



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Priyanka Arunkumar; Shriya Nagpal	Project Number J1001
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Project Title Lead in Elementary Schools

<p style="text-align: center;">Abstract</p> <p>Objectives/Goals In 1978 paint containing > 0.06% lead was banned but there were still old paint stocks available and being used. EPA's action level for lead is 0.5 % by wt. (5000 m/kg) for chipping or deteriorating paint. In humans, lead inactivates the sulfhydryl group of enzymes needed to synthesize heme, the oxygen carrying pigment in blood. Lead also interferes with metabolism. Low exposures can result in sluggishness and memory loss while high levels effect the Central Nervous System (CNS). Lead has greater impacts on children because children have a high metabolism, are closer to the breathing zone, and have developing CNS. In 1998 the California Department of Health Services tested 200 schools. 95% had detectable levels of lead with 77% above EPA action levels and 37% in deteriorated condition. Most schools were repainted after 1998. This project asks if kindergarten classrooms in Saratoga Elementary Schools have lead in peeling paint. Our hypothesis was if the classrooms were built or repainted after 1992, then no lead is expected.</p> <p>Methods/Materials Three samples were taken from two kindergarten classrooms at Argonaut, Foothill, and Saratoga elementary schools in Saratoga. The samples were labeled and transported to a laboratory for testing. The samples were prepared in the laboratory by digesting in nitric and hydrochloric acid. Project and quality control samples were tested using the ICAP (Inductively Coupled Argon Plasma) Instrument that measures specific spectra for lead at a specific wavelength (220.35) by optical spectroscopy.</p> <p>Results The results showed that 4 samples were non-detect, 12 < 5.0 mg/kg, and 2 > 100 mg/kg. All samples were below the 5000 mg/kg EPA action level for peeling paint. Samples from Oak and Foothill schools were all < 5.0mg/kg.</p> <p>Conclusions/Discussion The 2 samples taken from shelves at the Argonaut school showed results > 100 mg/kg (at 183.33mg/kg and 972.31mg/kg). Notifications were sent to all schools providing them with results. Even though the classrooms were repainted after 1992, lead was detected, particularly in shelf paint. All results were below EPA action levels.</p>
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Summary Statement The project asks if kindergarten classrooms in Saratoga Elementary Schools have lead in peeling paint.
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Help Received Ms. Inlow, Redwood Middle School, Saratoga, CA (Overall Support), Mr. Jani, Mr. Patel, Torrent Laboratories, Milpitas, CA (lab support), Mr. Chapman (Argonaut School), Ms. Ondrejka (Foothill School), Ms. Smalley (Saratoga School) ,Mr. Tipton (SUSD), (School Access), Ms. Vedantham (Overall



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Kevin J. Bajurin	Project Number J1002
Project Title Is There Too Much Arsenic in Bay Area Drinking Water?	
Abstract Objectives/Goals On January 23, 2006 the Environmental Protection Agency (EPA) lowered the allowable amount of arsenic in drinking water from 50 parts per billion (50 ppb) to 10 ppb. Arsenic is a semi-metal element in the periodic table, and is odorless and tasteless. Arsenic is also known to be a health threat to humans. Given the new standards, the objective is to determine whether Bay Area drinking water has less than 10 ppb. Methods/Materials Drinking water samples were taken from public school drinking fountains in nine Bay Area counties (Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano and Sonoma). Using an arsenic test kit ("Low Range Quick"), the water samples were tested for the level and presence of arsenic. Results After testing the water samples and recording the results, only one water sample demonstrated the presence of arsenic (Santa Clara County), but was less than the EPA standard. Conclusions/Discussion It appears that the water treatment in the Bay Area is doing better than the EPA standards.	
Summary Statement This project studied and confirmed that the Bay Area meets federal water quality standards for arsenic.	
Help Received Father drove me to all 9 counties in the Bay Area and supervised me while I was performing the tests.	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Kanan J. Best	Project Number J1003
Project Title Estimating Gas Consumption at Drive-Thru Restaurants and Businesses in California	
Objectives/Goals The objective is to determine how much gasoline is consumed by vehicles while idling at drive-thru restaurants in the state of California.	
Abstract Methods/Materials I collected data from 98 drive-thru restaurants throughout California. I took notes on how many vehicles were waiting in line, time of day, location, type of restaurant, and vehicle size. I also collected continuous information from the McDonalds in Arcata over the period the restaurant was open. I used these data to interpolate continuous data for the state observations. I did an experiment to determine the gas consumption rate for idling vehicles. I used the Internet to research the number of drive-thru restaurants and yearly gas consumption by vehicles. Rate of gas consumption was determined using average line length, number of restaurants, and idle gas consumption rate.	
Results Gas-consumption rates for idling vehicles ranges from 0.20 to 0.55 gal/hr. There are about 8500 drive-thru businesses in California. The average line length (averaged over a 24 hour period) is 1.6 vehicles.	
Conclusions/Discussion The average idle gas-consumption rate referenced in many studies is 1.0 gal/hr., and appears to be too high based on my results. About 32 million gallons of gas are consumed yearly by vehicles while idling at drive-thru businesses. However, California vehicles consume over 14.9 billion gallons per year, and consumption by idling vehicles represents only 0.2 percent of the total. Although this is a small portion, discouraging this, and other wasteful practices (such as idling at traffic lights), could collectively reduce energy consumption.	
Summary Statement My project shows how much gasoline is consumed by vehicles while idling at drive-thru businesses in California.	
Help Received My Mom took me to the Arcata McDonalds so that I could collect data throughout a 24 hour period. My dad showed me how to enter data into tables and create different graphs using Excel	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Emily Birch	Project Number J1004
Project Title What Is the Relationship between Turbidity Levels in Water and the Amount of Dissolved Oxygen?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Our world is water. I wanted to show how chemicals like sodium phosphates can effect algae growth and the water it's in. I wanted to show something that is happening in the world. Phosphate pollution in ponds and rivers is an issue that we can't just ignore. My hypothesis stated that as algal turbidity levels rise, dissolved oxygen concentrations also increase.</p> <p>Methods/Materials I used 5 Tetra Whisper pumps, 5 22x34x13cm plastic tanks, 280mL sodium phosphates, Flinn Scientific dissolved oxygen test kit (30 dissolved oxygen TesTabs, dissolved oxygen color comparison chart, test vial) EXTECH Foot Candle Lightmeter, 10mL graduated cylinder, and Celsius thermometer. To test dissolved oxygen, I got an overflowing sample of the water to be tested in the vile. I inserted 2 TesTabs into the water. When the tablets dissolved, the water turned an orange color. I compared the water's color with the color comparison chart and got a reading in parts per million. To test turbidity, I put the flashlight on one side of the tank. On the opposite side I put the lightmeter. As the light from the flashlight shown through the water, some was scattered by the algae. The light that didn't scatter continued to the lightmeter, which took in the light.</p> <p>Results Throughout the experiment, PPM readings stayed close. Tank3 had 8PPM of dissolved oxygen. Tank3 also had the lowest amount of foot candles, so it was the most turbid. Tank3 proved my hypothesis to be correct. When more algae is growing in the water, more photosynthesis is being performed, resulting in the release of more oxygen.</p> <p>Conclusions/Discussion As algal turbidity levels increase, dissolved oxygen concentrations increase. Tank3, which received 4mL of sodium phosphates, grew the most algae. This resulted in the more scattering of light. The phosphates provided nourishment for the green algae. As the algae grew and divided, dissolved oxygen increased due to more algae in the water performing photosynthesis. The algae was able to perform phtosynthesis during the day and release oxygen because the sun was giving light. At night, there was little sunlight, so the algae was unable to perform phosynthesis. The algae had to suck oxygen out of the water so it could "feed" itself. When fertilizers are washed into ponds, they enhance algae growth. As the algae rapidly grows, it produces more oxygen. Too much algae in the water can be harmful and eventually fatal to other organisms.</p>	
Summary Statement I wanted to show how algal turbidity can affect dissolved oxygen because it is affecting our environment today through fertilizer run-off.	
Help Received Step-father and brother helped test turbidity; Teacher provided sodium phosphates and pumps through the school's grant money.	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Meredith A. Brown	Project Number J1005
Project Title Solar Energy: Friend or Foe? A Matter of Perspective	
Abstract Objectives/Goals The goal for this experiment was to find out what the environmental impact of placing solar panels in the desert would be. Methods/Materials Three boxes were built from plywood, approximately 100X36X20 cm. The boxes were filled with sand and solar panels were placed about 4 cm above the sand. The boxes were enclosed in plastic. Thermistors were used to measure the temperature in the core, sand surface, panel surface and air above the solar panels. Readings were taken every half hour using a digital voltage meter. Those readings were converted to temperature. This was done for five days. Results It was found that the sand surface of the box without the solar panel (desert box) responded to temperature changes faster than the two boxes with solar panels. The core of the desert box responded faster to temperature change than the two other boxes. The air above the solar panel boxes was a lot hotter than the desert box. The core of the sand box was always cooler than the surface. Conclusions/Discussion Solar panels did affect the desert environment. They raised the temperature of the air and lowered the temperature of the desert surface. This happened because they provided shade for the ground, keeping it cool, but their dark color heated the air because it absorbed and not reflected the sunlight.	
Summary Statement This project found that there will be an environmental impact if solar panels are placed in the desert.	
Help Received Father helped test and obtain materials, Teacher helped with final notebook and dead lines.	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Nicole J. Burdett	Project Number J1006
Project Title What's in Your River? Nitrates, Phosphates, Ammonia, Oh My!	
Abstract Objectives/Goals My goal is to find out which area of the Santa Ana River contains the highest degree of pollution contaminants. I hope to get a better understanding of the quality of the Santa Ana River water. I chose this project because I started sampling the Santa Ana River in 2006 and I wanted to continue my project, refine the testing model, and continue taking water samples. Methods/Materials I interviewed lab analysts at the Riverside Water Quality Control Plant (RWQP) for water testing background information, and to get water sampling data for my project. Water sample sites were chosen consistent with WQCP testing sites: output dike at the WQCP, Hidden Valley Ponds, and Pedley Road. Coordinated water sampling dates with the water plants' lab analyzing runs. Samples were taken: 1/16, 1/22, 1/23, 1/24, 2007. Rinsed out the sample container with river water prior to collection to remove any contaminants. Recorded water temperature, air temperature, time location, and water turbidity. Took samples to the WQCP to be analyzed for fluorine, chloride, nitrite, nitrate, phosphate, and sulphate. Results Results are in milligrams per liter. The project design used three water sampling sites, however, the data from the out take dike at the WQCP was promised but not made available to me. Hidden Valley Ponds, Pedley Road averaged data: F: .65, .58; C:138, 99; NO3: 2.71, 35.25; PO4: 1.83,6.0; SO4: 141.8, 103.5; NH3: .25, .22. Conclusions/Discussion The Pedley Road samples had the highest degree of pollution with high amounts of nitrates averaging 34.27 mg/l. The EPA acceptable drinking water levels for nitrates are less than 4mg/l. Hidden Valley Pond nitrate levels averages 2.73mg/l. Sulfate levels at Pedley Road averaged 103.3 mg/l, and Hidden Valley 140 mg/l; acceptable drinking water levels are 80mg/l. The sulfate levels in eight samples were 43% higher than recommended by the EPA for drinking water. My hypothesis was correct: the Pedley Road samples would have higher concentrates of nitrates and phosphates due to the site being further downstream from the water plant and the nitrate scrubbing action provided by the Hidden Valley Ponds. The ammonia levels were below the national EPA standards. An aerial photo showed the Mira Loma Goose Neck Golf Course is directly upstream from the Pedley collection site and the grass fertilizer run-off may have affected the high nitrate and phosphate levels.	
Summary Statement I am trying to determine what area of the Santa An River has the highest degree of pollution contaminants.	
Help Received Lab water analyzing equipment at the Riverside Water Quality Control Plant used to analyze water samples. Anicia Yambot, lab analyst, at the Water Plant. Parents who drove me to sampling sites, mother helped build the board, and typed application forms.	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Alison Burklund	Project Number J1007
Project Title Hazardous Waste: What Soil Fits Its Taste?	
Abstract Objectives/Goals In my experiment I wanted to find out what soil type would be most effective so that hazardous waste would not contaminate the ground water. I had two main goals when performing my experiment. Achieve a general understanding of the chemical and physical effects that soil has on a contaminant through the process of a chemical reaction in the soil column. Determine what soil type chemically and physically really has the best positive effect on not contaminating the groundwater. Methods/Materials To do this experiment I used two 3-foot plastic tubes, each representing a soil column. I chose four different soil types and tested them each with four different liquids/contaminants. I measured the initial pH of all of these substances. The tubes were filled with soil and poured contaminant into the tube observing and recording my findings with time. Once the contaminant was beneath the soil I measured and poured average rainfall. I recorded how far the contaminant had moved about every 1-5 minutes depending on how fast the contaminant was moving. I then calculated average flowrate and measured the pH of the contaminant coming through the soil column and compared that with the substance's original pH. My tests measured the rate the chemical moved through the soil column and whether a chemical reaction may have occurred between the soil and the contaminant. Results The silty-clay was most efficient for slowing the contaminant down due to its impermeability, while the sand was the most permeable. Silty-clay was not effective in slowing down the acidic contaminant because the acid broke the organics in the soil down which caused the soil to lose its "sticky" effect. The basic soil was most effective for neutralizing acidic contaminants. Flowrates ranged from .005in/min to 1.36in/min for the experiments performed. Conclusions/Discussion I concluded that without rainfall the liquid would not move through the column. This means that if the contaminant is disposed of in arid or dry environments, it will not move downward, eliminating the potential for ground water contamination. Also, lining a landfill with either an acidic or basic soil, depending on the contaminant, would be useful. This would neutralize the contaminant just before it reached the water table, again eliminating the potential for ground-water contamination.	
Summary Statement The focus of my project was to find out what soil type is best so that hazardous waste does not contaminate the ground water supply.	
Help Received Discussed project with mother; mother made some suggestions when problems were encountered; mother supervised pouring and mixing of toxic chemicals.	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Arai Calvillo; Maglay Ruiz; Melanie Vieira	Project Number J1008
Project Title Cow Patties: How Much CO(2) Do They Really Give Off?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Which foods (feed grain/hay or silage/hay) when excreted by two different calves give off the most amount of Carbon Dioxide through their wastes.</p> <p>Methods/Materials Each day our group would test each calf's waste by placing the samples in containers and measured to within +/- 5 grams. Using the Carbon Dioxide tester, we would test each sample for 30 minutes at 2 minute intervals and record the results. Calf A was fed a diet of feed/grain and hay for 5 days and calf B was fed silage and hay for this same 5 day period. For the next 2 days, the calves will switch diets and testing will not be recorded for these days allowing the calves to clear out their previous diet. Testing will begin after the second day and continue for the next 5 days. Calf A will be fed silage and hay, while calf B receives a diet of feed/grain hay. At the end of our project we determined which calf gave off the most carbon dioxide by using the overall average reading of carbon dioxide for each calf.</p> <p>Results The measurements in our experiment show that the diet of silage and hay when given to both calf A and calf B gave off the most amount of carbon dioxide.</p> <p>Conclusions/Discussion As stated in our hypothesis we believed that the diet of silage and hay would produce more carbon dioxide when excreted through calf wastes then grain/feed and hay would when excreted through calf wastes. Our hypotheses was correct for the overall average of each diet proves that the silage and hay diet produces more carbon dioxide when excreted through calf wastes then the feed/grain and hay diet.</p>	
Summary Statement "Cow Patties" of calves fed silage and hay release more carbon dioxide then calves fed feed/grain and hay.	
Help Received Father and Uncle helped supervise bringing in the calves and doing research; Mrs. Wyman and Mr. and Mrs. Oliver for their guidance and direction.	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) William G. Carr	Project Number J1009
Project Title Air Pollution	
Abstract Objectives/Goals The objective of this project was to test which of the following areas had the cleanest air: the country, the city, or an area by the freeway. The hypothesis was that the area sampled in the country would have the cleanest air. Methods/Materials Three areas were chosen in the city of Manteca, California to perform the tests. A high-volume air sampler borrowed from the Lawrence Livermore National Laboratory, along with a set of clean filter papers were used to perform the sampling. The sampler worked off of a twelve volt car battery and had a built in timer and an air flow meter. On three separate days, the sampler was set up at each location and a thirty minute sample was taken. The car used to transport the sampler and supply the power to the sampler was turned off so that it did not contribute to what was being measured. The filters were placed into plastic bags and labeled. Later, the filters were compared to a color scale that started at white (represented by 1) and slowly progressed to black (represented by 25). Results were entered into a scientific journal. Results The results did indicate that the country area did have the cleanest air by far. All three of the country filters were ranked 1 on the color scale. The city area was the second cleanest air, in its first testing it ranked 4, on its second testing it ranked 5, on its third testing it ranked 3, and its average was 4 on the scale. The freeway definitely came in last place. In its first testing it got a 9, on its second testing a 10, on its last testing an 8, and its average was 9 on the color scale. Conclusions/Discussion In the end, the hypothesis that the country would have the cleanest air was correct. This is important information to know when choosing where you might want to live or to spend a lot of your time. While air pollution is not something that you can completely get rid of, people who are aware of the results of research like this may be able to make better choices that help to lower the amount of pollution they generate and are exposed to.	
Summary Statement This project is about air pollution and which location within a general area has the least of it: the country, the city, or by the freeway.	
Help Received Equipment was borrowed from Lawrence Livermore National Laboratory. My father drove me to sampling locations and helped connect sampler to car battery.	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Gregory M. Cloud	Project Number J1010
Project Title Gray Water Effects on Plant Growth	
Objectives/Goals Gray water is the water that comes from sinks, clothes washers, showers, and dishwashers. The gray water contains detergents (soaps) and other particulates (dirt, food bits, etc.). I want to know if gray water affects plant growth.	
Abstract	
Methods/Materials Materials: 12#3-inch Peat Pots; 2#500 ml bottles each filled with bath water, dish water, laundry water, and regular water; 4 seedlings of each: broccoli, peas, and green onions; 24x12-inch tray; planting compost; ruler; 12 plant tags; sunlight. Methods: 1. Fill Peat Pots with organic potting soil. 2. Plant all 12 plants in the peat pots. 3. Label each plant #control,# #bath,# #laundry,# or #dish.# 4. Gather bath water, laundry water, and dish water. Control water is purified bottled water. 5. Water them as needed with their assigned type of grey water (Control, Dish, Bath, and Laundry Water.) 6. Place the plants in a sunny window in the house to control the temperature and maximize sun exposure to help growth. 7. Measure and record the height of each plant every time they were watered.	
Results None of my plants died during the testing. The data I collected showed that broccoli plants didn't grow at all. It is possible that either the broccoli grows at a slower rate than the other plants or because some leaves fell off, the relative measuring point was not the same throughout the experiment. The green onion and pea plants grew at approximately the same rate regardless of the type of water used.	
Conclusions/Discussion All the plants grew at a comparable rate. I think that water containing large amounts of detergents may affect plant growth but, the amount of detergents in gray water typical in a household does not appear to hurt the plants.	
Summary Statement Can gray water be used instead of potable water to water certain types of plants.	
Help Received My parents helped me prepare my display board.	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) David M. Cohn, III	Project Number J1011
Project Title From Ashes to Life: Burned Region Plant Regeneration/ Soil Transformation	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The San Diego County Cedar Fire of October 2003 was the largest fire in California's history. Black and white ash blanketed my hometown of Poway, and I wondered if the plants would ever recover. I hypothesized that a wildland fire would cause invasive species to flourish during the first few years due to lack of competition and an abundance of nutrients, though over time the burned areas would return to their original state, with native plants replacing non-natives. I postulated that the number of plants observed in eight fire response functional groups would fluctuate over time leading to a more homogeneous and less diverse population.</p> <p>Methods/Materials I chose a fire test site at a local preserve and surveyed the site every three weeks for 42 months. I documented and classified plant regeneration in multiple plots and took notes on observations of the surrounding hillside. I recorded soil and ambient temperatures, moisture levels, and degree of slope. I used Simpson and Shannon equitability indices to analyze biodiversity trends. I worked as a parobotanist with the San Diego Natural History Museum, providing fire response research data. I pressed species samples for its collection and mine.</p> <p>Results Between 2006 and 2007, 1188 new plants germinated in my test plots. In the 42-month period, 2499 native plants germinated versus only 37 non-native plants. The native plants were comprised of 35 species and 21 different families. Endemic and frequent fire followers, opportunistic annuals, and native postfire specialists reached their maximum populations within two years. Native fire followers, such as <i>Cryptantha micromeres</i> and <i>Phacelia parryi</i>, were predominant in the first 14 months. Obligate seeders, facultative seeders, and obligate resprouters like <i>Lotus scoparius</i>, <i>Adenstoma fasciculatum</i> and <i>Hazardia squarrosa</i>, showed increased density and cover by the third postfire year. Simpson and Shannon equitability indices rose between 2004 and 2005. In 2006 and 2007, both indices declined.</p> <p>Conclusions/Discussion Native plants regenerated at significantly higher rates than non-native plants. Native alien grasses thrived in all plots. No non-native grasses were observed. Fire response trends seen thus far are as expected: the native fire followers have disappeared, the number of postfire specialists and opportunistic annuals has significantly declined, and the shrub cover and density is increasing.</p>	
Summary Statement This project examines the regeneration of native and non-native plants, tracks the transformation of soil, and measures the biodiversity of a chaparral community affected by a wildfire.	
Help Received Thanks to Janet Franklin Ph.D. at SDSU, Jon E. Keeley Ph.D. with USGS and UCLA, and Richard W. Halsey of the Southern California Chaparral Field Institute for information about plant classification and chaparral ecology.	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Kayla R. Dawe	Project Number J1012
Project Title Death by Toxicity	
Objectives/Goals Different types of pollutants can accumulate in parking areas. The purpose of conducting this experiment was to learn if our water is being effected by everyday contaminates that accumulate in parking areas when the sediment runs off in to our watersheds with rainfall.	
Abstract I established a stable culture of Daphnia Magna from culture kits purchased. I researched the San Benito County watershed visiting two to obtain sediment samples from the parking areas. Each sample was weighed in 80gr increments and placed in separate containers. Each sample was diluted with spring water at different concentrations of 0.25L, 0.50L and 1L simulating rain water run-off. Each container was labeled with g/L concentration. 20 Daphnia Magna were added to each concentration and 20 Daphnia were added to my control of plain spring water. All concentrations were placed in the same place so they would all have the same environmental conditions such as temperature and light. A count was conducted and the number of viable Daphnia recorded at 8, 16, 24 and 48 hours. The percentage of viable Daphnia was calculated. The percentage of viable Daphnia versus sediment concentration was graphed for each time point.	
Methods/Materials I established a stable culture of Daphnia Magna from culture kits purchased. I researched the San Benito County watershed visiting two to obtain sediment samples from the parking areas. Each sample was weighed in 80gr increments and placed in separate containers. Each sample was diluted with spring water at different concentrations of 0.25L, 0.50L and 1L simulating rain water run-off. Each container was labeled with g/L concentration. 20 Daphnia Magna were added to each concentration and 20 Daphnia were added to my control of plain spring water. All concentrations were placed in the same place so they would all have the same environmental conditions such as temperature and light. A count was conducted and the number of viable Daphnia recorded at 8, 16, 24 and 48 hours. The percentage of viable Daphnia was calculated. The percentage of viable Daphnia versus sediment concentration was graphed for each time point.	
Results After my final count at 48 hours, my control with no debris had the most viable Daphnia with 55% still alive. All of the concentrations with the debris added had a death rate of 80% to 100%.	
Conclusions/Discussion My hypothesis that this toxicity was harming our watersheds was proven. The Daphnia placed in with the debris did not last as long as my control group that was placed in plain spring water. I would recommend that people try to be more aware of things that could effect this run-off in to our watersheds. Daphnia Magna are part of the food chain so keep in mind that this toxic debris could also effect the fish that we eat!	
Summary Statement My project is about the affect that toxic run-off from sediment in parking areas has on our watersheds.	
Help Received Mother drove me to sights to obtain samples; Mother drove me to the store to purchase supplies to assemble my board; Mother ordered my Daphnia Magna culture kits; Mother helped type report; Cousin showed me how to create graphs on the computer.	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Camille G. Endacott	Project Number J1013
Project Title Got Pollutants? An Investigation Examining Indicators of Water Pollution in a Local Stream	
Objectives/Goals It's hypothesized that the two downstream locations will have the highest results in all the variable tests. This is because sediment, fertilizer, and wastes are expected to join the stream as it flows downstream. Each location was tested with different probes, each probe according to the variable it tested. The control location was the location most upstream. The variable was the site of the testing location. There were a total of five locations (including the control) and for each factor there were five trials. Data was taken and recorded. Data was recorded in meters/second (for flow rate), NTUs (turbidity), degrees Celsius (temperature), pH, and mg/L (for dissolved oxygen). Abstract The goal of this experiment is to examine and compare the results of different water pollution indicators from location to location of the Arroyo Seco stream.	
Methods/Materials The materials used were specialized probes for each test, a graphing calculator, water sampling bottles, foil for covering biological oxygen demand bottles, and a bucket for collecting water. The method used for testing was to first collect water, and then sample the water with a probe, with the calculator collecting data every second for thirty seconds. The average was then recorded, and the tests were repeated five times.	
Results The results supported part of the hypothesis. Location five's results were the highest, but location one also had high results. This only partially proved the hypothesis.	
Conclusions/Discussion The testing location #Control# had higher results in some test then the fifth location, which disproves the hypothesis. But the fifth location had some of the highest results, so part of the hypothesis was also supported. The data is slightly inconclusive due to the amount of different pollutant tests conducted. A discrepant event occurred while testing turbidity. The turbidity ranged from 226.545 to -9.931. This is varied and inconclusive, and could have occurred due to biased sample collecting and particles settling during the thirty-second testing period. A significant finding was discovering that the stream water is a base. The water probably came into contact with calcite from the large amount of boulders around the stream. The pH for the entire stream was 9.88, while water should have a neutral pH. Also observed was trash and urban run-off.	
Summary Statement This project examined the results of different water pollution indicator tests and compared the test results of the upstream and downstream locations.	
Help Received My dad taught me how to use lab equipment, Village Christian School lent me the equipment, my sister photographed the project in action.	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Edwin Espinoza	Project Number J1014
Project Title Is It Safe to Eat the Fish? Toxic Heavy Metals in Urban Lake Sediment	
Abstract Objectives/Goals My goal for this project was to see whether or not it is healthy for Los Angeles residents to eat Channel Catfish caught from Echo Park Lake. I expected to find high concentrations of Lead, Mercury and Cadmium in the sediment. Methods/Materials The way I conducted my investigation was I went out on two Saturdays, rented a paddleboat, and collected soil samples from six different locations at Echo Park Lake. I used a soil sampler that would work with a lock on top of it. I dropped it into the lake and once it hit the bottom I would tug on it so it would be sure to close. Then I would pull it up onto the paddleboat to fill up sample containers with soil. After all the samples from twelve different sites were collected, I took them to school and put them in Petri dishes and spread them flat. For this I used a small plastic spatula so it wouldn't affect my results. Next, I put all of my samples in an incubator because I only needed the soil, so I dehydrated them. I then took them to the California Institute of Technology (CALTECH), where I smashed each one of them with a mortar and pestel until the soil was very fine. I then measured 4.01 grams of each sample and added .95 grams of paraffin, because I was going to turn them into tablets. To turn the samples into tablets I used a Soil Press. I put a total of 1500 kg of weight on each sample. Finally, I put the samples into an X-ray Spectrometer and this told me how much of each element there is in each of the samples, as a percentage of the total sample. Results My results show that there are potentially toxic levels of Lead in Echo Park Lake sediment. Mercury levels were not high enough to cause concern of toxic exposure. Cadmium levels were high enough for possible toxic exposure depending on how much fish a person ingests. Conclusions/Discussion My results partially confirm my hypothesis because I only found high levels of Lead and Cadmium, but not Mercury. According to a study done by J.M. Czarnecki, if the metals are found at high levels in the sediment, they will be found in the catfish because they are bottom feeders. He tested the tissue of bottom-feeding fish and found that these elements accumulate in fish tissues. The next step in my investigation should be finding the mechanism by which these metals get into Echo Park Lake, and even testing the tissue of real fish that are caught in the lake.	
Summary Statement I tested lake bottom sediment from Echo Park Lake in Los Angeles to see if Lead, Mercury and Cadmium are present at high enough levels to cause concern about eating the Channel Catfish caught there.	
Help Received My science teacher provided the soil sampler. Dr. Dalleska at Cal Tech helped with the spectrometer and provided the soil press.	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Benjamin Francis	Project Number J1015
Project Title The Good, Bad, and the Ugly of CO(2)	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals I started this project because I was curious about the greenhouse effect and global warming. My objective was to research and educate myself. I found it all starts in the atmosphere with its gases and carbon dioxide. I choose an experiment that uses carbon dioxide as the main element and interest. How much carbon dioxide is produced by different gas sources?</p> <p>Methods/Materials The experiment uses four different gas sources to produce carbon dioxide: ambient air, human exhalation, nearly pure CO(2), and car exhaust. Each source of air was inflated into different balloons, then through a straw, the gas was leaked into its own test tube of bromothymol blue indicator solution. The goal of the experiment is to neutralize the carbonic acid by adding diluted ammonia to each test tube, documenting the drops used. Materials listed in brief: 5 test tubes, 20 funnel straws, 5 modeling clay washers, 20 balloons-5 sets of 4 different colors, bromothymol blue solution, ammonia, vinegar, baking soda, a tire pump, and a car.</p> <p>Results My hypothesis is: Car exhaust releases more carbon dioxide than the other gas sources. The result did not support my hypothesis. The nearly pure CO(2) released more carbon dioxide than any other gas source. After the experiment trials, I realized that it was now obvious that the nearly pure CO(2) used to represent the natural carbon dioxide would release more gas because it is a created part of the atmosphere.</p> <p>Conclusions/Discussion Carbon Dioxide is important for life on Earth. Natural sources produce carbon dioxide and man made sources produce carbon dioxide too, keeping the balance seems to be the issue. I don't believe that global warming is an accurate description of why our climate is having changes, but there is evidence that pollutants produce harmful effects and too much carbon dioxide has potential to be a problem for our atmosphere. Changing some activities big or small can make a difference. I would have liked to have interviewed a climate scientist and discuss all the techniques used to record weather and predict climates. It would be interesting to discuss global warming with scientists who are for and against the topic. In conclusion, we all need to be good stewards of Earth which sustains us all.</p>	
Summary Statement The interaction of carbon dioxide in the atmosphere and our environment.	
Help Received My mom helped organize my research and journal. She typed the papers and assisted me on putting my board together. My dad assisted me on the experiment. The bar graph was done by our family friend, Steve Kemmer and the interview was given by John Cook, from Central Valley Motorsports.	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Amy Franco; Jessica Mira	Project Number J1016
Project Title How Does Seasonal Change Affect Respiration Parameters for Oncorhynchus mykiss Living in Shallow Urban Lakes?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of our investigation was to determine how seasonal temperature changes affect respiration parameters (temperature, dissolved oxygen, and turbidity) for <i>Oncorhynchus mykiss</i> living in Macarthur Park and Echo Park Lakes, which are shallow, cement-lined lakes. We predicted that regardless of the season (Summer, Fall, and Winter) conditions in Echo and Macarthur Park lakes would not support healthy respiration in Rainbow Trout due to high water temperatures and high nutrient levels, which lead to high turbidity and low or even hypoxic oxygen levels.</p> <p>Methods/Materials We conducted a nine-month (July 2006-March 2007) transect study of the lakes. Every three weeks we would paddle down the center of the lakes and stop at four different testing stations. We used a water sampler to collect water at every 1 meter of depth of the water column. We then tested for dissolved oxygen with a dissolved oxygen probe. We also used a thermocline sensor to test for temperature at every .5 meters of depth of the water column. After testing for temperature we lowered a secchi disk to measure water clarity.</p> <p>Results Throughout our investigation, we found high water temperatures that at times were twice as high as trout hatchery standards, as well as consistently eutrophic nutrient levels and dissolved oxygen levels ranging from stressful to hypoxic.</p> <p>Conclusions/Discussion Our results support our hypothesis because during each season (Summer, Fall, Winter), we found potentially stressful and sometimes fatal conditions for trout. The lakes are so shallow that there is often no comfortable water temperature for the fish to live in, and warmer water carries less oxygen. Also biochemical oxygen demand and chemical oxygen demand reduce oxygen levels in the water, probably due to large amounts of bird waste and dead plant and animal matter. Finally, aeration pumps are not being used consistently. The next step in our study would be to continue testing these respiration parameters through Spring. A solution to this problem is that Rainbow Trout should not be stocked in these shallow urban lakes. Also, more aeration pumps should be installed for the water to be sufficiently replenished with oxygen.</p>	
Summary Statement We examined the affect of seasonal temperature change on water temperature, dissolved oxygen and water clarity in two shallow urban lakes where Rainbow Trout are stocked.	
Help Received Our science teacher helped us get the materials we needed and helped edit our report. Our parents drove us to the lakes and paid for the paddle boats.	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Katherine W. Glockner	Project Number J1017
Project Title Dinoflagellate Detectives: Bioluminescence as a Measure of Water Quality	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of this project was to determine if the water quality in a San Diego County lagoon, San Elijo Lagoon, varied according to high or low tide or location. Dinoflagellate mortality rate is an indicator for water toxicity in several realms, including bacterial contamination, pesticides, and water chemical imbalances. I hypothesized the dinoflagellates would show that lagoon water quality varies between different locations and tides.</p> <p>Methods/Materials I performed a total of 140 tests in this experiment. Two harmless dinoflagellate species, <i>Pyrocystis fusiformis</i> and <i>Pyrocystis lunula</i> were used. I collected water samples from four different sites in the lagoon (mouth, west body, east body, and headwaters) at high and low tides. I obtained samples of <i>P. fusiformis</i> and, to establish a baseline luminescence for each sample, I agitated them and took a picture with a digital camera each night for three days. I then added lagoon water samples to the dinoflagellates and agitated them each night for three days, taking pictures of each result. To analyze the luminosity readings for all the tests, I downloaded the images into Adobe Photoshop and used a histogram to discern the luminosity of each sample. I expressed the results as a percent of the baseline luminosity. I repeated this testing process, with a few minor changes, with <i>P. lunula</i> dinoflagellates. I also tested the samples at a Carlsbad company named Assure Controls using the Qwiklite, a machine that measures the number of photons produced by dinoflagellate bioluminescence.</p> <p>Results The results showed that water quality varied significantly in the lagoon. The dinoflagellate samples with water from the west body site in the lagoon at high tide had the least amount of dinoflagellate mortality, and the highest mortality occurred in water samples from the east body site at low tide.</p> <p>Conclusions/Discussion Based on the results of this experiment, the higher levels of contamination in the lagoon water samples appeared to be near the more urban areas. This implies that urban runoff may be a significant contributor to water contamination in the San Elijo Lagoon.</p>	
Summary Statement In this experiment, the water quality in several regions of a lagoon was evaluated by measuring the luminosity of two dinoflagellate species, <i>Pyrocystis lunula</i> and <i>Pyrocystis fusiformis</i> .	
Help Received Father helped take pictures; Used lab equipment at Assure Controls under the supervision of Mr. Bryan Bjorndal; Mother drove me to different sites; Mrs. Hunker helped decide what to research	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Robert E. Gray	Project Number J1018
Project Title Will the Land Application of Biosolids Have a Negative Impact on Ground Water?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals There is a lot of concern by the farm community that applying class B biosolids to farm ground is putting their groundwater supplies in serious danger. Anywhere the biosolids are applied they must be irrigated in. The purpose of my project is to determine if groundwater is affected when biosolids are applied on top of irrigated land. For my project I will simulate a biosolids application to a soil profile and apply water to replicate an irrigation. I will collect the filtered water and test it for contamination.</p> <p>Methods/Materials I will collect soil from a location where they are going to spread class B biosolids on irrigated land. For each test I will have a 24 oz. cup that I've cut the bottom out of. I will place a coffee filter over the bottom and secure it with a rubber band. I will fill the cup with soil (400ml). I will have 30 trials. 10 trials will be a control where I have only soil in the cup. I will have 10 trials that will have soil and 206.50 mg of class EQ/A biosolids on top and 10 trials that will have soil and 206.5 mg of class B biosolids on top. The soil profiles with biosolids will be the equivalent of a 5 tons per acre of biosolids. I will set/rest the plastic cup on in a 250 ml beaker. I will then apply distilled water gradually until 400 mls is added. The water will filter through and collect in the beaker. I will test the water for E-coli, nitrates, nitrites, alkalinity, and pH.</p> <p>Results My results were inconclusive in answering my question #Will the disposal of biosolids on farmland have a negative impact on ground water?# There were very similar results in the control and the class EQ/A biosolids. The results of the class B biosolids was nearly the exact opposite if the EQ/A and control. The lab director at Dellavale Laboratory said that the results indicate that there is definitely biological activity going on in the class B biosolids but there is not enough information to determine exactly what is happening.</p> <p>Conclusions/Discussion I learned that disposing of biosolids is a very complex issue. There is not a lot of science on the long term impact that land application could have on our ground water. This is an issue that needs further investigation.</p>	
Summary Statement I did an experiment to see if land application of class B biosolids would hurt the ground water.	
Help Received Dellavale Lab helped with the Ecoli test and interpreting results. My mom helped with the typing.	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Duncan C. Hosie	Project Number J1019
Project Title Is Global Warming Real? A Study of Atmospheric Temperature and Carbon Dioxide Emissions	
Objectives/Goals One Hundred Years Ago, Swedish Chemists developed the first theory connecting pollution to warmer global temperatures. They claimed emissions from coal combustion would raise the average temperature of the earth significantly, causing devastating consequences. Although accepted by a handful of scientists, the team was shunned for their efforts. The Swedish and International Community disgraced the team, and their lab was permanently shut down. Today the same attitude prevails about Global Warming for some, but for others it is embraced and supported. My goal was to end generations of confusion.	
Abstract I covered a basketball in aluminum foil, Centered on a glass vase, an extremely heat sensitive thermometer was positioned on top of the globe. All of this was held in a Plexiglas box. Two infrared heat lamps were faced towards the globe, outside the Plexiglas box. For 15-minute increments, I ejected varying amounts of carbon dioxide into the Plexiglas container to see how the temperature changed. Basically, I set up a model of our planet, our atmosphere, and the sun, with the ability to add carbon dioxide gas. I found that with more carbon dioxide, the temperature inside the box increased dramatically	
Methods/Materials I covered a basketball in aluminum foil, Centered on a glass vase, an extremely heat sensitive thermometer was positioned on top of the globe. All of this was held in a Plexiglas box. Two infrared heat lamps were faced towards the globe, outside the Plexiglas box. For 15-minute increments, I ejected varying amounts of carbon dioxide into the Plexiglas container to see how the temperature changed. Basically, I set up a model of our planet, our atmosphere, and the sun, with the ability to add carbon dioxide gas. I found that with more carbon dioxide, the temperature inside the box increased dramatically	
Results The more carbon dioxide put into the box, the higher temperature at the end of the fifteen minutes. What I found not only proved that Global Warming is real; it also verified the larger consequences.	
Conclusions/Discussion After the project results were in, I compared my graph to the more commonly available graphs on predicted global temperatures. I found that my slope line was extremely similar to sections of the other graphs in the early 2050s. Therefore this project proves the problems associated with global warming including devastating increases in global sea levels, millions of animal extinctions, stronger and larger hurricanes, etc. It is essential to our younger generation that cut carbon dioxide emissions by a minimum of 80 percent or more. All the students presenting their projects today will be affected dramatically if we do not do anything about global warming.	
Summary Statement Global Warming has generated much controversy, and I wanted to see if it really is true.	
Help Received None	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Victoria Hutchins; Amanda Weber	Project Number J1020
Project Title Saltwater Intrusion in Agricultural Fields: The Effect of Saltwater on the Growth Rate of Radish Seeds	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Saltwater intrusion is threatening agricultural land in California. The objectives were to determine how salinity affects the rate of radish seedling growth and also to investigate saltwater intrusion using a model.</p> <p>Methods/Materials We grew a total of two hundred radish seeds in various saltwater solutions. Saltwater media were prepared to 2.7ppt, 4.5ppt, and 9.0ppt concentrations. Freshwater was used as the control. For each treatment we placed ten radish seeds on moist filter paper in five plastic containers to germinate total of fifty seeds. We observed and measured in mm the length of roots and shoots of radish seedling for seven days. Materials: Five plastic containers, Early Globe radish seeds, Whatman filter paper, acetate sheets, a metric ruler, tweezers, weighing paper, 1 liter volumetric flask, 100mL graduated cylinder, a digital balance, a thermometer, a plastic pipet, and Balene sea salt.</p> <p>We built a model simulating the process of saltwater intrusion. Materials: two plastic containers that fit into each other, a soap dispenser, a small plastic container, a rubber band, freshwater, food color dyes, colorful gravel, sea shells, artificial moss, stickers, popsicles</p> <p>Results The growth rate of radish root decreased 1.85 times in 2.7ppt saltwater solution, 5.64 times in 4.5ppt saltwater solution and 17.92 times in 9.0ppt saltwater solution.</p> <p>The growth rate of radish shoot decreased 4.64 times in 2.7ppt saltwater solution, 14.61 times in 4.5ppt saltwater solution and 128.82 times in 9.0ppt saltwater solution.</p> <p>Conclusions/Discussion The growth rate of both the root and shoot decreased with increasing saltwater concentrations. Salinity has negative impact on the growth rate of radish seedlings.</p>	
Summary Statement Through our experiment and observations, we showed that saltwater significantly impacts the growth rate of radish seedlings. We also proved that the early Globe radish seeds can grow in low concentrations of saltwater.	
Help Received Dr. Jeff Hughey showed us how to press the Early Globe radish plants. Hartnell College provided the digital scale, graduated cylinder and volumetric flask. Our parents provided transportation.	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Kamal Kajouke	Project Number J1021
Project Title How Cool Is Green?	
Abstract Objectives/Goals The purpose of this experiment is to investigate how structures called green roofs affect the temperature of urban heat islands. More specifically, it measures the difference in temperature resulting from using green roofs compare to traditional roofing material and the amount of green roofs, represented by plants, needed to cool down the heat island. My hypothesis is that the more vegetation is used on green roofs, the more the temperature will drop in the urban heat island. Methods/Materials To conduct this experiment, I used five plastic containers, one of which was empty as a control group. The other containers were as follow: one with black roofing material, one with plants only, one with grass only, and one with plants and grass. I placed light bulbs on top of the containers as a source of heat and used a thermocouple digital thermometer to take and record temperature readings at pre-determined times (9:00AM before turning on the light, 12:00PM after 3 hours of light, 3:00PM before turning off the light, and 6:00PM). I repeated the process for ten days. Results The overall results support my hypothesis. As the heat increased, all the test groups containing plants had a significantly lower temperature than the test group containing black roofing and the control group consisting of an empty container. Furthermore, the lowest temperature readings were taken from Container E, which had the most vegetation.	
Summary Statement My project tested how vegetation on rooftops can affect the temperature in an urban heat island.	
Help Received Mother helped record temperatures	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Jennie R. Kaplan-Woodson	Project Number J1022
Project Title Baywatch: Spread Rate Analysis of Pollutants in a Coastal Bay Environment	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals I wanted to see how different bay pollutants might spread in Humboldt Bay. Which pollutant would have the fastest and farthest spread rate if it fell into a coastal bay?</p> <p>Methods/Materials Four sections of ten foot plastic gutter were used to represent four different bays. These gutters were protected from wind, temperature and gradient influences. Four different types of pollutants; gasoline, kerosene, diesel, and motor oil were introduced into their respective gutters. We added the same amount of pollutant and water to each gutter. The water used was drawn from Humboldt Bay, California. Each pollutant spread rate was measured in inches over a twelve hour period. The experiment was repeated three times the exact same way.</p> <p>Results The gasoline had the fastest and farthest spread rate over time. The kerosene and diesel results were very similar in their spread rates of time and distance in each experiment. The motor oil was the slowest and traveled the shortest distance.</p> <p>Conclusions/Discussion My hypothesis was that the gasoline would spread the fastest because it had the lowest molecular weight. The gasoline did spread the farthest and fastest in the gutter environment. Its molecular weight is 92-95, which is significantly less than the other pollutants. This study was limited only to spread rate over time. I realized from doing my experiment that in order to truly analyze the worst pollutant spill, numerous additional variables would need to be studied. These would include evaporation rates, wind, tides, longevity, depth, temperature, and chemical risk to marine life. Based solely on spread rate study, gasoline would be the worst spill in a coastal bay environment.</p>	
Summary Statement I tested four different pollutants in a coastal bay environment to see which pollutant would have the worst spill if it were to fall into a bay; based upon spread rate over time.	
Help Received Oral interview with Glen Sonntag; a member of the United States Coast Guard Spill Abatement Team; My parents helped me build my bay gutters; My father helped me understand the scientific method.	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Urina J. Kim	Project Number J1023
Project Title Ocean Water pH Tests	
Objectives/Goals My objective was to see if the pH is different for different beaches along the Pacific Coast.	
Methods/Materials I went to different beaches along the Pacific Coast. There I tested the pH. Then I took the temperature of the water, and the temperature outside. I used a thermometer for the temperature, and pH paper to test the water's acidity. I even took samples of the water.	
Results The pHs of the sea water from different beaches were all the same.	
Conclusions/Discussion My conclusion was that the amounts of gases that enter the oceans depend on the temperature of the water. The warmer the oceans are the more gases enter the oceans. The dissolved gases make the oceans more and more acidic. The acidity of the water stays the same because of the constant stirring of the sea water.	
Summary Statement Ocean Water pH	
Help Received My dad drove me to the different beaches along the Pacific Coast.	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Rose L. Leopold; Ella R. Madsen	Project Number J1024
Project Title Sandy Beaches: Pleasure or Pollutant? An Analysis of Sand Bacteria as a Possible Source of Ocean Contamination	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals We tested if beach sand could be a source of bacterial contamination of the ocean water causing many California beaches to be closed frequently. Our local beach, Capitola Beach, is our case study. We tested the sand for Escherichia coli (E.coli) bacteria and total coliform bacteria and to see if there was any correlation with the water content of the sand, organic matter content, grain size, depth (six, twelve and eighteen inches), and distance from the seawall/road.</p> <p>Methods/Materials We built two incubators out of Styrofoam coolers and light bulbs. We collected sand from depths of 6, 12, and 18 inches at nine different locations at the beach. We tested the sand for water content by weighing and baking it to evaporate the water. We tested for organic matter weighing and baking the sand for four hours to bake out organics. We tested for sand grain size by putting dried sand through a sieve and individually weighed each section of the sieve. Finally we tested for Escherichia coli (E.coli) bacteria and coliform bacteria. We tested strictly to state regulations using materials such as: distilled water, pipettes, sterilized jars, and iron, and Quanti-Trays. We then put the sealed Quanti-Trays in an incubator for 22 hours.</p> <p>Results Bacteria vs. water content: Less bacteria occurred with higher water content. Bacteria vs. organic matter: Data is inconclusive. Too few samples with organic matter. Bacteria vs. grain size: The smaller the grain size, the more bacteria. Bacteria vs. distance: Sites closer to the ocean, the bacteria MPN (most probable number) decreased. Bacteria vs. depth: Higher bacteria levels were found at 6 inch depth.</p> <p>Conclusions/Discussion In conclusion we proved all of our hypotheses incorrect except for the one about how organic matter would be higher with more bacteria. This one inconclusive because we had too few samples with organic matter.</p>	
Summary Statement To see if water content, organic matter, grain size, distance from seawall, or depth had any correlation to the presence of Escherichia coli (E.coli) bacteria and coliform bacteria in the sand at the beach.	
Help Received Dr. Adina Paytan (Stanford University) helped figure out project, Surfrider Foundation for donating supplies, Li Erikson for helping analyze data, parents for helping test	



CALIFORNIA STATE SCIENCE FAIR 2007 PROJECT SUMMARY

Name(s) Mikael H. Matossian	Project Number J1025
Project Title The Effects of Atmospheric Pollution on the Performance of Solar Cells	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of my project is to measure the effects of atmospheric pollution on the electrical current produced by two types of solar cells that were exposed to constant simulated sunlight; low-efficiency, single-junction silicon (Si) and high-efficiency, triple-junction gallium arsenide (GaAs).</p> <p>Methods/Materials Si and GaAs solar cells were placed in a large plastic container and were illuminated with a lamp that simulated sunlight. For constant lamp illumination, changes in the electrical current produced by each solar cell were measured for varying concentrations of five different types of air pollutants set up in the large plastic container; 1.) Aerosols (airborne dirt particles) 2.) Engine exhaust fumes 3.) Carbon dioxide (CO₂) 4.) Ozone (O₃) and 5.) Water vapor (H₂O). Each of the five pollutants had a different effect on reducing the amount of simulated sunlight reaching each cell, and resulted in different electrical currents being produced from each cell.</p> <p>Results</p> <ol style="list-style-type: none">1. Exhaust fumes reduced the current of the Si cell by 10%, while GaAs was unaffected.2. CO₂ reduced the current of the Si cell by 2%, while GaAs was unaffected.3. O₃ reduced the current of the GaAs by 2-5%, while Si was unaffected.4. Water vapor caused a gradual reduction in the current of the Si cell, while GaAs was almost unaffected.5. Aerosols reduced the electrical current of both Si and GaAs by 7%. <p>Conclusions/Discussion Solar cells are devices that convert sunlight into electricity. Atmospheric pollution can reduce the amount of sunlight reaching a solar cell, and thereby cause a reduction in the electrical current produced by the solar cell. My results indicate that five common atmospheric pollutants cause different effects on the electrical current produced by low-efficiency Si and high-efficiency GaAs solar cells. In addition, high-efficiency GaAs solar cells appear to be generally more resistant to three out of the five common atmospheric pollutants than Si solar cells. These findings should be applicable to solar cell engineers designing solar panels and power plants with these two types of solar cells.</p>	
Summary Statement High-efficiency GaAs solar cells are more resistant to common atmospheric pollutants than low-efficiency Si solar cells.	
Help Received Professor Antonio Machado (California State University Northridge) advised test methodology; Dr. Christian Gueymard (Solar cell expert) critiqued pollutant test matrix; Boeing Satellite Development Center (El Segundo, CA) supplied solar cells; Father helped assemble test apparatus.	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Jorie A. Moore	Project Number J1026
Project Title The Effects of Different Marine Environments on Oil Toxicity Level and Its Effect on Fish Embryo Development	
Abstract Objectives/Goals The goal of my project is to determine if the residue of oil from different marine environments is just as toxic as the oil itself. Methods/Materials Made a 3:1 water to oil solution. Place each solution in four environments: a simulated wave environment, an aerated environment, a heat environment and a cold environment. Each solution was left in the environment for 48 hours. I then took the residue from each solution and added 0.5 mls into a petri dish containing fish eggs and water. I recorded development for 7 days. Results Control show fish deveopment went to an average of 3.5 stage development. Fish Stages (1=earliest to 4=eyes prominent and heartbeat) All environment stop the deveopment at or before stage 2. Oil residue from heat environment was most harmful with an average of 1.6. The least harmful was aerated environment with an average of 2.0. Conclusions/Discussion In Conclusion, I learned different marine environment will have an effect on oil residue toxicity. However, toxic residue is left behind in all water environments and can harm marine life at early stages. Direct oil exposure is still the most toxic.	
Summary Statement Investigate if the residue of oil from different marine environments is just as toxic as the oil itself.	
Help Received Father helped create oil solutions. Grandfather help with supervision and graph suggestions.	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Karla Morfin; Edith Perez	Project Number J1027
Project Title It Will Grow, No Lye	
Abstract Objectives/Goals We had two objectives: First we wanted to determine how plant growth is affected by varying degrees of acid soil. Our second objective was to determine what pH level will neutralize acid soil. Methods/Materials Lemon juice was used to simulate acid soil conditions and baking soda was used as a neutralizer. Hydrion paper and the pH color chart was the indicator of choice. The potting soil used had a pH of 6.5. Four pots were used for acid soil (control 6.5, and the other 3 were 5.6 each). After 2 weeks these same soils (except the control) were treated with different levels of alkalinity, 7.5, 8 and 8.5. Growth rate of lettuce seeds were compared for each soil type. Results In each trial plants performed better in acid soil than in alkaline soil. The average number for germination rate for acid soil was 4.3 and for alkaline soil it was 4 for pH 7.5; pHs 8 and 8.5 both had germination rates of 0. Overall, the growth height ratio of acid to alkaline soil was 1.2 meters to .33 meters. Conclusions/Discussion Although we did not find out the correct pH level to neutralize acid soil, caused by acid rain, we have learned that lettuce seeds prefer a slightly more acidic soil than alkaline soil. This is reflected in the higher germination and growth rates in acid soil when compared to alkaline soil.	
Summary Statement The effect of acid rain on plant growth and the determination of the correct pH to neutralize acid soil.	
Help Received Mrs. Hinds, Science Teacher	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Nicole Newman; Sara Zepezauer	Project Number <h1 align="center">J1028</h1>
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Project Title
Water Works

Abstract

Objectives/Goals
 This project is a comparative test of reclaimed water from Lake Balboa with and without rain runoff to Los Angeles tap water, using distilled water as a control. These types of water were tested for coliform bacteria, dissolved oxygen, nitrate, pH, phosphate, temperature, and turbidity using the Low Cost Water Monitoring Kit made by Earth Force and the LaMotte Company.

Methods/Materials
MATERIALS:
 1. Low Cost Water Monitoring Kit
 2. 4 Jars or Containers (to hold the water)
 3. Samples of Reclaimed water with and without rain run off
 4. Tap water
 5. Distilled water
METHODS
 Refer to the Low Cost Water Monitoring Kit instruction booklet

Results

	Reclaimed Water	Reclaimed Water(w/rain)	L.A. Tap Water	Distilled Water (Control)
Nitrate (PPM)	40	5	0	0
pH	8	7	7	7
Phosphate (PPM)	1	2	0	0
Turbidity (JTU)	40	0	0	0

Conclusions/Discussion
 From our tests we found that the reclaimed water from Lake Balboa was not safe to drink or come into primary/physical contact because of the high level of fecal coliform bacteria. The other impurity levels in the reclaimed water were acceptable except in the nitrate level for reclaimed water without rain runoff. Los Angeles tap water was amazingly as pure as distilled water. **INDEPENDENT VARIABLES:** The independent variables are the types of water tested which include: reclaimed water from Lake Balboa with and without rain runoff, Los Angeles tap water, and distilled water. **DEPENDENT VARIABLES:** The dependent variables were the levels of coliform bacteria, nitrates, phosphates, dissolved oxygen, pH, and turbidity. The control that we compared the lake water and tap water to was the distilled water. We could improve or expand the experiment by testing more water samples, such as water stored in L.A. reservoirs

Summary Statement
 This project was to find out how the reclaimed water and L.A. tap water differ from each other in purity.

Help Received
 Teacher helped us with problem; tutor helped us with board layout; mothers drove us



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Nicolas A. O'Connor	Project Number J1029
Project Title The Effect of Fire on Chaparral Seed Germination	
Abstract Objectives/Goals The objective of my project was to observe fire's effect on the germination of plant seeds from chaparral and riparian habitats. I hypothesized that burned chaparral seeds germinate better than unburned chaparral seeds and that unburned riparian seeds would germinate better than burned riparian seeds. Methods/Materials Eight plant species' seeds were obtained. Four of the species were from chaparral habitats and four of the species were from riparian habitats. Half of the seeds of each species were exposed to fire and the other half were not. Results Two of my burned chaparral species had significant germination (over two seeds germinated). For these chaparral species, germination rates were much higher for burned seeds than for unburned seeds. The ratios for burned to unburned seed germination were 6.9:1 and 1.6:1 for these species. Only one riparian species had significant germination, but unlike the chaparral species studied, this species had more unburned seeds germinate than burned seeds (unburned:burned = 37.5:1). Conclusions/Discussion Based on the species that showed significant germination, I concluded that fire helps some chaparral seeds germinate and negatively affects germination of some riparian seeds. This information supports my hypothesis. Another observation was that the onset of germination (the number of days from planting to germination) came faster for burned chaparral seeds than for unburned chaparral seeds.	
Summary Statement My project is about the effect of fire on the germination of chaparral and riparian seeds.	
Help Received Soil Ecology Restoration Group of SD State Univ. provided seed. Parents helped with the experiment.	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Justo R. Padron, III	Project Number J1030
Project Title Investigating the Water Quality of Dairy Farm Water	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals With recent news report of E-Coli outbreak contamination of our farm crops, I wanted to investigate the effects of dairy farm animal waste would have in our ground water supply. My objective was to determine the amount of E-Coil and other contaminants would be found in our ground water caused by the animal waste at the various dairy farms tested.</p> <p>Methods/Materials Water samples were taken from five dairy farms from Fresno, Tulare, Kings, and Kern Counties. The water samples were then tested for the following contaminates: E-Coli, nitrate, nitrite, copper, chlorine, pH, iron, alkalinity, and water hardness. Each water sample was performed a minimum of three (3) times and an average was then recorded. For the E-Coli test, water samples were poured into a Medium Solution and the poured into a sterile Petri Dish. The samples were then incubated for a period of 48 hours at a constant temperature of 75 degrees. Using a test kit obtained from PureTest for well waters performed the other contaminant test. Each test samples was performed a minimum of three (3) times and then they average was then recorded.</p> <p>Results All water samples tested positive for contamination and in many cases exceeded the EPA Standards for potable water. Water samples tested for chlorine, Iron, nitrates and ammonia all tested negative. Water samples tested for pH had slight traces of pH contamination. Water samples tested for Nitrate and Hardness tested positive with high levels of contamination. Water tested for Alkalinity all tested positive with extremely high levels of Alkalinity contamination. Water samples tested for E-Coli bacteria growth, four (4) of the five (5) dairies tested had extreme high levels of E-Coli colony contamination while one (1) only had a slight colony contamination growth.</p> <p>Conclusions/Discussion The results of the test performed, each water sample tested positive but in various digress of contamination. All water samples exceed the EPA Standards for potable water. Four of the five dairies tested had extremely high levels of E-Coli colonies. My project confirms that animal waste does have an adverse effect on the quality of our ground water and may contribute to some of the E-Coli outbreaks reported in the past years that were found in the farm products produced.</p>	
Summary Statement The focus of my project was to determine the effects of animal waste would have on our underground water quality and supply.	
Help Received My mother helped type the report; my father helped with the graphics and WS Printing printed my project sign.	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Sebastian J. Revels	Project Number J1031
Project Title An Evaluation of Water In Rose Canyon Creek	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Rose Canyon Creek is a watershed in San Diego County, California. Knowing that Rose Canyon Creek is contaminated is valid information because eventually, the water will empty into other rivers, lakes, and the Pacific Ocean, thereby contaminating additional water sources. The goals of this research on the pollution levels of Rose Canyon Watershed are to become informed of the serious need to monitor and improve the water quality of this watershed and to educate others in the importance of improving all watersheds in our region. This is done through awareness, education, and daily conscientious choices.</p> <p>Methods/Materials In order to analyze the problem, two different locations along Rose Canyon Creek were examined and tested for foreign elements. Water was collected in sterilized bottles and transported home. A test kit was used that contained test strips, plastic droppers, plastic test vials and color charts. 144 test strips were used. Testing was done to examine the following elements: free and total chlorine, total hardness, PH and total alkalinity, nitrate/nitrogen, nitrite/nitrogen, iron and copper. Tap water was tested also.</p> <p>Results There are elevated levels of copper in Rose Canyon Creek. The PH and alkalinity decreased over 2 years. Alkalinity in Otay Water tap water decreased. Total chlorine in Otay tap water increased and remained the same in Rose Canyon Creek. Nitrate levels increased in both water sources. Tap water met the requirements for drinking water both years. Normal results for nitrites, total hardness, iron and copper for 2006/07. This was a 2 year study. (A water sample was also taken in the Manu River of Peru in 2005 due to a trip)</p> <p>Conclusions/Discussion The conclusion is that Rose Canyon Creek is receiving point and non-point elements. The data shows that contaminants are entering Rose Canyon Creek despite the laws governing against the polluting of our water ways. The test strip results show that a certain amount of copper was present in the Regents Rd. region of Rose Canyon Creek that does not exceed the MCL. The results state that watersheds are being polluted worldwide by the innocent and guilty actions of people worldwide. People everywhere should take into account how they handle their water because even watering your lawn can play a good or bad role in the cleanliness of watersheds everywhere.</p>	
Summary Statement Water in Rose Canyon Creek was tested to spread awareness of how our actions affect all bodies of water	
Help Received Father helped collect water samples; mother helped assemble the board display,.	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Haley S. Rogers	Project Number J1032
Project Title The Effect of Roads and Buildings on Global Temperatures	
Objectives/Goals To prove that black roads and buildings have an effect on the rise in temperature of our planet. However, the clouds in our atmosphere may cause a cooling effect.	
Abstract Methods/Materials # The Planetary Structure was built # 6 Balls of modeling clay were made, 2 inches in diameter. 2 White, 2 Blue and Green, and 2 Black. On each one of the two had clouds made of polyester fibers # The Balls were added to the planetary structure # The Thermometers were calibrated with ice water # The Globes and the Thermometers were put over the balls # The motor and light bulb was turned on # Temperature readings were taken every 5 minutes	
Results The worlds with no clouds were about 2.8 degrees Celsius higher than the Worlds with clouds. The all black world representing the earth totally covered with black buildings and roads recorded the hottest about 5 degrees above the control.	
Conclusions/Discussion The hypothesis was that roads and buildings have an effect in the rise of temperature of our atmosphere; and that clouds around our planet help decrease the rise in temperature. The hypothesis was proven correct. The highest temperature was the black world at 48 degrees Celsius and the lowest was the White world with clouds at 41 degrees Celsius. Since roads would add blackness to the earth, this would raise the temperature. Although this would be a very small amount, small changes in the average world temperature can cause dramatic changes in the global climate. The clouds on average made the worlds 2.8 degrees Celsius lower. It was very surprising to see it was that big of a change. To further the project the square footage of roads and buildings all over the world could be determined and added to my experiments.	
Summary Statement How roads and buildings effect global temperatures.	
Help Received Dad helped with construction of the planetary.	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Joel P. Ryan	Project Number J1033
Project Title Hydrogen Ion Concentrations	
Abstract	
Objectives/Goals Problem Statement: #What are the pH levels at different areas in the stream at Oak Canyon Nature Center?# Hypothesis: The pH levels in the water should be close to neutral, ranging from six to eight.	
Methods/Materials Procedure: 1. Gather the water from the varying locations 2. put in the universal indicator tablet 3. examine the color reaction Materials: a. water samples b. five test tubes c. five tablets of universal indicators, a tablet containing chemicals that will dye the water different colors depending on the pH concentrations.	
Results Results: Out of my five testing spots, two had a pH level of 7, and 3 had a pH level of 8. The average was approximately 7.6.	
Conclusions/Discussion Conclusions: The pH levels of the stream varied from neutral to slightly more alkaline than neutral. The stream is not the most hospitable place for many fish, but it is perfect for many invertebrates and amphibians.	
Summary Statement My project is testing the pH in a stream that runs through Oak Canyon Nature Center in Anaheim.	
Help Received My mother helped me pin a leaf border onto my project, drove me to my sampling locations, and financed my project. My father gave me encouragement when I needed it most.	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Drew H. Sherwood	Project Number J1034
Project Title San Luis Rey River: Planet Pal or Planet Peril?	
Abstract Objectives/Goals As the San Luis Rey River flows along its course, does it clean itself or is it dumping unhealthy water into the Pacific Ocean? I believed the pollution and debris this river would be picking up would be too much for it to filter out completely and would therefore be dumping unhealthy water into our ocean. Methods/Materials In order to efficiently test the water, I began by doing several tests on water from different locations along the river. I chose 5 sites at approx. 5 mile intervals and executed tests on pH, nitrates, turbidity, TDS and salinity, hardness, and water-born microorganisms on each of my five river samples. My control was distilled water. I also completed tests on daphnia magna and another on lettuce seedlings. Results After this series of tests, I concluded that the San Luis Rey River is in good health and filters out most harmful chemicals relatively well before depositing its water into the Pacific Ocean. Conclusions/Discussion My experiments did not support my hypothesis that the river would be dumping unhealthy water into the Pacific Ocean. I learned that the river cleans itself well of most harmful minerals and nutrients. While the pH level was not filtered out as well as I would have liked, it is still in the range where it is considered less harmful than higher or lower readings to most organisms. On the other hand, my lettuce seeds showed two sets of gradual increases in size, going downstream suggesting that the farther along the river, the seedlings improved. My daphnia also supported the theory that life downstream was healthier. Finally, nitrates show a drastic decrease of this harmful substance going downstream. Due to these tests, I can infer that the river does actually clean itself as it travels along this portion of its final course before entering the ocean. I believe additional research should be conducted because even though this river appears to be doing fine, it makes sense to test it on a regular basis to make sure it stays as healthy as it is. A possible use of my findings would be to discover how the San Luis Rey River filters its harmful substances out so well and if we can place that ability into unhealthy rivers. A question that developed from my research was if this river is filtering out toxicity and other harmful materials from the water, are these simply seeping deeper into the ground, possibly affecting underground drinking sources?	
Summary Statement Determining the health of the San Luis Rey River and the potential harmful water it's dumping into the Pacific Ocean.	
Help Received Mother helped type report; water test kit was loaned to me by Ivan Golakoff, from the San Diego Water Authority	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Johan M. Snider	Project Number J1035
Project Title Water Quality	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The goal of my project is to determine the differences of water in the High Desert. I looked at the water quality at my school{AAE}, the Mojave River and Arrowhead bottled water.</p> <p>Methods/Materials I used three commercial tests for my experiment. The Low Cost Water Monitoring Kit made by LaMotte company, the Quick Dip 5-in1 test kit made by Jungle Laboratories and the Water Works 9-way test kit made by ITS inc.</p> <p>Results The Mojave river water quality is very low the worst of the three, AAE school water came in second and the Arrowhead bottled water is the best.</p> <p>Conclusions/Discussion The Mojave River water tested positive for Coliform Bacteria, had stressed levels of Nitrite and hard water. My school water had above normal levels of Nitrite. Arrowhead bottled water had great levels for everything that I tested for.</p>	
Summary Statement My project is about drinkable water in Apple Valley.	
Help Received My father took the picture of me when i was testing the water.	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Gurleen K. Virk	Project Number J1036
Project Title Determining the Toxicity Level of Insecticide in Various Types of Water Conditions	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of my project is to determine how toxic insecticide is in different types of water conditions. I used one insecticide, 6 different types of test variables of water, and I used daphnia, because they are sensitive to toxic materials.</p> <p>Methods/Materials Materials used: daphnia, containers, insecticide, graduated cylinders, stopwatch, eyedropper, freshwater, saltwater, refrigerator, and microwave. I had a control group, which had no insecticide in it. To make my water cold I put the water into the freezer for 135 seconds. To make the water hot I put the water in the microwave for 45 seconds. I filled a container with 300 mL of water and add stir in 3 mL of insecticide in it. Next, I added two daphnia to the water and observed how long it took for the daphnia to die. After the daphnia had died, I removed them and added two more daphnia the next day. I kept doing this till the death rate of the daphnia reached about 5 hours. I had 5 containers for each test variable. After the whole experiment was done, I disposed of the water and cleaned all the containers. Then, I did the whole experiment again so I had a total of 10 trials for each test variable. I only had one trial for my control groups.</p> <p>Results At the end of my project, I have learned that the daphnia I used did not live in salt water, so they died very fast. In the saltwater the daphnia died the fastest in cold water and the slowest in room temp. water. In the cold saltwater the daphnia died at an average death rate of 1.15 min in five days and in the room temp. the daphnia died at an average death rate of 2.025 min in five days. In the hot water the daphnia died at an average death rate of 1.925 min in five days. In freshwater the insecticide was the most toxic in the cold water and the insecticide was the least toxic in room temp. In the cold water the daphnia died at an average death rate of 151.5 min and in the room temp. water the daphnis died at an average death rate of 177.25 min. In the hot water the daphnia dies at an average death rate of 166.5 min in five days.</p> <p>Conclusions/Discussion I have learned that insecticide is toxic to aquatic organisms. I have also learned that we, the people who use and live in this planet, need to care for our environment. I have learned that insecticide is a major source of water pollution around the world, and if we don't do something now our water will be too polluted to drink or even touch it.</p>	
Summary Statement I am determining how toxic insecticide is in various types of water conditions by using daphnia.	
Help Received Mother helped supplied equipment, Mr. Turman helped edit research and other papers, Mr Gong helped tweak project	



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Bryce K. Woods	Project Number J1037
Project Title pH Variation in Lake Mendocino	
Abstract Objectives/Goals My objective was to determine the variation of pH in the water of a large lake over the entire circumference at about the same time. My hypothesis was that the pH would vary by about 0.5 on the pH scale between sites. I thought this because there is an inlet on one end of the lake that keeps water circulating into it. Also the geology of the surrounding sides of the lake look different. Methods/Materials A small boat was used and water samples collected in seventeen different locations around perimeter of lake. Samples were collected in small bottles and kept cool and taken to laboratory to used pH meter. At lab pH samples were tested for pH. Data was then taken and entered into an Excel spread sheet program, where means and standard deviation was computed. Results I found that the pH of the lake does not vary, very much. On my first test the mean was 8.44 with a standard deviation of 0.0877. On my repeat test the mean pH was 8.12 with a standard deviation of 0.137. Conclusions/Discussion I did not prove my hypothesis. The pH of the lake was much closer all around than I had suspected. I want to test this further by taking pH at depth and getting more long term pH data for the lake, especially in relation to pH and fish health.	
Summary Statement pH data was collected at seventeen sample sites on the largest lake in Mendocino County and tested for variation.	
Help Received My dad helped launch my boat and drive me around. He edited my writing. I used Alpha Labs pH meter to test my samples.	