

ESF
in the
High School

Environmental Summit

June 3, 2015

Hosted by

ESF Outreach



A BETTER WORLD THROUGH
ENVIRONMENTAL DISCOVERY

What is *ESF in the High School*?

ESF in the High School is a partnership program between SUNY ESF and High Schools throughout New York State that enables qualified students to:

- Experience college-level course work while still in high school.
- Understand the complex scientific and social perspectives behind the environmental issues that make headlines every day such as the relationship between energy and the environment.
- Learn about and explore diverse interests and career opportunities in environmental science, engineering, management, policy and design - and in related areas such as law, communications, technology and medicine.



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WELCOME AND INTRODUCTION

The Environmental Summit is the culmination of a year's worth of scientific inquiry, skill development, and hard work. Today you will engage in an age-old tradition within the scientific community as you present your work and discuss your results with others who share your passion and interest in your subject. We hope this experience will inspire you to embrace the importance of scientific research and its influence on your day to day experiences and choices. We also hope that you've become active citizen scientists who are concerned with the science behind the headlines as a result of your involvement in an *ESF in the High School* course.

Dr. Richard “Rick” Beal, Assistant Dean for K-12 STEM Education
and Director of ESF in the High School

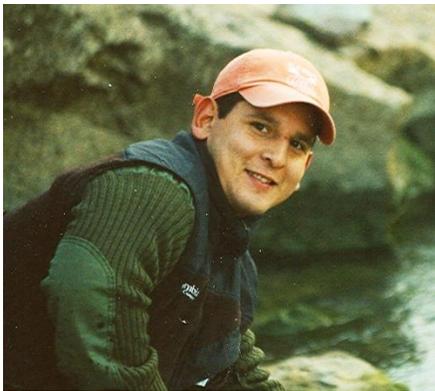
Brandon Murphy, Project Coordinator

Maura Harling Stefl, Administrative Assistant

Schedule for the Environmental Summit

8:00 – 9:00 AM	Registration/Check-in Baker Laboratory Lobby and poster setup in Gateway Center.
9:00 – 11:45 AM	Student Presentations in Baker Laboratory Presentation Rooms.
11:45 – 11:55 AM	Transition to Gateway Center for Keynote Speaker.
11:55 – 12:15 AM	Keynote Address – Gateway Center.
12:15 – 1:15 PM	Lunch and Poster Sessions (Mixer Style) – Gateway Center and Judging of Posters.
1:15 – 1:30 PM	Awards Presentation.

Keynote Speaker: Neil Patterson, Jr
SUNY College of Environmental Science and Forestry



Neil Patterson Jr., Tuscarora, is a member of the Haudenosaunee Environmental Task Force and the Assistant Director of the Center for Native Peoples and the Environment at SUNY-ESF. He has extensive experience developing environmental protection and restoration efforts in Haudenosaunee communities as founding director of the Tuscarora Environment Program. Neil leads several Haudenosaunee environmental education and biocultural restoration efforts, including revitalization of indigenous food and agricultural systems, conducting eco-cultural youth camps, and promoting customary use protection in upstate New York. Neil went to Niagara-Wheatfield High School in NY, has a BS in Environmental and Forest Biology from SUNY ESF, previously was a GK-12 Fellow at ESF and is in the process of completing his Master's degree at ESF. Many of you may have seen some of Neil's community work as he was the force behind the long house that sits on the NYS Fairgrounds which is based on an archeological excavation of a 17th long house.

Environmental Summit Presentations

Baker 145				
Time	Topic Category	Student Name(s)	Project Title	School
9:15	Alternative Energy	J. Mompeller & P. Jefferson	WIND ENERGY V.S SOLAR ENERGY	<i>Syracuse Academy of Science Charter School</i>
9:30	Alternative Energy	Samuelson, R.	PERFORMANCE OF BATTERIES OVER TIME	<i>Faith Heritage @ Corcoran</i>
9:45	Biodiversity and Natural History	Clemente,N., B. Damiano, B. Dillon, Y. Garkot, A. Haynes and E. McLatchie	SUSTAINABLE NATIVE GARDEN AND SHRUB WILLOW PROJECT AT SOLVAY HIGH SCHOOL 2015	<i>Solvay</i>
10:00	Biodiversity and Natural History	Grimes, B., C. Cowan, and S. Gass	ATTRACTION OF POECILIA SPHENOPS (BLACK MOLLY) AND POECILIA LATIPINNA (CREAMSICLE MOLLY) TO VARIOUS COLORS	<i>Central Square</i>
10:15	Biodiversity and Natural History	Morley,M and M. Krahl	THE REINTRODUCTION OF CANIS LUPUS (GRAY WOLF) INTO ROCKY MOUNTAIN NATIONAL PARK	<i>Central Square</i>
10:30	Biodiversity and Natural History	Reed, P.	AN OBSERVATIONAL STUDY OF EASTERN COYOTE, WHITE-TAILED DEER AND WILD TURKEY IN FABIUS, NY.	<i>Fabius-Pompey</i>
10:45	Ecological Economics	Boest, F.	ENVIRONMENTAL IMPACT OF CHINA'S NON-REGULATED INDUSTRIES	<i>South Kortright</i>
11:00	Ecological Economics	Driscoll, M.	POTENTIAL ENVIRONMENTAL IMPACT AND CONSUMER CHOICE	<i>Corcoran</i>
11:15	Biodiversity and Natural History	Young, A.	THE OUTBREAK OF THE EMERALD ASH BORER	<i>Weedsport</i>
11:30				

Baker 146

Time	Topic Category	Student Name(s)	Project Title	School
9:15	Ecological Footprints and Energy Audits	Claffey, S. , J. LeBlanc, K. Loughlin, and M. Skinner	HUMAN RESIDENCE EFFECT ON PINE TREE SPECIES AND THEIR HEALTH	<i>Lafayette</i>
9:30	Ecological Footprints and Energy Audits	Clarke, S. Cosentino, S. Stowe, A. and Ward, Z.	HOW DEEP IS MR. BORONCZYK'S CARBON FOOTPRINT	<i>Institute of Technology</i>
9:45	Ecological Footprints and Energy Audits	Davis, S., J. Dougherty, and D. Radin	AN ECOLOGICAL FOOTPRINT ANALYSIS OF WESTHILL HIGH SCHOOL STUDENTS	<i>Westhill</i>
10:00	Ecological Footprints and Energy Audits	Deschamps, C. and T. Lane	DOES GENDER TRULY AFFECT WHAT A PERSON FEELS TOWARDS THE ENVIRONMENT?	<i>Liverpool</i>
10:15	Ecological Footprints and Energy Audits	Drogo, N., E. Hurtic and E. Tihic	ENVIRONMENTAL IMPACT OF ALTERNATIVE FUEL SOURCES	<i>East Syracuse-Minoa</i>
10:30	Ecological Footprints and Energy Audits	Eassa, B. and K. Lippert	EXAMINATION OF STAFF INCENTIVES TO REDUCE PLASTIC WASTE	<i>Westhill</i>
10:45	Ecological Footprints and Energy Audits	Murphy, M.	IMPACT OF ENVIRONMENTAL SCIENCE EDUCATION ON PERCEPTION OF ECOLOGICAL FOOTPRINTS	<i>Liverpool</i>
11:00	Ecological Footprints and Energy Audits	Zych, A., Kimbrell, A, Bolio, Z, Murrell, M, Perry, Z, Narin, A, and Trepasso, G.	WHAT IF EVERYBODY GRB'D	<i>Fulton: G. Ray Bodley High School</i>
11:15				
11:30				

Baker 148

Time	Topic Category	Student Name(s)	Project Title	School
9:15	Pollution and Remediation	Clark, M., M. Geiler, and N. Onoff	EFFECTIVENESS OF VEGETATIVE SWALES IN REDUCING RUNOFF	<i>Westhill</i>
9:30	Pollution and Remediation	Delaney, D., and K. Reese	FILTERING ACID RAIN THROUGH SOIL	<i>Syracuse Academy of Science Charter School</i>
9:45	Pollution and Remediation	Gaido, L	TRICLOSAN BASED SOAP HAS NEGLIGIBLE EFFECTS ON BACTERIA COMPARED TO NON TRICLOSAN SOAP	<i>Fulton: G. Ray Bodley High School</i>
10:00	Pollution and Remediation	Harvey, E. and N. Reitz	NATURAL WATER FILTRATION USING LOCAL MATERIA	<i>Fulton: G. Ray Bodley High School</i>
10:15	Pollution and Remediation	Hughes, M. and K. Tiller	EFFECTS OF ROAD SALT ON SUGAR MAPLES IN CNY	<i>Lafayette</i>
10:30	Pollution and Remediation	Korba, C.	THE AFFECTS OF PLASTIC CONSUMPTION ON THE ENVIROMENT	<i>South Kortright</i>
10:45	Pollution and Remediation	Morffi, E. and L. Martinez	ANALYZING CLEAN UP EFFORTS IN ONONDAGA LAKE	<i>Syracuse Academy of Science Charter School</i>
11:00	Pollution and Remediation	Ngo, T. and T. Stone	WILL PAYING MORE FOR PREMIUM GAS HELP SAVE THE PLANET?	<i>Institute of Technology</i>
11:15	Pollution and Remediation	Phillips, N., D. Boyd, C. Jones, and Z. Smith	MERCURY LEVELS IN WATER IN COMPARISON TO METHYLMERCURY IN FISH	<i>Central Square</i>
11:30				

Environmental Summit Presentations

Baker 141				
Time	Topic Category	Student Name(s)	Project Title	School
9:15	Sustainable Food Production	Cardarelli, S., A. O'Reilly, C. Clappin ,and K.Morris	EFFECTS OF VARIOUS SUBSTRATES ON PLANT GROWTH IN AN AQUAPONICS SYSTEM	<i>East Syracuse-Minoa</i>
9:30	Sustainable Food Production	Owens, J, K. Willey, K. Moreno and B. Breen	USING BIOTHERMAL PROCESSES TO EXTEND THE GROWING SEASON	<i>East Syracuse-Minoa</i>
9:45	Sustainable Food Production	Parise,H., E. McNierny, C. Moore, and J.Wu	SMALL SCALE AQUAPONICS	<i>Vestal</i>
10:00	Sustainable Food Production	Santore, R., J. Mungo, Z. Blok, M. Hakic, M. Hunter, I. Lopez, and N.Castrello	LOW IMPACT GREENHOUSE FARMING IN CENTRAL NEW YORK	<i>East Syracuse-Minoa</i>
10:15	Sustainable Food Production	Wright, M	FOOD PRODUCTION AND WASTE IN THE USA	<i>South Kortright</i>
10:30	Ecology and Climate Change	Breckinridge, A.	PRATTSVILLE, A LOCAL EXAMPLE OF EXTREME WEATHER CAUSED BY CLIMATE CHANGE. HAVE THE NUMBER OF NATURAL DISASTERS AND SEVERE WEATHER PATTERNS INCREASED DUT TO CLIMATE CHANGE?	<i>South Kortright</i>
10:45	Ecology and Climate Change	June, N.	THE OCCURRENCE OF TORNADOES IN NEW YORK STATE	<i>Fabius-Pompey</i>
11:00	Ecology and Climate Change	Santelli, P., N. Sarkisian, B. Schriver, and S. Rachmaninoff	ROOFTOP GARDEN	<i>Vestal</i>
11:15				
11:30				

PLATFORM PRESENTATIONS

Alternative Energy

MOMPELLER J. and P. JEFFERSON - *Syracuse Academy of Science Charter School* **WIND ENERGY V.S SOLAR ENERGY** Solar energy is abundant, non-polluting and does not emit greenhouse gases responsible for global warming. Even in the northeastern United States, where sunlight is variable, solar energy helps to warm and light many buildings and can make a significant contribution to meeting demand for electricity and hot water.

Solar technologies can be applied at both large and small scales. Large commercial scale solar power plants feed electricity directly to the utility electric grid. Smaller distributed solar electricity generation by individual homes, institutions or businesses is economically feasible because New York has adopted "net metering," which allows excess electricity generated on sunny days to flow back into the electric grid, with credit or payment from the utility company for the power generated. We think that wind energy is more efficient in Upstate NY because Upstate NY receives more wind than sunlight. In the winter Upstate NY doesn't get a lot of sun like southern states because of Daylight Saving. But if we were to live down south Solar Energy would be a great resource to use because of all the sunlight they receive down south it would be great way to use less energy and help save our planet.

SAMUELSON, R. – *Faith Heritage @ Corcoran* **PERFORMANCE OF BATTERIES OVER TIME** I studied the overall performance of Duracell, Energizer, Sunbeam and Panasonic batteries, when used in flashlights over a 24 hour period of time. The Duracells retained their maximum capacity the longest and the energy within them drained slower than any of the other battery types. The sunbeam lasted the second longest at its maximum energy but drained faster than the Panasonic which began to lose power before it. The energizers were the first battery to drop below their maximum capacity and drained to empty faster than the other battery types.

Biodiversity and Natural History

CLEMENTE, N., B. DAMIANO, B. DILLON, Y. GARKOT, A. HAYNES, and E. McLATCHIE – *Solvay* **SUSTAINABLE NATIVE GARDEN AND SHRUB WILLOW PROJECT AT SOLVAY HIGH SCHOOL 2015** After reviewing articles about other schools with sustainable landscapes, our class wondered if the addition of a native plant garden would produce positive results within the school community. Our hypothesis is "the planting of a garden will environmentally, economically, and socially improve the wellbeing of Solvay High School." The high school will benefit socially because the garden will provide a way for students to come together in a productive manner as classes utilize the school garden and will bring aesthetic beauty to the school grounds. The school will benefit economically because the garden will increase adjacent land value and will also lower the cost of maintenance for that area which the school currently provides. The surrounding environment will benefit from the planting of native species by attracting native wildlife and insects, providing both food and habitat. A survey was constructed and given to both students and faculty to determine the social implications of having a sustainable garden close to school grounds. To determine the economic benefit of the garden, a comparison of the cost of maintenance for the garden area before and after planting will be reviewed. The environmental benefits of the garden will not be readily apparent since the garden is newly planted. However, an expected benefit is an increase in the presence of beneficial insects and birds utilizing the area.

GRIMES, B., C. COWAN, and S. GASS - *Central Square* **ATTRACTION OF POECILIA**

SPHENOPS (BLACK MOLLY) AND POECILIA LATIPINNA (CREAMSICLE MOLLY) TO VARIOUS COLORS Increases in trade and travel have begun to wreak havoc on nature. The influx of invasive species, specifically in aquatic environments, has destroyed the cycles of the food web and biogeochemical processes. One fish species that is a strong candidate for invasion is the molly because they're highly adaptable and therefore, are capable of overpowering native species when introduced to new habitats (Monks). Previous research has shown that many fish species tend to favor some colors over others (Ross). Our purpose is to obtain scientific data that supports that fish are more attracted to certain colors than others; then, using that information, lures could be made that have a greater likelihood of baiting a non-native species than an indigenous one. Consistent with research previously discovered, our hypothesis is that if a color similar to that of the molly being tested is present, then the molly will move towards it. The experiments we conducted supported our hypothesis. Thus, it proves that colored lures may be a viable resource to use to catch invasive, non-native species.

MORLEY, M. and M. KRAHL – *Central Square* **THE REINTRODUCTION OF CANIS LUPUS (GRAY WOLF) INTO ROCKY MOUNTAIN NATIONAL PARK** Rocky Mountain National Park (RMNP) has been suffering the effects of lacking a dominant predator. Large herd animals are overpopulating and overgrazing the land. RMNP's solution has been stepping in with rifles and alleviating the problem through culling. This is not a natural process. However, there is an alternate solution. If Gray wolves are reintroduced into Rocky Mountain National Park, the Elk population will decrease to a sustainable magnitude. Through gathering information from the reintroductions in Yellowstone National Park and North Carolina, we can deduce that the impact on RMNP will be positive. Through close monitoring of the wolves in other test areas, it is found that the biodiversity has increased and over abundant species have regained a maintainable size. Reintroducing Gray wolves into RMNP is a progressive, natural change. Our original hypothesis is backed by our results. The reintroduction will not only curb Elk numbers, but the rest of the parks wildlife will benefit.

REED, P. - *Fabius-Pompey* **AN OBSERVATIONAL STUDY OF EASTERN COYOTE, WHITE-TAILED DEER AND WILD TURKEY IN FABIUS, NY.** I conducted an observational study on the correlation of game trails traveled by the eastern coyote (*Canis latrans*), white-tailed deer (*Odocoileus virginianus*), and wild turkey (*Meleagris gallopavo*). This research was conducted on my property in Fabius, New York. I tracked the movement of wildlife in the woods using field cameras that could collect data as either a video or a photograph. Every one to two weeks I collected the SD cards from the cameras and downloaded the data I had collected so I could analyze it. I also examined a variety of research papers and abstracts about the behaviors of eastern coyotes, white-tailed deer and wild turkey. I expected to find a strong relationship between the movements of deer and coyotes because I thought the coyotes would be following the deer. However, I found no correlation between the sightings of coyotes and deer, though it should be noted that I did have a coyote sighting at the beginning of the study, but then the cameras were inoperable due to the excessively cold weather. I did get a lot of pictures and videos of deer and turkeys during the rest of the study. Since I am taking an independent study of an ESF course next year, I will continue this research and project through the summer and next year in school.

YOUNG, A. – *Weedsport* **THE OUTBREAK AND SPREAD OF EMERALD ASH BORER** This project involved primary, and secondary research on the Emerald Ash Borer. The primary research included field research in an area in Cayuga County in the Montezuma, Weedsport, Port Byron area. This research involved checking ash trees for signs of Emerald Ash Borers, and also for "barney boxes." The secondary research was done mostly online to gain information on the introduction, spread, population, and control of the spread of the Emerald Ash Borer. Maps and diagrams are also used to give visuals of the information given, and also for clarification. The United States Department of Agriculture and New York State Department for Environmental Conservation were two key sources of information in this project explaining the need to control the Emerald Ash Borer Population before it becomes out of hand, and uncontrollable. The spread will continue at the rate of a state a year if it is not controlled.

Ecological Economics

BOEST, F. - *South Kortright* **ENVIRONMENTAL IMPACT OF CHINA'S NON-REGULATED INDUSTRIES** This study was conducted to investigate the production, shipment, and trade between countries, specifically China and the United States. To get an idea of why people support international trade that is environmentally degrading and unsustainable, I handed out surveys to a range of people and discovered a small insight. A mixture between the fact that there are no other ways to buy the goods we need in order to live, and thus must support outsourcing, along with not being exactly aware of where our goods come from are two trends I noticed in my surveys. Also, I found that people seemed to be more concerned with how sustainable the United States' practices are compared to China's, likely because of the fact they are unaware that harmful emissions can still affect them even from across the world. By also conducting research and observing past studies, I discovered the impact of emissions. These harmful effects include health problems for both people living in the nation and overseas, along with difficulties for a thriving environment, and eventually global warming. In order to reduce the environmental, and of course future economic impact of harmful emissions, regulations and more sustainable industrial practices need to be in place. It is important that more sustainable practices, such as alternative energy, take place not only for a nation's economy but the health and environment that is significantly involved.

DRISCOLL, M. – *Corcoran* **POTENTIAL ENVIRONMENTAL IMPACT AND CONSUMER CHOICE** In today's modern society, there are many different "environmentally friendly" products, many of which are influenced by consumer preference. A survey was given to 100+ people to determine what their consumer preferences are regarding "eco-friendly" products. Although consumers usually prefer the cheapest product, they are willing to pay more for a product that is durable and eco-friendly. Consumers are willing to pay more in order to fulfill their social responsibilities and helping the environment. If more specific questions were asked about eco-friendly products, the results may have been different.

Ecological Footprints and Energy Audits

CLAFFEY, S. , J. LEBLANC, K. LOUGHLIN, and M. SKINNER – *Lafayette* **HUMAN RESIDENCE EFFECT ON PINE TREE SPECIES AND THEIR HEALTH** As human population grows, the environment must adapt to the changes we create. Through deforestation and planting different trees, we have manipulated our environment to conform to our needs and wants. We tested the hypothesis that species of trees in the woods would be more likely to survive rough conditions such as poor soil quality and extreme temperatures than trees growing near residential areas. We chose 5 trees of the same species in each area, the woods had a majority of Eastern Hemlock and the residential area had Black Spruce amongst several other tree types. We tested the soil quality and measured the circumference, comparing these to the averages for these tree species. Our results showed the woods tended to have a smaller circumference compared to the averages we found on a document labeled "Eastern Hemlock" by R. M. Godman and Kenneth Lancaster, the woods also showed less variety of species than the residential area we found.

CLARKE, S. COSENTINO, S. STOWE, A. and WARD, Z. - *Institute of Technology* **HOW DEEP IS MR. BORONCZYK'S CARBON FOOTPRINT** Science classrooms have many forms of technology that can impact the carbon footprint of the room and school. The goal is to discover how much energy is used over a year in the science classroom of our teacher, Mr. Boronczyk. By identifying hotspots in the room, phantom load and the amount of energy used, we can calculate the carbon footprint of the room and create a way to improve it. With these results, we can recommend energy savings and reduce the carbon footprint of the room. By using a volt meter to test various appliances in the room such as the Smart Board, the laptop, oven, fridge and microwave for a week we can find the KW/h. We found that the Smart Board and laptop had a small phantom load and are often if not always plugged in. This can contribute to the amount of energy used in large

amounts over time. The oven, fridge and microwave were large hotspots. By unplugging the large hotspots over the weekend, we can reduce the energy used drastically. The fridge, however, cannot be unplugged. Instead we will increase its temperature. For the lights, we can turn them off when the class is not in use, use minimal lighting, and not use them when outside light allows. In conclusion, by unplugging hotspot appliances over the weekend and turning the lights off when not needed, we can save energy, money, and reduce our carbon footprint by a large amount.

DAVIS, S., J. DOUGHERTY, and D. RADIN – *Westhill* **AN ECOLOGICAL FOOTPRINT ANALYSIS OF WESTHILL HIGH SCHOOL STUDENTS** The conducted study examined the ecological footprint of students at Westhill High School. Ecological footprints are a useful environmental analysis tool because they depict the impact of humans on the Earth's resources in addition to the human-caused strain on the limited resources. Previous research performed by the Global Footprint Network concluded that the average ecological footprint of a United States citizen is approximately 5 Earths. The purpose of this study was to calculate the average ecological footprint of a student at Westhill High School and to analyze if any changes in students' habits could be made to help reduce their footprints. The premise of the research was that as students increased in age their ecological footprint would decrease. The ecological footprints of the students were calculated through surveys based off an online calculator. These surveys were distributed to students at Westhill High School. Interestingly, the results of the experiment were the opposite of the hypothesis and as the students' ages increased so did their ecological footprint. Together these results indicate that the average impact of the typical student at Westhill High School is 0.5 Earths higher than that of the average person in the United States. The results indicated that students' habits at Westhill High School are not currently sustainable; however changes in their everyday habits will help reduce the use of resources and decrease their ecological footprints.

DESCHAMPS, C. and T. LANE – *Liverpool* **DOES GENDER TRULY AFFECT WHAT A PERSON FEELS TOWARDS THE ENVIRONMENT?** With the environment deteriorating fast, action needs to be taken. This research explores whether gender plays a difference in one's awareness and willingness to help aid the environment. Previous research has shown that women tend to be more environmentally friendly (Tindall, 2003) and better leaders in aiding their environments by organizing, leading, and participating in environmental projects (Zelezney, 2000). The purpose of this study was to find out if these results remain true in the modern generation (21st century teenagers). We hypothesize that women will still be more aware and willing to help. Students were surveyed in a suburban high school to assess their opinions and habits. Our results indicate that women still can be more dependable when it comes to environmental projects and education, supporting our hypothesis. It becomes necessary, then, that we find a way to educate more men about the problems and issues our environment currently faces in order to fix these issues before the problem escalates to the point it becomes extremely difficult to fix. Men are less likely to help and require more incentive and motivation than do women when it comes to helping the environment. What was strange about the results was that while men were less likely to help they had similar amounts of knowledge and awareness that women had.

DROGO, N., E. HURTIC and E. TIHIC - *East Syracuse-Minoa* **ENVIRONMENTAL IMPACT OF ALTERNATIVE FUEL SOURCES** One of the biggest sources of environmental damage is emissions produced by cars. This project's primary focus was to explore the possibility of operating vehicles originally designed to run off gasoline to be also compatible with an alternative fuel source(s) in an attempt to reduce each vehicles Carbon Footprint. We found that alternative fuels such as compressed natural gas (CNG), and other unconventional fuel sources emit a reduced amount of pollutants and greenhouse gases, such as carbon dioxide, carbon monoxide, and harmful hydrocarbons. Testing purposes focused primarily on propane, CNG, and diesels as they were all accessible and prevalent. In order to determine the fuel sources which produced the least harmful emissions, the research used a 2001 Chevrolet Trailblazer, fitted with a diaphragm and regulator to control and change the fuel into an operable state. Finally, we used an OTC Microgas analyzer to obtain readings of each fuel sources emittance of: O₂, CO, CO₂, and hydrocarbons, all

of which can cause significant harm to the environment. This research demonstrates that vehicles can be adapted to cause less harm to the environment.

EASSA, B. and K. LIPPERT – *Westhill* **EXAMINATION OF STAFF INCENTIVES TO REDUCE PLASTIC WASTE** This project was intended to examine the amount of plastic waste produced by staff members at Westhill High School and if those staff members were able to reduce the amount of plastic waste they produced through the regular utilization of a plastic reusable cup. Previous research on this topic has concluded that individuals believed that they were mindful about the amount of plastic waste they produced and how they disposed of it. However, they were actually not as environmentally friendly as they believed. The purpose of this study was to encourage staff member awareness of their recycling habits while trying to improve those habits. During the first ten day experiment, thirteen teachers and staff members were asked to collect all of their plastic waste to be counted. For the subsequent ten school days, they were encouraged to use a reusable bottle as much as possible in an effort to reduce the amount of plastic waste produced. When the pre-intervention data was compared to the post-interventional, only one participant did not decrease the amount of plastic bottles they produced. Together, these results lend support to the premise that if people are more aware of the impact they are causing to the Earth they will be more willing to change their habits. However a small percentage of people will still maintain old manners of recycling. In the experiment it was concluded that if people use reusable cups and bottles they are more likely to produce less plastic waste.

MURPHY, M. – *Liverpool* **IMPACT OF ENVIRONMENTAL SCIENCE EDUCATION ON PERCEPTION OF ECOLOGICAL FOOTPRINTS** Increasing environmental concerns and impacts, global climate change being one of the most important, have made environmental science education imperative to younger generations. Previous research has shown that the human population as a whole has been increasing the rate at which we use our resources, while the availability of these resources is declining (Hubbert, 1956). Ecological footprints, a widely used measure for resource use, is a comprehensive representation of the total use of energy and other resources. Students were asked questions about their lifestyle as well as an assumption of their ecological footprints. Then, the calculated results were compared to the ones the students estimated. Based on the ecological footprint survey designed by Mathis Wackernagel and the Global Footprint Network (2015), this study attempts to determine whether students are aware of the effect they have on the environment. The survey was also used to assess if students realized the negative impact they had on the environment. This was done in an effort to see if taking an environmental class had a significant impact on increasing awareness, thus reducing ecological footprints. Results indicate that the students who recognized that they were not as eco-friendly as they could be had similar lifestyles as those who did not recognize their effects. Together, these results indicate that we need more education for students at all grade levels about their effects on the environment and possible solutions to these issues.

ZYCH, A., A. KIMBRELL, Z. BOLIO, M. MURRELL, Z. PERRY, A. NARIN, G. TREPASSO- *Fulton: G. Ray Bodley High School* **WHAT IF EVERYBODY GRB'D** The objective of our project was to use a recycling program similar to our high school model at an elementary school as a way to increase environmental awareness. Elementary students were presented with an opportunity to be involved in their schools recycling program. Our volunteers were taught the process of recycling; sorting paper and cardboard and learning the difference between recyclable returnable plastics, and weighing materials to quantify their impact.

Ecology and Climate Change

BRECKINRIDGE, A. - *South Kortright* Prattsville, A Local Example of Extreme Weather Caused by Climate Change Have the number of natural disasters and severe weather patterns increased due to climate change?

Over the past 60 or more years natural disasters and extreme weather has increased. As a result of this, people are losing their homes, jobs, and lives. In 2011 Hurricane Irene struck in a town near me and due to the severe winds and floods that it brought, hurricane Irene destroyed the town. I first researched rain data from 1997 to 2014 specific to the town of Prattsville, NY to see how the amount has increased over the years. I then graphed this data to show the trend, and finally made a table showing the increased number of extreme weather patterns and natural disasters. I interviewed people on their take of how Hurricane Irene affected Prattsville and how they feel about the increased number of natural disasters and extreme weather patterns. I contacted a highway superintendent to answer some of my questions about the effects of floods, rain, and natural disasters on towns, roads and people, for data. The results came out to be that the number of natural disasters and extreme weather patterns in the past 60 years has increased greatly and will continue to rise. This is a very important subject to keep in mind because of how many people it affects, and one day it could affect you.

JUNE, N. - *Fabius-Pompey* THE OCCURRENCE OF TORNADOES IN NEW YORK STATE

Tornadoes form under specific atmospheric conditions. I mainly researched tornadoes in New York from 1950 to 2014. I examined the role of global warming in the occurrence of tornadoes, different atmospheric values to the frequency of tornadoes from year to year, and different tornadoes that have occurred in NY to each other. It is predicted that global warming will increase the occurrence of tornadoes. Tornadoes vary year to year based on the jet stream, and the Trans Nino Index, which is used to observe the development of El Nino or La Nina. Similar conditions exist in the development of tornadoes as seen when comparing the conditions that existed in particular tornadoes in NY.

I consulted with Dr. Scott Weaver, a research meteorologist at NOAA. I conducted a web query of all tornadoes that have occurred in NY, which I condensed into a Spreadsheet of tornadoes per year. I compared NY data to that of the nation by comparing graphs of the two sources. I correlated NY data and nationwide data to the Trans Nino Index, a value for the development of El Nino or La Nina. I focused on specific tornadoes that have occurred in NY, and compared the conditions that existed in the atmosphere on the days of the tornadoes occurred.

The results of this research show that the variability in the Trans Nino Index, as well as other factors such as the jet stream and instability in the atmosphere, contribute to the variability of tornadoes per year.

SANTELLI, P., N. SARKISIAN, B. SCHRIVER, and S. RACHMANINOFF. – *Vestal* ROOFTOP GARDEN

Rooftop gardens are increasing in popularity. They have been proven to lower the temperatures of roofs and buildings, while also insulating them during winters and decreasing the volumes of runoff. To test the efficiency of rooftops gardens and whether one would be beneficial on our roof at Vestal High School, we created three small gardens on the roof outside of our classroom window. We also set up water collection systems underneath the three gardens. A separate bin was used to only collect water. The volumes of the water in each of these collection systems were compared, proving that our gardens retained water and decreased runoff. In addition to the water collection bins, we placed three thermometers directly on the roof in various locations and one in each of the three garden bins to compare the rooftop temperatures to those of the gardens. After monitoring these daily, we concluded that the temperatures and runoff of the roof could easily be regulated by a rooftop garden. This experiment shows that a healthy rooftop garden over Vestal High School would be environmentally feasible.

Pollution and Remediation

CLARK, M., M. GEILER, and N. ONOFF – *Westhill* **EFFECTIVENESS OF VEGETATIVE SWALES IN REDUCING RUNOFF** The purpose of this study was to examine the effectiveness of vegetative swales in reducing stormwater runoff. Vegetative swales have the potential to prevent environmental issues associated with stormwater runoff including pollution, erosion, and flooding. Previous research has demonstrated that the use of vegetative swales slows the movement of precipitation, allowing water to penetrate into the ground, while also potentially filtering out harmful substances and controlling erosion. Apparatus were constructed out of two nesting plastic bins, with and without vegetation, with holes drilled in the bottom to allow water to filter through the soil. The water that collected in the bottom bin acted as simulated “runoff”. An unexpected outcome of this experiment was the finding that the soil-only apparatus retained more water throughout the trials than that of the grass bin, a conclusion which was in direct opposition to the original hypothesis. These results indicate that the construction of the apparatus were incorrect. The amount of water that did not fall through should have been measured instead of measuring the amount of water that fell through the bins. The results also indicated that vegetation provides quick passage for water into the soil while soil alone allows water to accumulate at the surface. The results did not support the hypothesis, however, the flaws in the initial data collection indicate that the results are not conclusive. Considering the amount of previous research supporting the initial hypothesis, this study could be cause for further discussion and research to address flaws in the study.

DELANEY, D. and KHAZIAH R. - *Syracuse Academy of Science Charter School* **FILTERING ACID RAIN THROUGH SOIL** Acid rain can be very harmful to the environment. It can kill fish by lowering the pH of lakes and rivers. It can harm trees and plants by burning their leaves and depriving them of nutrients. In addition, it can weather away stone buildings and monuments. But why is it more of a problem in some places than others? To answer this question, let's first look at how rain becomes acidic. Carbon dioxide, CO₂, is a gas found naturally in the air. When CO₂ dissolves into rain droplets, it produces a weak acid called carbonic acid, H₂CO₃. This makes rain slightly acidic naturally. Rain of pH 5 to 6 is common and does not generally cause any problems. When fossil fuels are burned, however, gases such as sulfur dioxide, SO₂, are released into the air. When sulfur dioxide dissolves into rain droplets, sulfuric acid, H₂SO₄, is formed. This rain can be as acidic as pH 4.

GAIDO, L. - *Fulton: G. Ray Bodley High School* **TRICLOSAN BASED SOAP HAS NEGLIGIBLE EFFECTS ON BACTERIA COMPARED TO NON TRICLOSAN SOAP** Our project showed that the amount of microbes killed by Triclosan based soap both on hands and residual soap in the drainage water is insignificant compared to Non Triclosan based soap. It would be beneficial for people to abandon Triclosan soap because it has detrimental effects.

HARVEY, E. and REITZ, N. - *Fulton: G. Ray Bodley High School* **NATURAL WATER FILTRATION USING LOCAL MATERIALS** Several combinations of what we assume easily found substrates from nature were used to try and find an economical method to filter water. Sand, pebbles, hay and charcoal as the materials we would use in the filters. Several water sources (local lakes and rivers) were used. At the time of submission, we have not reached conclusions on if the water filter is going to work, however hay has been eliminated because we found that it was turning the water greenish. Also, improvements in separating substrates into their own bottles has provided improvement.

HUGHES, M. and K. TILLER – *Lafayette* **EFFECTS OF ROAD SALT ON SUGAR MAPLES IN CNY** De-icing and anti-icing of roads in Central New York is a rising problem for roadside biota, influencing growth and health conditions of these vulnerable plant species with road salt

contamination. Since Sugar Maples are important as a nationally used product, this study makes knowledge of road salt effects valuable information to syrup producers, as well as the public consumers. Our study of local Sugar Maples attempts to give a more accurate insight to local conditions. Previous research showed that otherwise healthy Sugar Maple trees close to roads were diseased due to salt exposure. The purpose of this study is to determine if there are differences in visible health of Sugar Maple trees in iced locations and non-iced locations. We suspect that iced locations will result in Sugar Maples with observable diseases or deteriorated health conditions. We studied two separate locations of trees, ten close to the road and seven in nature, for diseases and salt effect. Sugar Maples having contact to iced roads showed dramatic differences in visible observations, consisting of white spots on the base of the tree, which were not present on trees that were studied in locations not exposed to road salt contaminants; older ages (salt-exposed) seemed to have more significant white spots than those appearing to be younger. Together, these results indicate that Sugar Maple trees in salt contaminated locations may be receiving detrimental effects due to finding white spots on trunks of salt-exposed trees, and a lack of these spots on salt-free trees.

KORBA, C.- *South Kortright* THE AFFECTS OF PLASTIC CONSUMPTION ON THE ENVIROMENT If people had a better understanding how they are personally affecting the environment by their consumption of plastic than most people will chose to be more careful. My surveys have found that the biggest reason people use plastic is for convenience and a lack of knowledge of the effect. Most people that took my survey said that they own reusable shopping bags but often forget them and as a result end up using plastic. Most people only use them for grocery shopping and end up using plastic for small trips into clothing stores, hardware stores and more. I noticed that when people were talking my survey they would check a number of how many plastic bottles they purchased with fluid that isn't water and then they would flip the page and read the choice of cleaning supplies and hygiene products and go back and change their answer. Many people seem to be aware of the effects of plastic water bottles but often forget about the other plastic bottles that they buy. Plastic is often used because it is cheap and convenient. My surveys found that the number one reason that people buy plastic water bottles is for convenience. What needs to be changed is either the material that the bottles are made of, or a way to make reusable bottles and grocery shopping bags convenient. I gave out with my survey a fact sheet that just had some statics about the effects of plastic pollution. Most people said that they weren't too concerned about plastic pollution but after reading the fact sheet they learned that plastic pollution is deadly and dangerous to wildlife and us. Maybe if people were more aware of the dangers, they would be more careful with their plastic consumption.

MORFFI, E. and L. MARTINEZ - *Syracuse Academy of Science Charter School* ANALYZING CLEAN UP EFFORTS IN ONONDAGA LAKE Back in the day Onondaga Lake was known as a salt industry supporter and a large tourist area. Industrial growth in the areas surrounding Onondaga Lake has resulted in extensive biological, chemical, and physical degradation of its waters. In addition to mercury contamination in the lake, analyses of sediment samples detected barium, cadmium, chromium, cobalt, lead, benzene, chlorobenzene, total xylenes, various polycyclic aromatic hydrocarbons and pesticides. They dumped around 20 lbs. of mercury each day. 1940-swimming was banned; 1972-fishing was banned; 1994-Onondaga Lake was added to the National Priorities List (NLP) Population due to high concentrations of mercury. Onondaga Lake has improved over time, but is difficult for fish and plants to survive due to its pollution. Our goal is to find out the current pH, Oxygen and conductivity level of the lake and try to understand if pollution is why the fish have a hard time surviving. We hypothesis the following; pH will be close to more neutral value, There might be increase in dissolved oxygen. Less conductivity compare the 20 years ago due to less heavy metals and salt content

NGO, T. and T. STONE - *Institute of Technology* WILL PAYING MORE FOR PREMIUM GAS HELP SAVE THE PLANET? The purpose of this project is to determine if better grades of octane can help reduce air pollution that is caused by transportation. Air quality is negatively impacted by the emissions produced by automobiles. Poor air quality, in turn, negatively affects living organisms such as causing respiratory illnesses in humans. If an automobile uses a gasoline with a higher

octane rating, then there will be lower harmful emissions. Using a gas analyzer connected to a car's exhaust system, we collected data for the emissions produced by gasoline of eighty-seven percent octane and gasoline of ninety-three percent octane. Our data indicated that there is little to no difference between the emissions produced by the two grades of octane. Therefore, spending extra money for premium gas will not positively affect the air quality.

PHILLIPS, N., D. BOYD, C. JONES, and Z. SMITH – *Central Square* **MERCURY LEVELS IN WATER IN COMPARISON TO METHYLMERCURY IN FISH** Although recent regulations on industry have decreased mercury emissions into the atmosphere, methylmercury accumulations in bodies of water still remains a significant problem. As methylmercury is transferred from the water into smaller fish, and then to predatory fish, the relationship between mercury levels in the water and mercury levels in the fish is important. For each lake, yellow perch, bluegill, and pumpkinseed were caught, and then a small piece of the fillet was taken from just under the dorsal fin on every fish, dried in a dry freezer, ground into a powder, and then tested for mercury. Water samples were also collected from Otisco Lake, North Sandy Pond, and Oneida Lake using Teflon bottles and were then filtered and preserved with hydrochloric acid until testing. We then took all of these samples to Syracuse University and conducted different types of mercury analysis on them. These results show that all fish and water tested contained mercury in its different forms as well as how mercury content is distributed throughout this part of the food chain. They also proved our hypothesis correct in the fact that water acidity and mercury content are positively related to methylmercury levels in fish. These results help to show that acid rain caused by the burning of fossil fuels will affect the acidity of water therefore causing methylmercury levels in fish to rise. These results help to prove the point that we need to move away from the use of fossil fuels because in the long run they are poisoning the people who eat fish out of these lakes and many others with mercury.

Sustainable Food Production

CARDARELLI, S., A. OREILLY, C. CLAPPIN, and K. MORRIS - *East Syracuse-Minoa* **EFFECTS OF VARIOUS SUBSTRATES ON PLANT GROWTH IN AN AQUAPONICS SYSTEM** An aquaponics system involves the symbiotic relationship of fish, bacteria and plants in order to achieve self-sustainable plant growth without soil. In this experiment, substrates of water, sand, sand with limestone rock, ground coconut husk, and aquarium gravel were tested and the growth of Roma tomatoes, cucumbers, zinnias, and California poppies were observed to determine which substrate would support the highest growth rate. Growth was hypothesized to be the greatest in the coconut husk substrate. Water was tested weekly for temperature, pH, concentration of ammonia, concentration of nitrates, and occasionally for phosphorus concentration to ensure the chemical balance of the system. Plant growth was measured every week to determine which substrate supported the highest plant growth rate. The results indicated that growth was not supported in the substrates of sand and sand with limestone rock, and though growth of cucumbers was only supported in the aquarium gravel, growth of Roma tomatoes, zinnias, and California poppies were the greatest in the ground coconut husk substrate.

OWENS, J., K. WILLEY, K., MORENO and B. BREEN - *East Syracuse-Minoa* **USING BIOTHERMAL PROCESSES TO EXTEND THE GROWING SEASON** The focus point of this project is to create and maintain growth-sustaining temperatures and living conditions year round in an artificial structure. The efforts of previous groups have confirmed that creating and sustaining comfortable air temperature within the growing structure is possible, but has failed to actually encourage the development of flora. This project attempts to identify, assess and optimize the factors necessary for healthy plant growth and how they can be incorporated into the process of extending the growing season. Using the compost leaf pile at Cleanwater Educational Research Facility in Minoa NY, the site of the project, student researcher's pumped heat through Pyrex tubing into the soil of the brown house. Over the course of the experiment temperatures were recorded from the leaf pile, air, and soil to determine the suitability of the conditions to the growth of the

plants. At the start of the experiment, improvements were made to the lights, soil quality, and surface area of the tubing. Efforts to sustain growth year-round in the structure, have led to the discovery that with the pump and lights actively working, that plant growth and suitable soil temperatures can be sustained.

PARISE, H., E.MCNIERNY, C.MOORE, and J. WU – *Vestal* **SMALL SCALE AQUAPONICS** The purpose of this investigation is to analyze the effectiveness of a small-scale aquaponics system. The investigation was performed in our environmental classroom. Over the course of two months, starting on April 10th, we've measured the inputs and outputs of the system, water quality, and ultimately the efficiency of the system. After transplanting the plants in the gravel beds on the first day, the plant and fish growth were measured weekly. Plants were harvested for consumption and massed while a random sample of the 15 total fish was also measured weekly to determine productivity. Throughout this experiment, we were able to observe a healthy environment that produced ongoing growth throughout the system. Longer periods of growth and investigation are needed for a more accurate analysis of this system's efficiency. However, this experiment allowed us to explore potential benefits of an aquaponics system in order to predict the viability of a large-scale system.

SANTORE, R., J. MUNGO, Z. BLOK, M. HAKIC, M. HUNTER, I. LOPEZ, and N. CASTRELLO - *East Syracuse-Minoa* **LOW IMPACT GREENHOUSE FARMING IN CENTRAL NEW YORK** A greenhouse was built at the Cleanwater Educational Research Facility in Minoa, NY during the Winter of 2014-15 to be used as an experimental platform for different methods of heating. The primary source of heat is a "nest egg" buried underground that holds approximately 350 gallons of water which is circulated through the soil. The structure is also designed to accommodate a solar heat collector which will be added in the future. The greenhouse is designed to sustain plant growth through the colder months of the year using natural energy to allow for low impact greenhouse farming. Lettuce was grown during the spring of 2015 to test the internal light levels and make sure that no additional lighting will be required.

WRIGHT, M. - *South Kortright* **FOOD PRODUCTION AND WASTE IN THE USA** The basic knowledge of where our food comes from and where it goes when we throw it away seems to be a fleeting, unimportant thought for many. The way that food is produced in various different venues, including fast food companies, results in tons of waste. Fast food companies are producing and abusing food using multiple inhumane and also unsustainable methods. People are purchasing foods from all over the world, and not even caring where their food was imported from, and the affect it has on our planet. This dissertation examines these issues our society is currently facing and reflects upon them. A survey was conducted asking teachers and students in South Kortright Central School about their eating habits, knowledge of fast food companies production methods, and if they cared where their food was imported from or not.

POSTERS

Alternative Energy

LEWIS, J. – *Corcoran* **SEAWATER DESALINATION AND THE ECONOMIC FEASIBILITY FOR USE BY NATIONS OF DIFFERENT ECONOMIC STANDINGS** As the population of the world grows, many nations, especially generally arid and nations, will be more and more hard pressed to satisfy the fresh water needs of their growing populations. Some nations in these regions and in others can afford to use water desalination technologies. In the near future these water needs will increase and it may be difficult to satisfy these needs. In the further future, some nations may resort to open conflict to be able to supply its people with fresh water.

CAMPOLIETA, B AND CUMMINS, J - *Fulton: G. Ray Bodley High School* **MAXIMIZING HORIZONTAL WIND TURBINE ENERGY USING CONSUMER LEVEL DEVICES** Wind energy is becoming a prominent source of energy around the globe. Different gears and blade design can change the variation of electrical output. The best combination of these two variables will maximize efficiency and production. Findings will be scaled to commercial products.

Biodiversity and Natural History

ALLEY, S. - *Fabius-Pompey* **POPULATION GROWTH OF VERMICOMPOSTING WORMS BY MASS IN A CLOSED CONTAINER** One acre of land may contain over one million worms. In a closed environment, I measured population growth and density of three separate populations of about 1000 worms (about 454 grams). I monitored the three populations over an extended period of time while each was given a constant supply of compostable sources of nutrients, including bananas, apples, cantaloupe, spinach, and carrots. My goal was to measure the weight of the individual populations and compare the weight gained or lost from the original weight. The next goal of my study is to designate a specific diet for each population. I would like to use crops from the Southern Onondaga County are, like apples and corn, as a primary diet and after some time measure the change in nutrient levels to further see how local agricultural practices affect the soil.

BREED, C. - *Fabius-Pompey* **STARTING A WHITE-TAILED DEER FARM IN UPSTATE NEW YORK** In this study I modeled the conditions necessary to start deer farm in New York State. I am seeking to find of the necessities to grow a successful deer herd. The means of a successful deer herd would be measured by how healthy they are and the males are putting out more and more inches in antler growth compared to the previous years. In order to be able to reach that goal I will need to have the adequate food, water and shelter. Food is a key item in growing a healthy herd; you not only have to have an abundant amount of food but also a variety of food, such as corn, hay fields, bean, and clovers. A clean water source is also important because you don't want only swamps to supply you herd with water. Due to the fact that the water isn't the healthiest choice for deer like ponds or streams. As for shelter, thickets and undergrowth are what deer seek for cover in spring and early fall, during the winter month's deer seem to prefer hemlock forests for cover. Another big thing I need to look out for is diseases. Being able to prevent harsh and life-threatening diseases is very important in keeping a herd healthy; the most important thing in preventing disease is to not feed the deer in the same spot, like corn piles and bait sites.

MCCARTHY, H. - *Fabius-Pompey* **CREATING A NEW YORK STATE NATIVE TREE ARBORETUM ON PUBLIC SCHOOL GROUNDS IN CENTRAL NEW YORK** An arboretum is a collection of live trees, often giving information about each individual species in the collection. Fabius-Pompey is a rural high school with plenty of room for a small arboretum, thus, a New York state native tree arboretum would be a fine addition. During this project, it was essential to select the right type of tree for the climate and location of central New York. The state tree, the sugar maple, was the first species added. Since this is an ongoing project, there is still room for other trees to be added at later dates. Once this was decided, the location and soil needed to be

observed to see what the Trees would need. Then, supplies would need to be pulled together and the grounds keeper would need to be informed of the project. After everything was approved, the last thing that had to go through is the way the trees are purchased. The official Arbor Day site, arborday.org, would be able to provide us with 5 sugar maple saplings for \$60. In order to obtain this, I purchased the trees myself. Once the trees arrived, they needed to be planted and the area needed to be cleared. After all this work is finished, the Fabius-Pompey Arboretum will be up and running, ready for more additions.

ROMANO, K. – *Weedspout* **MASTODON MATRIX OFFERS A GLIMPSE INTO A LOST WORLD**
My project was based on a mix I received from Cornell University that was dug from the site of a mastodon finding. I sorted the mix to observe the contents and to make a connection between the materials I found in the mix such as seeds and rocks and the environment in New York State during the last Ice Age. This was interesting because when you sort through this mix you are sorting through the contents of the mastodon's stomach at the time of its death. It's almost as though it were frozen in time which allows us to make a connection between the contents and our environment today. I expected to find plant materials such as seeds and leaves that could at least somewhat show what the environment in this area was like at the time of the mastodon's death. To sort, I carefully broke apart the lumps of soil and went through it with tweezers pulling out anything like rocks and plant material which I then placed in separate bags. I found there were seeds and other plant material that the mastodon had ingested, as well as little rocks, shells, and even the animal's hair. My results were consistent with my initial hypothesis as the plants found were, although not the same, similar to those that you can find in New York today but judging by what we know of the climate in the area at the time were built to survive in colder temperatures. You could also tell by the thick, coarse texture of the hair that it was designed to help the mastodon survive in low temperatures. In conclusion, the findings give us a glimpse into the world in which this megafauna lived and the history of our area.

Ecological Economics

BARIS, G. – *Liverpool* **CONSUMER BEHAVIOR UPON PURCHASE OF ENVIRONMENTALLY FRIENDLY PRODUCTS WHEN INFLUENCED BY ECO-LITERACY AND MARKETING TECHNIQUES** This research was meant to determine the relationships between consumer behavior upon purchase of environmentally friendly products and the influence of eco-literacy and marketing techniques. Green et. al (2014), while investigating ecoliteracy in the consumer populous, found that the consumer populous knows little about the effects of their purchasing decisions. Their work was the inspiration for this study; the purpose of which was to identify the cause for consumer purchasing decisions in the market, and the reasoning behind an increased tendency to purchase standard products rather than eco-friendly products. This is hypothesized to be due to the perception that eco-friendly products are of lesser quality. In order to test this hypothesis, a series of surveys were conducted that encompassed environmental, hypothetical, and opinion-based questions which assessed the consumer's participation in environmental health through product purchasing decisions. Through the results of these surveys, it was learned that both cost and quality are the most influential of all factors. The results suggested implications that revolve around marketing costs of certain products and the importance of marketing techniques. These findings could be valuable to product designers or advertisers, especially those that are producing environmentally friendly products, as the influences determined in this experiment may help sell these products at a rate similar to standard products. Decisively, this experiment may provide useful information for future marketing decisions, and aid in pro-environmental tendencies to aid the ecosystem as a whole.

KOGUT, Z. - *Fabius-Pompey* **THE ENVIRONMENTAL ECONOMICS OF MAINTAINING A WOOD LOT AS AN ENERGY CROP** Burning wood has become an essential means of heating a household during the winters in Upstate New York. This burning of wood, compared to oil, natural gas, coal, or pellets, is high in a rural area compared to that of rural areas. By conducting surveys, I

was able to determine that wood is not only the most common heat used in rural areas but that it is often paired with other heat sources such as oil. Wood, unlike natural gas or coal, is taken from forests at a slower pace and is also taken in much smaller amounts. The EROI for firewood is much smaller than that of oil and of coal but in a rural area it is much easier to gain access to forests to obtain firewood. Many environmental issues arise from obtaining wood through logging; this is one of the many reasons that it is not so widely used. The methods of logging: clear-cutting, strip logging, and selective logging all have positives and negatives associated with them. It is proven that strip logging, the clear-cutting of a strip of forest, has the greatest economic benefit and the least negative impact on the environment. Due to logging, habitats can be destroyed, diseases within a forest can be spread, and animals can be forced to move from their original locations. The use of wood for a heating source is declining in usage as coal and oil provide more energy per unit volume compared to wood.

PUTNAM, D. - *Fabius-Pompey* **A COMPARISON BETWEEN ORGANIC AND NON-ORGANIC DAIRY FARMING IN NEW YORK STATE** My project is whether organic farming is better than non-organic farming. I had to take all of the prices of the necessities for these types of farming and compare them. So far what I have found is organic farming is more expensive than non-organic farming. Even though with the price difference being as high as it is non-organic farming you still get great EROI but at the same time you can sell organic crops for way more than non-organic crops. Also milk prices are higher for organic because organic farming is healthier for you because you don't have some of the pesticides like non-organic farming does and with non-organic farming you don't get more natural crops so it could ruin the land that you work on and the nutrients that you get.

Ecological Footprints and Energy Audits

COYNE, K. and LAUN, C. - *Fulton: G. Ray Bodley High School* **CO2 EMISSIONS FROM DRIVE THRU** There are 4 drive thrus in Fulton, NY that can be used to measure the amount of CO₂ that is emitted while a car idles waiting for their food. Data was collected between the times of 6-7, or 7-8 because these were busy times at the drive thrus. The times collected were then converted to the equivalent miles that had been "driven", these conversions were used to calculate how much gas a car used while waiting in the drive thru. From there, these numbers were used to measure CO₂ emissions across the United States. McDonald's gives off the most calculated CO₂ out of the 4 restaurants. Even though it doesn't seem that large when it is just Fulton, NY when it comes to the United States as a whole, drive thrus appear to have a huge effect on the environment.

DRAKE S., E. AUBIN, and C. PARSONS - *Fulton: G. Ray Bodley High School* **VALET PARKING VERSUS NORMAL PARKING** We were interested in what kind of parking was more detrimental for the environment. Using Destiny USA as a test site, 30 cars were followed around and timed they found a parking spot. Then valet parking was timed on how long the cars would sit and idle and how long it took for them to be parked. Gas mileage and times parking/idled were used to calculate how much CO₂ emissions were released from each car. We discovered that valet parking had significantly more CO₂ emissions than normal parking. Valet parking gave off five times more CO₂(g) emissions versus normal parking .

FIELD T., T. GUY, and F. WIGGIN - *Onondaga Central School* **ECOLOGICAL FOOTPRINT OF OWNING AN IPHONE** If you own an iPhone, you are currently carrying over 10 different elements and minerals that are classified as "Rare Earth Elements". The purpose of our project was to determine the ecological footprint of the rare earth elements these iPhones contain. We researched the specific elements that can be found in the average iPhone, of which there was approximately 125 million sold in 2012 according to Apple (Statista, 2015). We found that there is on average about 3 grams of rare earth elements in every iPhone, so with the amount of iPhones sold in 2012, there would be approximately 375 metric tons of rare earth elements. The majority of these rare earths come from mines in China (about 95-97%) (Ramirez, 2013). Large amounts of earth are

moved to get minuscule amounts of rare earth elements. Open pit mines used for mining these elements are proven to be damaging to the environment. Also, during the mining and refinement process, wastes such as dust metal, and radionuclides are released that contaminate large areas surrounding the mines and refinement factories. Despite these problems, there are solutions that are being implemented to try to reduce the ecological footprint of this process. Some plans include recycling of products containing rare earth elements and developing mining/refinement processes that will be less damaging to the environment. Overall, rare earths are a major problem with many additional underlying issues, however the rare earths industry is moving towards a successful balance of environmental problems and economic success.

GRAVES, L., S. McPEAK, and C. RATHBUN – *Westhill* **THE EFFECTS OF ENVIRONMENTAL EDUCATION AT VARIOUS GRADE LEVELS AT WESTHILL HIGH SCHOOL** This study tested the effect environmental education would have on students' attitudes toward the environment. Given that humans are depleting Earth's important resources rapidly, it should be a priority to educate younger individuals that poor environmental decisions can have lasting effects on the planet. Previous research indicated that most Americans lead unsustainable lives. Additional research suggested that environmental education implemented earlier had a greater, positive impact on student behavior. If more environmental education took place earlier in life, many Americans could be willing to change their unsustainable lifestyles. This experiment began by having a select group of students from each grade level complete pre-tests that described their environmental habits. Next, the same students listened to a 30-minute presentation that discussed current environmental issues. Afterward, post-tests were administered to the group that asked how likely they were to change their habits. The results from the post-test were then compared to the pre-tests. After completing the experiment, it is evident that there is a positive result from environmental education taught to high school students. Freshmen students were the more apt to change negative environmental habits and seniors were the least apt to change negative environmental habits. These results indicate that some high school students are willing to alter negative behavior and, like earlier studies suggested, the earlier environmental education is taught, the more likely students will incorporate environmentally-conscientious habits into their lifestyles. Therefore, it would be beneficial to provide environmental education early in a student's schooling career and to continue this education.

RAVESI, C. and WILDE, A - *Fulton: G. Ray Bodley High School* **REUSABLE CUPS AND THE ENVIRONMENT** Using existing industry and environmental data, calculations were made regarding disposable vs reusable cups and their effect on the environment. The owner of local Dunkin' Donuts was also consulted. We concluded that reusable cups will be better for the landfills and keep cups out of the landfills, but if, and only if, the reusable cups are used >200 times before being more advantageous than foam.

WEAVER, C. - *Fulton: G. Ray Bodley High School* **COMPARING THE RECIPROCAL VACATIONS BETWEEN THE UNITED STATES AND FRANCE** The purpose of my project is to compare the differences between a vacation in America and in France. To accomplish this, I determined both the carbon footprint of a two week trip to France and a two week trip in the United States.

Ecology and Climate Change

BARLEY, D. – *Liverpool* **PHYSIOLOGICAL OBSERVATION OF PEOPLE TOWARDS CLIMATE CHANGE; AND THEIR ECOLOGICAL FOOTPRINT OR CARBON FOOTPRINT** Previous research has shown that majority of people surveyed about climate change do not believe in the topic. The purpose of this study is to see the psychological reaction to Liverpool High School's disbelief in Climate Change. Thru the surveying of 200 people, 4 different grades from 9th to 12th.

As well as a social test of 40 students. The most intriguing result is that no matter if one believed in global warming or not, they always said yes to still having renewable resources for an energy source. This was obtained thru the question in the survey asked. My hypothesis was wrong, majority of students attending Liverpool High School actually believe climate change is a growing problem. Together these results indicate that the belief in Climate Change is more than 80% of the people willing to take the survey. Believing this is a problem, nervous, anxious about it, almost all believing in the theory of climate change. They indicate that students are educated or have the reason to accumulate the idea of climate change and know it's a current event. Majority of students in Liverpool High School thru psychological testing thru surveys believe climate change is a current world issue.

BOULOS, S. - *Faith Heritage @ Corcoran* **OCEAN ACIDIFICATION'S EFFECT ON CORAL BLEACHING IN THE CORAL TRIANGLE** Coral reefs have been under distress for many years which results in coral bleaching. This bleaching is partly caused by the rising acidity of the ocean. I collected a set of data with the coral bleaching levels from 2009 - 2010 and the pH levels from the same time in the Coral Triangle. I found that both pH and temperature affects coral bleaching. When temperature fluctuates my graph starts to get sporadic and not precisely match up with the pH. Without coral reefs we would suffer an economic and ecological depression.

CHAVIS, K.. and J. HARRISON - *Syracuse Academy of Science Charter School* **DIRTY ROTTEN FLESH** Decomposition process of flesh and what may interfere with it. Depending on the weather conditions. Varying between hot and cold climates.

DIAZ, L. – *Weedsport* **NEOTROPICAL BIRD AND MIGRATORY ROUTES** This project based on the migratory routes and the presence of neotropical birds in South America and North America have involved secondary research due to primary research could not be possible because of the winter season. However the information extracted from the Cornell Ornithology Lab and website has made this project possible and also this project includes a general information of the zones that the birds usually fly. The different types of habitats were research so we can make and approach of possible resting sites of this birds besides the special program that the US and many countries of South America, like Bolivia, Brazil and Peru are doing to help this birds and the habitats that they live in. Also this presentation will show the different Projects that are functioning now in order to preserve the habitats, develop more areas to live, prevent extinction of different types of birds and monitoring of population when they migrate.

HUNTER, C., J. LALLY, M. OUDERKIRK – *Weedsport* **BIG CATS OF NORTH AMERICA: WHERE WERE THEY, WHERE ARE THEY NOW?** Our hypothesis was that the population and habitat range for cougars, bobcats, and lynxes were all affected by human population and agriculture. We also looked at the differences between the cats and how their diets and lifestyles varied based on their climate and ability to find various resources. We were able to obtain our information and data from multiple secondary sources. In order to get accurate information we cross examined all the sources we used before extracting the data and embedding it into our project. In conclusion, we were able to determine that humans had a huge impact on all of these animals and their range of habitat. Humans could easily decline population, or rebuild it. The most important piece of information we found was that the way to keep these animals in the “least of concern” status is by using protective laws. These laws helped preserve their available land space and keep them safe from hunting and trapping.

RASHID, F. - *Syracuse Academy of Science Charter School* **GLOBAL WARMING CAN GIVE YOU A HEART ATTACK** Global warming is the continual rise of average temperatures on Earth. This has been a major issue in the scientific community since the 1970's. Ninety percent of global warming has happened in the Earth's oceans. The Earth's temperature has increased by 0.85°C, since the early 20th century. This rise has raised concerns about things, such as storms, rising sea

levels, and tropical climates. Heart rate is the number of times that your heart beats in a minute. Heart rate is affected by air temperature, body position, body size, and medication use. A normal, resting heart rate can be between sixty and one hundred beats per minute. People who are usually more athletic or physically active can have a normal, resting heart rate of lower than sixty. Your heart rate can usually be found in your wrists, the inside of your elbow, top of your foot, or the side of your neck. In my experiment, I want to see if your heart rate can be affected by your emotional state. To test this, I will have people watch an emotional stimulating video about global warming. During the video, I will measure a person's electrolytes and their heart rate. An electrocardiogram (EKG) is a graphical tracing of the electrical events that occur within the heart cycle. An EKG consists of three waves: P wave, QRS wave and T wave. The P wave is the depolarization of the atria. The QRS wave is the depolarization of the ventricles. The T wave is the repolarization of the ventricles which I will be using to collect data because it is the easiest to spot and record.

THORNTON, A –*Corcoran* **THE EFFECTS OF GLOBAL WARMING ON EL NINO** Global warming has affected many weather conditions. The question is: does global warming have an effect on El Nino? Global warming is the heating of the earth's atmosphere. El Nino is the warming of the Eastern Pacific which causes weather conditions which can be destructive. The research used in this essay is inconclusive that Global warming is causing more frequent El Ninos. There are still questions about the effect Global warming has on El Nino.

Pollution and Remediation

BROOKS, M. and M. WHITEMAN - *Fulton: G. Ray Bodley High School* **THE EFFECT OF ACID RAIN ON EISENIA FETIDA** Soil acidity levels for Eisenia fetida were tested. Worms were separated in a container of 4 different pH levels and placed 15 worms in each of the different pHs. We then let a week go by and counted how many worms were in each pH level. We found the most worms in the pH level of 7 which happens to be neutral. We came to the conclusion that worms favor a more neutral environment.

Chirco, M. and S. Nemeč – *Weedspport* **DIFFERENCE IN AIR QUALITY COMPARED IN RURAL AND URBAN ENVIRONMENTS** The hypothesis of our project was that air quality would generally be better in a rural setting compared to an urban setting. The basic design for our project was to gather data from the internet and find correlations between air quality in rural areas and air quality in urban areas. The method that was used in our research was to use charts, graphs, and maps, with raw data to back it up, to find out the different levels of air quality in New York and Pennsylvania. The key techniques used were finding data maps and charts that support air quality in rural and urban areas. The results that we found proved our hypothesis correct. The data showed a correlation between urban areas and poor air quality and rural area with great air quality. Our interpretation of the data we found was very conclusive where there was a direct relationship between the poor to great air quality. Four of the major six pollutants were taken into account when determining the correlation, Ozone (O₃), Particulate Matter (PM), Carbon Monoxide (CO), and Sulfur Dioxide (SO₂). The implications of our research suggest generally, air quality is better in rural areas compared to urban areas.

COLES, M. and A. KINAHAN-DUNDAS – *Liverpool* **EFFECTS OF SALT DEICERS VERSUS ALTERNATIVES ON DAPHNIA MAGNA** The effect of road deicers on aquatic organisms is important because many ecosystems are inundated with salt water runoff from roads treated with salt in winter months which causes harm to the organisms within the ecosystem. Previous research has shown that salt has an overall negative impact on organisms; this includes decreased biodiversity in the ecosystems. This experiment was done to study the effects of salt and sugar on aquatic organisms including Daphnia magna and snails. This topic was decided because of the general overuse of salt in New York State and the desire to study the effects as well as an alternate substance (sugar) to be used that would not have as great of an effect. The purpose of this study

was to see if using sugar as an alternative to salt would have less of an impact. Daphnia are known to be sensitive to environmental stress (Gannon) and are important as all zooplankton are the base of aquatic food chains. The sugar alternative hypothesis was then tested by submerging Daphnia and snails into different concentrations of salt and sugar water to measure the effects on the organisms. The implications of our results were that the salt water had a greater initial effect. Long term indicated that the effect on the organisms seemed about the same in the sugar and salt water. Therefore it's concluded that salt and sugar had a negative effect and both should be used sparingly in the winter.

DIEFENDORF, C., E. FITZGIBBONS, and O. MANCABELLI – *Westhill* **THE CONTAMINANTS OF ONONDAGA LAKE, THE HEALTH RISKS, AND EFFECTS CAUSED BY POLLUTION** This study focused on the major pollution-caused contamination of Onondaga Lake, as well as its effect on the health of the local community. The toxins found in the lake, which include mercury, benzene, and methyl-mercury, are known to have adverse health effects and are connected to diseases that affect people as well as the plant and animal populations. Previous researchers found high levels of heavy metals and chemicals in the sediments and the organisms living in the lake. The methods of study included collecting data from various sources associated with the cleanup such as Honeywell Inc. and the New York State Department of Health. In addition, the improvements to the overall well-being of the citizens and region were tracked through public assessments. The amount of chemical contaminants decreased by 95% as a result of the lake restoration performed by Honeywell Inc. In regards to the health risks, there have been major improvements in the number of citizens that have been diagnosed with conditions such as asthma, neurological damage, or immunodeficiency. There are still research and cleanup procedures being conducted to improve the overall state of the lake. The cleanup of Onondaga Lake has been effective in improving the health conditions of the citizens in the area and decreasing the numbers of environmental problems of the community and city of Syracuse.

DIMPERIO, J. - *Faith Heritage @ Corcoran* **A STUDY ON THE EFFECTS OF COMMON POLLUTANTS ON THE ACIDITY OF FRESHWATER** My experiment was to test the effects of different common pollutants on the acidity of drinking water. I used 5 different materials, (trash, oil, calcium pills, iron, and wood) and left them in water for 13 days, measuring the waters pH every fourth day. After 13 days of experimenting, all of the substances had caused the water to decrease in acidity or increase in pH. Some of these are interesting, because a couple of the substances typically make the water more acidic. Other factors must be taken into account in these circumstances.

FUDO, L., and J. WILLIAMS - *Weedsport* **THE EFFECT OF YEAST ON THE RATE OF PLASTIC DEGRADATION** The world is littered with plastic all around, landfills are filled with plastic and most plastic is not recycled. Bacteria and other microorganisms can break down matter for food and energy. Plastic needs to be broken down by something and that has to be a microorganism. In the study done, yeast (Fungus) was used to try and degrade plastic. The plastic seemed to not break down even when heat was added to the mixture. The control groups were seen to have about a .09% loss in mass in the three month experiment. The experimental group had an average of .1% change in mass from the start. With future studies a microorganism might be found to breakdown plastic and clean the world of the trash.

HARDING, N., N. KOWAL, H. RODEN, R. SICKLER III *Weedsport* **HUMAN-ORIENTED LAND USE DEGRADES THE QUALITY OF OWASCO LAKE TRIBUTARIES** In this study, the water quality, physical parameters, soil hydrology, and land cover of tributaries and the surrounding areas in the Owasco Lake watershed were analyzed. Stream water was sampled at four sites - Fillmore Glen, Dutch Hollow Brook, Owasco Inlet, and Veness Brook - over a four year period. We hypothesized that if the percentage of the land cover that was natural vegetation was high, the quality of nearby tributaries would also be high. Fillmore Glen served as a control, as the natural state of the surrounding area has been largely preserved; the area is forested with good soil quality.

The other sites were experimental. To test this, we used Vernier and LaMotte water testing kits, the Finger Lakes Stream Monitoring Program procedure, and ArcGIS to obtain data to compare land use and soil hydrology to water quality. ArcGIS was used to find the soil quality and topography of the sites, to determine an area's potential for runoff, as well as to find land use surrounding the respective streams. Our results indicate that all parameters have influenced the water quality, but soil hydrology plays the most significant role; poor soil quality results in runoff and more nutrients going into the tributaries. Land use correlates to water quality because the amount of natural vegetation in an area tends to determine the quality of the hydrology of the soil. Fillmore Glen, surrounded by 73% natural vegetation, has the highest water quality. Owasco Inlet, with 52.7% natural vegetation, and Dutch Hollow Brook, with 30.7% natural vegetation had the next best water quality. Veness Brook had the poorest water quality and surrounded by only 16.9% natural vegetation. Based on our findings, we have determined that human-oriented land uses reduce the quality of the tributaries of the Owasco Lake watershed.

LACHANCE, G., M. SMITH, and J. WADDINGTON – *Westhill* **THE EFFECTS OF ROAD SALT AND BEET JUICE AS ALTERNATIVE DE-ICERS ON PLANT GROWTH** Road salt is often used to make roads less icy and prevent car accidents. Due to its frequent use, it is imperative that the environmental effects of road salt be considered. It is also necessary to study potential alternatives to road salts which work effectively on winter roads, but have less of an impact on the environment. Previous research indicated that road salt is very detrimental to the environment since it can ruin roads, cars, and local wildlife. Beet juice lowers the freezing point of water like road salt, but works more effectively in negative degree temperatures. The purpose of this study was to examine the effects road salt and beet juice have on plant growth and determine which solution has the least negative impact. It was hypothesized that plants exposed to beet juice would not have their potential growth as impaired as plants exposed to road salt. To perform this study, two trays of grass seeds, one with soil with road salt applied to it, and the other with soil with beet juice solution applied to it were provided with equal amounts of water and sunlight. The most interesting result pertaining to the hypothesis was that the beet juice solution had almost no effect on plant growth. Three days after the road salt solution was applied to the grass, there were noticeable effects, the grass either lost color, withered, or died. Together, these results indicate that beet juice is less harmful to the environment than road salt is.

HAMEED, N. - *Institute of Technology* **A BIOLOGICAL AIR QUALITY STUDY OF THE INSTITUTE OF TECHNOLOGY AT SYRACUSE CENTRAL HIGH SCHOOL** Air quality is very important to the health of the student body at ITC. My study focused on the biological aspect of molds and fungi that might be present in the building. This could affect the health of all students, especially those with asthma and respiratory problems. If it is a high traffic area like the office and atrium, then there would be more mold and fungi growth. Two different kinds of Bio paddles design with gels to promote growth of fungi and molds were exposed to the air for 20 minutes each in different traffic areas of the building. Five rooms were tested (the hillside room, the chemistry room, office, atrium and gym). The paddles were then placed into an incubator set at 36degrees Celsius for 72 hours the results showed that the office and atrium had the highest levels of mold growth. These results were consistent with my hypothesis showing that high traffic area tending to have higher levels of mold and fungi due to the high population in these areas. People should be more aware of where they spend a lot of time. Areas highly concentrated people can be a breeding place of these microbes which can affect your health

PECK, D. – *Liverpool* **THE IMPACT OF LIGHT POLLUTION ON PLANT GROWTH** Light pollution potentially affects the environment in numerous ways. If there are effects, and they are negative, then light pollution could cause a threat to global vegetation. This study was conducted to determine whether or not photopollution has any effect on the growth of plants. Very little research has been recorded about this subject. This experiment consisted of two groups of radish plants exposed to a normal photoperiod compared to plants exposed to additional light during the night. Plant height and biomass were compared. The Average Height Graph shows that the control group had a slope of .4372, while the experimental group had a slope of .5087. The Average Number of Leaves graph shows that the control group had a slope of .2427, and the experimental group had a slope of .2194. The results show that the control group had more biomass, but the experimental

group reached a higher average height. Therefore, it is likely that the extra amount of light caused the radish plants to grow in height faster than they could grow in width (leaves). The control group was shorter, but had more leaves, bigger leaves, and a much healthier appearance. Based on this experiment, light pollution more than likely has a negative effect on plant growth. This could cause a major issue among agricultural crops all around the world. Because agricultural crops provide for large portions of the world's food, a large famine could cause major food shortages.

POWELL, R. - *Syracuse Academy of Science Charter School* **SOIL SALINITY IN UPSTATE NEW YORK** Many plants have trouble growing in soil that contains too much salt. High soil salinity makes it more difficult for plants to get water from the soil and can interfere with their obtaining the proper nutrients. I think that the soil gathered from the downtown area is going to have the greatest amount of salt in the soil because, the main streets are usually located in the center of the city in the downtown area and the salt truck will throw the most salt to keep the roads clear for traffic. I took soil samples from, Downtown Syracuse, Westvale, Dewitt, Mattydale, and Nedrow. (North, South, East, West, and Downtown Syracuse) The soil sample from the West side of Upstate New York has the highest amount of salt in the soil. I predicted that Downtown Syracuse would have the highest amount of salt in the soil due to salt distribution on busy roads.

SANTORE, R. - *East Syracuse-Minoa* **DOES CLIMATE CHANGE REQUIRE REVISIONS TO THE REGULATION OF METALS?** The presence of Natural organic matter (NOM) in marine water can have a large effect on the bioavailability of copper. The importance of NOM's effect on copper bioavailability has been confirmed in toxicity tests on sensitive marine organisms such as *Mytilus* (blue mussels). These tests have shown that NOM can have a protective effect against copper toxicity (Rosen et al, 2008). In acidified conditions the binding sites on NOM can become less active, reducing the protective effects. Understanding NOM's responses to acidified conditions is important for modeling toxicity in marine environments that are becoming increasingly more acidic (ocean acidification and climate change), or in areas like estuaries which may have a variable pH from the influence of freshwater. Copper speciation measurements will be taken at concentrations that are known to be toxic to *Mytilus* in order to remain relevant to marine environments.

Sustainable Food Production

BISSON, R. - *Liverpool* **ORGANIC FARMING AND THE EFFECTS ON SOIL** This study investigated the effects of inorganic and organic fertilizers on soil. This is important in today's world because of the controversy between organic farming and inorganic farming and the potential health and economic benefits and disadvantages of both. Previous research showed that organic farming is both more profitable and safer for the environment (Sima 2014). Research has also found that organic farming leads to higher biodiversity and that food grown organically contains lower levels of pesticides and higher levels of nutrients (Gabriel et. al. (2009) and Crinnion (2010)). The purpose of this study was to compare the effect of organic fertilizer and inorganic fertilizer on soil. The questions sought to be answered were: what soil bed would have the highest amount of nutrients after growing radishes. The most interesting results from this experiment were that the control group, which contained no fertilizers, had the highest levels of phosphorus and nitrogen. The control group also grew the radishes the quickest. These results indicate that pure farming has the highest amounts of nutrients.

DEAVERS, A, C. SMITH - *Fulton: G. Ray Bodley High School* **COMPOST, THIS STUFF TURNS UP!** The purpose of this project was to see how the different number of turns affects the compost and how much waste could be saved if every household composted. The method was putting the same materials into four different bins and turning them at different rates to see what bin would decompose the quickest. Using crowd sourcing, it was concluded that the bin that was turned once a week was the most decomposed.

MASO, C. and R. ALQUIRAISHI - *Syracuse Academy of Science Charter School* **NON-CHEMICAL TREATMENTS TO EXTEND FRUIT SHELF LIFE** Knowing that fruits are part of our daily lives, and learning we can possibly increase the shelf life by stopping ripening appealed to our interest. In order to increase fruit shelf life, different non- chemical methods were used. The fruits underwent different procedures with UV-C treatment, dry heat, conventional microwave, and pulse microwave. DNA and protein were extracted from tomatoes and made into gels. There were many trials and errors, therefore, the test were performed several times to get proper results. The gels were run through the Bio Rad Power Pac basic in order to get the results. None of the protein and DNA was damaged during the process and the browning enzyme turned off and shelf life was possibly preserved.

ROBERTS, Z - *Faith Heritage @ Corcoran* **HOW PLANTS RESPOND TO THE INTRODUCTION OF FOREIGN CHEMICALS TO THEIR SOILS** In this paper I am trying to evaluate the effects of different substances on two different plants. I used water that had dissolved salt, lemon juice, dish soap, and gasoline by putting them with water into individual spider and wood sorrel plants. Some the plants with the lemon juice and the dish soap did not have much damage as the salt water or gasoline. This means that the change in pH does not affect a plant as much as I originally thought. The purpose of this experiment is to find the effects on spider plants and wood sorrel that are inflicted by foreign substances.

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