

Godzilla. Poster. Los Angeles: Legendary and Warner Brothers Pictures, 2014

**MARINE BIOLOGY
SCIENCE RESEARCH PROGRAM
2018**

PROGRAM

10:00 AM	Poster Board Set-Up in Hallways	All Marine Research Students
11:00 AM	10 th Grade Practice Judging	Marine Research Juniors & Seniors
12:00 PM	10 - 12 th Grade Judging	Adult Volunteers
03:00 PM	Students Move Posters to Mess Hall	All Students
03:10 PM	Group Picture in Basketball court	All Students and Adults
03:20 PM	Lunch	Students in 320 Adults in Mess Hall
03:45 PM	Report to Mess Hall	All
04:00 PM	Introduction and Welcome	Dr. Jeffrey Chetirko, NYHS Principal
04:00 PM	Introduction of Keynote Speaker	MCs
04:10 pm	Keynote Address	Maura Smotrich, RA
04:30 PM	Introduction of Student Speakers	MCs
04:32 PM	Microfibers: A marine catastrophe with a simple solution	Matthew Chiu NYHS Class of 2018
04:37 PM	The percent coverage of biodiversity on ECONcrete compared to the Harlem sea wall	Nicholas Ring NYHS, Class of 2018
04:42 pm	The biodiversity and species richness of invertebrates in the New York Harbor	Nailea Rodriguez NYHS, Class of 2018
04:47 pm	Cloacal vs. jaw swabs: A novel technique to genetically determine shark diet	Isabella Torres and Seth Rivera NYHS, Class of 2018
04:50 PM	Awards Ceremony	Presented by Mauricio González
05:35 PM	Closing Remarks	Mauricio González & MCs
06:00 PM	Ferry Departs to Manhattan	

MARINE BIOLOGY RESEARCH PROGRAM

Seniors

Project Titles

Angia Alvarenga

Geographic Information Systems

Christopher Bell

Myco-Buoys- Testing the durability and longevity of different mycelium buoy compositions

Phillip Bloom

Linux

Marcus Charles

Geographic information systems tools (GIS) and processes

Matthew Chiu

Microfibers: A marine catastrophe with a simple solution

Julien Olivier

Living Breakwaters

Nicholas Ring

The percent coverage of biodiversity on EConcrete compared to the Harlem sea wall (Hudson River-Raritan Estuary, 2018)

Seth A. Rivera

Cloacal vs. Jaw Swabs: A novel technique to genetically determine shark diet

Nailea Rodriguez

The biodiversity and species richness of invertebrates in the New York Harbor

Malik Taylor

Compost tea and radish experiment

Isabella Torres

Comparing the results of cloacal and mouth to determine the best and least invasive sampling method for adolescent sharks in the NY Area

Jared Vittore

Learning to make and understand maps by using ArcGIS and Arc Catalog

Tony Zhu

Distortions on 2D maps

Juniors

Project Titles

Aaniyla Allen

Your friend the microbe: Comparing the frequency, and concentration of *Enterococcus faecalis* among five different sites in the Hudson Raritan Estuary

Hailey Ayala

Using geographic information system to support sustainable/green technology

Cyd Bloomfield	The biodiversity, through genetic barcoding, of marine macroinvertebrates in the Hudson
Rosalia Elslamony	Geographic Information Systems
Chantal Hernandez	Geospatial technology for biodiesel company
Garry Jenkins	
George May	Great White Sharks
Leo McGuinness	Plankton vs. plastics
Ashley Onofre	Geographic Information Systems
Yosneidy Peralta	
Lauren Salitan	The effects of chlorine exposure on oyster larvae development and growth
Hildey Sierra	Using geographic information system to support sustainable/green technology
Chelsea Sumba	Using GIS to assess woody biomass potential for sustainable renewable energy

Sophomores

Project Titles

Caleb Black	Human contamination of an aquatic ecosystem model
Destiny Coley	Species richness of macroinvertebrates within the lower Hudson River-Raritan
George Desjarlais	Global diversity and review of <i>Siphonophorae</i> (<i>Cnidaria: Hydrozoa</i>)
Madelaine Dominguez	How do we maintain an aquatic ecosystem model?
Jonah Florholmen-Bouman	Peer-Reviewed Journal Article
Malik Ford	Carbonate precipitation in brine - a potential trigger for tropospheric ozone depletion events
Dylan Hom Constable	The effect of natural environment on antibiotic resistance on gram-negative bacteria
Isabella Karsch	GIS Careers
Wali Khan	Factors affecting the procurement of pharmaceutical drugs: A case Study of Narok County Referral Hospital, Kenya
Quinn Lavelle	Tool use in fishes

Susan Look	Ammonia in drinking water
Randy Maharaj	How to keep organisms alive in an aquatic ecosystem model
Daniel Martinez	
Willa Vy McAbee	The importance of touch in development
Brian Mejia	A review of the uses of work-class ROVs for the benefits of science: Lessons learned from the SERPENT project
Lisette Mejia	Barcoding different phenotypes of colonial sea squirts (<i>Botryllus schlosseri</i>)
Jacqueline Obermayer	The Success of constructed oyster reefs in no harvest sanctuaries: implications for restoration
John Quentin Seery	City Cetaceans: "Thaar She Blows" in NY
Sunita Siegel	Oyster reefs used as a breakwater to protect nearshore habitats
Shanyalee Rodriguez	The impact of environmental factors on marine turtle stranding rates
Tyler Scott	Banking biodiversity: Fundamentals of environmental economics
Quentin Seery	Whales in NY Harbor
Giles Walsmith	Promises, facts and challenges for carbon nanotubes in imaging and therapeutics
Ronnie Warren	Aquatic Ecosystem Models

KEYNOTE SPEAKER



Maura Smotrich is currently a Housing Policy and Community Development Analyst for the City of White Plains, New York, Planning Department. She previously worked as Project Manager for the Esplanade for CIVITAS Citizens, From June 2013 through May 2017. Maura holds a bachelor's degree in Pre-Architecture, a Master's in Architecture, and is about to complete a second Master's in Urban Planning. As Project Manager for the Esplanade, she managed a community-based planning initiative for Re-Imagining the East River Esplanade. During her tenure at CIVITAS, she oversaw development and implementation of all other facets of the CIVITAS East River Esplanade Vision Plan developed in conjunction with Mathews Nielsen Landscape Architects and released in

February 2015. The Vision Plan received an Honor Award from the American Society of Landscape Architects, New York Chapter (March 2016). She was co-developer and manager of a study, in collaboration with the Urban Assembly NY Harbor School's Marine Biology Research Program, to measure the baseline and feasibility of the restoration of an ecological edge along the lower Harlem River in East Harlem. As part of the collaboration, she co-authored the Citizen Science Hudson-Raritan Estuary Restoration Research Quality Assurance Project Plan with Mauricio González, Department Chair of the Marine Biology Research Program at the NY Harbor School. As a licensed architect, Smotrich practiced architecture prior to working as an urban planner at CIVITAS and analyst for the City of White Plains, New York.

SENIOR ABSTRACTS



Christopher Bell

Project Title Myco-buoys: testing the durability and longevity of different mycelium buoy compositions

Mentor Sue Van Hooke, Mycologist, Ecovative Design Project

Advisor Mauricio González, M.Sc., NYHS; Liz Burmester, PhD, Billion Oyster Project

Abstract This Projects tests which “mycobuoy” composition has the best sustaining durability in an aquatic environment. Mycelium is currently being used as a cutting-edge biomaterial. Mycelium is beneficial in various ways such as recycling nutrients from the environment they rest in, aquatic or terrestrial, rather than adding to the pollution. Mycelium buoys also degrade and break down while in water, therefore making safer for the environment. This may seem bad for being a buoy, but since these are being composed as fishing net buoys, they sustain well enough as fishing nets are only released in the water for a couple of weeks - a season, at max or are lost at sea! Mycelium buoys can last at least 1 month after initial degradation starts. There are 4 different buoy compositions all including mycelium fines: one with a different epoxy, and one with a different mixture that was pressed with the mycelium fines. The buoys were attached to oyster cages along the Harlem Sea Wall for approximately four months to test the buoys durability. It was found that the “HK buoys” showed the best overall durability and longevity compared to the other composites.

Biography Christopher Bell is a senior Marine Biology Independent Research Student. Throughout his 4 years at The New York Harbor School, he has maintained a 90+ average in every semester at the school. He also enrolled in a various amount of college courses from Marine Biology such as Oceanography through SUNY Stony Brook, Independent research college credits from SUNY Albany throughout various school years/summers, and more! This student also enrolls in the Varsity Soccer Team in his senior year at the New York Harbor School. Another after school program he is enrolled in is the Citizen Science Group, Harbor Seals. This comes with lots of internship and job opportunities as well as leadership skills and good group work skills. Christopher is going into college for subjects with a baseline of science, but also would like to explore fields in design and entrepreneurship as well as stuff like business and marketing. Some of his interests are skateboarding, surfing, as well as making/customizing apparel. Overall Christopher shows plenty of strong skills and characteristics and enjoys all aspects of his scientific research.



Phillip Bloom

Project Title Learning Linux to a tee

Advisor Mauricio González, M.Sc., NYHS

Abstract Linux is an open source operating system invented by Linus Torvalds and managed by the open source community. Linux allows full accessibility and customization of its system as a whole, hence why many hackers and programmers use it. Learning Linux was not easy and it still

isn't easy because you never stop learning. First there was my transition from the Windows community to the Linux community. I had never touched a terminal window until 3 years ago even then that was in a windows system and it was to change the color of text. Linux was different, touching the Linux command line meant your input went directly to the operating system, something Windows restricts completely, this was the equivalent of giving a kid keys to a car. I had full control of what I want my computer to do and with that knowledge alone fueled me to progress on this project. I started spending my time reading as much as I could on how to use the command line, what is a kernel and its functions in Linux, how to maintain the operating system as whole by managing updates, mounting file systems, how to troubleshoot network problems and even system problems should I come across them. My project is my journey into Linux, the long stressful hours spent troubleshooting problems and the rewards I gained from this. Ethical Hacking is my passion, and in order to pursue it, an extensive amount of knowledge on operating systems, programming languages, networking, and even problem solving is required. Linux is the operating system of the internet learning how to use it and configure it will help me get closer to the goal.



Marcus Charles

Project Title Geographic information systems tools and processes

Mentor Mauricio González, M.Sc., NYHS

Abstract ArcGIS is a mapping software that projects the physical world into a digital one. This feature allows us to break the world up into separate layers while also giving us the freedom to add and subtract layers as you please, this makes the software very useful because of its versatility. Now you can cater the map to your need with just a few clicks of a button. This year in the GIS

curriculum we explored many of the advanced tools and processes associated with professional map making using the ArcGIS software. We had to use many Geoprocessing tools in order to change the map's base, and clip various layers together in order to condense information. We learned how to take public information and input it into ArcMap after altering it to make it compatible. Another key lesson was dealing with setbacks, in various lessons there were software failures which my peers and I had to find solutions to, but one step at a time allowed us to bypass many of the problems we had with this cutting-edge technology. We are all looking forward to becoming GIS certified in the coming months.

Biography Marcus Charles is a 17-year-old senior at the Urban Assembly New York Harbor School. He is a member of the Marine Biology Research CTE and one of the highest performing GIS students in the program (2015-Present). Marcus has won first place twice in the Marine Biology Science Symposium, once in his Sophomore year and again in his Junior year. Marcus is a founder and co-captain of the Harbor School Chess Team (2016-Present). Marcus is a strong problem-solver and leader who has led groups of citizen scientists out on the Harlem River for data collection in an effort to restore the sea wall, as part of a 3-year project with the Marine Biology Research Program's after school citizen science team, Harbor Seals (2015-Present).



Matthew Chiu

Title Microfibers: A marine catastrophe with a simple solution

Mentor Rachael Z. Miller, Founder, Rozalia Project for a Clean Ocean

Advisor Mauricio González, M.Sc., NYHS; Liz Burmester, PhD, Billion Oyster Project

Abstract Microfibers are one of the leading pollutants in today's society. During the washing process, tiny fibers that make up our clothing are released into our waterways. Marine organisms end up consuming these fibers. When fisherman catch these organisms so that chefs prepare them for consumers to eat, we are eating our own clothing. In this study, I aim to upcycle microfibers, commonly known as dryer lint, and create clothing. Microfibers were collected from New York City residents ranging from all boroughs. Specifically, hats were made. Three prototypes of hats were made, all from mostly similar techniques, although varying by different materials. Prototype 2 posed as the greatest success, although prototype 3 possessed the greatest potential in making a new hat. Prototypes 1 and 2 were created with Coloration's Glue, while prototype 3 was made using a homemade, organic glue, including a completely organic dye. It seems as if it is highly possible to make a hat by upcycling microfibers and other materials.

Biography Matthew has been a part of several clubs and teams in his career while attending the New York Harbor School. These clubs and teams include the Harbor SEALs (2014-Present), the Rowing Team (2014-2015), the Sailing Team (2016-Present), the Chess Team (2016-Present), the Harbor Corps (2015-2017), and the Robotics Club (2014). Within the Harbor SEALs, a spotlight group bringing together Citizen Scientists to monitor the health of the Hudson River Estuary led by NYHS students. He has focused on data management in collecting raw data, inputting data into databases, and analyzing the data for trends. He was part of the Rowing Team as a competitor in local regattas. His team led the NYHS to a second-place victory for a VCB local regatta. He was a competitor in local sailing regattas, as well. Matthew held charge of the jib and genoa sails. In the fall of 2016, he founded the Chess Team at NYHS with his good friend Marcus Charles. Since then, they have led the team to two top ten victories in the state tournament each year in March. During his Sophomore year of attending the Harbor School, Matthew decided to join the Harbor Corps, a student led group which allows all CTE's to come together and collaborate and share progress within each of the CTE's to further the Billion Oyster Project. While he is no longer part of it, he has helped create the founding laws and guidelines for future years of the club.



Nicholas Ring

Project Title The percent coverage of biodiversity on EONcrete compared to the Harlem Sea Wall (Hudson River-Raritan Estuary, 2018)

Mentor Jim Lodge, M.Sc., Hudson River Foundation

Advisor Mauricio González, M.Sc., NYHS; Liz Burmester, PhD, Billion Oyster Project

Abstract The Harlem River sea wall is in a state of disrepair. The wall is made of Portland cement, and with a pH of 13, it does not support healthy ecosystem development (Perkol-Finkel & Sella 2014). EONcrete was made to be more supportive of a biodiverse ecosystem (Perkol-Finkel & Sella 2014). In order to see if EONcrete would be a better building material to use when compared to the current sea wall, several EONcrete disk were suspended on the Harlem River sea wall for a year. This experiment will be looking at the biodiversity of the intertidal zone on the Harlem River (Figure 01) of species on building materials, the sea wall, and EONcrete disks were then compared. The disks were attached to structures designed to hold them against the current sea wall and deployed in the Harlem River (under the Words Island Bridge, E116th Street). The EONcrete disks were photographed after, and the different species present were recorded. Then using Coral Point Count (Nova Southeastern) It was found that the sea wall as it stands has an extreme lack of growth, with an average of 0.5 species per square foot found on the wall, compared to an average of 6.4 different species on the eight EONcrete disks, each with a surface area of approximately 350 square inches. There were also seven species found only on the EONcrete disks and not on the sea wall. These results demonstrate that EONcrete supports a higher level of biodiversity when compared to the current Harlem River sea wall and should therefore be considered as the primary building material in upcoming coastal architectural projects.

Biography: In the past four years Nicholas has done everything he could to dive into the Marine Biology field. These efforts include, the Co-project manager of the Harbor seals, two-time first place winner at the 2016 and 2017 Harbor School symposium, and after presenting at the NYCSEF and NYCSEF Finals he has seen a lot of what the field of Marine Biology field has to offer. Nicholas is still diving deeper into it head first. Nicholas does volunteer work wherever he can. Nicholas has almost eight hundred and eighty volunteer hours at the Prospect Park Zoo. In this position he has thought children subjects such as: Plastic pollution, recycling, bats, how to be a zoo keeper, and many more. Nicholas has interned at Coastal Classroom where he taught kids about life in the Hudson River. Nicholas also volunteered to run the New York City Marathon as an Achilles athlete guide, helping a recovering quadriplegic run 26.2 miles in nine hours.



Seth A. Rivera

Project Cloacal vs. jaw swabs: A novel technique to genetically determine shark diet

Mentor Greg Metzger, Teacher and Researcher, South-Hampton Schools and Long Island Shark Collaboration

Advisors Mauricio González, M.Sc., NYHS, Christine Marizzi, PhD, Cold Springs Harbor Laboratory and Urban Barcode Project, Daniel Elefante, Lab Assistant,

South-Hampton Schools, Liz Burmester, PhD, Billion Oyster Project

Abstract Sharks are known to be carnivorous through the diet that they eat. That diet analysis was originally through conducting a devastating lethal method known as Gastric lavage. While effective, it caused cardiac arrest and other physical problems. To improve the sampling of larger, specifically chondrichthyan fish, and cut the invasiveness of the common procedure, two other procedures were used: mouth swabs and cloacal swabs. DNA Barcoding was used to analyze the samples. Two white spotted bamboo sharks were proxies for the great white shark population around the Long Island bay area. They were the sources of data. DNA barcoding was successful, showing several bands in the gel and certifying that there was DNA purified and inside both the saliva and fecal matter of the sharks. The samples did not have successful sequencing, not allowing specific analysis of the diet of the sharks, leading to several possible conclusions and plausible realizations.

Biography Seth is a student that has been part of several out of school activities including the Rowing team (2014-Present), a strong team made for training people in seafaring, physical strength and endurance, and leadership. In addition, he has been part of activities that have dedicated him to sailing and research, such as the NYHS/ HRCS sailing team serving as co-captain, Harbor SEALS where he was captain for the physical chemical parameters group. Seth's work experience includes working for the Harbor Seals, learning and teaching methods for sampling and analyzing the physical and chemical parameters of both the New York Bay and the Harlem River, working for the Friends of Governors Island, speaking to visitors and tourists about several programs that occur on the island and leading tours to historic sites around the island. Seth also has experience also working at Serrat Metal and welding, casting, carving and cutting, grinding and polishing, refurbishing, smelting and forging metals to create forms, fences, doors and different applications for metal. Seth intends to work on Pier 40 for a non-profit organization building and fixing wooden and fiberglass rowing boats, oars, and all other things included in rowing boats.



Nailea Rodriguez

Project Title The biodiversity and species richness of invertebrates in the New York Harbor

Mentor Nikos Konstantinides PhD, NYU

Advisor Mauricio González, M.Sc., NYHS; Liz Burmester, PhD, Billion Oyster Project

Abstract Habitat complexity is reduced when natural estuarine shorelines are replaced with concrete seawalls in highly urbanized regions (Levinton, 2015). In order to determine if

spatial complexity increases the biodiversity of invertebrates inhabiting the Estuary, different cage set-ups were deployed: 01) the experimental cages had eastern oysters and blue stone rock and 02) the control cages were empty. The invertebrates found in the control cages were barnacles, amphipods, sponge colonies, and tunicate colonies. The invertebrates found in the experimental cages were barnacles, tunicate colonies, amphipods, sponge colonies, oyster drills, mud crabs, glass shrimp, sea squirts, and slipper shells. There was a higher biodiversity in control cages due to more species evenness but a higher species richness and abundance on the experimental cages. These results support the hypothesis that the presence of spatial complexity in the form of oysters and blue stone rock in an environment promotes a higher species richness of invertebrates.

Biography Nailea Rodriguez is 18 years old senior at the New York Harbor School. She is an immigrant from Dominican Republic and has lived in the Bronx since she was 9 years old. Since she was a young girl she has had a passion for science, for animals, and for research. This is why she is part of the Marine Biology Research Program at the New York Harbor School. In this program, she has focused on her independent research project: “The biodiversity and species richness of invertebrates in the Harbor Estuary” which she just recently finished in December 2017. Nailea went on to win 2nd place at the New York Science Engineer Fair (NYCSEF) 2018 with her independent research project. Nailea will be starting as a freshman at Bard College in the fall semester of 2018. In which she will be majoring in Biology. She will use her past research experience in the marine biology field to help her achieve her dream of one day becoming a doctor.



Isabella Torres

Project Title Comparing the results of cloacal and mouth to determine the best and least invasive sampling method for adolescent sharks in the New York area

Mentor Christine Marizzi, PhD, Lab Manager, Cold Springs Harbor Laboratory and Urban Barcode Project, Daniel Elefante, Lab Assistant, South-Hampton Schools

Advisors Mauricio González, M.Sc., NYHS; Liz Burmester, PhD, Billion Oyster Project

Abstract Sharks are known to be carnivorous through the diet that they eat. That diet analysis was originally through a devastating lethal method known as gastric lavage. While affective, it causes large amounts of stress as well as cardiac arrest. To improve the sampling of specifically chondrichthyan fish, and cut the invasiveness of the common procedure, two other procedures were used: mouth swabs and cloacal swabs. DNA Barcoding was used to analyze the samples. Two white spotted bamboo sharks were proxies for white sharks. The DNA barcoding was successful through purification. Through sequencing there weren't as many promising results.

Biography Isabella is currently a senior at the Urban Assembly New York Harbor School. She is part of the Marine Biology Research program, which allows students to earn college credit and gain advanced marine biology skills. Isabella was given the opportunity to branch out and discover our independent research projects. Along with her partner, she worked on her research for two years, and was given the opportunity to participate in NYSCEF, the biggest science fair in New York City, preliminary rounds. Besides working on her project, through the research program, she has been given the opportunity to work with not-for-profit organizations such as: CIVITAS and Harbor SEALS (a citizen science organization that teaches students advanced marine biology skills). She has also worked with The Nature Conservancy (LEAF) in which she was stationed in Rhode Island and worked as an intern. While juggling marine research, she has also been a part of the rowing team at New York Harbor School. Her boat consists of an all-female crew and they have worked hard to accomplish 1st and 2nd place in competition.



Jared Vittore

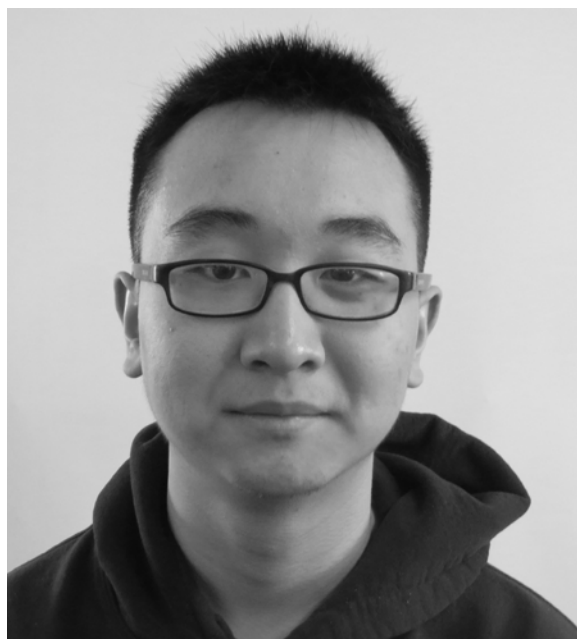
Project Title Learning to make and understanding Maps by using Arc GIS and catalog

Advisor Mauricio González, New York Harbor School

Abstract The GIS curriculum has taught me how maps are created using data gathered by other sources. The work that I've done is based on the lessons in the curriculum which requires me to make maps, answer questions on the information given or a group review of the lesson. Currently the lessons I'm working to complete are teaching me how to use Arc catalog. Arc

catalog is used to organize different geographic information for Arc GIS. This curriculum will eventually show how to create original maps without having to use data given from the textbooks. Overall there has been a lot to learn from the program and it has gave me tools to create maps using other forms of data such as vector or raster. While I am not looking to pursue this field after this year the skills I have gathered from the lessons could benefit me in the future.

Biography Once upon a time there was a boy named Jared who joined the Marine Biology CTE the beginning of Sophomore year. He remembers being excited to pursue his own research project, but he wasn't sure what topic he wanted to research. He ended up working on a project based on the genetics of algae sampled in the waterways of New York. That project took him and his partners on the project to places around Manhattan, competing in the urban barcode project and working in a sequencing lab on East 121st Street. That first year of CTE was full of memories which included moments of hard work to get our project ready to present at MBRP and school symposiums. Throughout his time in this school Jared has been a part of fishing club (2014-15) where he would go out after school to fish off Yankee pier on the island, and Harbor sharks (2017- present) – he is a player/ team manager of the school's basketball team. He was also part of an internship where he took GIS lessons at Bronx community college during the beginning of senior year. He is hoping to pursue a career in social work despite all the work he completed in science and GIS. Jared is looking forward to moving on and using these skills learned in the marine biology program in the future since it has prepared him for the next step. His achievements have included 1st place in the school symposium and the GIS internship completion.



Tony Zhu

Project Title Distortions on 2D maps

Mentor Mauricio González, M.Sc., NYHS

Abstract Maps are not perfect replicas of Earth. Look at any map of the world and you will see distortions of the size and shape of the different continents. This effect is going to occur with any map out there, since trying to turn a ball shaped planet into a flat piece of paper is going to require some stretching of some kind. However, the good news here is that there are ways to lessen distortions on maps. Projections and

Coordinate Systems are created as a way to alleviate distortion in a specific area of a map. This solves one problem but also creates another: when working with data in Geographic Information System (GIS) different data can have different projections and coordinate systems, which when working with GIS can create a problem of its own. Thankfully in GIS there is an automatic tool know as transform that alerts and changes differing coordinate systems.

Biography Tony Zhu has been a part of the MBRP for 3 years, where he has been learning about GIS (global information systems), among other things. Since sophomore year, Tony has been working to get into the Science Research Mentoring Program (SRMP) in the Museum of Natural History. In his Junior year in high school, he was accepted into the program. Tony is now an intern through SRMP, working on classification of Brown Dwarfs, and by the end of his time there he will be a Pinkerton Science Scholar. Currently he is also working on getting a GIS (Geographic Information System) license by the end of June 2018. By June, he will be finished with his GIS curriculum. Some of his favorite subjects are History, Economics, and Science. In college he hopes to pursue a major in Civil Engineering.

JUNIOR ABSTRACTS

Name Hailey Ayala

Project Title Using geographic information system to support sustainable/green technology

Advisor Mauricio González, NYHS

Abstract A Geographic Information System (GIS) is a type of system used for storing and manipulating information on a computer. It can be used to capture, store, manipulate, analyze, manage, and present all types of spatial or geographical data. This project will show how geospatial technology can be beneficial to conservation biology by mapping out areas that will and will not affect local wildlife. This map is set in the state of North Carolina, where the Bald Eagle is considered threatened, and where Harperella plants, which are endangered at both state and national levels, were found. The problem at hand is finding where we can build that will not affect either species.

Name Aaniyla Allen

Title Your friend the microbe: Comparing the frequency and concentration of *Enterococcus faecalis* among five different sites in the Hudson Raritan Estuary

Mentor Michael McCann, PhD, Urban Marine Ecologist with the Nature Conservancy,

Advisors Mauricio González, M.Sc., NYHS; Liz Burmester, PhD, BOP; Rob Buchanan, BOP,

Abstract When it rains a tenth of an inch, raw sewage is released along with billions of harmful bacteria and chemicals which then flow out into local waterfronts and beaches. Combined Sewer Overflows are systems that discharge raw sewage and storm water into local waterways. The purpose of this project is to determine the concentration and frequency of *Enterococcus faecalis* using the IDEXX Enterolert method, among five different sites along the lower Hudson River. Depending on the location and recent weather it is hypothesized that the concentration of *Enterococcus faecalis* will vary. Furthermore, when there is wet weather on previous days the amount of *E. faecalis* will be higher than on previous days that has dry weather. Results will be used to educate the surrounding communities on the concentration and frequency of this commensal bacteria and why it is very important to upgrade our sewage system.

Name Cyd Bloomfield

Title Biodiversity, through genetic barcoding, of marine macroinvertebrates in the Hudson Raritan Estuary along a salinity gradient

Mentor Elizabeth Burmester, PhD, Billion Oyster Project, Governors Island

Advisor Mauricio Gonzalez, M.Sc., Marine Biology Research Program, Governors Island

Abstract This project is a study to observe the possible correlation between salinity and marine macroinvertebrate biodiversity and to collect a baseline of marine macroinvertebrates in the New York Estuary. Finding the biodiversity of New York's Harbor through bioinformatics will increase the knowledge of the New York Estuary's overall health. If the Harbor's health is known, steps can be taken to improve it, and as a result of that, citizen health will improve. The problems being addressed with this study are: is there a correlation between salinity and biodiversity, and what is the biodiversity of the New York Estuary? Data will be collected from selected points along the coast of New York's Harbor and compared with data from other locations. It is expected that there will be greater biodiversity in an area where salinity fluctuates often. With this project, researchers hope to further both scientists' and the public's understanding of the ecosystem on which New Yorkers are heavily dependent.

Name Ashley Onofre

Title Using geospatial technology in habitat preservation

Advisor Mauricio González, M.SC., NYHS

Abstract This project is being conducted to show where there have been bald eagle and Harperella plant spottings. This information will then be used to make sure new homes, roads and buildings are created over these species habitats so that they don't remain endangered. Sure, these new buildings are expanding our society, but they are else ruining the lives of other species. With a map showing where to not build, these animals can be saved.

Name Lauren Salitan

Title The effects of chlorine exposure on oyster larvae development and growth

Mentor Elizabeth Burmester , PhD Environmental ecology

Advisors Mauricio González, M.Sc., Jeremy Esposito, NYHS

Abstract This project is an experimental study to understand the effects of chlorine exposure on oyster larvae, in regard to their development and growth. This independent research project is being carried out to understand and assess the plausible damaging results posed by common pollutants in the New York Harbor. Attempts to clean and restore the estuary have been carried out by planting oyster beds of larvae and spat and developing solutions to address the threats on marine life. The U.S. Environmental Protection Agency has tried to take on the issue of overflow from the New York City sewer system by releasing their Long-Term Combine Sewage Overflow Plan. The plan intends to limit the release of harmful bacteria and pathogens into the water by chlorinating in and off-line pipes. While this does seem to be one solution, it also risks hurting the marine ecosystem more than helping. This project aims to test if chlorine is a danger to oysters at the larvae stage since they would be the ones exposed to it and reverse the attempts made to help the New York Harbor return to what it once was. It is expected that exposing larvae will lead to damages in growth and development.

Name Hildey Sierra

Title Using geographic information system to support sustainable/green technology

Advisor Mauricio González, M.Sc., NYHS

Abstract This presentation discusses watersheds and their importance to the environment, and which of these countless rivers and streams receive funding for improvement. Perry Creek, for example, is in dire need of financial support. This lesson will show us on a map that will tell us exactly why this river needs the funding that it has and will give further evidence to keep funding for this river going. Some people may ask, what's the big deal with watersheds and where do watersheds even fall? And so that this presentation will try to tackle the very same questions and shed light on watersheds and why they are so important to the environment. This also will include the process to achieve this information both in a visual form as well as a written form. The reason why it is so important to find out which watershed should receive the funding is that the fact that each of the watersheds is unique and has their own components, and they interact with one another constantly, so if one of them is affected badly, the rest suffer. For example, if a company were to cut down and harvest the surrounding acre of forest and land near a watershed, that newly exposed land will be exposed to the water and create mudslides. This combined with the fact that roads will be paved will cause there to be a huge increase in pollution in the watersheds and will need a visual representation to determine which one of the watersheds should receive the funding compared to the others. This project will also explain the process of GIS, how many different companies use it, its real-world applications, and what can be expected in the future of GIS.

Name Chantal Hernandez

Project Title Geospatial technology for the Biodiesel Company

Mentor Mauricio González, M.Sc., NYHS

Advisor Sunil Bhaskaran, PhD. Bronx CC

Abstract The following project uses geospatial technology for a biodiesel company. Geospatial Technology is a computer-based tool that accumulates information and helps analyze issues spatially. This computer-based tool uses information as layers to show how different things are related. The map can raise questions such as, how can the problem be solved, and who benefits from this map? The Biodiesel Fuel Company is looking for an area in Tempe, Arizona (located west of Phoenix) to build a refinery of oil. Biodiesel is a fuel alternative that makes renewable resources using food products that don't harm the environment such as animal fats and vegetable oils. They are a desirable company for the environment because it's healthier than petroleum when it burns and is nontoxic. The company is running into a problem of communication with these restaurants and need a map to know how far or close these restaurants are from the upcoming refinery. Biofuels wants to set up a schedule for picking up the restaurants waste. The project gathers the distance of the refinery to the surrounding restaurants in miles and using this map the company can see where to go.

Name Chelsea Sumba

Title Using GIS to assess woody biomass potential for sustainable renewable energy

Advisor Mauricio González

Abstract Biomass is considered a renewable resource because it comes from plants and trees, which are reproducing constantly and taking in the sun's energy. Woody biomass includes all woodland and it can be converted into a renewable resource. With GIS, the data that's received can be used to scout the areas suitable for biomass production, as well as the types of trees, transportation in the area, and who owns the land. Calculations with GIS can even lead to the estimation of earnings that can be gained from biomass production. This project will help to find the areas where it's suitable for production and has potential for biomass. The hypothesis is that there will be an area where it contains all the requirements, which will make the area enhance into biomass production. With the information obtained, it will be a lead to the future of the Earth because the Earth's main resource is fossil fuels, which is nonrenewable and will soon run out.

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Prepared by Ms. Nailea Rodriguez, MBRP Class of 2018

