



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Devon A. Block-Funkhouser	Project Number J1101
Project Title Do Plants Make Fish Healthier?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals To determine if aquatic plants affect the ammonia and nitrate count in fresh water. I believe that the plants will lower both ammonia and nitrate levels, therefore making it safer and healthier for the fish.</p> <p>Methods/Materials I used six ½ gallon fish bowls filled with equal amounts of gravel and water. Bowls 1 and 2 had neither fish nor plants, bowls 3 and 4 had fish and plants, and bowls 5 and 6 had only fish. I tested the ammonia and nitrate every other day for 2 and ½ weeks. The constants in experiment were the amount of water and the environment the bowls were placed. The independent variable was the presence of plants and the responding variables were the amount of nitrate and ammonia. I measured the responding variables using commercial chemical testing kits.</p> <p>Results I accept my hypothesis, that if aquatic plants are added to the fish tanks the levels of ammonia and nitrate that builds up in the tank will be lower, because, according to the results, the ammonia levels in the bowls with fish and plants (Bowls 3 and 4) stayed in the range of 0.5-1.5 ppm while the ammonia levels in the bowls with fish and no plants (Bowls 5 and 6) ranged from 1.5- >2 ppm. The nitrate levels in Bowls 3 and 4 ranged from 25-60 ppm, while the nitrate levels in Bowls 5 and 6 went all the way from 25- 100.</p> <p>Conclusions/Discussion The presence of aquatic plants reduced the amount ammonia and nitrate in the water; thus making it healthier for the fish to live in. The plants reduced the amount of ammonia because plants give off oxygen, which increases the conversion of ammonia to nitrite in step two of the Nitrogen Cycle. The plants utilize nitrate in their cellular metabolism which reduced the levels of nitrate, which is the end product of the Nitrogen Cycle. This research is important for managing the freshwater lakes in our environment as well as for commercial fish farmers that are raising fish for food.</p>	
Summary Statement The presence of aquatic plants makes the water healthier for fish by reducing the buildup of ammonia and nitrate in the water.	
Help Received Dr. Bill Wise, Professor Emeritus, University of California- Santa Barbara	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Seung Hye Choi	Project Number J1102
Project Title Comparison of Quality of Water in Fresno and Clovis	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My objective was to test the quality of drinking water in Fresno and Clovis. Water is essential to the human body. all living organisms need it to survive. Furthermore the quality of the water people drink is a critical factor for kids to live a healthy life. In order to perceive the quality of water in Fresno and Clovis, I investigated the acidity, conductivity(total amount of ions), and hardness of the water.</p> <p>Methods/Materials To measure quality of water, I obtained samples from the San Joaquin River, Fresno and Clovis wells, and 10 schools in the Clovis Unified School District In order to measure pH, pH paper was used for a qualitative analysis, and a pH meter was used for a quantitative analysis. To measure conductivity, I used an instrument called a potentiostat and ran cyclic voltammetry. For water hardness measurements, I titrated water samples with 0.01 M EDTA in pH 10 buffer and in the presence of Eriochrome Black T as an indicator.</p> <p>Results pH of water from 10 schools ranged from 7.44 to 8.89. Conductivity of water from 10 schools ranged from 1.08E-7 to 3.70E-0.7 S. The total amount of calcium and magnesium(water hardness) ranged from 0 ppm to 12.2 ppm.</p> <p>Conclusions/Discussion From the results obtained, it was concluded that: 1) pH was slightly basic, which is better for the body. If water is acidic, it can cause premature aging and diseases. Also, if water is too acidic, it can cause corrosion in water pipes causing them to rust. If this happens, people may be drinking rust water. Also, fixing/buying new water pipes may be very expensive. 2) Conductivity confirmed the presence of ions, likely mineral ions, in the water. The presence of minerals in the water is important to maintain good health. very human must have a small intake of minerals every day. Most minerals exist in the form of ions in water. 3) Titration showed that the water was very soft. According to the EPA standards, soft water contains less than 60 ppm of calcium and magnesium - but our samples contained at most 12.2 ppm. This is better for the body because too much consumption of water with calcium and magnesium can lead to stone diseases. Also, if water is too hard, soap cannot be dissolved as well, leading to lack of hygiene.</p>	
Summary Statement The quality of drinking water in Fresno and Clovis was tested in terms of pH, conductivity, and water hardness.	
Help Received Used lab equipment at California State Univeristy, Fresno under the supervision of Dr. Choi.	



CALIFORNIA STATE SCIENCE FAIR 2012 PROJECT SUMMARY

Name(s) Angelina B.S. Clinkenbeard	Project Number J1103
Project Title Swimming in Bacteria	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals By collecting and testing various samples of water from fresh water lakes, then I can show that a moderate amount of bacteria will be found in the majority of these lakes, proving that participating in water recreational activities can pose a danger to our health.</p> <p>Methods/Materials Collect water samples, 100 ml of water from seven lakes for bacteria and parasites. Bacteria testing is done by using Coliscan Easygel medium to grow colonies of bacteria existing in water samples. After 48 hours of incubation, counts of the number of coliform/E. coli in the collected samples are recorded as MPN#s of E-coli CFU#s. Develop a questionnaire to ask each management of lake source to determine their policy for checking for bacteria</p> <p>Results The smallest recorded MPN's was 752 CFU's of E. Coli recorded in Big Bear Lake, with the highest recorded MPN's being 2500 CFU's counted in Jess Ranch. The Average CFU count was 1486 MPN's. 80% of questionnaire participants reported having at least one of the symptoms of E. Coli after swimming in one of the documented lakes.</p> <p>Conclusions/Discussion My hypothesis was correct. After testing each of my lake samples, the MPN#s of E-coli bacteria noted in each of the collected water specimens ranged from 750 to greater than 2500 MPN's. Along with E-coli, Cyanobacteria also grew in all samples and a few of the water samples showed parasites. Big Bear Lake had the fewest amount of bacteria at 752 MPN#s. The large volume of water in Big Bear Lake and the cold temperature of the lake most likely played a role in affecting those results. Since 80% of survey participants claim to have had, at one time or another, one of the health ailments associated with E-coli contamination after participating in a water sport activity, it is obvious that our lakes need monthly bacteria checks. Clearly the results of my experiment must raise our state official#s awareness to the potential health problems lurking in our public lakes.</p>	
Summary Statement To determine if high levels of harmful bacteria can be found in lakes used for water recreational sports which can lead to incidents of Water-borne illnesses causing severe health and financial problems	
Help Received Mother helped me gather phone numbers for lake management	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Emily K. Denny	Project Number J1104
Project Title The Distribution of Oil over Water in Different Wind Conditions	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My project is to determine if the speed of wind: high speed, low speed, or no wind, affects how oil disperses through water.</p> <p>Methods/Materials A 20" wide x 39" Tupperware container was marked every 10cm on all four sides. String was attached to form a grid. The horizontal sides were marked A-E and the vertical sides were marked 1-9. The container was filled up to 1/2" below the top. A fan was placed 30cm from the horizontal side and set to either high speed wind, low speed wind, or no wind. I poured 15ml of oil through an 8-1/2" cylinder which was placed at grid C-1. The cylinder was gently removed and the timer started. I recorded which blocks in the grid contained oil every 3 minutes for 15 minutes.</p> <p>Results The experiments with high wind speed dispersed the oil quickly to to the farthest side of the container. In the low wind speed tests the oil dispersed gradually and eventually moved the oil to the farthest side of the container. The oil in the no wind tests dispersed slowly and the oil stayed in the same area where it was poured.</p> <p>Conclusions/Discussion Based on my results, I expect an oil spill in very windy conditions to spread quickly and to a greater distance from the original spill. In low wind situations, the oil would spread out slower and stay around the same area.</p>	
Summary Statement My project is to determine if varying wind speeds affected the distribution of oil on the surface of water.	
Help Received My Mom proofread my project, My Dad helped me organize my procedure, My teacher helped me stay organized	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) David Duncan	Project Number J1105
Project Title Warning! Dangerous Bacteria in Los Angeles Lakes?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals There are 99 lakes in Los Angeles County that are not regularly monitored for water quality. The main objective of my project is to test four Los Angeles County lakes that are open to the public -- for the presence/absence and concentration levels of potentially harmful bacteria, specifically total coliform bacteria and E. coli. I believe that I will find bacterial contamination in some of the lakes that I test.</p> <p>Methods/Materials I collected lake water samples from four Los Angeles County lakes. I first did a presence/absence test for total coliform for each lake sample -- by combining the water sample with a nutrient-indicator, and incubating the sample for 24 hours at 35 degrees Celsius. If the sample tested positive for the presence of coliform (i.e., water sample turns yellow) -- I then tested the same sample for the presence/absence of E. coli by using a 365-nm UV light (i.e., the water sample glows fluorescent blue if E. coli is present). I also tested for concentration levels of total coliform and E. coli.</p> <p>Results All four lake samples tested positive for the presence of total coliform and E. coli -- and all four lake samples showed high concentrations of total coliform and E. coli. The results show that there are high levels of bacterial contamination in all four of the Los Angeles County lakes that I tested.</p> <p>Conclusions/Discussion Hundreds of thousands of people visit our Los Angeles County lakes every year for swimming, boating, and fishing. But unlike our California beaches, the majority of these lakes are not regularly monitored for safe water quality. My experiment showed that there are high concentrations of total coliform and E. coli in four of our L.A. County lakes. This potentially dangerous bacteria could pose a serious risk to public health and safety. The results of this experiment suggest the importance of having our lakes regularly monitored -- and the results posted for the public.</p>	
Summary Statement I tested four Los Angeles County lakes for bacterial contamination, specifically for total coliform and E. coli.	
Help Received My parents drove me to the four L.A. County lakes and helped me order/pick up supplies. A microbiologist talked with me about bacteria and loaned me a lab coat and goggles, a test tube rack, and a pipette pump. She helped make sure my materials and procedures were okay.	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Emma R. Freedman	Project Number J1106
Project Title Rollin' on the River Testing the Effects of Deforestation on the Water Quality of the Kinabatangan River in Borneo	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals To compare the health of a location on the Kinabatangan River to a tributary that runs through a region of deforestation by measuring water quality.</p> <p>Methods/Materials Samples were taken in a location where a tributary goes through deforestation then joins the Kinabatangan River in Borneo. Permission to test was obtained from Eugene Tan, a Malaysian landowner on the Kinabatangan River. Samples were taken upriver, downriver, and in the mouth of the tributary. The sample bucket and dissolved oxygen test bottle were filled with sample water from the middle of the river, just below the surface. Time, GPS reading, temp. of water, and image of sample water were recorded. Five tests were performed on each sample using a water quality test kit from Lamotte: DO ppm (Winkler Method), turbidity JTU, alkalinity ppm, pH, and nitrate-nitrogen ppm. Samples were taken in the morning and afternoon in each of the 3 locations over 4 days for a total of 54 samples. Measures were taken to randomize the samples to better capture the natural fluctuations of the environment. After each sample, equipment was washed in mineral water. All wastewater was collected and taken to the city for safe disposal.</p> <p>Results After analysis, the data suggests that the mouth of the Lokan tributary is less healthy than the Kinabatangan upriver. The alkalinity and pH levels appear to be lower in the Lokan. This suggests that the water is slightly more acidic because it has less capacity to buffer fluctuations in pH. The Lokan has the lowest dissolved oxygen compared to the main river. The dissolved oxygen appears to be lower in the afternoon. In the afternoon, the Lokan has the highest nitrate-nitrogen levels compare to the main river. In all locations, the turbidity is higher in the afternoon. The Lokan is extremely turbid in the afternoon.</p> <p>Conclusions/Discussion My data suggests that the water quality of the Kinabatangan River is affected by deforestation. Lower pH, alkalinity, and dissolved oxygen levels and higher turbidity and nitrate nitrogen levels suggest that the water in the Lokan is less healthy than the Kinabatangan River. In all of the tests there are fluctuations between the morning and afternoon. This study provides a baseline for other studies in the area and I would like to return and test how this location changes over time. This important ecosystem is threatened. We need to learn what we can before it, and the Orangutans are gone.</p>	
Summary Statement I am interested in the effects of deforestation on the orangutans in Borneo so I tested water quality as an indicator of deforestation at a study site on the Kinabatangan River.	
Help Received Dr. David Bernick is my mentor and introduced me to R; Mr. Eugene Tan gave me permission to test near his river lodge; Two Malaysian river guides and my little brother were my assistants; My mother recorded the data that we found and helped me with background research; My dad helped me use R.	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Peach S. Gerthoffer	Project Number J1107
Project Title Brine Shrimp and pH	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My project objective was if I had five tanks, of equal size also holding equal volumes of water, and I changed the pH to different extremes (acidic, more acidic, neutral, basic, more basic) how will it effect the growth and population of one gram (to begin with) of brine shrimp. I believe that the tank with the more acidic pH (pH 4) and the tank with more basic pH (pH 9.0 *on basic pH scale) will have the strongest decline of brine shrimp growth/population, towards the end of my experiment. On the other hand, the tank with an acidic pH (pH 5) and the tank with the basic pH (pH 8.5) with have a more climbing growth/population, and the one unchanged tank (pH 6-7=neutral) will have the highest growth/population of brine shrimp towards the end because it is not too high or too on either of the pH scale ends.</p> <p>Methods/Materials The primary materials for this project consist of five small plastic tanks all the same size and holding the same volume of water (48 fluid ounces), one large jug of purified/filtered water (240 fluid ounces), Aquarium salt, pH up and pH down solution, An air pump, 5 t-splitters, 5 small valves, air-tubing, and 5 air-stones. Also a gram scale, plankton net, petri dishes, stir sticks, a magnifying glass, a camera. Each tank was given pH solution except for the neutral for the experiment.</p> <p>Results Over time, my original hypothesis became slightly flawed. The More Acidic had a higher number of population/growth in the 3.0 gram range (weight of brine), ranging widely in the five hundreds (amount of brine), the acidic went up and down in numbers and weight, ranging again in a similar range to the more acidic (slightly less than). The neutral stayed at a constant population/growth, going only from 1.0 grams to 1.85 grams (in the 100-200 range). The more basic was also higher than expected, in the high 2.0s' to the low 3.0 grams. Mostly around 2.7 grams (with a population of brine in the 300-400 range). And lastly, the basic came in slightly lower than the more basic at a 2.0 gram average, and a 200-300 count range.</p> <p>Conclusions/Discussion My conclusion is, Brine shrimp can live in very extreme pHs such as very acidic (pH 4) and acidic (pH 5), and very basic pHs (pH 9.0 * on a basic scale) and basic pHs (pH 8.0-8.5 *on a basic scale). They can also thrive at a neutral pH such as pH 6-7. If we know this information about our marine ecosystems/wildlife, our ocean may finally be on the road to recovery.</p>	
Summary Statement My project is about testing pH effects on Brine shrimp growth/population over time.	
Help Received My mentor Connie Griffith volunteer manager/sea center interpreter helped to provide some of the resources needed in order to perform this experiment.	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Elle G. Henriksen	Project Number J1108
Project Title Nuclear Power: Hot or Not?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My objective was to investigate whether the levels of ionizing radiation increase with increased proximity to a Nuclear Power Plant. If I increase the proximity to the San Onofre Nuclear Generating Station (SONGS), I predict that the amount of ionizing radiation (detected by a digital Geiger counter) in the environment will increase as compared to other Pacific Coastal areas. According to my research, the closer you live to a nuclear power plant, the higher the risk of negative health effects such as developing leukemia and other forms of cancer, possibly due to higher levels of ionizing radiation in the vicinity of the nuclear power plants.</p> <p>Methods/Materials Scientific Instruments, Inc. Digital Geiger Counter (model GCA-04W), two 9V Duracell alkaline batteries, one sheet of both, Reynolds Wrap aluminum foil and Xerox printer paper, automobile Odometer (Lexus ES350), log book, pen, camera. Go to the entrance of San Onofre Nuclear Generating Station (SONGS), a Pacific coastal area ten kilometers, and Pacific coastal area fifteen kilometers north of SONGS, each 400 meters away from Pacific Ocean. Determine the type of radioactivity that you will be testing. Measure the radiation level for one minute at every 0.2 (two tenths) kilometer intervals (total of 1.4 kilometers). Repeat for 10 trials.</p> <p>Results Analyzing the data suggests no relationship between proximity and radiation levels in the three areas, except for that of the two locations directly underneath the power lines outside of SONGS. In all three areas that were compared for radiation, the levels recorded by the Geiger counter were within the range of background radiation (15-20 micro R/hr). Based on my background research, everywhere on Earth has a level of background radiation of approximately 15-20 micro R/hr, which is composed of minerals containing radioactive elements such as Uranium and Thorium, as well as cosmic radiation.</p> <p>Conclusions/Discussion Although, there is much research that links living in close proximity to a nuclear power plant and the negative impact on health, the data in this investigation suggests that the risk of ionizing radiation exposure due to an individuals proximity to San Onofre Nuclear Generating Station (SONGS) under a normal operating situation is minimal and equivalent to an individuals everyday exposure to background radiation (between 15-20 micro R/hr).</p>	
Summary Statement My objective was to investigate whether the levels of ionizing radiation increase with increased proximity to a Nuclear Power Plant.	
Help Received My mother rented a Digital Geiger Counter for the project and drove me to the locations for measurement.	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Kimi P. Hirano	Project Number J1110
Project Title How Toxic Is Your Child's Park? Comparing the Effects of Parks' Parking Areas' Run-Off on Daphnia magna	
Abstract Objectives/Goals My objective was to use Daphnia Magna to compare the effects of run-off from parking areas of local San Mateo and Foster City parks. (San Mateo Central Park, Sea Cloud Park in Foster City, and Foster City Edgewater Park). Methods/Materials This experiment used transfer pipettes; same-sized containers; an electric balance; spring water; a Daphnia Magna culture kit; and sediment samples from the parking areas of three local parks (San Mateo Central Park, Foster City Sea Cloud Park, and Edgewater Park in Foster City). To simulate run-off, I mixed each sediment sample with spring water. For each trial, I used four containers; three were for the three different run-off samples, and one was a control, i.e. no sediment. The experiment was conducted within a 48-hour window by recording the number of dead Daphnia in each of four containers at specified time points. Then the 48-hour experiment was repeated again for a second trial using fresh sediment samples, live Daphnia, and fresh water. Results The containers with the San Mateo Central Park parking area sediment samples had a consistently higher death rate than those from the other parks. By the end of the experiment, compared to the control group, the sediment from the Central Park parking area had a 63.64% higher death rate, while the other two parks both 55.56% higher death rates than the control. On average, the sediment from San Mateo's Central Park parking area had an 18.18% higher death rate than the other two parks' parking areas. Conclusions/Discussion My conclusion is that, amongst the sediment from Sea Cloud Park and Edgewater Park, the sediment from San Mateo Central Park's parking area is most toxic.	
Summary Statement I tested the effect of simulated run-off (from parks' parking areas) on marine animals by using Daphnia Magna as my test subjects.	
Help Received Mom and Dad helped get some of my materials, and they drove me so I could get my samples	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Kaelene M. Jensen	Project Number J1111
Project Title How Do Nitrate Levels Along the Salinas River Compare to Non-Farm Tributary Water?	
Objectives/Goals My objectives were to compare nitrate levels from agricultural runoff at various points along the Salinas River in Monterey County, and to compare them to a non-farm tributary, the Arroyo Seco. My goal was to determine if the California Regional Water Quality Control Board should adopt regulations to prevent fertilizer nitrates from polluting the water supply.	
Abstract Methods/Materials I tested the Salinas River water at 7 different points, and the Arroyo Seco tributary as a baseline point. I took the samples in two different conditions: before the first-flush rainfall of the winter and on the day after the first-flush rain. The Monterey Bay Analytical Services tested for the nitrates and I helped perform the electrical conductivity tests.	
Results Salinas River nitrate levels were high before and after rainfall. Baseline nitrate levels in the tributary were nearly undetectable. These results are due to the different land uses associated with each river. Lands bordering the Salinas River are intensively farmed, while the tributary area is not farmed. The first winter rain did not flush more fertilizer nitrates out of the farm fields and into the river, but rather had a diluting effect as confirmed by the electrical conductivity tests.	
Conclusions/Discussion In conclusion, my data and results prove the first part of my hypothesis as correct because the Salinas River (experimental group) recorded excessive levels of nitrates, and the non-farm Arroyo Seco River (control group) had almost undetectable levels. Also, my data and results did not support the second part of my hypothesis because rainfall actually diluted the fertilizer runoff into the Salinas River, rather than showing higher concentrations of nitrates. Overall, my study supports the position of the Regional Water Quality Control Board that it needs to regulate the intensive use of fertilizer by farms adjacent to the Salinas River.	
Summary Statement My project studied nitrate levels from agricultural runoff in the Salinas River, compared those levels to a non-farm tributary, and determined that public regulations are needed to reduce the pollution from fertilizer used in agriculture.	
Help Received Monterey Bay Analytical Services Laboratory helped perform the nitrate tests and I used their equipment, Father drove me to and from the Salinas River bridges, My parents read over my reports.	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Anastasia B. Leopold	Project Number J1112
Project Title Plastic Lint: A Study of Microscopic Marine Debris	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My project studies plastic lint, microplastic pollution coming from synthetic fibers in the wash. Millions of fibers can easily get to the ocean each day. My project compared four different synthetic fabrics in both wash and rinse cycles to see how much plastic lint they each produce which can in turn be a source of marine debris. I hypothesized that the fleece would shed the most fibers.</p> <p>Methods/Materials I used my washing machine, 4 different types of synthetic fabric, Whatman Fisherbrand Glass Fiber Filter Circles G4, a vacuum pump, flask and funnel, a microscope, petri dishes, two five-gallon buckets, detergent and a measuring cup. I washed 1-yard samples of each fabric separately and filtered 250 ml of each wash and rinse cycle for fibers. I counted each sample under a microscope and recorded the number of fibers. I repeated this three times with more rounds still to be completed.</p> <p>Results The first wash of each fabric released the highest amount of fibers as expected. On average, the wash phases released more fibers than the rinse phases, with some exceptions. The second round showed reduced fiber release, but in Round 3, the total number of fibers went back up showing that fibers continued to come off in high numbers. I am continuing with more rounds to see if there is a clear trend line. In general, the fleece fabrics shed the most although the black minkie fabric had the highest rinse release numbers.</p> <p>Conclusions/Discussion My results partially support my hypotheses because it has shown that one fleece fabric shed the most fibers. My data shows that all synthetic fabrics shed a lot of fibers, but it can vary from wash to wash. This project is important because it means millions of microplastic fibers are being let into our oceans every day since very few are filtered out in water treatment centers.</p>	
Summary Statement My project studies a new type of plastic marine debris: plastic lint coming from synthetic fabrics in the wash.	
Help Received Mr. Phillip Crump for help with my procedure; my science teacher for supplies and support, my mom for helping me with the wash.	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Maya D. Miklos	Project Number J1113
Project Title Soiling Our Earth? Analysis of Nitrogen Levels in Fertilizer Runoff	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Excessive nitrogen runoff from fertilizers results in an overabundance of algae blooms in water systems and also pollutes drinking water supplies. The goal of my project was to determine if there is a difference between the levels of nitrogen runoff in organic compared with inorganic fertilizers. I hypothesized that there would be less nitrogen in the runoff from organic fertilizers as compared to inorganic fertilizers, since the nitrogen in organic fertilizers is covalently bonded into amino acids, while the nitrogen in inorganic fertilizers is found in water soluble forms.</p> <p>Methods/Materials Test pots were set up so that the estimated nitrogen content of fertilizer added was 0.5 grams. Five different fertilizers were tested; three organic (compost, alfalfa, blood meal) and two inorganic (Miracle Grow, Vigoro). Each experiment had four replicates, two of which contained soy bean seedlings. Pots were watered and runoff was collected at 12 different times over 21 days. The runoff was assayed for nitrate, nitrite, and ammonium levels using the API Freshwater test kit. Plant heights were measured, recorded, and photographed 4 times over the course of the experiment.</p> <p>Results The sum of all 12 nitrogen runoff measurements was lower in the organic than the inorganic fertilizers. Using a student's paired T test, there was a statistical difference between the two groups for nitrites and ammonium but not for nitrates.</p> <p>Conclusions/Discussion My data supported my hypothesis; overall there was less nitrogen in the organic fertilizers as compared to the inorganic fertilizers. An important finding was that there were differences between the organic fertilizers in the amounts of nitrogen released, the forms of nitrogen, and the timing of the release. For example, alfalfa released large amounts of nitrates (80 parts per million (ppm) on day 1) and ammonium (75 ppm on day 3) early on, but undetectable nitrites throughout. In contrast, compost released moderate levels of nitrates (50.6 ppm) and nitrites (4.31 ppm) but low levels of ammonium (8.3 ppm) steadily. Comparing plant growth, all plants grown in alfalfa died by day 5, while the average growth for plants grown in compost was 16 cm by day 21. My data suggests that it is not simply a matter of comparing total nitrogen runoff; Amounts and timing of the different forms of nitrogen released should be important considerations in fertilizer selection.</p>	
Summary Statement My project compared the forms, amount and timing of release of nitrogen runoff in organic and inorganic fertilizers.	
Help Received Father helped with data analysis, mother helped with board arrangement.	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Brandon T. Moreno	Project Number J1114
Project Title Eco-Friendly Car Wash Detergent vs. Regular Car Wash Detergent: Which Is Better for Our Environment?	
Abstract Objectives/Goals The objective is to analyze if environmentally friendly (eco-friendly) car wash detergents are less harmful to the environment than regular car wash detergents. The project analyzes the effects of these products on plant development to determine their environmental impact. I would expect that watering plants with a solution of eco-friendly car wash detergent would develop taller plants with more flowers and with better color quality than plants watered with a solution of regular car wash detergent. Methods/Materials Nine Impatiens plants were tested using solutions of eco-friendly car wash detergent and regular car wash detergent. plants 1-3 were watered with an eco-friendly solution, plants 4-6 were watered with a regular solution and plants 7-9 got just water (control variable). Plants were watered every four days for one month. Plant height, flowers bloomed, and color quality were measured after each watering. Measurements were averaged and graphed to show results over time. Results The plants watered with eco-friendly solution performed better than plants watered with regular solution. Plants watered with eco-friendly solution grew 3cm, bloomed 4 flowers and had good color quality. Plants watered with regular car wash solution decreased in height by 1cm, had less flowers in the end with many brown and dying petals. Conclusions/Discussion The results showed that plants watered with eco-friendly car wash solution grew more in height, developed more flowers and had better color quality compared to plants using regular car wash solution. The results proved that eco-friendly car wash detergents can be less harmful to the environment than regular car wash detergents. The environmental impact of cars being washed with eco-friendly products is huge - as many as 30% of car owners wash their own cars. This is a big opportunity to raise public awareness and make sure people use the right product to protect our environment.	
Summary Statement My project tested whether using eco-friendly car wash detergent is less harmful to our environment than using regular car was detergent	
Help Received mom helped purchase materials and develop the pictures	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Maximilien Moreno	Project Number J1115
Project Title Earth, the Great Decomposer	
Objectives/Goals My goal was to prove that Holtville's soil will decompose oranges at a faster rate than Calexico's or Niland's soil. I predict this because Calexico's soil is a mix between silt and clay. Niland's soil is clayish, and Holtville's soil is sandy, therefore it allows more air to move through the dirt along with bugs that eat move through the sandy soil which makes a quicker decomposition on the oranges.	
Abstract Methods/Materials I used three different landfill soil, placed in five, one gallon plastic containers that had holes in the bottom for drainage. I also placed an eighth piece of an orange in each landfill container covered with the different soils. I had a scale to weigh each piece of orange before I placed it in the dirt and after I removed it from the dirt, water to wet soils, labels to identify all containers.	
Results The result was obvious because of the air and bugs that move through the sandy soil in Holtville's landfill made the oranges break down faster for a quicker decomposition.	
Conclusions/Discussion My conclusion was correct, Holtville's landfill decomposed the oranges at a faster rate than Calexico and Niland because the sandy soil in Holtville's landfill makes it possible for air and bugs to speed the decomposition process.	
Summary Statement My project is about the type of soil needed to cause a quicker decompotion in the Imperial Valley landfills.	
Help Received Mother and father drove, with art work, and proof read for grammerical error.	



CALIFORNIA STATE SCIENCE FAIR 2012 PROJECT SUMMARY

Name(s) Riley E. Rich	Project Number J1116
Project Title Water Quality Changes in Redtail Fairy Shrimp Environment	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals I was drawn to studying fairy shrimp after hearing about how important they are from my neighbor who works for the U.S. Fish and Wildlife Service. He showed me different types of fairy shrimp he had collected and saved when he investigated samples at vernal pools. Of course, I could not have any contact with the highly endangered endemic fairy shrimp species, but I was able to accompany him in the field and observe and learn about the fairy shrimp's habitat. As my project, I grew Redtail fairy shrimp (<i>Streptocephalus</i>) from eggs and tested the water quality. I thought that water quality values would change as shrimp grew. I decided to take initial and final measures of water quality to try to determine how their lifespan might be affected by water quality changes. I expected to see changes in the nitrate, phosphate, ammonia, pH, and total dissolved solids levels, due to the accumulation of waste in the environment.</p> <p>Methods/Materials I split the "simple pack" of 50 Redtail fairy shrimp into 6 jars. Then added water per directions. I tested the water temperature, ammonia, dissolved oxygen, biochemical oxygen demand, available dissolved oxygen, nitrate, nitrite, phosphate, chlorine, hardness, total alkalinity, pH, free chlorine, total hardness, total dissolved solids, and turbidity. I fed the fairy shrimp daily and counted the fairy shrimp in each jar on several different days. When the shrimp died, I performed all of the water tests for a second time.</p> <p>Results After performing more than 100 water quality tests, I discovered that the pH remained the same, at pH 8.0. The phosphate increased from 0 ppm to 5 ppm. The total dissolved solids increased from 0 ppm to 48.0 ppm. The ammonia rose from 0 ppm to 1.0 ppm. The dissolved oxygen dropped to between 1 ppm and 2 ppm in five of the six samples. The nitrate and nitrite were at 0 ppm. My nitrate and nitrite test strips may have had problems even though they were still within the code date. I observed fairy shrimp cysts remaining in the six water samples. I photographed a cyst I viewed using a microscope.</p> <p>Conclusions/Discussion In conclusion, ammonia appeared to be at toxic levels in the final readings and the oxygen levels were too low to support life. It seemed that as some of the shrimp died, this may have promoted a die off in the samples. My findings revealed rising phosphate and ammonia levels and decreasing dissolved oxygen.</p>	
Summary Statement My project monitored the effects of time on water quality changes in Redtail Fairy Shrimp environment.	
Help Received Thanks to Chris Powers for taking the time to teach me about our endemic fairy shrimp and introduce me to the vernal pool habitat. Thanks to my parents for their support. Thanks to my science teacher for her guidance and for lending equipment.	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Elise J. Rio	Project Number J1117
Project Title Eco Dive	
Abstract Objectives/Goals The objective was to determine which type of material works best to construct artificial reefs. Methods/Materials Three types of materials were tested: concrete, wood, and stainless steel. The materials were cut into similar small plates that were attached together using a bungee cord in the ocean. Three sets of plates were monitored over a period of 85 days. With a mid period check survey. The placement, monitoring, and collection were done through scuba diving, at the Catalina dive park in Avalon, California. Results The concrete plates showed the most obvious signs of marine life coverage. One plate was almost completely covered, 75%, another was only 60% covered, and the third plate had a marine life coverage of 70%. These percentages were very high compared to the other materials that always seemed to have only low and one high percentage in the different plates. Indeed the wood plates had a range of results. One plate was only covered 5% while the other two were in high numbers like 80% coverage. The steel was also inconsistent, ranging from 20% coverage to 85% coverage. The type of marine life ranged from animal growth, like barnacles, to soft seaweed and different types of kelp, to hard growth like coral. Conclusions/Discussion In my hypothesis, I had predicted that concrete would be the material with the most marine growth coverage. Overall the concrete did have the most marine growth, and most constant amount developing on it, but an unexpected event did occur in my results. The stainless steel plate number two was covered in marine life and a small kelp piece had even started to grow on the top of the plate. Wood plate number three also showed some major marine life as it was covered in small algae. After my experiment I would still rule that concrete works best in creating artificial reefs, as it was the material with the most consistent growth. Over a longer period of time more life would have developed on all three materials. From my immediate results stainless steel, and wood worked best two out of three times while concrete worked well three out of three times. This verifies my hypothesis that concrete would work best in sustaining marine life.	
Summary Statement How does the type of material, wood, stainless steel or concrete, affect how much marine growth develops on it?	
Help Received Father was my buddy during the scuba diving	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Andrew B. Roman	Project Number J1118
Project Title Can the New River Be Cleaned So that Invertebrates Can Survive in Its Reclaimed Water?	
Objectives/Goals My goal is to determine that invertebrates will have a healthy survival and reproduction rate in reclaimed water from the New River in order to assess the effectiveness of the wetlands project as a method to clean the polluted river.	
Abstract Methods/Materials Three water samples were collected, from the end of the wetlands, another from water entering the wetlands project and a third was a control sample of a super clean nutrient water from the Lab. I filled testing vials with each of the samples for the bio-assay test. I selected 25 healthy Ceriodaphnia from a lab culture and placed one in each vial of water; I then added feeding solution. The Ceriodaphnia Dubia in the vials were checked daily for survival and reproduction. For a period of seven days I extracted the Ceriodaphnia with a pipette, emptied vial, refilled vials with water samples accordingly; placed the Ceriodaphnia back in vial and using a micro pipette fed all Ceriodaphnia with feeding a solution.	
Results In Sample A, water exiting from the Wetlands Project, most of Ceriodaphnia in this sample survived with a fare amount of reproduction. Sample B, the water sample entering the wetlands project, by day 2 of my project the Ceriodaphnia started to die, and only reproduced small amounts of neonates. Sample C, my control which consisted of clean nutrient rich water from the lab; all the Ceriodaphnia survived in this sample with a healthy amount of reproduction.	
Conclusions/Discussion my hypothesis based on my research on the New River, Salton Sea and the wet lands project was proved wrong, because, I predicted that the invertebrate, Ceriodaphnia, will not survive in Sample A. (water coming out of the wet lands project). The man-made wetlands appear to be an effective way to improve the New River#s water quality; however the project needs to be expanded to include a larger amount of water.	
Summary Statement My project demonstrates that Ceriodaphnia can survive in reclaimed water from the New River, therefore demonstrates that the wetlands project is an effective way to improve the water quality of the New River.	
Help Received Used lab equipment at I.V. Environmental Lab under the supervision of Miguel Ortega, Father helped type report	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Kaitlyn A. Russo	Project Number J1119
Project Title Determining the Effect of Ammonium-Nitrogen on Aquatic Life	
Abstract Objectives/Goals To determine whether the level of Ammonium-Nitrogen in Clovis Stormwater is toxic to aquatic life. Hypothesis: The toxic level of ammonium-nitrogen to the aquatic life will be a solution of .5 ppm; the level of ammonium-nitrogen in the Clovis stormwater will be toxic to the aquatic life. Methods/Materials Materials: Dissolved Oxygen Kit, Algae, Distilled Water, Ammonium-Nitrogen Testing Kit, Glass Jars, Ammonium-Sulfate, Graduated Cylinders Methods 1. Add ammonium-sulfate to distilled water to create four levels of ammonium-nitrogen: 0ppm, .5ppm, 1ppm, 2ppm. 2. Add algae and seal for 60 hours. 3. Test for dissolved oxygen to determine if the levels are detrimental to fish. 4. Test the level of ammonium-nitrogen in Clovis stormwater collected from 20 different gutters throughout the city. Results At the .5ppm of ammonium-nitrogen, the level of dissolved oxygen was the highest at 8mg/l. At the 2ppm level, the dissolved oxygen was at 5.17 mg/l--the lowest in the experiment. Clovis stormwater was found to have 3.5ppm of ammonium-nitrogen. Conclusions/Discussion At 2ppm of ammonium-nitrogen, the dissolved oxygen levels were borderline unhealthy. Clovis stormwater exceeded 2ppm and could be toxic to aquatic life. My first hypothesis was not supported. The second part of my hypothesis could not be supported since my testing range was not broad enough. However, the toxicity level of ammonium-nitrogen is much lower than what I found in the storm water. We can use this information to inform the public about lawn run-off and contaminates in the gutters and to help water districts realize that they need to find ways to lower the amount of ammonium-nitrogen in our waterways.	
Summary Statement Determining at what level ammonium-nitrogen becomes toxic to aquatic life.	
Help Received Mother helped me type and drove me to gather storm water.	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Sage A. Strieker	Project Number J1120
Project Title Murky Waters: The Impact of Oil Spills and Oil Spill Cleanup Dispersants on Gulf Coast Mangrove Habitats	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My objective was to understand the effects of oil spills and oil spill cleanup dispersants on Gulf Coast waters and their mangrove ecosystems.</p> <p>Methods/Materials I created three red mangrove habitats in three tanks, each containing an equal amount of uncontaminated ocean water. The first tank remained this way. I added motor oil to the second and third tanks to simulate the oil spilled in the Gulf Coast in 2010. I added dishwashing liquid (a dispersant) to the third tank to simulate the dispersant used to treat the spill. During 22 days, I logged the changes in the oxygen and pH levels of the water in each tank, and the changes in the appearance of the water and the mangroves.</p> <p>Results For red mangrove habitats to be healthy, an oxygen level of 7 mg/L or higher, and a pH of 8.2 to 8.4 are essential. All three tanks began with healthy oxygen and pH levels. In the first tank, these levels remained steady. In the second tank, the oxygen level reached a low of 0 mg/L and the pH reached a low of 7.8. In the third tank, the oxygen level dropped to a low of 0 mg/L, but the pH level only dropped below 8.2 once, which was probably due to a testing error. The appearance of the water and the trees in the first tank stayed healthy, but in the second and third tanks, the water became polluted and the trees died.</p> <p>Conclusions/Discussion I conclude that we need to find a way to get rid of oil spills, but to find an alternative to using toxic oil dispersants to do it. All three of my tanks started out with healthy oxygen and pH levels, but after 22 days, only the tank free from oil and dispersant stayed healthy. This suggests to me that whole mangrove swamps and their ecosystems could be obliterated under conditions similar to those in the second and third tanks.</p>	
Summary Statement My experiment is designed to demonstrate the effects that oil alone, and oil mixed with cleanup dispersants, have on Gulf Coast mangroves and their habitats.	
Help Received James Crites (my expert) helped me select materials. Ms. Novak helped me decide which direction to take with my project. Victor Alaniz helped me take oxygen and pH levels. Anthony Duran taught me the computer graph program. My mother added water to the tanks and helped me buy supplies.	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Louisa Vanhecke	Project Number J1121
Project Title Internal Global Combustion Warming Engine	
Abstract Objectives/Goals The purpose of my science project is to find out if the residual heat produced by the internal combustion engine of the car could be a major contributor to global warming. If this were to be true, should we as a nation and world find a more eco-friendly means of transportation, such as a hybrid car or better carpooling? Methods/Materials I have obtained the six most common kinds of cars on the road today, a large and midsize SUV, a sports car, a small sedan, a compact car, and a hybrid. These cars were driven for fifteen minutes on a designated loop and then parked in a controlled area to record the minimum and maximum temperature reached. This test was repeated three times for each vehicle. Once these temperatures were recorded, I found the differences, and calculated averages for each car and all the cars combined. Results The average temperature difference of all the cars combined was 4.1°F. I calculated the volume of the controlled test area and converted it into cubic kilometers so that I could relate it to the cubic kilometers of earth's atmosphere (4.2 billion cubic kilometers). I then devised two methods to find out how many "control areas" fit in earth's atmosphere to determine the percentage of the 4.1°F increase. Conclusions/Discussion The conclusion of my science project is that the residual heat given off by the car after fifteen minutes of driving hardly makes a difference to the atmosphere at all. However, I did come to a result in that even though the heat increase was minimal, it was still a recordable number.	
Summary Statement Does the residual heat produced by the internal combustion engine of a car contribute to global warming?	
Help Received My dad with the driving of the cars and recording data. My mom with display board layout and presentation. Daniel Huthsing (Friend and intern at FLIR Santa Barbara) with IR pictures.	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Mika Weissenberger	Project Number J1122
Project Title The Global and Local Burrito: An Analysis of Transportation Carbon Footprint and Price	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of the project was to determine the transportation carbon footprint and price of locally sourced food versus wholesale food using a burrito as example.</p> <p>Methods/Materials A list of the ingredients in a typical burrito (Tortilla, Meat, Beans, Avocados, Cheese, Lettuce, Sour Cream and Rice) was put together and taken to New Leaf (local Community Market) and the Farmers Market to record where the particular ingredient came from and how much it cost. Then the same table was taken to Costco (Wholesale Market) with the same intent. It was relatively easy to find the place of production for the New Leaf/Farmers Market sourced ingredients, however for the Costco sourced ingredients only the distribution centers could be determined (even with extensive online searching which was performed later as well). After the collection of the price and place of production/distribution of the ingredients, the distance it had traveled was determined by using Google Maps. The transportation carbon footprint was then calculated using a) the method in which the ingredient was transported (truck, train, plane), b) the distance that the ingredient traveled, and c) the weight of the ingredient.</p> <p>Results The carbon footprint of the wholesale burrito had a 111x higher carbon footprint than the locally sourced burrito, and the locally sourced burrito was 2.2x more expensive.</p> <p>Conclusions/Discussion The results supported my hypothesis which was that the carbon footprint of the wholesale food would be higher, but the local food would be more expensive. Surprising though was the fact that the carbon footprint of the wholesale burrito was so much higher, and that the Costco meat came from as far as New Zealand and Australia. This science project made me and my family more aware to look where the food we are going to buy actually comes from and I hope it will raise awareness about the carbon footprint of food.</p>	
Summary Statement A comparison of the transportation carbon footprint and price of a burrito with locally sourced ingredients vs a burrito with ingredients sourced from a wholesale store.	
Help Received The assistance that I received on this project was from my mother who drove me to Costco, New Leaf and the Farmers Market. She also read over everything I wrote for the project and gave me feedback. Many Thanks also to Christine Potrero and Volker Enders, for their time answering my interview questions.	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Maaike R. Wielenga	Project Number J1123
Project Title Too Salty for Seeds! An Experiment Examining the Effect Salinity Has on the Germination of Pea Seeds	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of this experiment was to measure the effects the salinity of the water has on the germination rate of pea seeds. It was expected that as the salinity increased, the germination rate would decrease.</p> <p>Methods/Materials Five different solutions of salt water were made according to directions in the procedure. Then, 5 bags were gathered per solution and labeled according to directions in the procedure. 10 seeds were placed in each bag on a paper towel and labeled 1-10 on top of the bag. The bags were watered with 20mL of the correct solution and sealed. They were then placed in a box. Every day for 7 days, the lengths of the radicals of each seed were measured.</p> <p>Results As the salinity of the water increased, the radical lengths decreased, and therefore the germination rate decreased. Though there was a lot of variation of radical lengths within the different solutions, the overall average showed that the germination rate decreases as the salinity increases. Seeds watered with Solution A (0% salt) had an average radical length at the end of day 7 of 49mm. From there the average length of radicals decreased with Solution B (0.5% salt) at 30mm, Solution C (1% salt) at 19mm, Solution D (2% salt) at 4mm, and Solution E (3% salt) in which there was no growth of radicals.</p> <p>Conclusions/Discussion Salinity is a big problem in the world today in places such as Australia and even California. As the salinity of the soil increases, the germination rate decreases. This causes lower production of crops, loss of income, and loss of land to grow crops. The greater salinity of the water, the shorter the radicals of the seeds and the germination rate is decreased. This supports the hypothesis.</p>	
Summary Statement The effects of salinity on pea seed germination.	
Help Received Parents helped buy materials	



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Elizabeth Mikszta	Project Number J1199
Project Title The Effect of Ocean Acidification on Bioluminescent Plankton	
Abstract Objectives/Goals Cars and power plants release carbon dioxide. This dissolves into water and makes it acidic. This process is called ocean acidification. I want to know how this will effect sea life. I am using bioluminescent plankton to test whether I can show the effect of ocean acidification. My hypothesis is that pH below the natural about pH 8 of sea water will eventually kill bioluminescent plankton. Methods/Materials I purchased Pyrocystis fusiformis and media and grew it for a month at 68 - 70° in a 12° light/dark cycle. I split the cultures into 6 sets of 3 jars with 50 mls of plankton each and 4 normal controls. I titrated each set to pH 4 through 9 with 0.1 N HCl or NaOH while testing with pH paper. I checked the jars for the first time about an hour after I titrated them and then every day for 7 days and then at two weeks from the beginning. Results All of the acidic samples died. The most acidic died at one day and the pH 7 samples took 6 days to die. The pH 8 and pH 9 samples stayed strong the entire two weeks. Conclusions/Discussion My hypothesis was correct. All of the plankton below pH 8 died. The lower the pH, the faster they died. I found this was a good system to find the effect of ocean acidification on sea life. If I study further I will look at the pHs between 7 and 8. I will then need access to better equipment to measure 0.1 differences between pH 7 and 8. The equipment I would need would be a pH meter, better pipettes and a way to accurately measure luminosity.	
Summary Statement Bioluminescent plankton are sensitive to acid and at risk from ocean acidification.	
Help Received My mother and father helped get the equipment together and supervised the work, especially the acid titration. My mother typed a lot of the report and helped put it on the board. My teacher, Mrs. Yount, encouraged me and Mr. Roth helped me practice the presentation.	