



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Emily P. Africa	Project Number J1101
Project Title Star Light, Star Bright, I Can't See the Stars Tonight! A Study on the Effects of Skyglow on Stellar Visibility	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of my project was to determine the area in the Temecula Valley whose stellar visibility was most affected by skyglow.</p> <p>Methods/Materials Three (3) locations of varying artificial light activity, digital camera with full manual control, image analysis program and constellation guide application obtained from free online source, GPS to determine coordinates of locations. Surveyed each location by taking pictures of same section of sky with constant exposure time, aperture, focal length, and sensitivity, and at the same time every night, then read histograms of images and calculated an EET (equivalent exposure time) from a calibration curve graphed before collecting data from the three locations previously identified.</p> <p>Results After comparing the EETs (equivalent exposure times) of the images, I found that Location A (a residential area) was the area that was least affected by skyglow. Location B (an undeveloped area near a freeway) came next, and Location C (a mountainous area) was ultimately the area whose stellar visibility was most affected by skyglow.</p> <p>Conclusions/Discussion The surveying of three different areas representing various artificial light activity found that the areas whose stellar visibility are most affected by skyglow are not necessarily the most secluded/undeveloped areas, and that factors like moonlight and cloud cover must be taken into account in order to formulate a more accurate conclusion. This experiment could help raise awareness about the diminishing number of stargazing places in easily accessible areas and raise questions about how we can prevent a "starless night" from happening.</p>	
Summary Statement I showed that the areas whose stellar visibility is most affected by skyglow are not necessarily the most secluded areas using a calibrated digital camera.	
Help Received Substantial. I received assistance during transportation to various locations and during the calibration process by family members.	



CALIFORNIA STATE SCIENCE FAIR 2016 PROJECT SUMMARY

Name(s) Zoie S. Andre	Project Number J1102
Project Title Black Bear Damage to Conifers in Redwood Forests	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Black bears strip the bark off conifers and eat the cambium as a food source. I wanted to determine if a redwood forest regenerating from a clear cut would create favored conditions for black bears to damage conifers. The project would show which silviculture type, previously clear cut in last 50 years or not clear cut, can be used to minimize the amount of conifers stripped by bears.</p> <p>Methods/Materials To conduct the project 30 plots were randomly selected with 15 in not clear cut and 15 in forest has been clear cut in the last 50 years. At each plot I counted the trees that had been stripped by bears and the total trees in the plot over 4 inches in diameter. I then found the percent of trees stripped by bears. I used a GPS (Global Positioning System), Laser Range Finder, and Wildlife Motion Cameras from the City of Arcata Environmental Services Department.</p> <p>Results The results of my experiment were that if the forest had been clear cut in the last 50 years, then the amount of trees stripped by bears will increase. The previously clear cut forest had a mean of 30.27% damaged trees. The not clear cut forest had a mean of 4.06% damaged trees.</p> <p>Conclusions/Discussion In conclusion, forest areas that have been recently clear cut will have more conifers that have been stripped by black bears. For land managers who harvest conifers in northern California selective logging should be considered instead of clear cutting. Although there would be an exchange for growth rate and logging volume it would help lessen black bear damage.</p>	
Summary Statement This project tested the effect of silviculture type (clear cut or not clear cut) on the amount of conifers stripped by bears in north western California redwood forest.	
Help Received I used a GPS (Global Positioning System), Laser Range Finder, Biltmore Stick, and Wildlife Motion Cameras from the City of Arcata Environmental Services Department. I was granted access to Jacoby Creek Forest by the City of Arcata. Brian Kang GIS Coordinator for City of Arcata helped me put my plot	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Noe T. Arredondo-George	Project Number <h1 align="center">J1103</h1>
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Project Title
Monterey Bay: Sanctuary for Microplastics?

Abstract

Objectives/Goals
 The objective of this study is to determine if there are microplastics in Santa Cruz ocean waters on Monterey Bay Marine Sanctuary. I decided to do this after reading about seabirds unknowingly consuming plastic. My hypothesis was that there would be microplastics in Monterey Bay and that water from most-used beaches would have the most microplastics.

Methods/Materials
 Sampled water at three local beaches (one heavily used/populated, one hardly ever used/populated, one a popular CA State Beach, medium use/populated) using plastic milk jugs, glass measuring cup, filtered using clear plastic tube, plastic kitchen funnel and coffee filters (6 micron filter), analyzed using method of identifying microplastics similar to that of Dr. Abby Barrows - visually identified plastics using father's microscope (Leica # MZ6 Dissecting Microscope) and microscope camera (AmScope# Microscope Eyepiece Camera 250 mA USB 2.0 DC 5v).

Results
 Microplastics found at every beach in every sample regardless of use/populatedness. Microplastics count ranged from 13 microplastics/2 cup sample to 73/2 cup sample. Repeated samples over several months confirmed. Most microplastics found at most heavily used beach. Least used beach did not have least amounts of microplastics. Most common microplastics found: thin, brightly & evenly colored filament fragments, 0.3 mm-2.0 mm (Pictures A&B).

Conclusions/Discussion
 Evidence supported hypothesis:
 - found microplastics at all beaches sampled; Cowell's water had most. Unexpected: Fair Street beach had more than Natural Bridges even though less populated and less accessible --- possible explanation: runoff from Fair and West Cliff dumps into Fair St beach. Results are very disturbing because so many microplastics found- Monterey Bay is marine sanctuary, so would expect to find much fewer- Santa Cruz is small city, so would expect less microplastics than near a larger city. Impact- can help us focus cleanup and conservation resources- teaches us that there is microplastic pollution in Monterey Bay - urgently need to figure out how to remove them: October 2015 bills passed in California and at national level prohibit microbeads in products --- but not until 2020!

Summary Statement
 I studied ocean water in Monterey Bay to determine if there were microplastics in a marine sanctuary, and my results confirmed striking amounts of microplastics in every water sample.

Help Received
 I designed, sampled, and filtered mostly by myself. My father taught me how to use his microscope and camera, my mother drove me to sample sites, my grandmother helped hold the plastic tube while filtering.



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Hermak Banda	Project Number J1104
Project Title Which Tree Is More Capable of Sequestering Carbon from the Environment?	
Abstract Objectives/Goals The purpose of this project is to compare the ability different types of trees have to sequester carbon from the environment and leave it in the soil by measuring inorganic carbon (carbonates: CaCO_3) present in the soil around it as an indirect indicator of CO_2 . Methods/Materials Three type of trees were selected: Date Palm tree, Mesquite tree and Eucalyptus, common in Southern California. Three samples were taken from the soil around them, digging 30 cm away from the tree and 30 cm depth. Other three samples were taken from an area with no trees or plants around (blank sample) to compare results. I measured the amount of inorganic carbon (CaCO_3) present in the soil by the method of acidification. For the acid, I used hydrochloric acid (HCl) or muriatic acid and performed titration analysis with NaOH or Easy off. Results My analysis shows that Date Palm tree is more effective in sequestering carbon from the environment. Date palm tree required 115 droplets of NaOH to neutralize, which means that 28.75 % of CaCO_3 is in every gram of soil of this type of tree, followed by Eucalyptus tree and Mesquite with 16 % and 15.15 % each one. Blank sample showed the lowest content, 12.75 %. Conclusions/Discussion Date palm tree is more capable to sequester carbon from the environment, although the difference between trees is small. Compared to a blank sample, there is a significant difference. It means that having a tree around, would help for sure to clean the environment that surround us. I would like to explore other methods to measure carbon in soil as well as ways to improve their ability to maintain carbon in the soil.	
Summary Statement Date palm tree is more effective sequestering carbon from the environment than mesquite and eucalyptus trees.	
Help Received I did all procedures and analysis. PhD Monica Carrillo explained to me titration method and formulas to calculations.	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Hannah E. Cooper	Project Number J1105
Project Title Effects of Ash Contamination on Water pH in Moving and Still Water Systems	
Abstract Objectives/Goals The objective of this experiment is to discover the effects of ash contamination on California water systems. I am testing this due to the ash left over from recent forest fires up in the mountains of California which are now polluting our waters. The moving water, such as streams or oceans, are cleansing the high level of ash pH. However, still water such as lakes are keeping the ash floating in the water. My goal is to help prevent pollution not only in the aquatic life but also in the water systems themselves as used to irrigate fields in the central valley. Methods/Materials Materials: 6 cups of gravel, 480 cups of water, 2 wave makers, 1 gallon Crystal geyser water, 2(42.9 cm x 29.2 cm x 23.5 cm) plastic tubs, 12 tablespoons of ashes, environmental pH Tester, metal strainer Procedures: Setting up the experiment: Place 3 cups of gravel at the bottom of your plastic tubs. Fill each tub with 40 cups of water. In one of the tubs put the two wave makers on the side of the tub. Turn on the wave makers. Conducting the experiment: Set your timer for five minutes and put one tablespoon of ash in each plastic container at the same time. Before the timer runs out take your pH tester and pour a little bit of Crystal Geyser water over the top to set the pH level to the regular setting. Place the tip of the tester into the water and write down the results for each tub. Clean out the gravel by straining it out and rinsing it. Repeat the previous two step until 60 minutes has been reached. Results My tests found that the Ash additive from the California fires are doing a great amount of damage once they get into our still water systems. Fortunately, for us over time, the pH in our moving water systems will regulate the pH down enough so that no aquatic life will be harmed and our irrigation systems may or may not be as effected. Conclusions/Discussion I learned that our aquatic life could be in danger if we do not properly clean up ash residue from fires. The	
Summary Statement This project tests the ash additive exposed to moving and still water systems with moving water having better pH results over an hour period.	
Help Received Craig Jones, Kjirsten Humphrey, Carl Gong, Casey Cooper	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Xavier T. Csato	Project Number J1106
Project Title Radiation Investigation: What's in YOUR Fish?	
Abstract	
Objectives/Goals The objective of my study is to determine whether the species and/or location of fish has an affect of the radiation levels found within.	
Methods/Materials Vernier Labpro, Vernier Radiation detector, Bluefin Tuna, Cuttlefish, Red Sea Bream, Mahi Mahi, Fresh Tuna, Sockeye Salmon, Farmed Salmon, Pacific Snapper, Albacore Tuna, Iwashi Sardine, Dover Sole, Computer, Logger Pro Application, and paper plates. My procedure for testing the fish was to buy fish, identify where fish is from, cut all of the fish into equal portions, and test for radiation using a Vernier Radiation Monitor.	
Results When I finished testing and I analyzed my data I realized that the Albacore Tuna from Fiji had the highest average count of radiation, and the two fish with the highest overall count of radiation were the tuna and the Dover Sole from the USA. According to the Vernier radiation monitor I used, anything above 10 counts of radiation is unsafe, and even though nothing equaled or topped 10 radiation counts, the Dover Sole and tuna came close with a 7.	
Conclusions/Discussion After analyzing my data, I partially accept my hypothesis about the tuna fish containing the most radiation. According to my data, fish from the USA contain the most radiation and tuna contain the most radiation. This could be bad because there is a revolution to start buying locally produced foods, but fish from the USA contains radiation and may be harmful to your health.	
Summary Statement I showed that the radiation levels in different species of fish from different locations while not harmful alone, can be harmful when consumed at a constant rate.	
Help Received My mother helped me purchase the fish I used, my science teacher Norm Brennan provided a radiation detector, and different stores such as Whole Foods, Pavilions, Nijiya Market, and Marukai provided me with where the fish was from.	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Madison M. Dietz	Project Number J1107
Project Title Make It Rain: What Material Works Best in Cloud Seeding?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The standard protocol that scientists are using to create more rain for drought affected areas is through cloud seeding. Cloud seeding has become extremely popular lately in its attempt to bring more rain to California. Scientists use a hazardous chemical called silver iodide to seed clouds, which is entering our atmosphere and making the air we breathe more harmful. My goal is to find an alternative and all-natural way to seed clouds.</p> <p>Methods/Materials I made five modern day cloud chambers using plastic, cookie tin lids, hygrometers, turkey basters, syringes, pots, paper clips, string, silver iodide, flower pollen, turmeric, and ground-up pine tree bark. I did three separate trials and tested the effects of different aerosols on the amount of rain a cloud would produce. The results were taken from different hygrometer readings during each trial, as well as the water droplets collected in the tins and measured after the trial was finished.</p> <p>Results My hygrometer readings and water droplets collected showed that turmeric was the most effective aerosol in seeding clouds. Silver iodide, which is what scientists are currently using, came in behind turmeric and flower pollen. This shows that either turmeric or flower pollen could be used to seed clouds in a natural way.</p> <p>Conclusions/Discussion My results prove that there is a more natural and effective way to successfully seed clouds. Turmeric as well as flower pollen increased the moisture content and water the best out of all of the aerosols. If turmeric is used to start seeding clouds, it would prevent the risk of silver iodide being in our atmosphere. Silver iodide increases risk of anemia and poor eyesight as well as trouble breathing and discoloration of skin. With turmeric, there's now a more effective, efficient, and natural way to seed clouds.</p>	
Summary Statement After assembling cloud chambers, I measured natural substances versus the standard silver iodide in calculating what material produces the most rainfall.	
Help Received I conducted my experiment, built the modern day cloud chamber, and analyzed the results by myself. I had help with the drill when building the chamber, and was instructed by my teacher and parents with the safety of the hazardous chemical portion.	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Annabelle Fowler	Project Number J1108
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Project Title
The Effect of Storm Drain Runoff on the Concentration of Chloride Ions and Dissolved Oxygen in Newport Harbor's Back Bay

Abstract

Objectives/Goals
The objective of this study is to determine the impact of storm drain runoff on concentrations of chloride ions and dissolved oxygen in an estuary.

Methods/Materials
I collected samples from Back Bay at high tide each day for a period of ten days, recording weather conditions and air and water temperatures, and measuring the dissolved oxygen concentration of the water using a dissolved oxygen probe. I performed three titrations on each sample using silver nitrate and potassium chromate to determine the concentration of chloride ions present.

Results
The amount of dissolved oxygen present at the storm drain was consistently lower than at the two other locations, on average by 0.94 milligrams per liter, despite the fact that the water was colder near the storm drain. During the first three days of my experiment, the chloride ion concentration was almost ten times lower at the storm drain than at the other two locations, whose concentrations were about the same. However from November 23 to the end of my experiment, the chloride ion concentrations differed by less than 4.1×10^{-5} moles per gram at all three locations.

Conclusions/Discussion
The low levels of dissolved oxygen near the storm drain have led me to conclude that my hypothesis was correct. The algae and decomposing materials carried into the bay by the storm drain were most likely the cause of the lowered oxygen levels.

The days when there was very little difference in chloride ion concentration between my sample sites coincide with the time period when my collection sites were experiencing a king tide. During this period, all three sites were completely submerged at high tide when I did my collecting. The amount of freshwater deposited by the storm drain was not enough to dilute all the extra bay water, so the amount of chloride ions was not lowered significantly. From the data I collected during normal tide patterns, I have come to the conclusion that my hypothesis was correct; storm drain runoff lowers the concentration of chloride ions. However, if I had had more time, I would have taken more samples on days with regular tide patterns to see if the effect I observed was consistent.

Summary Statement
My analysis shows that effluent water released to an estuary causes a decrease in levels of both chloride ions and dissolved oxygen, chemicals that are essential to the survival of the Bay ecosystem.

Help Received
I designed and performed the experiment myself. My parents helped me acquire and dispose of the materials for this project. Robin Madrid, of the California Department of Fish and Wildlife, provided articles for background research, and Stephanie Tartakoff taught me how to do titrations.



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Fatima S. Gasmelseed	Project Number J1109
Project Title Carbon Dioxide in the Lakes	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Ocean acidification is a worldwide problem that concerns ocean life and it is caused by the excess carbon dioxide that comes from factories, cars, electricity and more. Many scientists and researchers are working hard to find a solution to this problem but they are mainly focusing on changing or buffering the ocean. What many people don't know is that lakes have a big impact on the oceans acidification. Lakes let out more carbon dioxide than they absorb which is nearly as much as the ocean lets out. This project investigates what qualities help lakes absorb more or less carbon dioxide to see what kind of lakes can absorb more carbon dioxide and a suggestion to a more efficient solution for ocean acidification.</p> <p>Methods/Materials To find the amount of carbon dioxide lakes/water absorb in a day I first tested their pH and KH levels in degrees. I used a pH meter to test their pH in degrees and a KH test kit to find the KH levels in degrees. After testing I used the results and compared the pH and KH data in a pH and KH carbon dioxide comparison chart to find the amount of carbon dioxide absorbed from each lake or water.</p> <p>Results The control which was rainwater had the least amount of carbon dioxide in it while the Marina Lake had the most amount of carbon dioxide in it and it was also the smallest and the most polluted lake that was tested. El Estero had the second to least amount of carbon dioxide and it was the biggest and cleanest lake. Laguna Del Rey and Roberts Lake have the most cars near them and they're results are in the middle.</p> <p>Conclusions/Discussion After analyzing the results it can be said that lakes are mainly affected by the amount of pollution in them and their size. Smaller and more polluted lakes absorb more carbon dioxide while bigger and less polluted lakes absorb less carbon dioxide. This means that if the smaller and more polluted lakes become cleaner less carbon dioxide will go into the atmosphere lowering the amount of carbon dioxide being put into the atmosphere.</p>	
Summary Statement Lakes that contain more pollution and are small absorb more carbon dioxide so cleaning lakes will lower the carbon dioxide in the atmosphere for the ocean to absorb.	
Help Received I conducted the experiment and project by myself but I received a tip from the Monterey Bay Aquarium Research Institute, who told me that it is easier to test carbon dioxide in freshwater than saltwater and Ralph Keeling told me that the ocean absorbs more carbon dioxide than lakes.	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Madelyn R. Goley	Project Number J1110
Project Title Do Sea Lion Carcasses on the Surface Affect the Amount of Bacteria in the Soil?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The goal of my project was to determine how the presence of a sea lion carcass on the beach affected the number of bacteria in the soil below. I predicted there would be more bacteria under the carcass than under a control at two depths (2 inches and 12 inches).</p> <p>Methods/Materials I collected soil samples from 2 and 12 inches under the sea lion carcass and under the control using sterile collecting supplies. I isolated the bacteria from the samples and plated dilutions of the samples on nutrient agar plates before counting the number of bacterial colonies.</p> <p>Results I found that the bacteria were 220 times more abundant in the shallow soil sample under the sea lion than under the shallow control (447.3 vs. 2.03 million colonies/ml). Bacteria were 33 times more abundant at depth under the sea lion than under the deep control (15.7 vs. 0.48 million colonies/ml).</p> <p>Conclusions/Discussion In conclusion, my hypothesis was supported. My findings are important because there is currently a large sea lion die-off along the coast of California due to the current El Niño event. Over 1,500 California sea lions have died on California beaches this year (NOAA). If these bacteria are harmful they could affect people and animals that come into contact with them. If these bacteria are beneficial, they may help to decompose the animal quickly and recycle important nutrients deep into the environment. This would be similar to the role that bacteria play in decomposing whales (whale fall) in the deep ocean.</p>	
Summary Statement I showed that there were significantly more bacteria under a sea lion carcass than under a control plot which is important due to the large numbers of sea lions dying along the coast of California due to the ongoing El Niño event.	
Help Received Dr. Mark Wilson at Humboldt State University trained me in microbial culture techniques which included diluting samples I collected on the beach, preparing spread plates of samples, counting bacterial colonies and calculating bacterial concentrations.	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Riley K. Gooding	Project Number J1111
Project Title Impacts of Restoration vs. Natural Recovery on Coastal Scrub Soil	
Abstract Objectives/Goals I wanted to find out how well plants grew back after a fire. The reason I did this project was to investigate how the aftermath of a fire should be handled and how people can help plants grow back after a fire. I believed that plants in an undisturbed burned area will grow better than the plants in planted areas. Methods/Materials For this project I used a three way meter, rapitest soil test kit, and a ruler to collect data from my 24 samples. I tested the samples for moisture, light, temperature, ph, nitrogen, phosphorus, and potassium. Results The results I found supported my hypothesis. The soil in the restoration area was very high in nitrogen and had a very acidic ph level. This can cause plants to be susceptible to diseases and the bacteria responsible for breaking down the nutrients required for plant growth. Conclusions/Discussion These results show that we should perhaps leave burned areas alone after a fire instead of trying to plant and add more minerals. The reason for this is when more minerals added to soil, the faster plants will grow, but they may not be able to survive long due to having weak cell walls and may be unable to reproduce. I would recommend leaving burned areas undisturbed after a fire and letting plants grow back naturally. If one wanted to plant after a fire, I would recommend to not add any extra minerals. I would also recommend taking a wider variety of results.	
Summary Statement My project compared plant growth after a fire in an undisturbed area versus are planted area.	
Help Received Roxanne Hunker, Kimberly Gooding	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Finn A. Horsley	Project Number J1112
Project Title Impacts of Recreational Boating on Copper Levels in Bays and Marinas	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals In San Diego, we all live relatively close to the ocean and therefore we have to make sure we are taking care of it. I discovered people are concerned about copper pollution in our bays. Upon doing further research, I hypothesized that much of the copper pollution comes from copper biocide paints and that copper levels in local waters would be higher around boats.</p> <p>Methods/Materials I collected a total of 36 water samples from local bays and beaches. I performed a variety of tests with copper kits, but needed a more sensitive testing method. I decided to use a Hach DR 890 Colorimeter to measure the copper levels in parts per billion. I then compared the copper levels from the various locations.</p> <p>Results Sixteen samples were from locations with boats (marinas and bays) and 18 samples were from beaches. The samples from marinas and bays contained an average of 12.2 parts per billion copper. The average beach sample only contained 2.9 parts per billion copper. These results supported my hypothesis that copper levels would be higher near boats. The copper standard for marine life is only 3.1 parts per billion.</p> <p>Conclusions/Discussion These results suggest that copper biocide paints may impact copper levels. Because of the harmfulness of copper paints, marine life would benefit more if boaters switch to an eco-friendly paint option. Boaters are slowly making this change. I hope my project promotes awareness of how prevalent this problem is in our local bays and marinas and encourages more boat owners to make the switch.</p>	
Summary Statement I tested the copper levels in the bays marinas in parts per billion to determine the impact of copper biocide paints.	
Help Received My mom drove me to the bays and marinas. My science teacher helped me find some test kits to use. My dad rented a hach colorimeter that I used to test my samples.	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Jackson J. Humphrey	Project Number J1113
Project Title Effects of Particulate Matter on Precipitation	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of this project is to determine if the source and size of airborne particulate matter (PM) can affect precipitation rates. While conservative water usage is an important factor to consider during the drought, understanding precipitation formation and patterns is vital as well. The reduction of dust and other PM10 may be contributing to the minimal precipitation.</p> <p>Methods/Materials Testing was done with three common particulates; pine smoke, dust, agricultural burning (grape drying paper), and a control. To test these variables, a cloud chamber was constructed.</p> <p>Results Dust produced the most condensation at an average of 8.3g of condensation. The control had an average of 7.9g of condensation. The pine smoke variable had an average of 7.3g. The results showed that the dust created more condensation than the control.</p> <p>Conclusions/Discussion This study's hypothesis showed to be correct. It stated the dust would have the greatest amount of condensation produced when compared to the control. Dust is PM10 and provides a larger surface for the precipitation to condense around, thus creating more condensation. Pine smoke and agricultural burning are measured to be PM2.5, therefore providing a smaller surface for condensation to form.</p>	
Summary Statement The purpose of this project is to determine if the source and size of airborne particulate matter (PM) can affect precipitation rates.	
Help Received I recieved help from from environmental consultant Paul Humphrey, owner of Paul Humphrey, E.P.	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Linnea J. Jackson	Project Number J1114
Project Title Cyanobacteria at Pinto Lake	
Abstract Objectives/Goals The goal of my project is to see if there is less cyanobacteria in the middle of Pinto Lake, or in the water near the dock's side during a cyanobacteria bloom. Methods/Materials I used a microcystin testing kit that I was able to buy, and a photo spectrometer that I was able to borrow from the City of Watsonville Water Resources. I only had the photo spectrometer available for four tests out of the six total that I did. When I didn't have it to use, I based my data on the color change of the water in the test tube. Results Based on my photo spectrometer results, the water in the middle of the lake has 8.2 percent less cyanobacteria than the water near the dock. Based on the test kit results, the middle of the lake still had less cyanobacteria. This means that there are less toxins in the middle of the lake than there are in the water near the dock. Conclusions/Discussion My conclusion is that the middle of Pinto Lake has less cyanobacteria than the water at the dock's side. When the county of Santa Cruz tests the lake to see if there is an unsafe amount of cyanobacteria, they only test at the dock. My sailing group is most likely to come in contact with the toxins in the middle of the lake, which, based on my results, is safer than the water near the dock during a cyanobacteria bloom.	
Summary Statement I tested the amount of cyanobacteria in two different locations in Pinto Lake, and found that the middle of the lake has less cyanobacteria than the shore of the lake.	
Help Received My dad helped me with transportation and understanding how the testing kit and the photospectrometer worked. Michael Crane, from the City of Watsonville Water Resources provided the photo spectrometer, data from the county and he let me tour his lab.	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Samuel B. Kahn	Project Number J1115
Project Title Post-fire Regeneration in Coastal Sage Scrub: Second Year of Study	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals I studied the number and type of species (native vs. non-native) that grew in burned and unburned areas after fire in Coastal Sage Scrub (CSS). I looked in detail at the recovery of one native, <i>Artemisia californica</i>, to see how the number and height of this common native was affected by growing in an area that recently burned. I am beginning to study how weeding out non-natives in a burn area can affect the growth of native species.</p> <p>Methods/Materials I began my study in October 2014 after a fire in July 2014. I put 8 meter long transect lines in a burned and an adjacent unburned area. I sampled 4, 1 meter square quadrats along each transect line once a month, recording the type and number of plants that grew. In July 2015, I added a third transect in the burned area, that I weeding all non-natives out of. I also counted and measured the height of the native plant <i>Artemisia californica</i>, in two large 8 meter by 3 meter quadrats in the burned and unburned areas.</p> <p>Results During the dry months of summer, fewer plants grew in both transects. During the winter, many plants popped up because of winter rains. There were more species in the burned area, but also more non-natives. Eighteen months after the burn, Rattlesnake Spurge was the most common native in the burned area, and Matchweed the most common native in the unburned area. Indian Sweet Clover and Black mustard were the top non-natives in the burned area, and Red-Stemmed Filaree in the unburned area. In the burned area there were significantly more and larger <i>Artemisia californica</i> than in the unburned area.</p> <p>Conclusions/Discussion My project can help understand how CSS recovers from fire and how to manage this habitat. I saw differences in the type of species and when they appeared between the burned and unburned areas. This information can help with management because I identified major non-native invasive species in CSS (Indian Sweet Clover and Black Mustard), which could be the focus of removal efforts. I also identified what natives grow and when they grow, which could help with native replanting. I showed that fire can have a positive effect on the growth of some plants, as <i>Artemisia Californica</i> seedlings were taller and more numerous in the area that burned. In the future I plan to study whether weeding of a burned area will help to prevent native habitats from being taken over by invasive species.</p>	
Summary Statement I showed that the species, number, and size of plants that grow in Coastal Sage Scrub habitat are altered after a fire.	
Help Received Ranger Chris Axtmann helped me to get permission to go into the burned area in Mission Trails Regional Park. My mom helped me on data taking days by driving me to the park and helping me identify plants. My Dad helped me with Excel and the statistics.	



CALIFORNIA STATE SCIENCE FAIR 2016 PROJECT SUMMARY

Name(s) Ethan P. Kerr	Project Number J1116
Project Title The Effect of Man-Made Materials on Urban Temperatures	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My objective was to determine whether the average temperature in an urban environment is greater than in a natural, non-urban environment because of the man-made materials used in an urban environment.</p> <p>Methods/Materials My approach to the problem was to heat both man-made, and natural materials to mimic the heating effect of the sun, and then to test the surface temperature, and the air temperature above the materials. I built a testing apparatus made up of a 2 foot high, 10 inch diameter steel duct with a thermometer port at 14 inch high, topped with a heat lamp. I filled the bottom of the duct with 2#3 inches of the material to be tested (concrete, asphalt, brick, sod, soil with twigs and leaves). Then I turned on the heat lamp for 30 minutes. I then removed the heat lamp and took temperature readings of both the air above the material, and the surface temperature of the material every minute for 60 minutes. This process was repeated for each of the materials. The data allowed me to determine the average temperatures (air and surface), and to see the rate of cooling of the materials.</p> <p>Results I found that the average air temperature above the materials was 4.8 degrees F warmer with the man-made materials than with the natural materials. The average surface temperature of the man-made materials was 28.1 degrees F warmer than that of the natural materials. The natural materials cooled down more rapidly than did the man-made materials.</p> <p>Conclusions/Discussion Man-made materials generate more air and surface heat than natural materials, and natural materials cool at a more rapid rate than man-made materials. The science behind the results is that since the man-made materials are denser than the natural materials, they retain heat for a longer time and cool more slowly. I would like to study the effect of color and/or reflectivity on temperature. I observed, for example, that the concrete, being light in color did not reach as high a surface temperature as the darker materials, but due to its density it cooled more slowly and had the highest ending surface temperature. My experiment supports the idea that providing for natural open spaces in urban areas would be beneficial to the inhabitants, as would the use of more natural materials in urban landscaping, because that would reduce the abnormally high temperatures of urban areas known as Urban Heat Islands.</p>	
Summary Statement I showed that man-made materials found in urban environments cause higher air and surface temperatures than natural materials found in non-urban environments.	
Help Received My dad helped me with equipment design and fabrication.	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Erin K. Lamphear	Project Number J1117
Project Title A Spatial and Temporal Comparison of Sound Levels in a Rural and Urban Interface	
Abstract Objectives/Goals The purpose of this experiment was to determine the sound level variation between time periods and between zoning in a rural and urban interface in Northern Coastal California. Methods/Materials The study area, consisting mainly of industrial, commercial, residential, and agricultural zones, had 49 sites distributed evenly, sampled over three time periods (weekday afternoon, late evening, and weekend morning). Decibel (dB) sound recordings were taken for 30 seconds at each site and mean and maximum dB values calculated. Area weighted mean and maximum values were calculated for all periods. Inverse distance weighted interpolation was used to generate study-wide mean and maximum sound surface rasters for each time period. Zonal mean and maximum sound levels were calculated for each of the three time periods. Results Across the study area, the weekday afternoon period exhibited the highest mean and maximum dB values, followed by the weekend morning, and evening periods. Area-weighted zonal mean and maximum dB values followed predicted results with the exception of Residential Medium Density and Natural Resource Public Trust zones exhibiting higher than expected mean sound levels. In addition, unexpected maximum dB values were experienced in Agriculture Exclusive and Residential Low Density zones. Conclusions/Discussion Sound levels in all temporal periods were higher in the east side of the study area, consisting mainly of residential and commercial zones. Sound levels were lower in the west side of the study area, primarily comprised of agricultural land and low density residential zones. Unexpectedly high sound levels within the Residential Medium and Low Density zones can be explained by the zones# proximity to major primary and secondary transportation arteries. High sound levels adjacent to major streets throughout the study area and across time periods indicate that vehicular traffic is the primary cause. Noise pollution is a growing concern in rural and urban areas. Detrimental effects of noise pollution include, #stress-related illnesses, high blood pressure, speech interference, hearing loss, sleep disruption, and lost productivity# (U.S. EPA 2016). Interpolative surface raster modeling of dB values provides spatial information raising local awareness about unsafe sound levels and can be used to evaluate and monitor the influence of sound effects across a heterogeneous rural and urban interface.	
Summary Statement This study is a spatial and temporal comparison of sound levels (dB) in a rural and urban interface.	
Help Received My father, David W. Lamphear a research analyst with Green Diamond Resources, provided supervision and mentoring during this study.	



CALIFORNIA STATE SCIENCE FAIR 2016 PROJECT SUMMARY

Name(s) Ella T. Lifset	Project Number J1118
Project Title Efficacy of UVC Treatment Facility on Cottonwood Creek Water Quality	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Near where I live is a creek called Cottonwood Creek, which has been plagued with high nutrient and bacterial levels. This contamination has been addressed by two methods: a riparian zone and an Ultraviolet-C (UVC) germicidal facility. Last year, I tested if the creek riparian zone reduced nutrient levels. This year, I studied whether the UVC facility improved water quality by reducing bacterial growth. I tested 14 water samples multiple times from four sites on two days: Site 1) Before UVC Facility, Site 2) Inside Facility, Site 3) After UVC Treatment and Site 4) Moonlight Beach Effluent.</p> <p>Methods/Materials I inoculated 74 plates using Coliscan Easygel to detect coliforms, E. coli, noncoliforms and mold growth. I also tested overall water quality and performed 114 tests. I measured nitrates, phosphates, ammonia, copper, chromium and iron.</p> <p>Results Bacteria growth results supported my hypothesis that bacteria in the water would be elevated before UVC treatment and decrease after UVC treatment. However, my tests at the beach effluent showed that bacteria levels were approximately as high as before UVC treatment. I was surprised by this because I had not predicted bacteria levels would increase to such an extent. The nitrate levels detected were consistently high at each site. In fact, the nitrates were 70-80 times greater than state standards. Recommended levels for nitrates is less than or equal to 1 ppm. The phosphates were less consistent, however still exceeded state standards. The phosphate values were 40-85 times higher than recommended levels. The phosphate state standard is less than or equal to 0.1 ppm.</p> <p>Conclusions/Discussion According to my findings, the UVC facility does eliminate creek bacteria, but 15% of the creek water is not directed through the facility. After the untreated water joins the treated water, the bacterial contamination rises to unsafe levels before it is discharged at Moonlight Beach. Phosphate and nitrate contamination was above state standards at all sites.</p>	
Summary Statement The purpose of this project was to test whether a UVC germicidal facility effectively decreases bacteria levels at the beach effluent of a local creek.	
Help Received I contacted the Senior Environmental Specialist of the City of Encinitas who allowed me access into the UVC germicidal facility. My science teacher supplied the water sampling equipment and the testing supplies. I collected all the water samples myself as well as performed all water quality tests.	



CALIFORNIA STATE SCIENCE FAIR 2016 PROJECT SUMMARY

Name(s) Michael McPhie; Pranav Moudgalya	Project Number J1119
Project Title Extraordinary Elodea: A Look into the World of Pollution	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals In our project, we wanted to address the worldwide crisis of pollution, so we investigated the effect of pH levels on underwater plants. By doing this, we would be able to analyze the effects of acid rain (a common form of pollution) on plants- thereby proving how harmful different kinds of pollution are to the very essence of life, oxygen. Specifically, we wanted to know how the pH of a solution would affect the oxygen (O₂) respiration rate of a plant called Elodea anacharis.</p> <p>Methods/Materials We measured Elodea in three different levels of pH. We first choose 6 pH, which is the average acidity of normal rain, to serve as the normal amount of oxygen that the elodea plants produced- under optimal circumstances. Then, we choose 3 pH and 9 pH solutions to represent our acidic and alkaline solutions, respectively. We combined vinegar, water, and a substance called Qure water (water alkalized with minerals) to create our three solutions of 3 pH, 6 pH, and 9 pH. With a total of fifteen 15 mL test tubes, we put 3 inch strips of elodea into each and set them out in the sun for two hours, checking on them every 15 minutes.</p> <p>Results Our results were very interesting. By measuring the amount of oxygen bubbles produced by the plants during the two hour period, we found that on average, the plants in the 6 pH #optimal# solution produced an average of 0.96 mL of oxygen per plant, while the plants in the 9 pH alkaline solution produced 0.82 mL of oxygen, only 15% less than the 6 pH solution. The Elodea 3 pH acidic solution, however, only produced 0.36 mL of oxygen, 63% less than the optimum solution.</p> <p>Conclusions/Discussion In short, throughout the course of this experiment, we learned that alkaline pollution is far less harmful to plants than acidic pollution. Many methods, such as the #cleaner coal# method and the Integrated Gasification Combined Cycle (IGCC) method, change the pH of the resulting pollution from acidic to alkaline by pulverization and conversion into a gas called synthesis gas, respectively. Further development of these methods, refinement, and widespread use of these procedures can bring a tremendous change over the entire planet- for the better.</p>	
Summary Statement In our project, we showed that acidic pollution is much more detrimental to the oxygen production of plants than alkaline pollution.	
Help Received Our project was designed to measure accurate, informative, and useful data without requiring the help of outside professional research laboratories or equipment.	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) John D.M. Olson	Project Number J1120
Project Title The Effect of Location on Pollution Levels in the Russian River	
Abstract Objectives/Goals The objective of this study is to determine whether a person can drink water straight from the river safely, without the water having to be purified. Methods/Materials Russian river water, yardstick, imhoff cone, rope, gloves, flotation ball, silver sleeves, turbidity sticker, data chart, LaMotte water monitoring kits, science journal, stop watch, bottled H ₂ O Results The test data results indicate that the water quality is fairly consistent and within the standard state level with the exception of a qualitative result in tests for coliform bacteria. Conclusions/Discussion The results of the experiment are repeatable. The data shows that the largely populated areas, as well as the agricultural areas both contribute high levels of pollutants which contaminate the river water. The results prove that my hypothesis is not valid.	
Summary Statement It was determined that coliform bacteria exists in all locations of the Russian River, purification process for drinkable water is absolutely necessary.	
Help Received Mr. Oelker & Mr. Quijano both scientists from UWC demonstrated in their lab correct safety & collection testing processes. Mr. Torres suggested areas on the Russian River.	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Nithyasree Palakodety	Project Number J1122
Project Title Exposure to Bad Air Quality, Bad Water Quality, and Toxic Mold: Do They Increase the Risk of Getting a Brain Tumor?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective was to determine if bad air quality, bad water quality, and toxic mold could increase the risk factor of a person getting a brain tumor.</p> <p>Methods/Materials Computer with Excel, 30 cities chosen based on their air quality, water quality, and relative humidity. Relative humidity used as a proxy for mold exposure, Wonder CDC database used to find population of city and cancer count. About 500 data points used to perform a logistic regression analysis to find odds ratios (OR) and confidence intervals (CI). Analysis done for interaction levels of every combination of air quality, water quality and humidity as well.</p> <p>Results Results show that bad air quality has a negative correlation with brain cancer, meaning exposure to it lessens the chance of brain cancer. The correlation between bad water quality and brain cancer is inconclusive, because the results for each year were opposites. Mold was inconclusive as well as the interaction between all 3 variables.</p> <p>Conclusions/Discussion The results were close to the hypothesis but had a smaller OR than predicted, showing that the correlation was negative for 2011. The CI was also lower than predicted, showing that the results were more precise than the CI in the hypothesis. The results were opposite in 2012 except for air quality which stayed negative. 2012 results were less precise. The objective of the project was not accomplished. In the future, more testing should be done to find more accurate and reliable results. The results do not show whether these 3 variables slightly increase the chance of brain cancer. But since results were inconclusive, actions should still be taken to limit pollution and exposure to mold.</p>	
Summary Statement The results of my project, aiming to find out whether bad air quality, bad water quality, and toxic mold could increase the risk of getting a brain tumor, were inconclusive, and more research needs to be done.	
Help Received I conducted the whole study by myself with help from my dad who edited my writing and helped me to research and plan my procedure.	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Rachel E. Pendergast	Project Number J1123
Project Title You're Going to Eat That? Is It Possible and Probable to Survive in Riverside, CA Using Only Natural/Wild Resources?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The goal of this project is to determine if it is possible and probable to survive in Riverside, California using only natural and wild resources.</p> <p>Methods/Materials During this project I researched different edible plants and bugs to compile different diets to sustain nutritional needs. I also learned that eating plants and bugs such as crickets, weevils, termites, purslane, mustard greens, mallow weed etc. is a much more sustainable diet than cattle and poultry. I also learned different fire starting methods for warmth, cooking and protection. I found the easiest, most effective way was using the #Russian Prison Fire# method using an AA battery and a gum wrapper a blazing fire can be started. A magnifying glass or matches takes longer and ideal conditions must be reached. I also used methods of water purification and tested multiple water samples from various locations (Fairmont Park Lake, Gage Canal and a backyard pond). Using the Innovating Science Qualitative Coliform Test Kit to test for the presence of E.coli the three water sources tested positive for coliform. After boiling the three water samples for 30 minutes at 212 degrees Fahrenheit the water when retested proved safe for consumption.</p> <p>Results The results of this project were that it is possible and probable to survive in Riverside, California with basic survival knowledge using only natural and wild resources. If you eat the right bugs and plants, sterilize your water and start a fire you can survive and meet the daily daily needs required for survival.</p> <p>Conclusions/Discussion Yes, my results did support my hypothesis that it is possible to survive in Riverside, California, with only basic survival knowledge. This project provides knowledge of survival and living off of the land in an urban area. It furthers knowledge of sustainable farming too since many bugs can use less water and less food to grow as much meat as cattle or poultry.</p>	
Summary Statement My project is about if it possible and probable to survive using basic survival knowledge and natural/wild resources.	
Help Received My Aunt and I both have interest in survival, farming and living off the land, we developed the idea together and I brought the idea to life and completed the research. My family assisted with the purchase of necessary items and making certain that I was able to meet the requirements for the project.	



CALIFORNIA STATE SCIENCE FAIR 2016 PROJECT SUMMARY

Name(s) Gerardo Rochin	Project Number J1124
Project Title The Effect of Runoff Substances on the Fertilization of Sea Urchins	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals This experiment was conducted to test whether different quantities of fertilizer dose have an affect on fertilization percentages on the reproduction of Sea Urchins. My goal was to successfully have understanding between previous information learned as compared to the outcomes of the experiment. It can be a reference towards the fact that many humans use fertilizer as a benefit for them specifically for their crops, but don't realize the impact it can have on the marine ecosystem, which is the message I want to send.</p> <p>Methods/Materials I first was provided with the organisms used in this experiment by the facility of CMA. Once collected, the Sea Urchins were injected by a Potassium Chloride solution, that was created by me, although the actual process in injecting the Sea Urchins was done by an adult. I then created 3 different fertilizer concentrations, which was a combination of a certain quantity of fertilizer dose and clean water. Once the previous procedures were completed, I combined the egg cells and the chosen concentration on the microscope slide, while using different pipets. I then combined the sperm cells into the mixture with a toothpick. After a minute, I measured the number of fertilized eggs as compared to the total amount of eggs that appeared.</p> <p>Results The results of this experiment show that the controlled concentration had an average of 92% of all eggs with normal AQ2 water got fertilized. The 10% fertilizer concentration had an average of 95% of all eggs with 10% fertilizer dose got fertilized. The 25% fertilizer concentration had an average of 88% of all eggs with 25% fertilizer dose got fertilized. The 50% fertilizer concentration had an average of 85% of all eggs with 50% fertilizer dose got fertilized. These results indicate to my objective because they both relate towards the fact in how the greater quantities of fertilizer dose had a greater affect.</p> <p>Conclusions/Discussion This project can expand our knowledge about the subject of fertilization because humans today can analyze these aspects in a different way. The act of using substances as a benefit for different tasks whether it's at home or at work can now be realized that it's having a negative affect on the marine ecosystem. Higher quantities of fertilizer being exposed to the ocean can lower the number of fertilized eggs, which over time can decrease the Sea Urchin population which can also affect their predators.</p>	
Summary Statement After distributing multiple trials, I observed that higher quantities of fertilizer dose for example in this case the 50% fertilizer have a significant difference as compared to low quantities in comparison of number of fertilized eggs.	
Help Received I would like to acknowledge the staff of Cabrillo Marine Aquarium in assisting me throughout this project, from answering all my questions to injecting the Sea Urchins needed in this experiment.	



CALIFORNIA STATE SCIENCE FAIR 2016 PROJECT SUMMARY

Name(s) Phoenix Rumbaugh	Project Number J1125
Project Title Which Has More Plankton, the Santa Cruz Wharf or the Santa Cruz Harbor? How Much of that Plankton Is Toxic?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of this study is to count the number of plankton found in water samples from the Santa Cruz Harbor and the Santa Cruz Wharf. To determine which location has more plankton, and what percentage of the plankton samples contain toxic plankton.</p> <p>Methods/Materials I created a plankton collector from a soup can, & thick string, which was attached through to holes I made in the can. The string was about 40 feet long, long enough to throw the can into the harbor or lower to the water from the Wharf. Samples were transferred to jam jars, from the soup can, Using a permanent marker I wrote the sample date and location on each jar. After the contents settled overnight in a jar, a pipette was used to take 2 drops from a jam jar to put on a slide. On each slide the date and location was written. Using my microscope I counted plankton, and recorded data and drew pictures in my log book. I used reference books, and UCSC Professor Kudela's plankton ID online to identify the plankton. Then the slides were placed in my micro slide box.</p> <p>Results I found more plankton in the Santa Cruz Harbor than at the Santa Cruz Wharf. The percentage of toxic plankton was higher at the Santa Cruz Wharf. I counted: 1732 plankton from the Santa Cruz Wharf, of which 441 were Pseudo-Nietzsche, about 25 percent of the plankton counted at the wharf was Pseudo-Nietzsche. 2305 plankton from the Santa Cruz Harbor, of which 438 were Pseudo-Nietzsche, about 19 percent of the plankton counted at the Harbor, was Pseudo-Nietzsche.</p> <p>Conclusions/Discussion Although the Santa Cruz Wharf and the Santa Cruz Harbor are only a mile apart, the environments are very different. Both share water with the Monterey Bay, and the samples show they have a similar number of toxic plankton, Pseudo-Nietzsche which produces domoic acid. Twenty-five percent of the sampled plankton found at the Wharf, were Pseudo-Nietzsche.</p>	
Summary Statement By counting plankton samples I showed Santa Cruz Harbor has more plankton than Santa Cruz Wharf, and the main toxic plankton is Pseudo-Nietzsche.	
Help Received Clifton Herman, MS in Applied Marine Science, Emily Green BA in Anthropology, were consultants on collecting plankton, and identification, Anne Rumbaugh, helped with transportation, docent at Seymour Labs, in Santa Cruz, explained Domoic Acid, Online Plankton Identification site.	



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Haidyn N. Washburn	Project Number J1126
Project Title Salinity Stress on <i>Lycopersicon esculentum</i> Associated with Drought Affected Ground Water	
Abstract Objectives/Goals During times of drought the water table drops due to excessive groundwater pumping; this leads to an increase in water salinity. This study is to determine what level of salinity stresses a tomato plant and adversely affects its fruit production. Methods/Materials 4 groups of 10 tomato plants were used with group 1 being the Control. Groups 2, 3, & 4 were watered with a mixture of magnesium sulfate and water (g/L) Group 2 test solution .08g MgSo to 1L H ₂ O. Group 3 test solution .12g MgSo to 1L H ₂ O. Group 4 test solution .25 MgSo to 1L H ₂ O. Leachate was collected and EC measured; plant growth and production were measured. Results Early testing determined a reasonable level of salt tolerance from all tomato plants. Over the duration of testing the EC in the leachate increased with the increase in salt solution per test group. Along with these findings I found that fruit production decreased and plants in Group 4 showed signs of severe distress. Dry biomass decreased in each group as the salt solution was increased. Conclusions/Discussion I determined that plant sensitivity to high levels of salinity during growth negatively affect plant life due to abiotic stress. This means that irrigation water quality can have a profound impact on agricultural production.	
Summary Statement I determined which salintiy levels caused abiotic stress in tomato plants thereby adversely affecting fruit production.	
Help Received Dr. Leonard Fong from OLAM provided me with the data regarding salinity levels of several local agricultural wells.	