

ESF
in the
High School

Environmental Summit

June 3, 2009

Hosted by



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 hope that you've become active citizen scientists who are concerned with the science behind the headlines as a result of your involvement in SUNY-ESF's Global Environment course.

Schedule for the Environmental Summit

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

PRESENTATIONS

Alternative Energy

1. MOHAMD, S. and E. LEONARD - Paul V. Moore. **NUCLEAR FUSION.** What if energy was cleaner, safer, and more sustainable? Our old sources are out dated and quickly losing it sustainability. Coal power plants are dirty and poor sources of energy return on investment, nuclear fission is cleaner than coal but will only last as long as plutonium is on the ready. What if there was a better way? What if I could say it is nuclear fusion? Fusion is cleaner, safer, and has an endless amount of required resource. Nuclear fusion reactors would be a much more efficient method of powering the states and even the world. Nuclear fusion as an energy source is still but only a theory. What is needed for the theory to become more worldwide combination of scientist around the world.
2. SCHRADER, J. – LaFayette. **ETHANOL PRODUCTION FROM WOODY BIOMASS.** Woody biomass is an excellent feedstock for ethanol production. The town of La Fayette's need for gasoline can be replaced by ethanol from the current freestanding biomass within the town's boundaries while still harvesting with sustainable practices. The town uses roughly 77,777 gallons of gasoline annually so the town would need approximately 116,665 gallons of ethanol due to an energy conversion factor of 1.5. By replacing the gasoline with ethanol, we can reduce our dependency on fossil fuels and we can also limit our carbon dioxide output.
3. TODD K. - Paul V. Moore. **MEETING OUR NATION'S ENERGY DEMANDS.** It has been predicted that within the next twenty years the United States will need 21% more energy to meet our nation's rising energy demands. It is imperative that the United States finds a solution to meet these needs. Nuclear energy is seen as a possible solution, but is nuclear energy an eco-friendly solution to our nation's energy demands? Research was conducted using several sources including the Nuclear Energy Institute and the World Nuclear Association. Research yielded that although operation and maintenance costs are higher than other energy sources, once efficiency increases, these costs can be lowered. In comparison to other sources nuclear energy requires small amounts of land, and though radioactive waste is produced it can be dealt with in a safe manner. Review of information and data allowed the researcher to come to the conclusion that nuclear energy is an eco-friendly solution to our nation's energy demands. It has the capacity to significantly continue lowering carbon dioxide emissions, provide job opportunities and aid our ailing economy, while helping to meet our nation's energy demands.
4. VERZOSA, B. – LaFayette. **HEAT FROM WOODY BIOMASS.** This project focuses on the use of woody biomass as a heat source, and on the production and distribution of the biomass. In the project I found a lot of information online about the area of study (LaFayette, NY), and a lot of information on wood as a heat source, and also information on the energy in one ODT of wood. The results I have found are that LaFayette needs about 11X107 BTU's to heat LaFayette. I was able to find the amount of harvestable wood in LaFayette by finding the total acreage of LaFayette and then averaging how many acres are available to be harvested with sustainable practices for wood production. In conclusion the use of wood as a heat source has been around for thousands of years, and we should continue to use it now and into the future.
5. VESTERDAL, M. – LaFayette. **WIND POWER GENERATION IN THE US AND IN THE TOWN OF LAFAYETTE.** My project focuses on wind power generation and compares the potential and actual use of wind power generation of the USA and Europe. It also explores the possibilities for wind turbine generators in the town of Lafayette, NY. By using different information ranging from local and regional wind maps over power consumption in affected areas to specific wind turbine data, I have tried to determine if wind power generation in the USA today is an underestimated energy source, or if it has reached its maximum potential. Through my research I have learned that the wind power potential is more than sufficient in America, but the transfer from conventional energy sources to wind power is made difficult because the infrastructure heavily supports the use of fossil fuels. Thus it can be concluded that even though the US theoretically could get a lot of its electricity from harnessing the winds, it cannot happen right away due to social and political factors.

Biodiversity and Natural History

6. ALOI, J. – OCM BOCES. **PERCH HEIGHT PREFERENCE OF A CAPTIVE RED-TAILED HAWK (*BUTEO JAMAICENSIS*).** The purpose of this research was to determine what perch height was preferred most by a captive red-tailed hawk (*Buteo jamaicensis*). The study was a way to improve the welfare and decrease stress levels of the red-tailed hawk. It was hypothesized that the red-tailed hawk would prefer to be on the highest perch available. Seven perches were offered in the red-tailed hawk's pen: three at five feet, two at three feet and two at two feet in height. For seven weeks perch height preference was recorded throughout the day. It was determined that the hawk preferred the highest (five foot) perch. The hawk was found using all the other perches offered, but with much less frequency. These results support the hypothesis of preferred perch height as in the wild this would allow the hawk to have better sight of a larger portion of the ground for prey location. This study supports work with birds-of-prey in that it furthers our knowledge on how to reduce stress in captivity.
7. BENACK, A. - ESM. **REINTRODUCING GREY WOLVES TO NEW YORK.** To assess the feasibility of reintroducing wolves to NY, mainly the Adirondacks, I assessed data that was collected by Yellowstone National Park that tracked their wolf population growth and diet. I compared the prey population of elk in Yellowstone to the population of deer in the Adirondacks. The deer population is large enough and has a 3.55% growth rate. I found that Yellowstone's wolf population (171 wolves) would only kill around 1.82% of the deer yearly. This data supports that it is possible to sustain a larger population than that of Yellowstone. I compared the area in which the wolves roam in Yellowstone to how much area the wolves would be able to roam in the Adirondacks. The Adirondacks is 50.7% larger than Yellowstone. I lastly interviewed a grey wolf caretaker at our zoo and learned that wolves will avoid humans and man made objects. They would not pose a threat to humans. The result of this analysis suggests that the Adirondacks may, indeed, be a sustainable and suitable habitat for wolves. This study shows that New York could successfully reintroduce wolves after a hundred years of extinction.
8. FITZGERALD, N. and B. FREDENBURG – OCM BOCES. **EFFECTS OF NATURAL FATTY ACIDS VS. SYNTHETIC FATTY ACIDS ON LEARNING AND BEHAVIOR IN MICE.** This study investigates the effects of synthetic and natural DHA (Docosahexaenoic acid) and EPA (Eicosapentaenoic acid) supplemented diets on mouse learning and behavior. We hypothesized that the brain activity of mice can be increased by feeding pregnant mice either a synthetic EPA and DHA diet or a natural DHA diet with the dietary conditions continued until the pups reach maturity as compared to a non-supplemented diet. A maze test and Eater Morris test were used to determine learning capacity in three mouse populations. The results of these tests were compared to a control population using t-tests. The results of the t-tests showed that the population that was fed a synthetic DHA and EPA supplemented diet benefited more than the mouse population that ate the natural DHA diet as compared to the control (non-supplemented) diet. The results of this study indicate

that DHA and EPA supplemented diets may result in increased capacity for learning in mice.

9. KISE, M. – OCM BOCES. **EFFECTS OF DIET ON THE COLORATION AND HEALTH OF BROOK TROUT (SALVELINUS FONTINALIS)**. The purpose of this research was to compare the overall health and coloration of hatchery-raised brook trout fed a standard hatchery diet (control group) vs. those fed a higher quality food that more closely mimics a wild diet (experimental group). The study site was Carpenter's Brook Fish Hatchery in Elbridge, NY. The fish were observed once weekly from December, 2008 until May 2009. Data on the mortality, water flow, feeding and tank maintenance was recorded and photographs of the fish were taken throughout the experiment. Coloration changes between the control group and the experimental group was compared and it was determined that the higher quality food led to a wild-type coloration. This research is of value to hatchery managers and anglers because by simply switching to a higher quality diet, hatchery raised brook trout will more closely resemble wild trout, which are more vibrantly colored.
10. LAMANNA, K. – Fabius-Pompey. **WATER QUALITY AND ITS EFFECT ON TROUT POPULATIONS**. Five points located on Fabius Brook, a small stream in upstate New York of the Chesapeake Bay watershed, were tested twice a week for two weeks to reveal differences between the water quality of urban areas and that of forested areas for brown trout and brook trout. The tests taken at these data points include levels of phosphates, nitrates, dissolved oxygen, carbon dioxide, acidity, and alkalinity. The urban locations of Fabius Brook experienced results with lower levels of dissolved oxygen and higher levels of phosphates and carbon dioxide than the areas located on forested gradients. With research completed on previous studies, the locations in urban areas are less likely to support large populations of trout than areas on forested gradient because of these water qualities. The data support the concept that forested areas of the stream with better water quality will sustain larger populations of trout than urban areas holding worse water conditions.
11. MASTRIANO, M., M. RINELLA, S. SALAMONE, and J. WHRITENOUR – CNS. **THE EFFECTS OF ZEBRA MUSSELS ON ALGAE LEVELS**. The effects of Zebra Mussels on algae levels are considered a problem in the northeast region of the United States. Zebra Mussels are an invasive species that affect aquatic environments, by filtering the water and consuming algae. This can be harmful to the surrounding area because many fish feed on algae. We tested the hypothesis that as the Zebra Mussel population increases, algae levels will decrease. Two fish tanks were filled with eight gallons of water from Oneida Lake, as well as large rocks, algae, and Zebra Mussels (one tank). Temperature, Ph, dissolved oxygen, and nitrate levels were measured for each tank with the LaMotte testing kits. Overall the presence of the Zebra Mussels in the tank had little effect on the measured environmental conditions.
12. MCGINNIS, P. and M. FOSTER – Chittenango. **THE SUCCESS OF CAPTIVE BREEDING PROGRAMS FOR RED PANDAS**. The project that my partner and I are currently researching is based on the captive breeding success of Red Pandas. Red Pandas are an endangered species whose habitats are being destroyed by humans. We plan on finding out if captive breeding programs in zoos across the world are currently being successful or not, through information shown on on-line databases and from contact with zoos through which we obtained our information for our research. Our results concluded that the current success rate of captive breeding programs is -1%, which basically means that more Red Pandas are dying than are being born. At this current rate the Red Panda will most likely become extinct in the near future.
13. MORENO, M. – ESM. **THE EFFECT OF DISTURBANCE AND SUBURBANIZATION ON THE BIRD POPULATION IN SYRACUSE NEW YORK**. In this study research and data was collected to find out whether or not the bird population was effected by suburbanization and disturbance of humans. If so what is the difference between the areas with many suburban homes, and plots of land less invaded with residencies. Data was collected from two sites, a suburban neighborhood and a wooded area, more true to birds' natural habitat. A correlation was made between how much food the birds consumed with how the human disturbance effected their eating habits and the amount of birds accumulated in the area. Research was collected over a period of seven weeks. It was found that disturbance and suburbanization does have some effect on the eating patterns of the local birds. The average difference between the forested area and suburban neighborhood was 1.1 cups, with the forested area coming out on top. Some factors that were not taken into as much consideration were weather and the type of species and how that may have effected the consumption.
14. PERRYMAN, A. and A. ROSADO – Fowler. **CHILDREN AND THEIR PERCEPTIONS ON THE ENVIRONMENT IN URBAN SETTINGS**. The newly "Free To Be Green" trend has become more popular within the US population. Unfortunately this transformation has not been absorbed by the younger generations, primarily in urban settings. In this study, we have sought out to examine youth's perception and experiences of nature in the context of a highly urban setting. When constructing this experiment the main question was what effect does education and the consumption, of environmental information, and media have on youth's knowledge, concerns and behavior? We decided to approach this concern through environmental education. If this study was able to change the learning behavior of these children through environmental education, then it may be possible to improve the environment in the future. This project is relevant because due to unintended ignorance, environmental issues go unnoticed in urban areas compared to areas in the country where environmental education is promoted. As the research develops it reveals that urban children needs and experiences differ from those of mature adults, and they deserve to be understood. We first obtained information on the youth's knowledge through surveys constructed in one of Syracuse's West Side school Blodgett Elementary. The surveys revealed various factors that contribute to youth's ignorance on nature, such as violence, peers, and technological appliances. We will then use the information collected to create an urban youth program in elementary schools. The project will be completed with "A Guide To The Westside" that includes local plants and animals.
15. SIVALIA, J. and K. POWELL – Liverpool. **THE EFFECTS OF ROCK MUSIC AND CLASSICAL MUSIC ON GREEN BEAN (PHASEOLUS VULGARIS) PLANT GROWTH**. Previous research has shown that plants grow faster and better when exposed to sound variables. If plants grow faster when exposed to sound variables, this could revolutionize growing techniques used to mass produce plants. The purpose of this study was to determine if there was a relationship between bean plant growth and music exposure. For the experiment, three separate treatments of bean plants were exposed to classical music, rock music, or ambient sound. Height and leaf length were recorded each time the plants were watered. We predicted that rock music would produce the most growth in bean plants. The results of our study were that rock music may not have a negative effect on the rate of growth, yet it does have a negative effect on absolute growth. Classical music had the fastest rate of growth and it may improve belowground growth in green bean plants. These results indicate that there is a correlation between music and bean plant growth.

Ecology and Climate Change

16. DUNN, R., J. CHAPIN, and T. STONE - Henninger. **THE GAIA THEORY**. Our project in simplest terms is to show the counter effects of humans on the environment. Our hypothesis is that the environment will backlash and have negative effects on humans. To attempt to verify

our theory, we initiated a case study to examine the past and simulate the future. For our case study approach, we chose the Ancient Aztecs. For the simulation to speculate future data, we used Daisyworld. The Aztec civilization strained their environment in such a small area and their society consequently died. For Daisyworld, we ran various simulations with varying solar luminosity. The results ran in a standard Bell curve for both the white daisies and the black daisies in the simulation. The earth regulates for its own benefit not for the benefit of the inhabitants as is shown in Daisyworld where the amount of each kind of daisies fluctuated to regulate the earth's temperature. This shows that the earth was in fact regulating itself due to temperature and doesn't regulate for the benefit of its inhabitants. This is the basis of Gaia Theory.

17. EITNER, M. and A. LUMIA - Henninger. **THE EFFECT OF CLIMATE ON EDUCATION.** We examined the effect of climate on academic success in High School students. Climate includes many factors, we focused on two, average annual temperature and precipitation. Our hypotheses were that students in areas with high average temperature would have lower academic success than students in areas with lower temperatures and those students in areas with high precipitation would have greater academic success than students who live in low precipitation areas. In order to examine these relationships, we used data available online for the states of Germany and the US for the average temperature and the average precipitation and compared this to data that we felt measured academic success. We measure success by looking at graduation rates in the U.S. and national test scores in Germany. We also compare a world-climate map and a world-precipitation map with the scores of the international PISA test. We found a strong negative relationship between temperature and academic success and a strong positive relationship between precipitation and academic success in both countries which supports both of our hypotheses. We think that the reason for this is, that cold temperature and rain prevent students from doing other fun activities and makes them focus more on education.
18. THOR, A. - Nottingham. **THE MAPLE SUGAR EFFECT: EFFECTS OF CLIMATE CHANGE ON ACER SACCHARUM SAP PRODUCTION.** Changes in our Earth's climate have had the effect on many environments and habitats, and while some are clear, there is still some newly developing. Different areas see different effects of climate change, one that is among the area that I inhabit is the changing of Sugar maple trees. My objective for this study is to better understand the extensive effects that climate change can cause, especially in ones own backyard. The methodology used in this paper is the comparison of charts, graphs, and peer reviewed studies. From this comparison, I will find a general synopsis to make a conclusion. This study shows that there is a relation between climate change and the effect on sugar maples. Effects from climate change on sugar maples, though not very extensive now, will be more significant in the future.
19. WILLIAMS, R. - Fowler. **CO2 LEVEL INFLUENCE ON PLANT GROWTH.** Plants make carbohydrates from sunlight, carbon dioxide (CO₂), and water. This is called photosynthesis. As the CO₂ content of the air rises, plants will likely grow faster and bigger. This study created CO₂ by mixing 20 g of baking soda and 40 mL of vinegar and added it to a contained area with the experimental unit plants. This study allowed me to notice an enhanced rapid growth rate in the three plants exposed with elevated levels of carbon dioxide. Due to the high concentrations of CO₂, the plants grew fast but it could have made them die sooner than the equivalent controlled group of plants. In addition the plants may have been larger in weight and height but may have died from excess concentrations of CO₂. Excess CO₂ results in an enhanced greenhouse effect that leads to warmer temperatures. This study did not record temperature, but it's possible temperature may have resulted with the experimental units' rapid death.

Ecological Footprints and Energy Audits

20. ASKIA, M. and C. PHAM – Fowler. **IMPACTS OF RECYCLING AT FOWLER HIGH SCHOOL.** In this experiment we researched how much waste students at Fowler High School produce in a day. New York State on average produces four million Styrofoam trays a year, all ending up in landfills where it will remain for a long period of time. We experimented with eleven fowler students and weighed the mass of the student's garbage used at breakfast and lunch for one day. We ask them to bring only solid waste, no food or liquids. While we are weighing the mass of the waste we see if any of it can be recycled. We also get the average mass of the lunch trays to see the average tray impact. After a day of collecting we give them a student fact sheet that has information on the environment and how they can make a positive impact by recycling. Then we ask them to collect their garbage again and see if they have made any improvements in the amount of waste they produce. We collect their breakfast and lunch and get the data and see if the amount of unrecyclable waste has decreased. The purpose of this whole experiment is to find out how much garbage the average student produce and see if learning about recycling and its impact on the environment would change it. This study could also influence school recycling policy.
21. BARNES, J., A. LAZORE, T. O'LEARY, and P. DAVIS – Fowler. **THE UNKNOWN IMPACT OF DRYER LINT.** Organic wastes from landfills produce annually 22 million tons of greenhouse gases (GHG). The release of carbon dioxide and more specifically methane contribute to our local and national carbon footprints. The production of GHG contributes to global warming and recent studies have shown that the release of methane have an increased effect upon the rate of warming of our planet. This study focuses on the benefits of reusing dryer lint to reduce garbage in landfills and ultimately GHG emissions. In our study we collected dryer lint from families over a brief period and were able to calculate the average amount of dryer lint that is produced by the average person. By using the base average we can then calculate an estimate of GHG that are released from this lint. This comparison of depositing the dryer lint in a dump, or by using the dryer lint in other ways demonstrates the need for a small individual change that collectively can have huge impacts on a global level. Many people think there is nothing they alone can do to improve the situation of the environment. We hope to prove that by making only a small change in their lifestyle, a person can reduce their carbon footprint.
22. COOTS, D., E. ENNIS, J. MULHOLLAND, and K. WHALEN – CNS. **AGE, GRADE AND GENDER EFFECTS ON ECOLOGICAL FOOTPRINTS OF HIGH SCHOOL STUDENTS AT CICERO-NORTH SYRACUSE.** Society plays a major role in global warming. By 2010, there will be a 6° increase in the average global temperature (Turner, 2009). The purpose of this experiment is to show and educate about how much one person impacts the earth. Our hypothesis is that if the age of high school students at Cicero-North Syracuse is lower, then they will have a greater ecological footprint. 150 students at Cicero North Syracuse High School were given a survey asking questions about his or her lifestyle. Survey results were calculated using the format on www.myecofootprint.org. Averages for each group of students based on age, grade, and gender were calculated. It was found that as the grade level increased the average eco-footprint increased. It is hoped that when students are shown the results of this study, they will make a conscious effort to lower their global impact.
23. GEORGE A. – Fabius-Pompey. **EFFECTIVENESS OF RECYCLING IN FABIUS-POMPEY CLASSROOMS.** In this report, the waste stream of a school was analyzed by comparing the recycling and trash components. The trash and recycle bins of the Fabius-Pompey Middle-High School were weighed for the total amount of waste in the trash and recycling bins, as well as the amount of waste that was in the incorrect bin. The findings showed that 89% of recyclable material was recycled, yet 3% of the material in the recycling bins was not

actually recyclable. The reasons for this could be the result of lack of education or laziness. Educating students and urging them to increase their recycling could lead to a more efficient waste stream.

24. HER P. and I. SHABAZZ - Henninger. **THE LINK BETWEEN INCOME AND ECOLOGICAL FOOTPRINT.** Our study focuses on the relationship between a person's income and their ecological footprint. Ecological footprints are a measure of human demand on the earth's resources. We hypothesize that the greater the individual's income, the greater the individual's ecological footprint. Using a previously established ecological footprint calculator, we developed an internet based survey (<http://sites.google.com/site/ecoprintyourlife/>) to gather data on income and ecological footprint sizes for people in 8 different income categories from throughout the United States. Our website also seeks to inform the participants of ways that they can decrease their ecological footprints. Over fifty surveys have been completed with the most common income range being \$30,000-\$50,000. The ecological footprint values were calculated for all of the participants and the relationship between income level and ecological footprint was analyzed using a simple linear regression and the categories were compared using ANOVA and t-tests. The participant comments suggest that they believe that lifestyle, more than income level influences their ecological footprints. We found that the \$100,000-\$150,000 range had the highest footprint count. With this study we can better inform people of their impact on the environment and we are also able to identify "target groups" for information campaigns to influence positive change in their ecological impact. We believe that it is important that we all contribute to the change, but targeting those groups of people with the greatest impact is an important step we can use to sustain nature.
 25. HUDSON, I., Q. GRAY, and K. BOYD - Corcoran High School. **ECOLOGICAL FOOTPRINT OF STUDENTS AT CORCORAN HIGH SCHOOL.** Ecological footprint measures how much land area it takes to support individual's lifestyles. Every human on earth has an ecological footprint. We believe this is important because teenage students will be given the opportunity to understand our own consumption habits and it will help us stop degrading our world. We tested the hypotheses that: (1) non athletes have a higher ecological footprint than athletes, and (2) females have a higher ecological footprint than males. To test our hypotheses, we passed around an ecological footprint survey to students in all grades and genders, including athletes and non-athletes, and also teachers. We surveyed 66/1700 students and teachers that attend Corcoran high school. We had a 10% margin of error because we did not survey all 1700 students. We found no significant differences between athletes and non-athletes, nor between females and males. The average ecological footprint for student at Corcoran high school was about 8 hectares (16 football fields) per person per day. To make our results more accurate in the future we could survey a larger sample of students from Corcoran high school.
 26. STÜTZLE, A. - Nottingham. **ENERGY EFFICIENCY AND RUN-OFF PERFORMANCE OF GREEN ROOFS.** In this study I examined the differences between standard roof tops and roof tops with vegetation on them, also known as green roofs. The objective was to find out if green roofs are in fact more energy efficient, temperature stable, and have less run-off than standard roofs. In order to do this, representative models of a green roof and a standard roof were built. The temperature of each of the interiors of both models was recorded over a week span. Also, the run-off was recorded with a certain amount of water that was poured on each of the rooftops and then collected through a gutter system and measured. Lastly, the energy efficiency of each model was recorded by placing a container of hot water in each of the models and then measuring the temperature over a certain period of time. The final findings of this experiment were that the green roof model was more energy efficient in the indoor trials, but not significantly in the outdoor trials. Also, the green roof model had slightly less run-off amounts and had an overall more stable temperature than the standard roof model. This is important for construction methods especially in cities because it can lengthen the lifespan of buildings, cut down on heating and cooling costs, help precipitated water move naturally back to the environment, and improve the general air quality of buildings and the area itself.
- Pollution and Remediation**
27. BUCKELY, A., K. DITTES, J. ROACH, and B. WEST – CNS. **THE EFFECT OF "GREEN" DETERGENT ON PLANT STEM HEIGHT.** The term "green" is often used in producing products today. "Green" detergents use natural cleaning ingredients and fragrances, which claims to makes them less harmful to the environment. The use of detergents for cleaning by humans can have an adverse effect on plants because of the change made in the chemicals in the water. Our hypothesis is that if a houseplant is watered with diluted name brand detergent "Tide", then the plant will grow at a slower rate than one given diluted "green detergent". Snapdragons were potted in their own separate pots with potting soil, and put in a controlled environment. The plants were watered daily with the diluted solutions and measured every three days. The results show that plants watered with "green" detergent had less ill effects then that given "Tide". Detergent is an example of a contaminant that people unintentionally add to water. This pollution of a resource can have negative effects on the environment as well as humans.
 28. COFFEY, S. – Liverpool. **HOW THE ADDITION OF AMENDMENTS AFFECTS THE GROWTH OF ZEA MAYS (CORN) ON THE SOLVAY WASTE BEDS.** The objective of this study was to determine if amendments (Miracle Grow fertilizer and Nutri-Brew) would improve the growth of Zea mays (corn) on the Solvay waste beds. This is important because improved growth will aid in the phytoremediation of the contaminated soil, and this will help prevent the further contamination of Onondaga Lake. Previous research showed that Salix (willow shrubs) has served the purpose of phytoremediation on the Solvay waste beds, and this suggests that perhaps corn can serve the same purpose. Corn was selected for this study because it can adapt rather easily to its growing environment and it also can be used as a food source or biofuel. This test was conducted by obtaining soil from the Solvay waste beds and testing the growth of corn in the control (waste bed soil only) against the growth of corn in the waste bed soil and different concentrations of the amendments. Results suggest that optimal corn growth occurs when there is a mixture of 75% Nutri-Brew and 25% waste bed soil. However the control group that contained only waste bed soil and no amendments yielded successful corn growth. These results indicate that that there is potential for corn growth on the Solvay waste beds despite the difficult growing conditions, and that the use of Nutri-Brew can be beneficial to growth on the waste beds. If Nutri-Brew is used on the waste beds, it should be used in a mixture of 75% Nutri-Brew and 25% waste bed soil.
 29. CRAWFORD, T., A. VAUGHN, S. HENLEY – Corcoran High School. **SALT ON YOUR VEGETATION: EFFECT OF ROAD SALT ON ANNUAL RYE GRASS.** Road Salt is used during the winter months to help treat icy roads. Does road salt have effects on plants? The purpose of this study is to show the effects road salt would have on Annual Rye Grass. We tested the hypotheses that: (1) Road Salt would reduce growth of established Rye Grass plants, and (2) reduce germination of Rye Grass seeds. We treated established grass plants with different concentrations of road salt. To test our second hypothesis we treated Rye Grass seeds with the same concentrations of road salt. Interesting results were that the highest concentrations (5%) of road salt did reduce growth and seed germination. Together these results indicate that road salt in higher concentrations could affect road side plant growth.
 30. DAY, K. and P. MAGGIONO - Paul V. Moore. **RETHINK, REGROUP, RECYCLE.** If you recycle your junk mail you could save 600lb

of paper a year. Just imagine how much can save if we recycle in our school. This raises the question of how many people actually recycle in our school. After taking a survey, we came our hypothesis, if recycling was better advertised then more people would recycle because they would be more aware. To test this we monitored two classrooms for a week. One class room had the regular, school provided recycling bins and in the other we made a new box coated in highlighter green and put a sign above it to get peoples attention. We also put it right next to the trash can. Then we put fliers all over the hallways in our school that advertised recycling. In the end we found that advertising recycling helped get more people to recycle.

31. EUSON N. and C. GUERRA - Henninger. **COMPARISONS OF PH LEVELS BETWEEN URBAN AND RURAL AREAS IN NEW YORK STATE.** Acid rain is caused by sulfur and nitrogen dioxide emissions into the atmosphere. Due to different amounts of emissions caused by industry, agriculture, and automobiles, the pH levels can vary ranging from 3-6. Acid precipitation is harmful to aquatic life, the soil, and indirectly causes respiratory problems in humans. Using detailed acid rain data from The New York State Department of Environmental Conservation Bureau of Air Quality Surveillance 2007 statistics showed the differences of pH levels between urban and rural areas around New York State.
32. HEFFRON, N., B. OWENS, and C. ROBERTS - Corcoran High School. **BUFFERING CAPACITY ANALYSIS OF VARIOUS SOILS OF ONONDAGA COUNTY.** Acid precipitation typically has negative effects on the flora of the region on which it falls. Thus, it is an essential trait of the soil to buffer the acid from the precipitation so that a variety of floras may populate the particular region. Previous research shows that soils often have the ability to raise the pH of an acidic solution passing through it, or neutralize it completely. The purpose of this investigation is to test the buffering capacity of various soils throughout Onondaga County. This will be done by passing an acidic solution, with a pH consistent of acid rain in Upstate New York, through various soil samples and observing any change in pH. From the results that were found, the sample at White Spot was most interesting as it not only neutralized the solution, but made it more basic. All the results indicate that soils in Onondaga County buffer acidic precipitation to a point where the resulting pH is close to a neutral state.
33. KNIGHT, R. and A. KRAUS – Chittenango. **CORRELATION BETWEEN WATER QUALITY AND FISH COMMUNITIES.** Water quality plays a significant role in the species richness and species fullness of fish communities. Nitrates are one chemical in water quality that negatively effect fish communities due to nitrate poisoning. Chittenango Creek is a small river located in Central New York that has a surface Area of approximately 290 Square miles. We collected primary data on Chittenango creek and contracted data from the project watershed site. Methods used in this project include, electroshocking and measurements from different areas of chittenango creek. The purpose of this research is to see if abnormal water quality measurements relate to species richness of a fish community. major findings are water quality fluctuates and species richness decreased.
34. LYNCH, S. - Nottingham. **WATER QUALITY IN ONONDAGA CREEK, NY.** There has been an increase in the amount of pollution, caused by urbanization and many other factors. The objective of this study was to determine if in Onondaga Creek there was an increase in the amount of pollutants in a ten year span. In addition the study determined if there was a difference between rural and urban areas. Using data collected from project watershed, I looked at nitrates, phosphates, pH, chlorides, and dissolved oxygen, which are indicators of pollution, from five different locations. I was able to determine if it was able to support aquatic life from looking at the data collected and I was able to determine the conditions of the creek pollution levels.
35. PIPER, H. and SMITH, S. – Henninger. **MAKING THE GRADE: A RECYCLING BASED ANALYSIS OF CONSUMER PRODUCT PACKAGING.** The types of product packaging that are used for common consumer goods have a vital impact on the environment. Due to the short term use of packaging it would be most environmentally responsible to use products that are recyclable. Our rubric compared the common packaging types of paper, aluminum, glass, polyethylene and polystyrene. The material that scored the highest according to our rubric was aluminum. It is important to note that aluminum may not be the ideal to package all products; therefore, we used our conclusions to outline the best packaging for some choice products. As a result we plan to educate and advocate for the use of more eco-friendly material over the use of cheaper, less eco-friendly materials such as Styrofoam lunch trays found in school cafeterias and to emphasize to importance of recycling.
36. POLLOCK, P. – Chittenango. **COMPARATIVE DATA ANALYSIS OF THE PH OF NORTHEASTERN LAKES AND THE UNDERLYING FACTORS AFFECTING/AFFECTED BY THOSE PH.** My research consists of data comparison of different characteristics of 500 freshwater bodies in the Northeastern United States. I am comparing a few different characteristics to the pH of these lakes to find which characteristics have the strongest correlation to pH. I am using Excel to create regression lines in scatter plots of these data. I am finding that there are a few characteristics (such as color measured in PCUs) that show a very strong correlation to pH. These trends can be utilized not only to further our understanding of acid rain and its effects on our sources of freshwater here in the Northeastern US, but they can also be used to educate civilians and show them what traits of lakes might be indicators that the lakes might have a dangerously high pH.
37. TRAVER, P. – Nottingham. **THE EFFECT OF PH AND NITROGEN CONTENT ON CERATOPTERIS RICHARDII SPORE GERMINATION AND GROWTH.** All over the world pollution is accelerating acid rain production which can hurt plant growth by causing soil to lose nutrients and adding heavy-metal toxins to soils. This experiment worked with two variables, pH level and Nitrogen content, and tested their effects on C-Fern growth and germination. It was predicted that as the acid level moved away from optimal level of 6.0, the ferns would show less growth, and that all samples containing Nitrogen would show better growth than those without. Ferns were grown in Petri dishes containing Potato Dextrose Agar at 4 pH levels (4.0, 5.0, 6.0, 7.0). Half contained Urea, a Nitrogen-based fertilizer, and half did not. Those spores grown in media of pH – 4.0 showed significantly less growth than all other samples, however the Urea did not significantly affect spore growth at any pH level. These results show that proper acid-level was the most influential variable in this experiment in determining successful plant growth.
38. WILLIAMS, H., G. ZAJAC, A. SMITH, and D. DAVIES – CNS. **THE EFFECT OF FERTILIZER USE ON SURROUNDING ECOSYSTEMS.** Soil quality determines the amount and health of biodiversity in ecosystems. Nitrogen and phosphate found in fertilizers can affect surrounding environments. Fertilizer use can cause eutrophication, which can lead to a decrease in biodiversity. Two different areas were selected near CNS High School. Soil samples were taken at 10-meter increments up to 40 meters from the athletic fields. Samples were tested for nitrogen, phosphate, and pH levels with a LaMotte soil testing kit. Our hypothesis is that the closer in proximity to the CNS athletic fields, a greater concentration of nitrogen and phosphate will be found in the soil. Fertilizer runoff can cause excessive plant growth and place a strain on other resources.

Sustainable Food Production

39. BREIER, J. - Nottingham. **COMPOSTED WASTE MANAGEMENT AND THE BENEFITS OF COMPOSTED SOIL IN COMPARISON WITH REGULAR SOIL.** As the public becomes more concerned about environmental issue like the climate change, other issues also draw more and more attention. For many Americans composting has become a reliable method to manage their waste and provide cheap and effective fertilizer for their plants. However, modern agriculture mostly relies on industrial fertilizer consisting of resources that are becoming less abundant like oil. We have to look for more natural and sustainable alternatives in order to guarantee adequate food supplies for a growing world population. Therefore, I designed an experiment dealing with the effects of compost and chemical fertilizer on the Arabidopsis plant. Seeds are grown in four types of soil: regular soil, compost, soil with chemical fertilizer, and a mixture of compost and chemical fertilizer. In one of the most important references for my project the team of scientists Matt Liebmann has examined similar effects and found out that composted swine manure increases the height of common waterhemp as well as its seed production. Thus, it is evident that compost improves living circumstances for plants and works best together with chemical fertilizer. This data also emphasizes further research on compost as it can become an important alternative to industrial fertilizer.

POSTER SESSION

Alternative Energy

40. ASHE, C – ESM. **WILLOW ETHANOL: COMPATIBILITY FOR ESM.** The analysis of various resources, including the Willow Beta project worksheets and the East Syracuse- Minoa school district bus garage, have led me to come up with a reasoning for the conversion of the bus fleet to an E85 ethanol. I used the price used for each fuel besides willow ethanol, since we will not be paying for the fuel itself, only the formation and running of the willow farm itself. With the use of 2009 records, my findings suggested that the best choice besides willow ethanol for the bus fleet was the diesel that had already been running the bus fleet at the present time. Therefore, I dismissed the other fuel resources, which included corn ethanol and gasoline, and only compared the cumulative prices for the biodiesel and the running of the willow farm for my analysis. I came to the conclusion that the conversion to willow ethanol will be cumulatively much higher than the regular biodiesel that our buses use for the first 10 years. On the other hand, over the next 12 years (by the 22nd year), the ESM school district will be able to save over 1.6 million dollars.
41. ELTER, J. – Fabius-Pompey. **WIND STUDY IN FABIUS: FEASIBILITY OF INSTALLING A WIND TURBINE FOR POWERING FABIUS-POMPEY CENTRAL SCHOOL DISTRICT.** This study was to access the potential to harness the wind power in the local community of Fabius. It was proposed to Fabius-Pompey High-School that installing a wind turbine would reduce the cost of the school's energy bill. To access the wind I installed an anemometer, a device that takes measurements of different weather components, I collected data of the wind speed. I collected information on different wind turbines to learn about the power produced by them and the type of wind conditions they need. I learned where wind is fastest, what conditions affect it and what sort of power it produces. With the information I could compare the wind speed and see if it is a possibility for wind power to be successful. Another aspect of the research is to find any previous studies of the wind speed before this one. One study was performed by AWS Truewind. Comparing their results and mine will also be done.
42. KELLEY, B. and N. WILDING – Paul V. Moore. **WIND ENERGY.** Wind energy is a source of energy that could have the potential to provide some of America's need for electricity while cutting out side effects that result from other energy sources. Secondary sources found on the Internet were used to research the subject of wind energy. Results were found that show that wind energy provides benefits that other sources of energy do not such as the fact that wind energy does not produce any material that is harmful to the environment and overall they have little impact on the environment. Wind turbines, which produce the energy from the wind, are relatively simple in the way that they work and effective at making electricity. Wind energy has some potential issues involved with it but a majority of those do not seem to be truly problematic. The wind has the ability to provide America with energy that would otherwise have to be generated using other energy sources that have more of an effect on the environment and could be a real solution to future energy production.
43. MONTROSS, T. – Fabius-Pompey. **FEASIBILITY OF USING SOLAR POWER AT FABIUS-POMPEY MIDDLE SCHOOL/HIGH SCHOOL.** Increasing dependency on the use of fossil fuels has led to major global warming. An alternative energy source is needed like solar power. The study that is being done at Fabius Pompey Middle School High School is measuring the energy output of solar panels and the feasibility of using solar power at the MS/HS. Using solar power would greatly decrease the amount of carbon dioxide production. There are currently 50 schools participating in a program by school power naturally in where they are given photovoltaic systems. The research is done to see if the solar panels produce enough energy to be cost effective. The schools that were chosen to be used in the study were on the same line of latitude because the same line of latitude has about the same solar energy output. The data shows that solar panels at Fabius Pompey MS/HS would be feasible to use. Even though solar power would be used the school would still have to use oil for heating.
44. MOON, R. - ESM. **INCREASE ENERGY EFFICIENCY IN THE HOME TO REDUCE COSTS OF THE ELECTRIC BILL.** The purpose of this study was to find ways to help poverty struck homes make living more affordable. The study assigned costs for energy consumption in a home without energy efficient appliances in order to show how much money could be saved. Two key factors, conservation and efficiency were identified for decreasing consumption. The recession is impacting the poor at a higher rate than the rich. Saving money on energy costs will help people in poverty procure basic goods.
45. MURRAY, E. – Chittenango. **NUCLEAR POWER AND AQUATIC LIFE.** My project is about nuclear power plant effects on the aquatic life of the water bodies that surround them. I researched what nuclear power plants use water for, what kind of cooling systems they use and ways in which they harm the aquatic life. For my research I used internet websites such as the NYSDEC website and news articles pertaining to nuclear plants effect on aquatic life. From this research I concluded that nuclear power plants that do not use a closed cooling system cause harm to aquatic organisms. Nuclear power plants that use outdated cooling systems are the ones that cause the most harm to the aquatic life. The organisms can become impinged, entrained and when the heated water is released back into the lakes or rivers it disturbs and changes the aquatic ecosystem.
46. RUSZCZYK, C. – ESM. **REDUCING RESOURCES AND ENERGY IN THE COMMON HOUSEHOLD.** The present economy suggest the importance of reducing energy. Money as well as energy and resources can be saved in as little as a one-month study by reducing the consumption of resources in the common household. The study consist of 4 people, 2 teens, 2 adults and also 2 cars. Calculations of the amount of gas, water, heat, and miles driven in a period of time are made. Recommendations for future practice are provided.
47. TEALE, N. and K. Potter – Fabius-Pompey. **WIND POWER USE IN THE FABIUS-POMPEY HIGH SCHOOL.** The use of wind power has been suggested as a main energy source to decrease our reliance on other sources. Although wind power is a very efficient alternative in some areas, it is unclear how wind power could be used in the Fabius-Pompey High School. We researched a few different styles of wind turbines to find which would be the most efficient to use to power the high school, or decrease the amount the school pays on the energy bill. We found that the Abundant Renewable Energy website was the most helpful in supplying information about their wind turbines, including specifications and productivity. For this reason, we selected the ARE turbines to be the best options for the Fabius-Pompey High School. In the process of researching, we interviewed a turbine-owner in the area to conclude if the wind power generated is worth the cost of installation. Our results demonstrated that wind power is a good source of alternative energy for use in the Fabius-Pompey High School.
48. WHITE J. – LaFayette. **THE USE OF SWITCH GRASS FOR HEAT ENERGY IN THE TOWN OF LAFAYETTE, NY.** This study focuses on switch grass potential to be used as an energy source for heat in homes in the town of Lafayette, New York, as an alternative to fossil energy. This biomass is very good for the environment and will regenerate and also help future crops. I calculated the demand for

residential heat. Next, I found the amount of land available to produce switch grass, and calculated heat energy available in the form of pellets. My results found a high yield of heat energy and nearly sufficient to heat the town using the farm land in our area while growing it with other crops.

Biodiversity and Natural History

49. BYRNS J., C. JOSEPH, and P. MARGARET – Liverpool. **IT IS LUPIS**. We chose to focus on the student opinions regarding wolf reintroduction in the Adirondacks, specifically if it varied by region. We saw this as important because other surveys had noted regional differences leading to different opinions. To test this, a survey was compiled and distributed to ESF classrooms in high schools across Central New York. Results showed that schools labeled “rural” and those labeled “urban” had no significant differences in support for reintroduction.
50. COMI, J. – OCM BOCES. **ALLELOPATHY OF BLACK WALNUT (*JUGLANS NIGRA*) ON TOMATO (*LYCOPERSICON ESCULENTUM*) PLANTS**. The goal of this research is to provide farmers and gardeners with an accurate understanding of the damage caused by black walnut (*Juglans nigra*) fruit. The hypothesis tested was if a tomato plant (*Lycopersicon esculentum*) is watered with a solution of water and black walnut (*Juglans nigra*) fruit husks, then its ability to maintain health will be negatively effected. The experiment was conducted on 60 tomato plants, 30 were watered with water-only (control population) and 30 were watered with a solution of black walnut fruit husks steeped in water (experimental population). It was found that when both populations were compared on average height, maximum height, maximum leaf broadness and number alive both populations has a similar state of health. Due to these results it has been concluded that black walnut fruit husks do not effect the ability of tomato plants to remain healthy.
51. DAVIES, E, K. SEYMOUR, and A. VORONSHYY - Henninger. **EFFORTS IN THE CONSERVATION AND PRESERVATION OF THE WOOD DUCKS SPECIES**. The wood duck is a species of duck found throughout the North American Continent. Due to serious destruction of habitat and mass hunting of the duck, their population was headed towards extinction in the early 20th century. But through the help of legislation regarding hunting and the construction of wood duck nesting boxes throughout North America, the population has been revived to sustainable numbers. Our objective in this project is to assist in the further conservation of the species through the construction and distribution of wood duck nesting boxes. We hypothesize that with construction of nesting boxes and education of the specie’s plight, their population will continue to increase. In our efforts we hope to help return the wood duck population to their previous numbers.
52. LACHANCE, M. – Fabius-Pompey. **WATER QUALITY OF THE BUTTERNUT CREEK**. Macroinvertebrates play an important role when determining stream health. Macroinvertebrates indicate chemical levels of the stream and determine the amount of fish, frogs, birds, etc. that can live in the area. This study monitored populations of macroinvertebrate populations at the Butternut Creek, located in Onondaga County, New York. The research site was located in a rural area in the Jamesville Park, near the Jamesville reservoir. Kick nets and leaf packs were employed to collect these macroinvertebrates. This study found indications of low to mid-level amounts of pollution in the Creek, which was determined by measuring several chemical levels and populations of macroinvertebrates. The population of macroinvertebrates collected had a low level of taxa richness (13), or not a diverse population. High levels of phosphorous and nitrogen, both found in fertilizers, in the water of the Butternut Creek site. This study is not confirmed to be 100% true and more studies should be done to establish a concrete solution of the stream health of the Butternut Creek.
53. PISTON, H. - OCM BOCES. **EFFECTS OF NATURAL VS COMMERCIAL DIET ON THE GROWTH RATE OF EASTERN PAINTED TURTLES (*CHRYSEMYS PICTA*)**. The goal of this research is to compare the growth rate of eastern painted turtles (*Chrysemys picta*) when fed either a natural diet or a commercial turtle diet. Two juvenile turtles from the same clutch were provided two identical habitats with the only difference being type of food they were provided with. One turtle was fed a diet consisting of natural type food (crickets, small fish and plants), the other turtle was fed a commercially prepared turtle diet (pellets). After six months the turtle that was fed the commercial diet spent more time basking, didn't hibernate and demonstrated a greater overall growth rate. The turtle that was fed the natural diet did not bask, hibernated, stopped eating and demonstrated a smaller overall growth rate. The results of this study conclude that a commercial diet appears to be better for the overall health and growth of captive turtles.

Ecology and Climate Change

54. BECKER J. and C. SCOTT – Paul V. Moore. **EFFECT OF GLOBAL WARMING ON MINNOWS**. We are testing the effects of an increased temperature on the environment of minnows due to global warming. We obtained five tanks each with a higher temperature than the last, starting at 77 degrees Fahrenheit. We used fat head minnows in the experiment. Only minnows in tanks one and two survived through the first night of the experiment. The minnows in tank one survived for a day longer than the minnows in tank two. This contradicted our hypothesis. This shows that global warming can have a substantial effect on the minnow population. This could possibly carry over into other species of fish and therefore shows that global warming should be controlled.
55. BRIGGS, L. – ESM. **THE AFFECTS OF CLIMATE CHANGE ON PLANT GROWTH**. Climate change is something that can drastically affect us all. Changes in temperature and precipitation, related to climate change, can cause droughts and natural disasters in unexpected locations. Climate change can drastically affect grasslands as well. Grasslands are important for food production and are the homes for many animals. The purpose of this study was to examine the changes in grass (representing the grasslands) in order to show minor climate changes can have profound affects. Two fish tanks, divided equally, were set up with planted grass seed. Each tank contained an area with average moisture and an area with a 20 percent decrease in moisture. One tank was exposed to an increased temperature of about 3 degrees Celsius. At the end of the experiment changes in plant growth from tank to tank will be noted. At the end of the study, changes in overall grass growth will allow others to see climate change as a more serious matter than commonly believed.
56. COLE, M, and A. WAYNE – Chittenango. **THE ERADICATION OF GARLIC MUSTARD INVASIVE PLANTS ARE A PROBLEM ALL ACROSS THE WORLD, AFFECTING FOOD WEBS OF NATIVE PLANTS**. We are trying to control and eradicate the invasive plant, Garlic Mustard on the land of the Sisters of St. Francis in Manlius, New York. Our purpose is so this invasive plant won't ruin any food webs on their land and kill off all of the native plants. We have three different methods we thought up to test whether we can actually get rid of this species on their land or not. Our methods are hand picking, a terrestrial mat and spraying round up. Our plots are 7X10 feet and we have four of them, one for each method and then a control plot. Our control plot has 3 Garlic Mustard stems, hand picking has 101 Garlic Mustard stems, our round up plot has 2 Garlic Stems and finally our terrestrial mat plot has 91 Garlic Mustard stems. Further research

and time of our plots will give us more information on whether these methods actually work. If they do work our plan will be considered successful and we can continue with our plots.

57. **DATTMORE, T. - ESM. CENTRAL NEW YORK SNOWFALL AFFECTED BY EL NINO AND LA NINA OCCURENCES?.** When comparing Syracuse annual, five-year, and ten-year average snowfall totals, along with the Oceanic Nino Index, there were some indications of a possible correlation between El Nino and Syracuse snowfall. The numbers gathered from all three Microsoft Excel graphs indicate that the average snowfall in Syracuse has increased over the past 58 years as seen in the trend lines. From the years 1989-1994 Syracuse broke the annual snowfall record for the most snow twice, and in those five years Syracuse exceeded 160 inches of snowfall 4 times (NOAA). In the previous 37 years from 1951 to 1988 Syracuse only exceeded 160 inches of snowfall once (NOAA). The Oceanic Nino Index represented a strong El Nino occurrence during those 5 years in the tropical pacific (NOAA). In fact the 5-year occurrence of this El Nino was the longest occurrence of an El Nino on record from the years 1950- 2008 (NOAA). In my introduction I mentioned that during El Nino occurrences the Northeast United States experiences warmer and drier conditions during the early winter season months. Based on my finding above this doesn't seem to match. However, during the winter season of 1992-1993 snowfall totals were below average for the months of November, December, January, and February, but well above average for the month of March. In fact, this was the year of the largest snowstorm on record for the city of Syracuse, where snowfall totals topped over 44 inches (NOAA). The results from my research showed me some interesting finds but it is difficult to tell if there is a correlation between sea surface temperatures in the tropical pacific and Syracuse snowfall because there are other factors that mix in such as lake effect snow.
58. **STENGER, K. and A. GALLAGHER – Fabius-Pompey. THE EFFECTS OF INCREASING AMOUNTS OF WATER ON PLANT GROWTH.** Global warming is affecting our climate and more specifically annual rainfall totals. Certain plants such as grasses require a certain amount of water each year to be able to photosynthesize and to grow into healthy green plants. Too much or too little water will result in weak and unhealthy plants. In this study, we looked at the effects of different amounts of water on the growth of grass plants. Our hypothesis states that increasing amounts of water will result in increased grass plant growth and mass. The experiment consisted of three separate grass plant samples receiving 4mL, 9mL, and 13mL amounts of water, consecutively. Each week, one sample was removed from each group and the soil was then carefully removed from the roots. Plants were then dried in an oven and weighted to determine the plant's biomass. Each plant's overall mass was measured along with its above-ground mass and below-ground mass. Our results show that the more water a plant receives, the more they will grow both below and above ground resulting in increased biomass. This experiment supported our hypothesis.
59. **STUMP, J. – OCM BOCES. EFFECTS OF DISSOLVED OXYGEN, pH AND CHLOROPHYLL ON TURBIDITY.** It was hypothesized that if high levels of chlorophyll are found in a water body, this will cause an increase in the levels of turbidity and pH in the water. In Cross Lake and Onondaga Lake samples of dissolved oxygen, pH and temperature were compared to turbidity (level of chlorophyll in this case). It was found that the waters that had higher turbidity also had higher levels of dissolved oxygen and a higher pH. These results are attributed to higher levels of chlorophyll from algae in the water. As plant growth in the water increases, so does photosynthesis which results in higher dissolved oxygen and pH levels.
60. **VANAUKEN, Z. and E. CLARY – OCM BOCES. STREAM WATER QUALITY DETERMINED BY MACROINVERTEBRATES COMPARED TO STREAM WATER QUALITY DETERMINED BY CHEMICAL COMPOSITION.** Composition of water bodies ultimately determines levels of species diversity. This means that is the water quality is high, then organisms sensitive to pollutants will be found there. This also means that lower water quality will contain more tolerant organisms. Using a LaMotte water testing kit, chemical tests were done to determine dissolved oxygen, pH, phosphorous and nitrate levels of Six Mike Creek. At the same site, a kick screen was used to collect macroinvertebrates in order to perform a Hillsenhoff Field Biotic Index (FBI) to determine water quality based on organism tolerance levels. The chemical testing found the dissolved oxygen to be at 8ppm, nitrates at 0, phosphorous at 1 and pH at 7, all of which are in optimal ranges for water quality. The macroinvertebrates collected for the FBI indicated high water quality due to them all being very sensitive to any pollutants in the water. These results indicate that chemical composition of the water does determine levels of species diversity and that chemical testing is the more accurate means of testing water quality. However, macroinvertebrate sampling does indicate pollution levels to some degree.

Ecological Economics

61. **CHRISSELEY, L. and M. CHOPSKIE - ESM. ONONDAGA LAKE: DO THE BENEFITS OUT WEIGH THE COST?** Ecosystem services have continually shown an impact on economies. Onondaga Lake in Syracuse, New York has ecosystem services that impact the economy in and surrounding Syracuse. Of the lake being one of the most polluted in the United States, there are negative externalities as a result. The purpose of this study is to show that a clean up project, which is currently underway, will help to reduce negative externalities while also giving the economy a boost. The hedonic pricing method was used to examine home prices near and away from Onondaga Lake. It was found that home prices increased as distance away from the lake increased. The pllution of Onondaga Lake has had a negative impact on the value of homes surrounding it, which ultimately reltaes to the decrease in the productivity of the economy. Businesses are affected by potential homebuyers tending to stray away from looking at homes near the lake. Museums such as the Salt Museum and St. Marie Among the Iroquois have suffered as a result of the lake's pollution negatively impacting tourism in Syracuse. The obvious solution to solving the economic problems created by Onondaga Lake is to complete the clean up project. The next step is to maintain a clean lake. If people form the Syracuse area neglect the lake as in the past, the same types of problems could reoccur. The economical issues regarding Onondaga Lake can be solved as long as people are willing to cooperate with the clean up process and maintain a clean lake.
62. **PURCELL, K. – Fabius-Pompey. ENERGY EFFICIENCY IN THE HOME: THE INFLUENCE OF ENERGY STAR PRODUCTS.** There has been a considerable amount of research to determine how to save on energy bills and decrease the burning of fossil fuels. Energy Star, a joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy, creates products that are more energy efficient. The average energy bill in New York is \$103.25, while the total money spent on energy bills in Onondaga County is \$11,873,750. By equipping all households in Onondaga County with the Energy Star products, thousands of dollars could be saved on their energy bills, while also helping to protect the environment. Televisions, ceiling fans, refrigerators, clothes washers, and dehumidifiers are some of the many products that can help homeowners. Televisions could save 35% of their energy usage, ceiling fans could "pay back" the consumer in about 2.8 years, refrigerators could save 45-55% of their energy used, clothes washers could save 50%, and dehumidifiers are about 10% more efficient than other brands. These are only a few of many items that are economically and environmentally more efficient. This proves that the hypothesis of Energy Star products decreasing energy bills and be more environmentally friendly is supported.

63. SIRAGUSA, B. and A. LAWSON – Liverpool. **A STUDY IN THE CAUSES OF BEHAVIORAL MODIFICATION IN TEENAGERS IN REFERENCE TO GAS CONSUMPTION.** Much of the hope of the modern environmental movement is vested in the youth of the world. This is because of the assumption that young people are receptive of new education in the scientific lessons of the consequences of human effect on climate change. Although there has not been much research done in the specific area of high school student gas consumption, there has been ample inquiry made into the question of what kinds of transportation are most sustainable. Previous research showed that most people choose convenience over sustainability in transportation. We aimed to establish if this trend was true of students as well, but the main purpose of this study was to determine the causes of this trend in students. Our hypothesis stated that if students perceived gas consumption as an environmental problem then they would be less likely to change their consumption habits than if they perceived gas consumption as an economic problem. We tested this by surveying student drivers in Liverpool High School. Although students do recognize the problem of energy consumption, their motivations for becoming more sustainable are usually economic. These results indicate that in order for people to reliably behave sustainably they have to be confronted with economic incentive. This can mean either that government must impose economic incentive on people, or people will naturally convert to sustainable behavior when the world's supply of cheap oil runs out, regardless of whether or not the technology to allow a smooth transition exists.

Ecological Footprints and Energy Audits

64. FEENEY, M. – Fabius-Pompey. **THE EFFECTS OF COMPUTERS AND LIGHTING ON THE ENERGY CONSUMPTION AND EXPENSES AT FABIUS-POMPEY HIGH SCHOOL.** In general, there is a tendency towards inefficiency in the ways we use electricity and other energies. There are a couple of different sources where the energy, or money, in a sense is just leaking out of our schools and homes. So, that is why I have proposed to find out how many computers are left on overnight during the school year, as well as how many people turn their lights off when not in the room. At Fabius-Pompey MS/HS, anywhere from \$13,000 to \$20,000 is spent on electricity monthly, and that is just for the electricity grid. So, if our schools were a little more efficient in the way we use our computers and our lighting systems, potential savings could be made. This not only makes people within the district happy by lowering their budget, but it also has a deeper ecological effect. First off, the majority of the electricity we get is created by coal plants. Burning coal creates many ecological problems, seeing as it produces quite a bit more CO₂ than burning oil does. There are other, more ecological ways of producing electricity; it's just that coal burning is the easiest and most effective way. So, every little bit of energy saved could potentially go a long way to saving our environment.
65. HERMNEUWOEHNER, M. and K. LANE – LaFayette. **GERMAN AND AMERICAN CLOTHING FOOTPRINTS.** This project is a comparison between American and German high school students and their purchasing of clothes. We asked 10 students in Lafayette, NY and Hoevelhof, Germany to answer a survey about their shopping habits. The survey concluded questions about clothing footprints assessing personal preferences and trends.
66. PERKINS B. – Paul V. Moore. **ENERGY CONSUMPTION.** I decided to figure out how much energy an average household wastes a year in their energy consumption. I also decided it would be important to find out how much money the wasted energy cost. The average household uses a lot of energy by leaving things plugged in when not in use. This eventually leads to about a \$100 extra dollars you pay in you bill at the end of the year. This adds up to 8% of your energy used being a waste. I found out most of my information by using calculators and finding the research through electric companies.
67. RANDALL, A. – Fabius-Pompey. **THE FEASIBILITY OF ONONDAGA COUNTY SWITCHING TO HYBRID CARS.** There has been a considerable amount of discussion on the benefits of hybrid technology considering the harmful CO₂ emissions that are released daily due to the burning of fossil fuels and the operation of gas-powered cars. Hybrid cars, such as the Toyota Prius used in this experiment, have been shown to reduce CO₂ emissions in the atmosphere; however, the public is generally misinformed on the benefits that hybrid technology really offers. I hypothesized at the beginning of my research that if the entire population of Onondaga County switched from gas-powered cars to hybrid technology, then there would be significant environmental benefits. This researched information is highly important since we are facing a global crisis concerning the increasingly limited supply of oil around the world. After research, my hypothesis is not supported because hybrid cars, such as the Toyota Prius, are only temporary solutions to the emergent environmental issue concerning the burning of fossil fuels. It is not only impractical for an entire population to switch from gas-powered cars to hybrids, but unfeasible as well considering the vast economic costs the switch would entail. Also, the environmental benefits would not be as significant as most are coaxed into thinking. Having been an issue for more than forty years now, the debate over oil and alternative energy has plagued politics, economics, and the everyday lives of individuals around the world simply because we are highly dependent on the energy produced using oil. The results of this study are both important and eye-opening to the public about the dangers of CO₂ emissions and it is important to know just what those benefits of hybrid technology really are before a population makes the change to alternative energy use.

Pollution and Remediation

68. DODGE, K. – Fabius-Pompey. **STREAM CHEMISTRY OF BUTTERNUT CREEK.** Water chemistry is extremely important to the health of the stream and the organisms that inhabit the stream. The runoff from the surrounding land greatly affects the stream's chemistry. Most of the contaminants in this runoff are present do to the activities of people. Different contaminants affect the stream in different ways. Many of these contaminants came from road and agricultural runoff. The levels of these contaminants affect what organisms can live in the stream, or how well they can live. My study focuses on several locations of Butternut Creek in Jamesville, New York. The data was collected between 1997 and 2008. My data was collected from <www.projectwatershed.org>, which monitors many waterways throughout the country with the help of volunteers. My project focuses on the streams nitrate, chlorides, and phosphate levels, and what other chemical levels it effects.
69. MURPHY, A. J. – Fabius-Pompey. **A COMPARISON OF SNOW ACIDIFICATION TO SOURCE REGIONS OF WEATHER SYSTEMS.** Acidic precipitation has been responsible for the die off of many plants and increased acidity in lakes that led to the die off of many species of fish. Acidic precipitation comes mainly from factories producing greenhouse gases, mainly sulfur dioxide. So where does the most acidic precipitation come from? My methods include collecting samples of newly fallen snow, melting it down, and testing the pH of the water. This along with the tracking of the snow systems of which it came in I can determine which region of the country produces the most greenhouse gases. I found that the acidity levels of snow from all samples were higher then I had originally predicted. However, my thesis was correct in that the snow from the Midwest was more acidic the lake effect snow. The significance of my finding is that overall we need to decrease the amount of greenhouse gases let into the atmosphere that will lead to acidic precipitation. If we can do this, then we can

reestablish the plants and fish that died off as a result of acidic precipitation, and maintain that environment for our future generations to enjoy.

70. MURPHY, T. and M. HARTMAN - Paul V. Moore. **THE EFFECTS OF PH ON MARINE LIFE.** The effects of Acid rain have been very severe especially here in New York. Acid rain is made when plants western of New York and the New England region omit there air pollutants, mainly sulfuric acid, which combines with a cloud to form what is called an acidic cloud. That cloud then travels east to our state and neighboring states and release the acid rain. The acidic water stays in our lakes and pollutes the water. The acidic water in effect makes fish smaller and vegetation weaker. For our research we went to local lakes, Oneida, Onondaga, Skaneateles, and took research from lakes in the Adirondacks like Blue Mountain, Bonaparte. Our hypothesis was that the farther north we went that the lakes pH levels would decrease. We found that the information we found about these lakes coincided with our hypothesis. The local lakes had a pH level of a modest 5.5-6.5, which is relatively decent for a normal lake that the range begins at 6.0. While the Adirondack lakes were surprisingly as low as 4.0, which is devastating to marine life. While doing research on the effect of pH levels on fish we found that the average largemouth bass in the Adirondacks were an astounding five inches shorter on average than those in Florida and Texas. While still an average of two inches smaller than Pennsylvania's. In summation our research has shown that pH levels in our states water are affecting the size of fish and other marine life.
71. PELLICHET, R. and S. DENNIS - Henninger. **THE EFFECTS OF ALCOHOL ON ANTS BEHAVIOR AND THEIR ABILITY TO TUNNEL.** Alcohol is a mind altering chemical that affects humans as well as many animals. We plan to observe how alcohol can affect ants. Alcohol can cause disorientation, disruption of certain functions as well as other side effects in humans. (Maze 2006) Ants, however, are very different from humans; would they be affected by this drug in a similar way? We chose this experiment because it relates to how people can adversely affect the environment. When pollutants enter the environment, such as alcohol in this situation, they can negatively impact the lives of different organisms. Ants build tunnels for their homes and this is what we plan to observe and compare. We will use two groups of ant farms to view the tunnels, with one group receiving alcohol while the other only water. The ants will be given equal water and food and for the group that receives alcohol, we will dilute it into the water they receive daily. To compare the tunnels we're going to trace them and measure the lengths to determine the more successful group. The group whose tunnels are longer would be considered successful. We believe that the alcohol group will become disoriented, therefore causing their tunnels to be shorter and less stable than the control group.
72. SALISBURY-RUF, C. – Liverpool. **PLASTIC AND THE WAY IN WHICH IT DECOMPOSES.** Plastics (plasticus) are used frequently in everyday life situations yet they end up getting thrown away after they are used. Plastic never breaks down completely and can only be recycled so many times before it is thrown out. Studies suggest that it takes longer for plastics to break down than for us to use them and this creates a large environmental impact and there only certain conditions that plastic can break down in. I believe that biodegradable plastic decreases in mass than non-biodegradable over a given time. In order to show this I degraded both groups to see if there is a significant difference under the conditions of heat, water, uv light, and soil. Although they were both hard to break down the results show that it would be better for the environment if we used bio-degradable corn based plastic. The corn based packing peanuts dissolved completely in after two weeks in water when the standard Styrofoam peanuts remained. The question is, is biodegradable plastic better than non-biodegradable plastic? I believe that it is.

Sustainable Food Production

73. INFANTINE, G. – Chittenango. **PLANT GROWTH IN SOIL MEDIUMS.** There are many different ways farms grow crops in order to produce as much as possible. There are different opinions of the best form of growth and what the certain plant should be grown in. I wanted to know what medium would be best for growth in basil plants, using a split-root system. Using mediums including water, soil, vermiculite and styrofoam I grew plants for two weeks to find how much biomass was accumulated. Keeping the sunlight the same and same amount of water in each plant showed how much growth the plants amassed under the same conditions. I found that the split-root system of soil and water helped the plant gain a higher average of biomass than the other experiments.



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