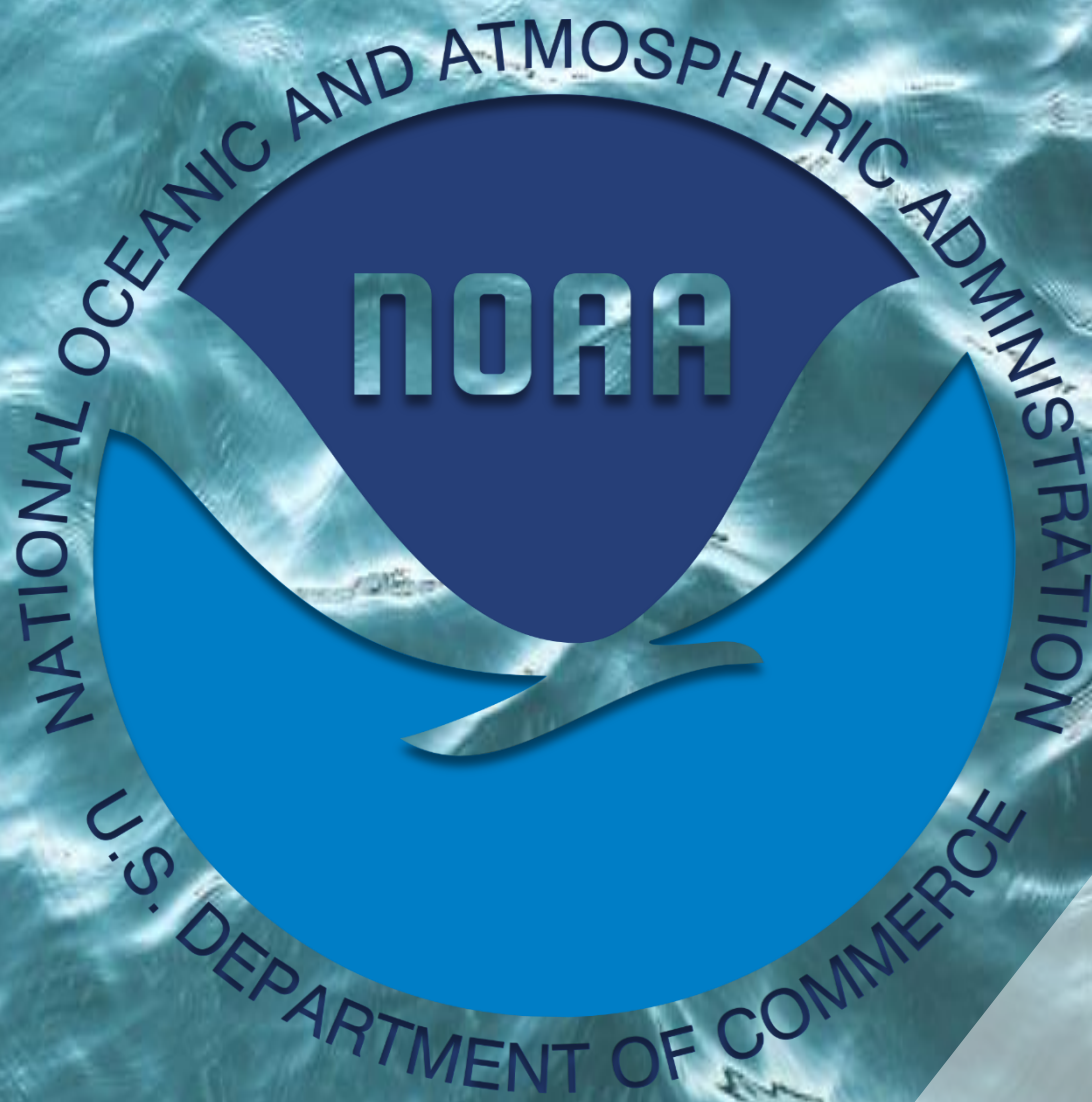


Internships in Marine Geography



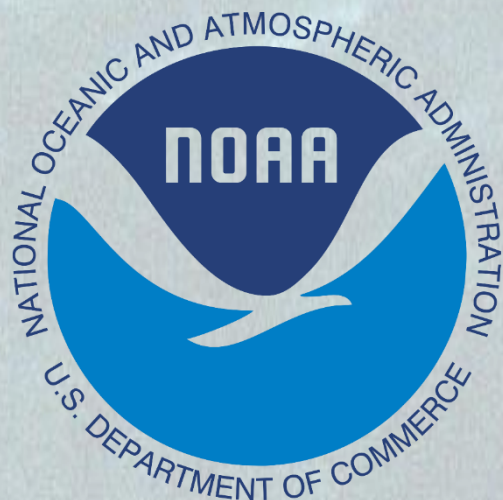
2017 Report



Greening Youth
FOUNDATION

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Office of Coast Survey Internships In Marine Geography Program *2017 Report*

Program Partners

NOAA, Office of Coast Survey (OCS)

President Thomas Jefferson created the U.S. Coast Survey in 1807 to provide nautical charts that would help the young nation with safe shipping, national defense, and maritime boundaries. Two centuries later, Coast Survey (now an office within NOAA) continues to provide navigation products and services that ensure safe and efficient maritime commerce on America's oceans and coastal waters, and in the Great Lakes.

For more information on NOAA:

Website: <https://www.nauticalcharts.noaa.gov>
Twitter: /noaacharts

GREENING YOUTH FOUNDATION

Greening Youth Foundation (GYF) is a federal non-profit partner whose mission is to engage diverse youth and young adults in environmental and conservation programs and expose them to careers in conservation. With headquarters in Atlanta, GA, GYF operates many national programs across the country with the National Park Service, the US Fish and Wildlife Service, and the US Forest Service.

For more information on Greening Youth Foundation:

Websites: www.gyfoundation.org hbcui.gyfoundation.org; gyfatlantayouthcorps.com.
Facebook: @GreeningYouth
Twitter: /greeningyouth

National Park Service, Geologic Resources Division

The Geologic Resources Division assists the National Park Service and partners in the Service-wide coordination, support, and guidance necessary to understand and implement science-informed stewardship of geologic and associated park resources; reduce impacts from energy, mineral, and other development; and protect visitor values. GRD also manages two Service-wide internship programs — Mosaics in Science and Geoscientists-in-the-Parks.

For more information on the Mosaics in Science Program:

NPS internet website: www.nps.gov/subjects/youthprograms/mosaics.htm
NPS orientation and mentoring toolkit: www.nature.nps.gov/geology/gip/mentor.cfm
Mosaics in Science partner's program: www.mosaicsinscience.org

Acknowledgements:

We want to give a special thank you to all of our NOAA partners, supervisors, and mentors

Kathleen Jamison

Amanda Phelps

Paul Turner

Dr. Shackhak Pe'eri

Mark Griffin

Lieutenant Russell Quintero

Kyle Ward

Leland Snyder

James Kirkpatrick

Lucas Blass



Concluding the inaugural completion of the "Internships in Marine Geography Program" of 2017.





President Thomas Jefferson created the U.S. Coast Survey in 1807 to provide nautical charts that would help the young nation with safe shipping, national defense, and maritime boundaries. Two centuries later, Coast Survey – now an office within NOAA – continues to provide navigation products and services that ensure safe and efficient maritime commerce on America’s oceans and coastal waters, and in the Great Lakes.

Program Summary

Four interns with unique backgrounds spent 11 weeks working within the Office of Coast Survey. The interns used their education in marine geography to assist NOAA and the OCS in completing skill focused projects that benefited the staff as well as equipped the interns with “real world” experience. At the conclusion of the program, the 4 interns attended a Career Workshop in Denver, Colorado. During the conference, each intern was given an opportunity to present their research and network with representatives from Federal Agencies in their field.

Program Objectives

1. Encourage a diverse group of young adults to study and pursue careers in Science, Technology, Engineering and Mathematics (STEM) fields;
2. Provide meaningful and relevant science-based internships to individuals from underrepresented groups in STEM fields;
3. Introduce program participants to science careers at NOAA;
4. Increase relevancy, diversity, and inclusion in the NOAA workplace.

Total Budget: \$61,888.40

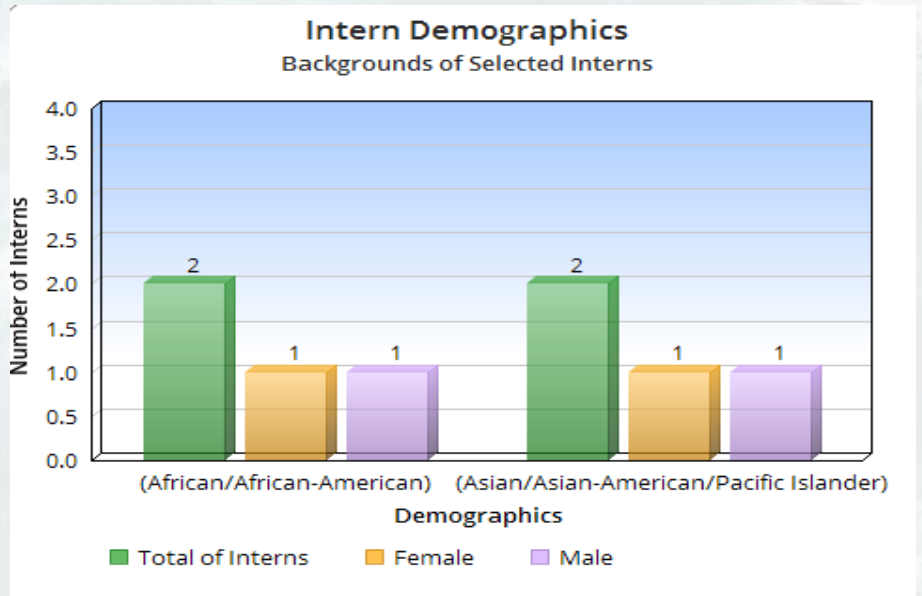
223 Total Applicants

Silver Spring, Maryland Position(s):

1. “Source Area of Interest Intern”: 63 applicants
2. “Survey Priorities Communication Strategist Intern”: 55 applicants
3. “Nautical Chart Adequacy Intern”: 52 applicants

Fernandina Beach, Florida Position(s):

4. “Hydrographic Assistant Survey Technician Intern”: 53 applicants

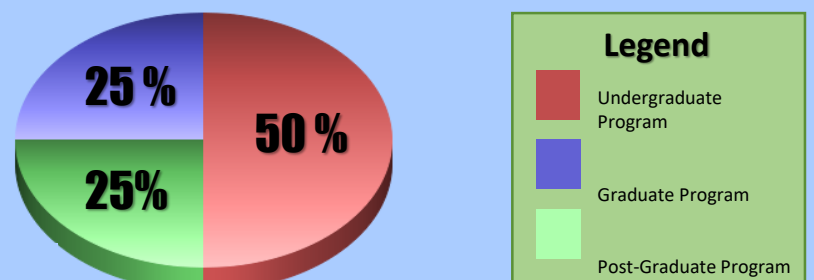


Recruitment:



The Greening Youth Foundation worked with many colleges and universities to recruit exceptional students for the Marine Geography Internship Program. GYF recruited bright and qualified applicants from all over the nation. In doing so, we received over 200 applications from all over the United States.

Education Status of Selected Interns



Career Workshop & Webinars:



Weekly Career Webinars:

- Webinar 1: *Financial Literacy*
- Webinar 2: *Non-federal Resumes & Interviews*
- Webinar 3: *Graduate School*
- Webinar 4: *Intern Presentations*
- Webinar 5: *Pathways to the Park*
- Webinar 6: *Federal Resumes*
- Webinar 7: *Workshop Presentations*
- Webinar 8: *Workshop Details*

Career Workshop: August 6th-10th, 2017 (Colorado)

Interns enjoyed an all expense paid career workshop in Colorado. This career workshop gave the interns the opportunity to present their research as well as network with professionals and other interns in their fields.

In order to prepare for the Career Workshop in Denver, the interns attended weekly online webinars. These webinars promoted professional development within the internship to equip the intern with skills for the workforce.

NPS Mosaics in Science / NOAA Internships in Marine Geography Internship Programs Career Workshop - August 6-10, 2017

Workshop locations: Hyatt House at Belmar, 7310 West Alaska Drive, Lakewood, CO 80226
YMCA of the Rockies, 2515 Tunnel Rd, Estes Park, CO 80511

Workshop meetings: Sunday and Monday: Hyatt House
Tuesday - Lakewood NPS office (tentative)
Wednesday and Thursday: YMCA of the Rockies / Rocky Mountain National Park

Objectives:

- present the intern's project results to their peers and NPS and NOAA management;
- learn about science careers, needed skills, and how to apply for federal science positions;
- participate in facilitated discussion about the value of diversity and inclusion in the workplace and whether any issues were encountered during the internship;
- visit one of the participating parks and learn about the intern's project; and
- obtain feedback on the program, projects, and intern experiences.





Meet The Interns



(left to right) James Moy, Remy Phillip, Aleah Worthem, and Nia Matsumoto
Internships in Marine Geography

2017 Intern Profiles Intern Biographies



Aleah Worthem
Chart Adequacy Intern

Aleah is a graduate student at the University of Maryland, College Park. In the fall, she will be entering her second and final year of her Master's program as an MPS GIS candidate. Though her Master's degree will be in Geospatial Information Sciences (GIS), Aleah received her B.S in Geological Science from New Mexico State University. Though she gained an immense amount of knowledge from her degree in geology, Aleah felt the need to be able to apply what she learned to applications that could be used by the public. This led her to the pursuit of her next degree, as well as the need to for on the job experiences. At the start of her internship with NOAA, the concept of a Nautical Chart Adequacy intern, a mouthful in itself, was a vague yet compelling concept, which she was willing to undertake. Throughout this internship, Aleah dove into the vast

world of marine/nautical cartography and has learned concepts such as Satellite Derived Bathymetry, reading nautical RNC and ENC charts, International Hydrographic Standards, as well as the process of implementation chart adequacy. After the completion of this internship, Aleah hopes to pursue as full-time position at NOAA or within a federal capacity as a GIS analyst/cartographer.



James Moy
Source Area of Interest Intern

James Moy is a recent graduate from the University of Maryland, College Park with both an M.S. and B.S. in Geospatial Information Systems (GIS). While earning his degrees, he also worked as a Teaching Assistant for several GIS courses. With his background, James is passionately interested in exploring the potential of GIS, its technology, and how it can be used to better society. While interning at NOAA, James has developed his GIS skills, gained practical work experience through analyzing data from various sources, and created Area-of-Interest data for a new NOAA Weekly Update webpage. This data primarily serves to inform mariners and the

general public of all corrections to navigational products weekly. After this internship, James is looking forward to joining the workforce, and applying his knowledge of GIS for others.



Nia Matsumoto

Survey Priorities Communication Intern

Nia is a senior finishing her B.S. at the Ohio State University pursuing a degree in Geographic Information Science with a minor in Computer Information Science. This summer, she worked for NOAA as the Survey Priorities Communication Strategist intern. Nia was tasked with creating a plan of communication for the Office of Coast Survey's Hydrographic Survey Division. Her goal was to clearly and effectively communicate the purpose and results of a highly technical hydrographic model being developed. The audience varies greatly in terms of technical understanding and intended use of the new model, so Nia served an important role as the intermediate interpreter between users and scientists. In the future, Nia hopes to pursue a master's degree and find a career that combines her passion for the environment with her interest technology.

Nia Matsumoto

Survey Priorities Communication Intern

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Remy Phillip

Hydrographic Assistant Survey Technician Intern

Remy is a rising senior at Embry-Riddle Aeronautical University currently working for a B.S in Civil Engineering. For the past 2 months, Remy has been stationed at NOAA's National Response Team #2 (NRT2), based in Fernandina Beach, FL. His job has been to assist his team leads in networking, soldering, hydrographic surveying, map cleaning, and general problem solving. Land surveying in itself is one of the backbones of Civil Engineering and is something Remy understands quite well, but doing it in the open water is something completely different and has been a challenge for the up and coming engineer. Without his teammates guiding him and explaining how each equipment works in gathering data, this internship would not have been as successful as it was. After the summer ends, Remy plans to finish his senior year with the hopes of being sponsored for an accelerated master's degree and from there, find a job that suites his steadily growing interests.

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Intern Position Overviews

Nautical Chart Adequacy Intern

NOAA's Office of Coast Survey maintains the nation's nautical charts, surveys the coastal seafloor, responds to national maritime emergencies, and searches for underwater obstructions and wreckage. In support of Coast Surveys mandated mission to provide reliable nautical charts and other products necessary for safe navigation in U.S. ocean and coastal waters, the NCA intern performed various geographic information systems (GIS) analysis tasks and compiled bathymetric data sets to: generate coverage maps, intersect source layer data in order to generate adequacy maps, and process vessel traffic data.

Supervisor: Dr. Shackhak Pe'eri (NOAA/OCS)

Chart Adequacy of North Slope Alaska

Aleah Worthem
University of Maryland

Introduction
The release of the National Charting Plan is a direct result of NOAA's Office of Coast Survey's dedication to being the leading provider of nautical charts. This plan describes some of the steps Coast Survey is taking to improve NOAA charts, including changes to chart formats, scales, data compilation, and symbology working towards making comprehensive improvements across the entire suite of NOAA's nautical chart products.

Interpolation
• 33.5 million reference of depth from 2008 to 2010 were processed and interpolated into a reference surface.
• Interpolations are typically used to create an elevation/reference surface. This reference surface is a continuous prediction of depth from sampled points.
• But... not all surveys are reliable. Inconsistencies in data may exist due to external factors while surveying:
• Wave action
• Bad weather
• Ice cover

Conclusions
After the steps of preprocessing, creating a test reference surface, identifying artifacts/outliers, and running the interpolations again, I created depth contours reflecting the depths of the water in meters. These depth contours will then be added to the re-sampling cells. These cells use chart scales of various distances.

Methods
The full process of calculating chart adequacy involves various steps. Fortunately, NOAA provides this data free for public use. The data collected includes ENC, SDC, AIS, and Hydrographic Surveys on depth and data processing is performed in ArcMap.
• Gather Hydrographic Surveys from Sineath Sheets Surveys, Single-Beam Surveys, Multi-Beam Surveys, Bathymetry, Altimeteric Grids, and Sonar Data.
• Convert multi-depth values into a single depth measurement of (meters).
• Merge and project data into necessary dataset.
• Perform spatial interpolations to create a reference surface.
• Form reference surface, identify anomalies data.
• Generate unsmoothed reference surface.
• Generate depth contours across reference surface.
• Create attribute table for Contours.
• Update MQLM tables.
• Deriving near-shore bathymetry using SDB.
• Conducting chart adequacy evaluation.

Results
Raster DTMs are susceptible to artifacts. Creation of DTMs will magnify these errors and make them visible. Unusable data causes the creation of artifacts (contours) in the interpolated reference surface.
• Half moon artifacts
• Overlapping artifacts
• Pixel artifacts

Future Directions
Currently there are too many distinct scales (1:1) for the US shoreline.
• These scales don't conform to IHO standards for ENC charts.
• There are duplicates that duplicate coverage areas at different scales.
• Overlapping artifacts.
The final charting project aims for:
• Standardized progressive scales to adhere to IHO specs)
• Reduced number of scales (15-20)
• Standardized chart view and scope

"The best experience of my internship was the training I received to develop a new skill set and the networking events I participated in with international Hydrographers." -Aleah Worthem

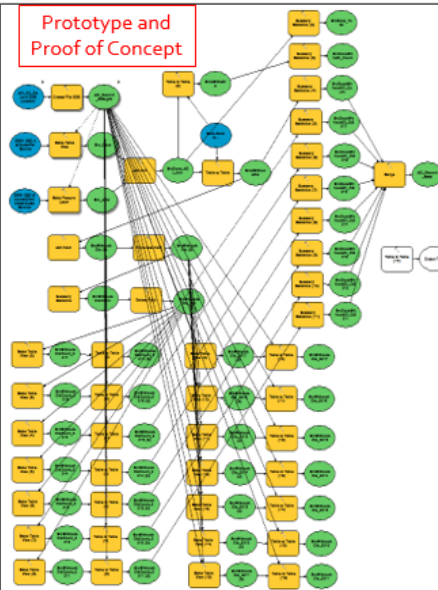
AOIs: QCTOOLS (3) – SELF-CREATED

Self-Created ArcTool to Calculate and Export:

- Total Source Docs
- Source Docs w/o AOIs
- Source Docs w/ AOIs
- By Year
- By Source

OBJECTID*	COUNT_SourcesID	Name
1	44633	AllSrcDocs
2	17375	WithAOI
3	27258	WithoutAOI
4	2547	Src w/o AOI 2011
5	2344	Src w/o AOI 2012
6	2080	Src w/o AOI 2013
7	1517	Src w/o AOI 2014
8	672	Src w/o AOI 2015
9	135	Src w/o AOI 2016
10	41	Src w/o AOI 2017
11	848	Src w/ AOI 2017
12	2001	Src w/ AOI 2016
13	3096	Src w/ AOI 2015
14	3206	Src w/ AOI 2014
15	2828	Src w/ AOI 2013
16	2367	Src w/ AOI 2012
17	2212	Src w/ AOI 2011
18	2136	2016 Src Docs
19	3768	2015 Src Docs
20	889	2017 Src Docs
21	4723	2014 Src Docs
22	4908	2013 Src Docs
23	4711	2012 Src Docs
24	4759	2011 Src Docs

Prototype and Proof of Concept



Source Area of Interest Intern

Supporting Coast Survey's mandated mission to provide reliable nautical charts and other products necessary for safe navigation in U.S. ocean and coastal waters, the SOI intern worked with subject matter experts to collect new polygons and meta data associated with existing source databases to create a geospatial component for use in ArcGIS web sites. This project helped complete the work necessary for the full deployment and use of the new Weekly Update webpage informing mariners of all corrections to navigational products released weekly by the Office of Coast Surveys Marine Chart Division. The SOI intern benefited in applying learned GIS skills in creating GIS components while also learning how GIS is used in creating the nations navigational products.

"This internship has been a great experience to get hands-on work with what NOAA does, and to analyze how my technological skills can contribute to their mission."

-James Moy

Supervisor: Mark Griffin (NOAA/OCS)

Intern Position Overviews...Continued

Hydrographic Assistant Survey Technician Intern

The HAT intern served on a small boat engaged in oceanographic/survey operations performing such activities as: operating and monitoring fathometers, multibeam, singlebeam or side-scan-sonar instruments, including annotating records and recording data using the above mentioned equipment. The HAT intern assisted in the staging and set-up during preparations for, and at the completion, of oceanographic and survey operations such as tide gauge, horizontal control or sound velocity. The HAT intern was tasked to perform oceanographic and/or survey observations, measurements, and calculations. The intern also assisted in preparation, installation, deployment and recovery of oceanographic and/or survey equipment and instruments.



"I was really able to bond with my head supervisor and co-worker. Through them, I was able to obtain many skills that I've always wanted to possess."
 –Remy Phillip

Supervisor: Kyle Ward (NOAA/OCS)

Hydrographic Health Model Communications Strategy

Nia Matsumoto
Ohio State University

Introduction

The Office of Coast Survey, located in Silver Spring, Maryland, is one of the many offices housed by the National Oceanic and Atmospheric Administration (NOAA). One division of the Office of Coast Survey is the Hydrographic Surveys Division (HSD).
 Annually, HSD handles a number of operations including:
 - Planning and management of 25 projects
 - Acquisition of ~3,000 square nautical miles of updated data
 - Processing roughly 130 hydrographic surveys

Examples

$$\text{Hydrographic Health} = \left(\frac{\text{Desired Survey Score} - \text{Present Survey Score}}{\text{Desired Survey Score}} \right) \times \sum \left(\text{Consequence} \times \prod \text{Likelihood} \right)$$

The two main contributors to a region's hydrographic health are:
 - Hydrographic Gap: The difference between the desired and present survey score; the larger the gap, the worse the hydrographic health.
 - Hydrographic Risk: Modeled as the risk to surface navigation due to inaccurate depths or unknown hazards; the greater the risk, the worse the hydrographic health.

Conclusions

It is important to bridge the gap between the technical model and the users, which vary greatly in technical ability. Developing a strategy that benefits each user and plans each method in advance will ensure a smooth rollout of the model. This communication plan will help HSD manage the model in a more efficient manner and handle the needs of all potential stakeholders based on a variety of factors.

Results

Effective communication is often done through a visual and interactive interpretation of the model. Providing visuals that simplify and dissect the various contributing parts helps any user to understand its purpose. Not all stakeholders require an interactive model, so it was important to consider all needs and adjust accordingly in order to reach the largest audience possible. Each stakeholder may be attended to according to their involvement and specific requirements.

Methods

In order to effectively communicate the model to NOAA's stakeholders, a plan was crafted to understand their needs. After identifying the stakeholders, some contributing factors were considered:
 - Which stakeholders have more influence and/or interest in the model
 - Different interests and purposes the model serves for individuals
 - How frequently to update or contact each stakeholder
 - Benefits and risks presented by sharing the model publicly

Future Direction

This model will be adjusted as necessary by the project managers and hydrographic health team to better suit the needs of the stakeholders. As time goes on, the model will surely change as it is very dynamic. Some possible changes could be:
 - Changes to inputs or addition/removal of inputs
 - Weight of variables
 - Metrics, break values and color schemes
 The drafted methods will need to reflect these changes over time. The frequency of changes are roughly planned in the spreadsheet so that managers may act accordingly. Hydrographic health will be an important part of the daily operations for NOAA's survey teams and stakeholders for the foreseeable future.

Acknowledgements
 I would like to thank my supervisor, Lieutenant Russell Quintero, the Hydrographic Surveys Division, NOAA Ship Thomas Jefferson and crew, Amanda Probst, Kathleen Jamison, and the Greening Youth Foundation.

Survey Priorities Communication Strategist Intern

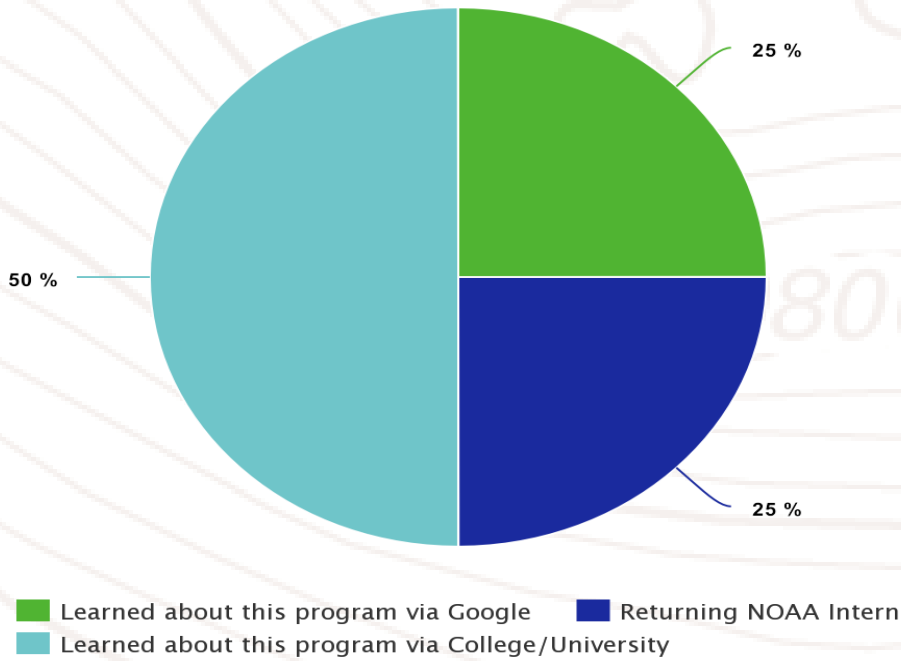
NOAA's Office of Coast Survey is responsible for ensuring prompt and accurate surveying of the US Coastal Waters. Covering the expansive sea floor promotes its own set of problems and associated prioritization. In order to more accurately and efficiently plan Hydrographic Surveys, Hydrographic Surveys Division (HSD) is endeavoring to use new technology to build an updated model for planning and prioritizing hydrographic surveys. Once the model is created, a communications strategy must be implemented. The SPC intern performed an analysis of the new model results to previous iterations of survey priorities to understand the extent of updates. The intern interfaced with customer affairs for the purpose of developing and implementing a communications strategy for the new model.

"My experience with NOAA has entirely changed my mindset about working for the federal government. I learned so much about the world of nautical charts and coastal surveying.... It was an incredible learning opportunity and opened my eyes to a career in the public sector." –Nia Matsumoto

Supervisor: Lieutenant Russell Quintero (NOAA/OCS)

Closing Statements From The 2017 Marine Geography Interns

How did you learn about this internship program?



Would you participate in this program again?

Yes, the experience was a great opportunity to see how GIS is used in a real work setting. It was also very beneficial to network and meet others in the field. I appreciated the chance to move to DC and experience something new.

Would you participate in is program again?

Yes, Shachak provided me with clear directions and training on the work I performed. He allowed my to utilize my GIS skills to complete projects, as well as teach me new skills that aren't available to learn in the classroom.

Would you recommend this program to other students?

I definitely would recommend this program to those wanting to gain hands on experience in a real work environment.

Thank you to everyone involved in this year's program success.



