmont Private Schools . My science teacher helped me by conducting the experiment at two of the Fairmont Private Schools . The science teachers from other campuses helped me in setup.	



**CALIFORNIA STATE SCIENCE FAIR  
2010 PROJECT SUMMARY**

<b>Name(s)</b> <b>Kathryn I. Piper</b>	<b>Project Number</b> <b>J1222</b>
<b>Project Title</b> <b>The Balance of Nature: How Does Varying the Number of Freshwater Snails Affect a Closed Aquatic Ecosystem?</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The purpose of this experiment was to find out the effect of varying the number of freshwater snails in a closed aquatic ecosystem. I predicted that a closed aquatic ecosystem with two freshwater snails and one freshwater plant would provide the best balance and healthiest ecosystem.</p> <p><b>Methods/Materials</b> The experiment involved setting up 12 identical jars with gravel, a thermometer, one freshwater plant, and purified water. Each of the three trials had a jar with no snails, 1 snail, 2 snails, and 4 snails. The pH of the water was recorded for each jar at the beginning and end of the experiment. Each day, for 12 days, the following information was recorded for each jar: condition of the water, condition of the plants, condition of the snails, and water temperature. A photograph of each trial was taken daily and all jars were rotated for equal sun exposure.</p> <p><b>Results</b> The results showed that the water temperature and pH did not change over time in the jars. The water conditions did not change in the 0 snail jars or 1 snail jars. The water clarity started to change in the 2 snail and 4 snail jars on day 9 and changed to murky and discolored by the end of the experiment. The plants stayed green and sprouted new growth in the 1 snail jars. The 0 snail, 2 snail, and 4 snail jar plants developed brown, transparent leaves, and many died by the end of the experiment. The snails were active in all the snail jars through day 9. The snails in the 2 snail jars and 4 snail jars became less active on day 10 and all the snails died by the end of the experiment in these jars.</p> <p><b>Conclusions/Discussion</b> In conclusion, my hypothesis was not correct. The 2 snail jars with one plant did not have the most balanced ecosystem. The plants and snails died and the water became murky, brown and slimy. When there is too much of one thing or not enough of another, the effects spread throughout the unbalanced system. The 1 snail jars with one plant had the most balanced ecosystem. The plants started to sprout new growth, the snails stayed active and the water stayed clear. I learned that there is a balance in nature and changes or disturbances to even small parts of the system can have significant effects.</p>	
<b>Summary Statement</b> My project tested the effect of varying the number of freshwater snails in a closed aquatic ecosystem.	
<b>Help Received</b> My mom helped me set up the experiment and help put together my board. My dad helped me make the graphs for my board and report.	



# CALIFORNIA STATE SCIENCE FAIR 2010 PROJECT SUMMARY

<b>Name(s)</b> <b>Emerson C. Pizzinat</b>	<b>Project Number</b> <b>J1223</b>
<b>Project Title</b> <b>Human Impacts on Rocky Intertidal Environments: San Nicolas Island vs. the California Coast</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> My objective was to determine whether there are more and larger intertidal invertebrates on a remote island far from human impacts compared to coastal areas accessible to humans.</p> <p><b>Methods/Materials</b> After selecting three intertidal study locations, two along the Santa Barbara County Coast and one remote island (Faria Beach, Coal Oil Point, and San Nicolas Island), five 30-meter transects were placed at each. Transects were two meters apart. The number of four intertidal invertebrate species (sea anemones, Anthopleura sp.; ochre sea stars, Pisaster ochraceus; chitons, Nutalina fluxa; and black turban snails, Chlorostoma funebris) were counted within one meter of either side of each transect. If 50 individuals of any species were encountered, the distance along the transect was noted and counting for that species discontinued. At the completion of each transect, the total number of each species and distance along the transect if 50 were encountered was recorded. Sea stars were also measured from the center of their body disc to the tip of the longest arm, to provide relative size measurements.</p> <p><b>Results</b> There were greater numbers and densities of all four species at San Nicolas Island. Faria Beach had intermediate densities and Coal Oil Point consistently had the lowest. All sampled species occurred at all three sites, with the exception of sea snails which were not present at Coal Oil Point. Though sea star abundance was far greater at San Nicolas Island, sea stars were largest at Faria Beach and only slightly smaller at Coal Oil Point.</p> <p><b>Conclusions/Discussion</b> Intertidal invertebrates are subject to a variety of potential human perturbations including oil spills, vessel groundings, water pollution, harvest and over use. Trampling by tidepool visitors has been shown to have a significant impact on species present. San Nicolas Island is owned by the U.S. Navy, remote and has little human access. My other two sites were easily accessible and near to potential pollution sources. My hypothesis was partially supported by the data collected. There were more of all sampled species at San Nicolas Island, likely due to reduced human presence and thus less impact. However, my hypothesis that the size of sea stars would be larger was incorrect. This may be caused by a need for sea stars to be harder to survive in areas of greater impact, but may have also been an artifact of my small sample size.</p>	
<b>Summary Statement</b> I studied the relative densities of intertidal invertebrates at a remote island, far from human impacts, and compared this to densities along the mainland coast to determine if accessibility to humans reduced the number and size of species.	
<b>Help Received</b> My uncle transported me to all three study sites and provided access to the U.S. Navy facility.	



**CALIFORNIA STATE SCIENCE FAIR  
2010 PROJECT SUMMARY**

<b>Name(s)</b> <b>Dale J. Risk, III</b>	<b>Project Number</b> <b>J1224</b>
<b>Project Title</b> <b>The Effect of Physical Contaminants on Surface Water Pollution</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> To test various types of bodies of water from the U.S./Mexican border to the Arctic Ocean in Alaska for physical pollutants and determine if more the more populated areas of the south are more polluted.</p> <p><b>Methods/Materials</b> Using test kits, test various bodies of water for dissolved oxygen saturation, nitrates, nitrites, turbidity, pH, alkalinity, and hardness. Using a GPS, measure latitude, longitude, elevation for location of sample; also measure air and water temperature for each sample.</p> <p><b>Results</b> 58 samples were taken; 36 percent (21 samples) were from lakes and other bodies of standing water, 48 percent (28 samples) were from rivers and streams, 4 samples from oceans, 3 samples from geysers, 2 samples from glaciers, and 1 waterfall sample. Dissolved oxygen, nitrates, pH, and alkalinity all indicated higher pollution levels in the south (areas of higher population). Standing bodies of water tended to have more physical pollutants than moving bodies of water.</p> <p><b>Conclusions/Discussion</b> Pollution levels from physical contaminants are higher in the south in more populated areas.</p>	
<b>Summary Statement</b> I wanted to test a variety of samples from the Mexican border to the Arctic Ocean in Alaska to see if physical contaminants in surface water were higher in the southern latitudes where population density is heavier.	
<b>Help Received</b> Father drove me to take samples; Mother helped type report.	





**CALIFORNIA STATE SCIENCE FAIR  
2010 PROJECT SUMMARY**

<b>Name(s)</b> <b>Dustin N. Rutherford</b>	<b>Project Number</b> <b>J1225</b>
<b>Project Title</b> <b>Effects of Various Environmental Pollutants on Tenebrio molitor</b>	
<b>Abstract</b> <b>Objectives/Goals</b> I will investigate the effects of four modern day environmental pollutants on mealworms caused by industrialization. <b>Methods/Materials</b> I will use 625 mealworms, divided into 5 groups containing five containers in each group, with 25 mealworms in each container. The five groups are: 1. Environmentally Friendly Dish Soap 2. Acid Rain 3. Livestock Run-off 4. Car Exhaust 5. Control Group/Tap Water <b>Results</b> I determined that the various pollutants did have an effect on weight, development and deaths of the mealworms. <b>Conclusions/Discussion</b> The Environmentally Friendly Dish Soap killed the most worms, however; they developed faster than the other groups. The least amount of worms died in the Livestock Run-off Group and the Car Exhaust Group developed the slowest.	
<b>Summary Statement</b> Environmental pollutants will have various effects on the development of Tenebrio Molitor (mealworms).	
<b>Help Received</b> Mom proof-read my papers, my dad helped me acquire car exhaust and my teacher loaned me his scale.	



**CALIFORNIA STATE SCIENCE FAIR  
2010 PROJECT SUMMARY**

<b>Name(s)</b> <b>Olivia D.K. Sanchez</b>	<b>Project Number</b> <b>J1226</b>
<b>Project Title</b> <b>Bacteria Growth in Water</b>	
<b>Abstract</b> <b>Objectives/Goals</b> My objective for my experiment was which water sample has the most bacteria: water from the Las Palmas swimming pool, rain water, water from a local pond, or Las Palmas recycled water. <b>Methods/Materials</b> My method for this project was to gather the water samples from the different sources, then grow the bacteria in agar filled Petri dishes for 7 days in a fairly warm and dark place. <b>Results</b> The results for my experiment were: Pond water had the most bacteria, rain water had the second most, and pool water came in third. The recycled water showed no sign of bacteria growth, as well as the control sample (distilled water.) <b>Conclusions/Discussion</b> The conclusion for my experiment was that pond water had the most bacteria. This means that my hypothesis supports my conclusion. I hypothesized that pond water would have the most bacteria because of all the potential bacteria sources such as: animal feces, animal and plant decomposition, garbage and waste.	
<b>Summary Statement</b> My project was to measure the amount of bacteria growth in different residential water sources.	
<b>Help Received</b> Mother helped me gather my water samples; Mother helped me dispose of the bacteria; Dad helped me type my report.	



# CALIFORNIA STATE SCIENCE FAIR 2010 PROJECT SUMMARY

<b>Name(s)</b> <b>Divya Siddarth</b>	<b>Project Number</b> <b>J1227</b>
<b>Project Title</b> <b>Acid Ocean: The Effect of pH on Calcifying Organisms</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective of my experiment is to investigate the effect of pH on clam shells. I hypothesize that the lower the pH of the ocean water, the more weight the shells will lose after 10 weeks.</p> <p><b>Methods/Materials</b> I prepared about 15l of ocean water by mixing the recommended amount of Instant Ocean salt and filtered tap water in a bucket. I adjusted the pH to be close to 8.1 by adding tap water or Instant Ocean salt as necessary. This ocean water was then divided into 5 parts. To 4 of these parts, I added drops of vinegar such that I obtained ocean water with pH of 8.0, 7.8, 7.6 and 7.4. The pH of all the solutions was measured with an electronic pH meter. I cleaned about 300g of clam shells and dried them thoroughly. I carefully weighed approximately 20g of shells using an electronic scale and placed the shells in a clean 11 glass jar, which I filled to the brim with one of the five ocean water samples. I then repeated this procedure three times for each of the five pH values. After 10 weeks, each of the jars was drained carefully by emptying it through a sieve over a sink. The shells were rinsed and dried thoroughly with paper towels. They were then weighed with the same scale as before. All data were recorded in a lab notebook.</p> <p><b>Results</b> The weight loss by the clam shells increased as the pH of the ocean water was decreased. The rate of decrease was not constant: there was very little or no loss in weight at pHs of 8.1 and 8.0. As the pH was decreased from 8.0 to 7.4, the weight loss gradually increased from .01g to .02g.</p> <p><b>Conclusions/Discussion</b> Increasing the acidity of the ocean water has a small but measurable effect on the weight lost by the clam shells: the lower the pH, the greater the weight loss. My results suggest that even over a relatively short period of time, decreases in pH can have demonstrable effects on calcifying organisms, with significant weight loss occurring at pHs below 8.0. These findings raise concerns regarding the future of calcifying marine species if the current rate of carbon dioxide emissions is continued.</p>	
<b>Summary Statement</b> My experiment demonstrated that clam shells lose weight as the ocean water is made increasingly acidic.	
<b>Help Received</b> Dr. Kepe, Department of Pharmacology, UCLA, guided me in the use of the digital pH meter in his laboratory.	



# CALIFORNIA STATE SCIENCE FAIR 2010 PROJECT SUMMARY

<b>Name(s)</b> <b>Kayla M. Stearns</b>	<b>Project Number</b> <b>J1228</b>
<b>Project Title</b> <b>The Air Is Cool at Eureka Schools</b>	
<b>Abstract</b> <b>Objectives/Goals</b> My goal was to determine the amount of outdoor airborne pollutants at ten Eureka schools within a five-mile radius. I wanted to discover which school has the most airborne pollutants because of ongoing vehicle traffic, and if weather conditions make a difference with the amount of pollutants. I also wanted to find out if there are any airborne pollutants that are hazardous. <b>Methods/Materials</b> Four colored sets of 10 3x5 cards were numbered and identified by location. One tsp. of petroleum jelly was spread over the drawn circle on each card. Each card was placed close to the school's main road, remaining there for 48 hours. After the cards were gathered for data they were immediately covered with cling wrap to prevent any loss of pollutants. This procedure was repeated four times over an 8-week period which included various vehicle traffic patterns and different weather conditions. <b>Results</b> The ten schools that were part of my investigation have very little outdoor airborne pollutants. There are no hazardous pollutants within any of the areas surrounding the schools. There is no significant difference among schools that have the most ongoing vehicle traffic than the schools that have the least ongoing vehicle traffic. The various weather conditions did not affect the amount of pollutants. <b>Conclusions/Discussion</b> As I worked on my project I learned the importance of clean air to one's physical health. The school areas where I did my project have little airborne pollutants, so the students are in a healthy, clean air environment. Much scientific research is taking place in air quality technology. There are over 5,000 ambient air quality stations in the United States, including one station in Eureka, that can detect hazardous airborne pollutants. I have an important role to help maintain clean air in my environment. Breathing clean air must not be taken for granted.	
<b>Summary Statement</b> My project was to determine the air quality at ten schools in Eureka.	
<b>Help Received</b> Grandpa drove me back and forth to each school for me to work on my project to obtain information.	



**CALIFORNIA STATE SCIENCE FAIR  
2010 PROJECT SUMMARY**

<b>Name(s)</b> <b>Sarah E. Tadlock</b>	<b>Project Number</b> <b>J1229</b>
<b>Project Title</b> <b>Gases Are Hot!</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> What is the rate of transmission of ultraviolet energy in atmospheric Greenhouse Gases such as Methane, Oxygen, Carbon Dioxide, Atmospheric Air, and Humidified Air?</p> <p><b>Methods/Materials</b> Fill 10 balloons with a pure sample of Oxygen to a constant volume, measure initial temperature with electronic heat gun, expose for thirty minutes to an ultraviolet light source at a constant one meter distance, record secondary temperature as a measurement of absorbed energy. Repeat 10 times with samples of Carbon Dioxide, Methane, Atmospheric Air, and Humidified Air. Measure volume change in all samples as a representation of molecular activity.</p> <p><b>Results</b> Initial tests showed the highest rates of energy absorption occurred in Methane, followed by Humidified Air, then Carbon Dioxide, Dry Air, and lastly Oxygen. Volume/molecular activity tests are ongoing.</p> <p><b>Conclusions/Discussion</b> The gasses tested are components of the atmosphere and The Greenhouse Gas effect. The author concludes that Methane and Humidified Air have great potential to absorb and transmit ultraviolet energy within our atmosphere.</p>	
<b>Summary Statement</b> This project tested how Oxygen, Methane, Carbon Dioxide, Atmospheric Air, and Humidified Air absorb ultraviolet energy.	
<b>Help Received</b> Parents obtained pure gases that were tested.	



# CALIFORNIA STATE SCIENCE FAIR 2010 PROJECT SUMMARY

<b>Name(s)</b> <b>Ryan C. Thomas</b>	<b>Project Number</b> <b>J1230</b>
<b>Project Title</b> <b>Water Quality of Little River, Moonstone Beach as Reflected in Bacterial Counts</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> My science project was designed to determine if swimming in Little River, Moonstone Beach, poses a health risk due to bacterial contents.</p> <p><b>Methods/Materials</b> Using sterile sample jars (100ml), I took eleven samples of river water at varying times, weather, and locations. Eight samples were taken at the Moonstone site near the mouth of the river. One sample was taken approximately two miles upstream in the open forest. Two samples were taken mid-way between the other two sites near a cattle ranch. At Moonstone, six samples were collected after rainstorms; two in sunny conditions. Two of those samples were taken at a deeper level; the rest at surface level. In addition, I ran two control tests; one of pure rainwater and the other from my toilet. All tests were run under the supervision of North Coast Laboratories where I measured total coliform and e.coli levels using quanti-trays and a black light.</p> <p><b>Results</b> My results indicate that the upstream site had cleaner water with a total coliform count of 648 MPN/100ml and E. coli at 12.0 MPN/100ml. As the water traveled downstream, bacteria levels rose. At the ranch location the E. coli had risen to 43.7 MPN/100ml with total coliform at over 2419.6 MPN/100ml. Finally, at the mouth of the river there was a mean E. coli level of 227.4 MPN/100ml with mean coliform of 2179.7 MPN/100ml. These results demonstrate that the bacterial content is influenced by pastureland and residential run-off after rainstorms. Waterfowl, pets and human usage also influence the counts at the mouth of the river. Here, at the mouth, bacterial levels were at their highest of the samples, with one test exceeding state standards. Predictably, the rainwater and toilet bowl samples showed less than 1.0 MPN/ml E. coli.</p> <p><b>Conclusions/Discussion</b> Bacterial levels at Little River, Moonstone Beach, were consistently high, at one point testing over state standards. Swimmers should exercise caution before any recreational use especially after rainy weather. Continued monitoring of the bacterial levels there seems important in preventing a future health hazard and ensuring the well-being of our community.</p>	
<b>Summary Statement</b> My project was to determine if bacterial content of Little River, Moonstone Beach, poses a health risk for recreational use.	
<b>Help Received</b> North Coast labs taught me how to test using quanti-trays. Humboldt County Health suggested how to get started. Green Diamond took me upstream to test. Humboldt Baykeepers shared their findings.	



**CALIFORNIA STATE SCIENCE FAIR  
2010 PROJECT SUMMARY**

<b>Name(s)</b> Sara X. Thomas	<b>Project Number</b> <b>J1299</b>
<b>Project Title</b> <b>How Does the Amount of Carbon Dioxide Affect Temperature and Photosynthesis in Plants?</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> My goal was to find how carbon dioxide affected temperature and if plants could solve the problem of global warming.</p> <p><b>Methods/Materials</b> Increasing amounts of carbon dioxide were made in a one gallon plastic water bottle by mixing varying quantities of baking soda and vinegar. The temperature was recorded in a connected bottle using a thermometer. The thermometer bottle had a 60 watt light behind it and temperatures were recorded at five minute intervals over 25 minutes. A similar experiment was set up including a destarched geranium plant in the thermometer bottle with a 25 watt light behind it. Temperatures were recorded over two days and the plant was tested using iodine solution for evidence of photosynthesis with increasing amounts of carbon dioxide added.</p> <p><b>Results</b> As the carbon dioxide was increased, the cumulative temperature change also increased. Atmospheric carbon dioxide increased 16 degrees Fahrenheit over 25 minutes with increases ranging up to 27 degrees Fahrenheit when the largest carbon dioxide quantity was used. In the plant experiment, the total temperature increase was on average three degrees Fahrenheit less when carbon dioxide was added than when atmospheric carbon dioxide was used. All plants tested positive for evidence of photosynthesis.</p> <p><b>Conclusions/Discussion</b> When increasing the amount of carbon dioxide, it causes temperature to increase in the atmosphere. Increasing carbon dioxide allows plants to photosynthesize and reduce temperature.</p>	
<b>Summary Statement</b> Increasing amounts of carbon dioxide raise the temperature, and plants are our solution to global warming.	
<b>Help Received</b> My tutor, Andrew Green was a second pair of hands at multi-tasking times and supervised safety during the experiments.	