

NATIONAL CENTERS FOR COASTAL OCEAN SCIENCE

we deliver ecosystem science solutions to sustain thriving coastal communities and economies

PRESENTATION 13

Outreach, Distribution, Tools, and Technology

Tracy Gill, Physical Scientist



JULY 23-25, 2019
SILVER SPRING, MD

NATIONAL CENTERS FOR COASTAL OCEAN SCIENCE

PUBLICATIONS

Biogeo Publications, 2015-2019

Journal articles: **69** (in 44 journals)

NOAA technical memoranda: **51**

Magazine articles: 3

Books: 1

Book chapters: 2

Standard Protocols: 2

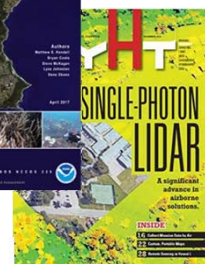
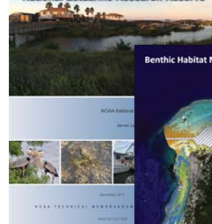
- Shallow-water benthic habitat mapping
- National Coral Reef Monitoring Program (NCRMP)

Where can you find Biogeo pubs?

- [NOAA Institutional Repository \(NIR\)](#) ~162 Biogeo pubs
- [NCCOS Data And Reports Explorer](#) (2018 and newer)
- [NCCOS Legacy Publications Explorer](#) (2017 and earlier)
- On our Project Pages

26 (~50%) Program scientists and their papers are accessible on ResearchGate.

Changing the Social Values of Ecosystem
Services in the Mission-Aransas
National Estuarine Research Reserve



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WEB PRESENCE

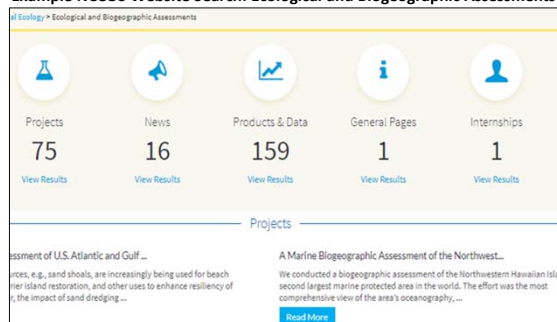
The NCCOS website: <https://coastalscience.noaa.gov/> houses and/or links to [Biogeo project pages and products](#)

Biogeo currently has 133 web pages, including project pages, data collections, publications, news and more.

You can search the NCCOS website for Biogeo projects or products by contact/PI, product type, water region, state, project title, or research category. Biogeo project pages occur under the research category [Marine Spatial Ecology](#), within these three subcategories:

- [Ecological and Biological Assessments](#)
- [Habitat Mapping](#)
- [Regional Ecosystem Science](#)

Example NCCOS Website Search: Ecological and Biogeographic Assessments



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WEB PRESENCE

Google Website Analytics for Biogeo Web Pages

Sept, 17 - early July, 19 (22 months, 2FY15 thru Sept '17 not available)

- **24,985** visits (excludes visitors from NOAA domain, some who are our clients/partners)
- **20,338** unique visits (counts one page view per person per session, regardless of pages visited on site)
- An average of **189** visits per page, or 154 unique visits
- A median of **99** visits per page, or 87 unique visits
- Each visit lasted ~**2.63** minutes

Note: This misses visits from 10/1/15-9/1/17 (~23 months)



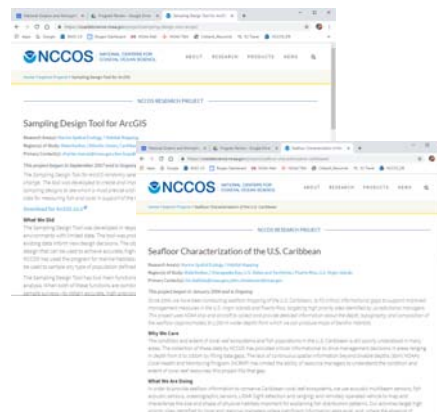
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WEB PRESENCE

Top 10 Project Pages Visited, 9/1/17-7/10/19 (last 22 months)

1. Sampling Design Tool for ArcGIS: **1,814 visits**
2. Seafloor Characterization of the U.S. Caribbean: **1,076 visits**
3. National Coral Reef Monitoring Program Implementation: Biological and Socioeconomic Monitoring: **921 visits**
4. How do Ocean Currents Connect Coral Reefs among Islands in the Mariana Archipelago, and How will Climate Change Affect Them: **880 visits**
5. Benthic Habitat Mapping of Florida Coral Reef Ecosystems to Support Reef Conservation and Management: **676 visits**
6. Economic Valuation of Shoreline Protection by Natural Infrastructure to a Coastal Community: **663 visits**
7. Deep Coral Predictive Habitat Modeling in the U.S. Atlantic & Gulf of Mexico: Focusing on Uncharted Deep-Sea Corals: **658 visits**
8. Marine Biogeographic Assessment of the Main Hawaiian Islands: **658 visits**
9. Benthic Habitat Mapping in Puerto Rico and the U.S. Virgin Islands: **613 visits**
10. Southeast Deep Coral Initiative (SEDCI): Exploring Deep-Sea Coral Ecosystems off the Southeast US: **596 visits**



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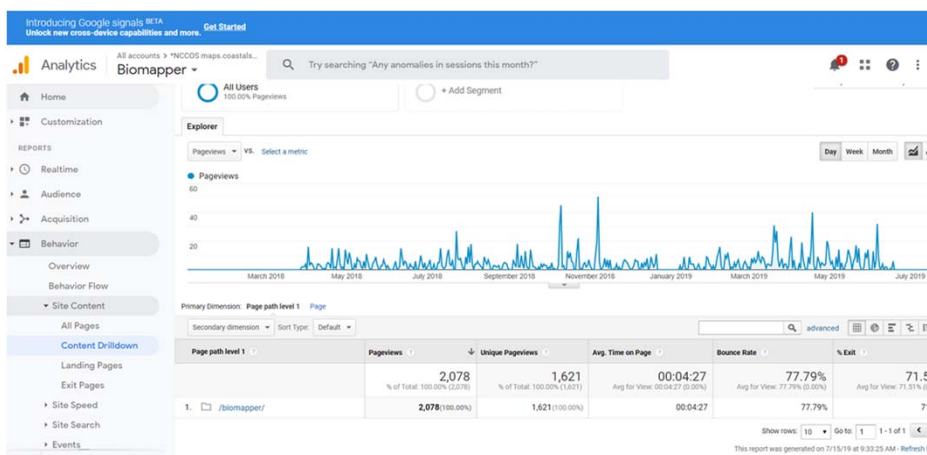
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WEB PRESENCE

Google Analytics on BIOMapper, a Bigeo online map and data explorer.

To date, BIOMapper has been applied to eight Biogeo research areas.

1,621 unique visits to all BIOMapper pages, April '18 - July '19 (~16 months)



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WEB PRESENCE

Project Pages are the main, forward facing link to our work

- Biogeo has 59 project pages, covering 2015 to 2019.
- Using the project title, these projects are easy to find thru Google.
- Each project page provides easy access to project information.
- Project pages link to products: including publications, data sets, imagery, maps, web tools, data explorers, analytical tools, videos presentations, project fact sheets, and more.
- Biogeo projects are also found using the [NCCOS Projects Explorer](#)

Prioritizing Areas for Future Seafloor Mapping, Research, and Exploration Offshore of California, Oregon, and Washington

Research Area(s): Marine Spatial Ecology / Habitat Mapping, Regional Ecosystem Science

Region(s) of Study: Waterbodies / Pacific Ocean; U.S. States and Territories / California, Oregon, Washington

Primary Contact(s): Bryan Costa; Ken Buja

This project began in October 2018 and will be completed in September 2019

We developed a spatial framework and online application to identify priorities for seafloor mapping and visual surveys along the U.S. West CONUS coast (WCC), off California, Oregon and Washington. This project will enable federal resource agencies and participating organizations to more effectively coordinate assets, and efficiently guide future WCC seafloor mapping, research, and exploration activities.

Why We Care

Spatial information about the seafloor is critical for decision-making by marine research and management organizations. These organizations are tasked with ensuring safe navigation, sustainable fisheries, smart renewable energy, oil and gas extraction, and sound ecological stewardship and conservation in U.S. coastal and marine waters. For example, recently gathered information helped inform decisions in 2018 by the Pacific Fishery Management Council to close 136,000 square miles and re-open 3,000 square miles of seafloor to bottom trawling, in an effort to improve management of essential fish habitat. However, collecting spatial information about the seafloor is expensive and time consuming, making its collection challenging for individual organizations. Coordination among these research and management organizations can help them more efficiently leverage



Proposed spatial framework for identifying seafloor mapping and visual survey priorities along the U.S. West CONUS coast. This framework is based on the 2010 California commercial



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WEB PRESENCE

When a Biogeo project begins, a project page is created and posted. As the project evolves, publications and other products are posted.

Each page has a high level summary of the project, so that a stakeholder, scientist, student or staffer can get a good understanding of the project within 5 minutes.

Each project page also provides access to all available project info - useful when visitors needs, data, contacts and products.

Each project page includes: project title, contacts, project period, project status, project overview, why we care, what we are doing, what we found, benefits of our work, and next steps. Links to products are posted as they become available - data, imagery, tools, reports, journal articles, presentations, news, and links to related websites - e.g., partners



Lakebed Mapping and Assessing Ecological Resources off Wisconsin's Lake Michigan Coast

Research Area(s): Marine Spatial Ecology / Ecological and Biogeographic Assessments, Habitat Mapping, Stressor Impacts and Mitigation / Invasive Species

Region(s) of Study: Waterbodies / Great Lakes; U.S. States and Territories / Wisconsin

Primary Contact(s): charles.menz@noaa.gov

This project began in April 2018 and is projected to be completed in April 2019

We are working with NOAA Office of National Marine Sanctuaries and local partners to map and assess important lake resources in Lake Michigan offshore of Wisconsin.

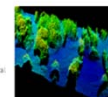
Why We Care

The area where we are working was proposed by the state of Wisconsin in 2014 as a national marine sanctuary with the goal of conserving a nationally significant collection of shipwrecks and other underwater cultural resources. These cultural resources are part of a broader interconnected lake ecosystem. This project collects and assesses key ecological information to map how lake resources are interconnected, and supports monitoring, protection and management of ecological and cultural resources.

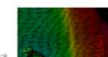
This project began with the goal of supporting the proposed Wisconsin-Lake Michigan National Marine Sanctuary, though work on the sanctuary stopped in 2018. However, having begun while the designation process was active and because of commitments to our partners, NCCOS followed through with plans to deliver new lakebed maps and assess ecological resources. The maps and assessments will benefit a variety of partners and policy makers (e.g., Wisconsin Historical Society, Wisconsin Department of Natural Resources) notwithstanding sanctuary designation.

What We Are Doing

- We collected new sidescan and multibeam mapping data off Milwaukee and Sheboygan, Wisconsin. These data were interpreted to map important lakebed habitats, substrates, infaunal mussels and nuisance algae. These data are also being used to update nautical charts, and improve our understanding of lake habitats and underwater cultural resources.
- We gathered lakebed mapping priorities from researchers and managers spanning a diversity of fields to prioritize future



3D visualization of lakebed mapping data showing the seafloor topography and cultural resources.



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WEB PRESENCE

Example Project Page: Left - Project description; Right - products (all linked), including, data, peer-reviewed pubs, reports, news

Mapping Habitat Change in Saipan Lagoon, CNMI

Research Area(s): Marine Spatial Ecology / Coral, Habitat Mapping
 Region(s) of Study: Waterbodies / Pacific Ocean; U.S. States and Territories / CNMI
 Primary Contact(s): bryan.costa@noaa.gov, matt.kendall@noaa.gov
 This project began in December 2015 and was completed in March 2017

In 2004, shallow-water benthic habitats were mapped in Saipan Lagoon, Commonwealth of the Northern Mariana Islands. Since then, habitats in the lagoon have likely changed because of coral bleaching events and recent typhoons. Local resource managers requested an updated map to help better understand these habitat changes and to help inform their monitoring and management decisions. In response, we created an updated benthic habitat map for areas shallower than 30-meters inside the lagoon.

Why We Care

Shallow-water benthic habitats in Saipan Lagoon, Commonwealth of the Northern Mariana Islands (CNMI) have been stressed by recent typhoons and bleaching events. In March 2015, an El Niño event began in the equatorial Pacific, resulting in increased storm activity in the region and substantial coral bleaching. Estimates suggest that approximately 85 percent of staghorn corals in Saipan Lagoon have died due to bleaching since 2013. In August 2015, Typhoon [Soudelor](#) swept through the Pacific, directly hitting Saipan. Preliminary estimates indicate that some coral reefs [were severely impacted](#) by the storm.

The combination of these stressors and other human-caused threats has most likely changed the composition of habitats in Saipan Lagoon. Local resource managers from CNMI's Bureau of Environmental and Coastal [Quality requested](#) that the existing habitat map—produced by the University of Guam in 2004—[be updated](#) to better understand these and other habitat changes over the last decade. This updated map [is being used](#) to inform monitoring and management decisions in the lagoon, including updating the [Saipan Lagoon Use Management Plan](#).

What We Did

We used multispectral imagery to produce an updated, shallow-water benthic habitat map for Saipan Lagoon. A new satellite image of the lagoon [was collected](#) in February 2016. This remote sensing data [was used](#) to develop a new habitat map. The resulting habitat map depicts the distribution of key biological and geomorphological habitats using a classification scheme comparable to [Hsu and von Hippel, 2008](#) published in Marine Ecology Progress Series, 2008: 359–38–50. We collected underwater photos and videos in partnership with local experts in CNMI. These photos and videos [were used](#) to improve the quality of the habitat map. A separate accuracy assessment [was conducted](#) to independently assess the thematic accuracy of the resulting habitat map. Local experts from the jurisdictional community evaluated the habitat map products before they [were finalized](#). The final habitat map and associated products are publicly available for download and for viewing online (see [Data Collections](#) below).

Benefits of Our Work

The products developed during this project provide a critical spatial framework to better understand benthic habitat changes over the last decade in Saipan Lagoon. Future projects or management actions in Saipan Lagoon will benefit greatly from the updated imagery, habitat map, and underwater photos and videos compiled during this project. These data sets will inform decisions about sampling, permitting activities, management of marine protected areas (MPAs), land-based sources of pollution, fishery regulations, climate change, and scientific research.

Products, Datasets & Reports

Datasets:

- NCCOS Assessment: Benthic habitat maps of Saipan Lagoon, Commonwealth of the Northern Mariana Islands (NCEI Accession 0162517)
 - Metadata for Benthic habitat maps of Saipan Lagoon
 - Data Download for Benthic habitat maps of Saipan Lagoon
- Saipan Lagoon [BIOMapper](#) Web Application
- Saipan Lagoon [MapServer](#) Web Service
- Saipan Lagoon Video Explorer
 - Metadata for Saipan Lagoon Video (PDF)
 - Data Index for Saipan Lagoon Video (CSV)
- Project Metadata for Mapping Habitat Change in Saipan Lagoon, CNMI

Reports:

- 2017: Benthic habitat maps of Saipan Lagoon (NOAA Technical Memorandum NOS NCCOS 229)

Peer-Reviewed Publications

- Costa, B., M. Kendall, and S. McKagan. 2018. Managers, modelers, and measuring the impact of species distribution model uncertainty on marine zoning decisions. [PLOS ONE](#), 13(10):e0204569. doi:10.1371/journal.pone.0204569

News & Feature Stories

- August 2016: NOAA remaps coral colonies in Saipan Lagoon
- August 2016: Federal surveys reinforce status of imperiled coral, sea life in lagoon



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OUTREACH

Scientific Collaboration and Outreach

Biogeo scientists present, lead and collaborate in numerous conferences, seminars, workshops and project-related meetings, contributing, sharing and evolving Biogeography Program approaches and products.

Some include:

Sanctuary Advisory Council (SAC) meetings ~2 times per year
 Stakeholder/Partner meetings, e.g., prioritize mapping areas
 ESRI (GIS) conference - we present every year
 Pacific Seabird Group Annual Meeting, and many others
 NOAA Science Seminar Series - we present 1-2 times a year

Additional outreach and collaboration listed on next page.



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OUTREACH

Scientific Outreach and Collaboration:

Examples of conferences, meetings, workshops and groups we're involved with

Grays Reef NMS Sanctuary Advisory Council and Science Advisory Group

Nancy Foster Seafloor Mapping VIP, Education Days

NOAA SECART: NOAA's SE & Carib Regional Collab Team

Mariana Science meeting

ESRI GIS Conference: presentations, posters

Smithsonian Natl Museum of Natural History World Ocean Day

EXPRESS mtg: prioritizing seafloor mapping & visual surveys

Costa Rican Embassy meeting

State Department mtg: how does bathy support mgmt. in Pac?

JABLTXC Conf: Evaluating utility of EAARL-B lidar waveforms

for characterizing benthic habitats

NAVFAC meeting

NPS meetings: Results from sUAS flights in St. Croix

GeoHab: Use of multispectral backscatter for char'g ben. habs.

iTAG Fish Telemetry in the Gulf of Mexico

International Symposium for Deep Sea Corals

Deep-sea coral modeling best practices workshop

NOAA DSCRTP Pacific Islands DSC Wrap-Up

NYSERDA State of the Science on Wildlife and

Offshore Wind Energy Development

Mapping Prioritization for Wisc Lake Michigan NMS

Atlantic Marine Bird Coop. Marine Spatial Planning work group

US Caribbean Acoustic Network (USCAN)

BOEM Gulf of Mexico Information Transfer Meeting

Pacific Seabird Group

Telepresence expeditions aboard Okeanos Explorer

Gulf of Mexico Oil Spill Conference

CNMI benthic habitat meetings

White abalone restoration meeting



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OUTREACH

Educational Outreach

- Leading Diver Training in NCRMP Monitoring protocols
- Mentoring undergrad, MS and PhD student; serving as committee members for PhD students
- Deep-sea coral taxonomy workshop and lectures
- Hosting summer interns; participating in intern open houses
- NOAA Kids Day, 2015-2019; Biogeo leads many hands on classes: mapping, squid dissection, speed interviews with NOAA Professionals, fish transects, design a fish, and more.
- Hands-on activities in K-12 & college classrooms to do on ecology, squid dissection, fish transects, and more
- Oxford Day and NC Seafood Fest; science outreach to kids and adults
- Outreach on NOAA ships to K-college and grad students, fishers, VIPs, in Great Lakes and Caribbean



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BIOGEOGRAPHY PROGRAM REVIEW

Biogeography Program By the Numbers

John Christensen, Chief
NCCOS | Biogeography Branch



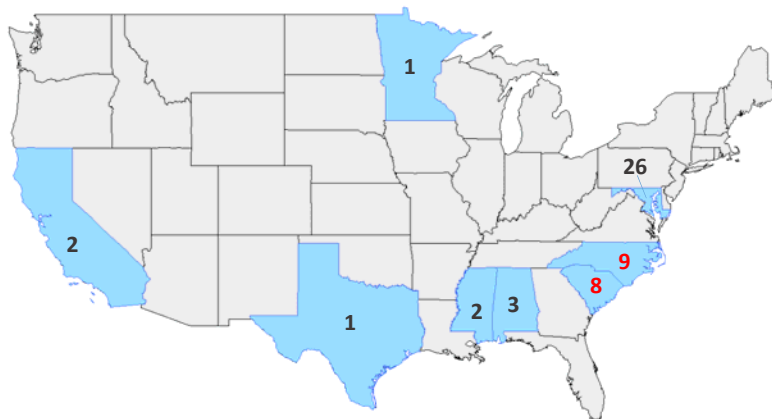
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Biogeography Program By the Numbers | Staffing

Total Full Time Positions (52)

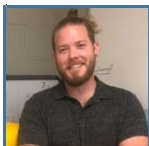
- Federal Staff (18, \$2.8M)
- Contract Staff (34, \$3.4M)
- Bachelor Degrees (10)
- Master Degrees (26)
- Doctorate Degrees (16)
- Ecologist/Biologists (36)
- IT Specialists (3)
- Physical Scientists (6)
- Social Scientists (7)
- States (8)
- Laboratory Facilities (2)



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Biogeography Program By the Numbers | Staffing



Corey Ames
Beaufort, NC
Mapping Team
7 years of experience



Rachel Basset
Charleston, SC
Deep Coral Team
25 years of experience



Tim Battista
Silver Spring, MD
Mapping Team
23 years of experience



Ken Buja
Silver Spring, MD
Crosscut Team
32 years of experience



Heidi Burkart
Tuscaloosa, AL
Mon. & Assess. Team
13 years of experience



Michael Bollinger
Beaufort, NC
Mapping Team
5 years of experience



John Christensen
Silver Spring, MD
Crosscut Team
24 years of experience



Larry Claffin
Silver Spring, MD
Mon. & Assess. Team
43 years of experience



Randy Clark
Stennis, MS
Mon. & Assess. Team
21 years of experience



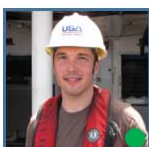
Chris Clement
Silver Spring, MD
Mapping Team
29 years of experience



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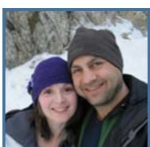
Biogeography Program By the Numbers | Staffing



Bryan Costa
Santa Barbara, CA
Mapping Team
15 years of experience



Michael Coyne
Durham, NC
Modeling Team
22 years of experience



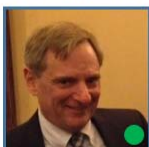
Dan Dorfman
Silver Spring, MD
Mon. & Assess. Team
22 years of experience



Erik Ebert
Beaufort, NC
Mapping Team
10 years of experience



Peter Etnoyer
Charleston, SC
Deep Coral Team
18 years of experience



Don Field
Beaufort, NC
Mapping Team
36 years of experience



Chloe Fleming
Charleston, SC
Social Science Team
6 years of experience



Kim Foley
Beaufort, NC
Mon. & Assess. Team
20 years of experience



Amy Freitag
Oxford, MD
Social Science Team
6 years of experience



Janessy Frometta
Charleston, SC
Deep Coral Team
5 years of experience



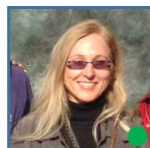
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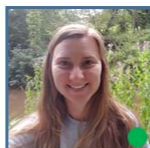
Biogeography Program By the Numbers | Staffing



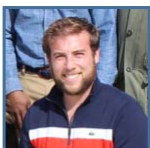
Tracy Gill
Silver Spring, MD
Crosscut Team
39 years of experience



Theresa Goedeke
Silver Spring, MD
Social Science Team
30 years of experience



Sarah Gonyo
Silver Spring, MD
Social Science Team
5 years of experience



Matt Gorstein
Charleston, SC
Social Science Team
5 years of experience



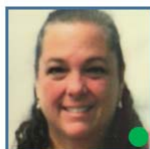
Holly Goyert
Silver Spring, MD
Modeling Team
12 years of experience



Elizabeth Gugliotti
Charleston, SC
Deep Coral Team
1 year of experience



Brendan Guthrie
Silver Spring, MD
Mapping Team
5 Years of experience



Jamie Higgins
Silver Spring, MD
Crosscut Team
32 years of experience



Sarah Hile
Charlotte, NC
Crosscut Team
16 years of experience



Jacob Howell
Tuscaloosa, AL
Mon. & Assess. Team
3 years of experience



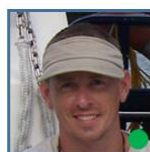
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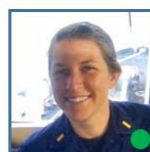
Biogeography Program By the Numbers | Staffing



Chris Jeffrey
Silver Spring, MD
Crosscut Team
20 years of experience



Matt Kendall
Silver Spring, MD
Mon. & Assess. Team
23 years of experience



Jennifer Kraus
Silver Spring, MD
Mapping Team
9 years of experience



Jeff Leirness
Minneapolis, MN
Modeling Team
7 years of experience



Zhifa Liu
Silver Spring, MD
Modeling Team
8 years of experience



Ayman Mabrouk
Silver Spring, MD
Mon. & Assess. Team
24 years of experience



Tom McGrath
Silver Spring, MD
Mon. & Assess. Team



Charlie Menza
Silver Spring, MD
Mon. & Assess. Team
17 years of experience



Moe Nelson
Silver Spring, MD
Mon. & Assess. Team
30 years of experience



Avery Paxton
Beaufort, NC
Mapping Team
7 years of experience



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Brad Pickens
Wilmington, NC
Mapping Team
15 years of experience



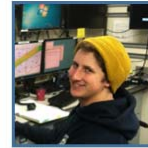
Matt Poff
Silver Spring, MD
Modeling Team
9 years of experience



Seann Regan
Austin, TX
Social Science Team
10 years of experience



Enrique Salgado
Charleston, SC
Deep Coral Team
12 years of experience



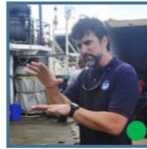
Will Sautter
Silver Spring, MD
Mapping Team
9 years of experience



Andrew Shuler
Charleston, SC
Deep Coral Team
17 years of experience



Laughlin Sicheloff
Stennis, MS
Mon. & Assess. Team
19 years of experience



Chris Taylor
Beaufort, NC
Mapping Team
15 years of experience



Katie Watson
Tuscaloosa, AL
Mon. & Assess. Team
9 years of experience



Bethany Williams
Silver Spring, MD
Mon. & Assess. Team
2 years of experience



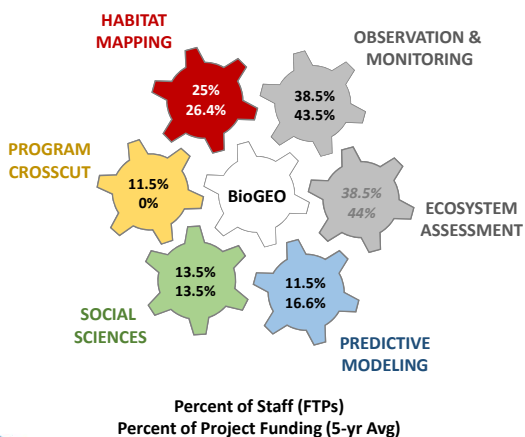
Arliss Winship
Silver Spring, MD
Modeling Team
19 years of experience



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Biogeography Program By the Numbers | Staffing



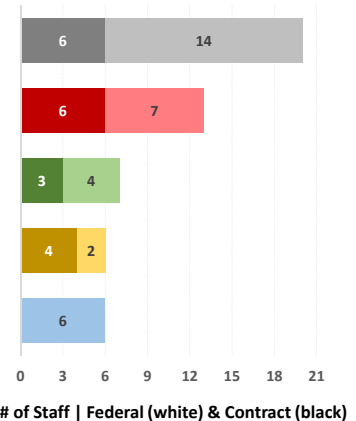
Monitoring & Assessment

Mapping

Social Sciences

Program Crosscut

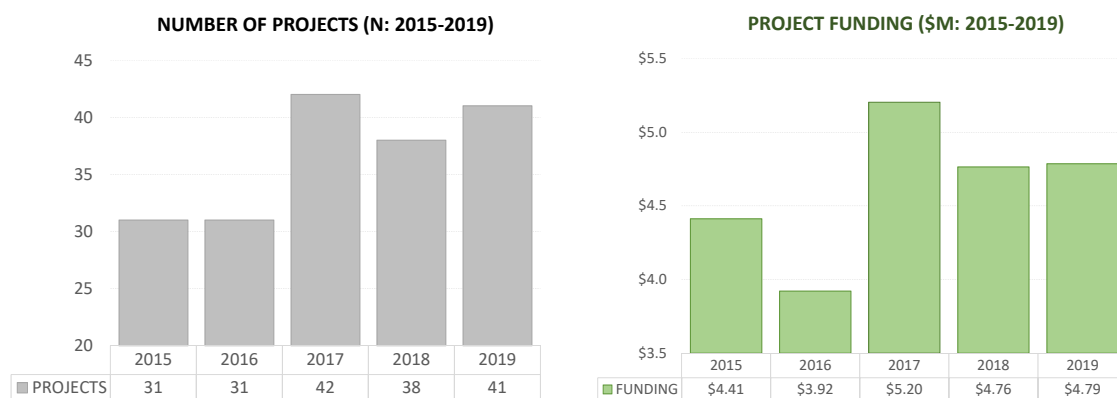
Modeling



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NATIONAL CENTERS FOR COASTAL OCEAN SCIENCE

Biogeography Program By the Numbers | Projects & Funding

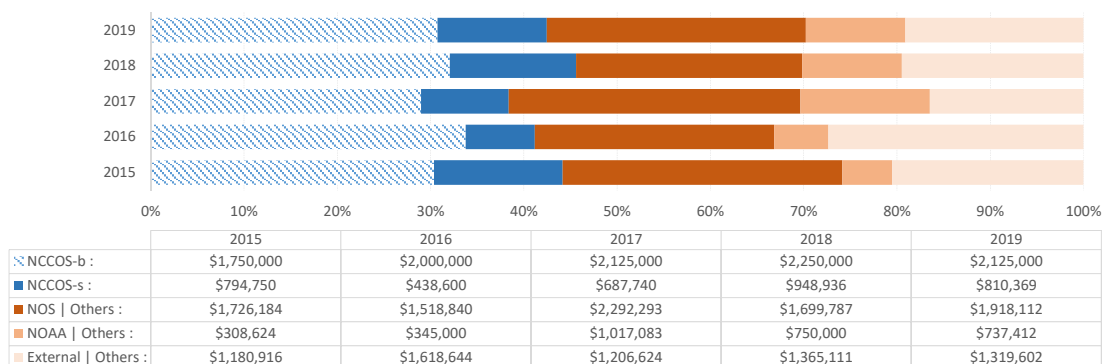


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Biogeography Program By the Numbers | Projects & Funding

PROJECT FUNDING SOURCES: PROPORTIONAL (2015-2019)



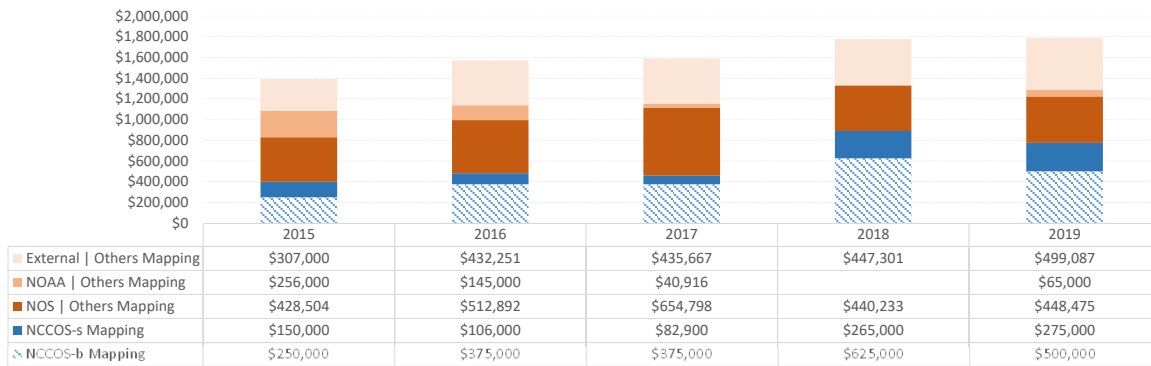
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Biogeography Program By the Numbers | Projects & Funding

PROJECT FUNDING SOURCES & AMOUNTS: MAPPING (2015-2019)

5-Year Total: \$ 6.0M | Annual Average: \$1.2M



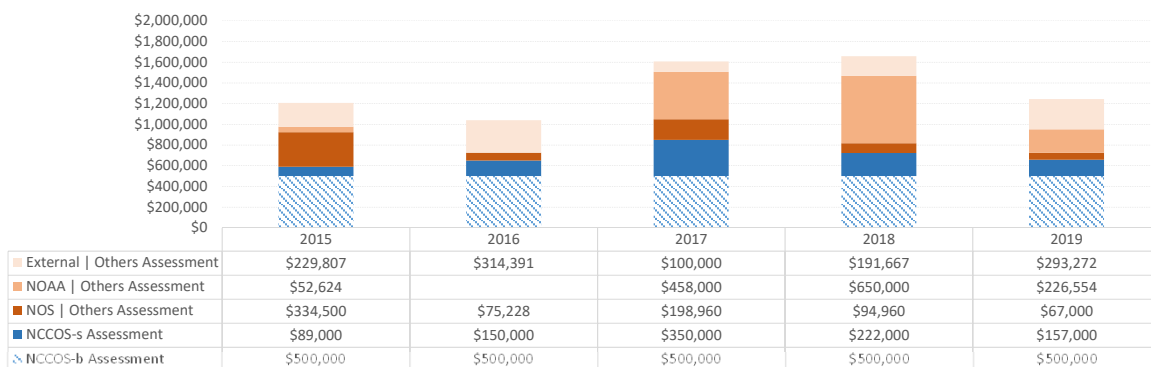
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Biogeography Program By the Numbers | Projects & Funding

PROJECT FUNDING SOURCES & AMOUNTS: ECOSYSTEM ASSESSMENT (2015-2019)

5-Year Total: \$4.3M | Annual Average: \$851K



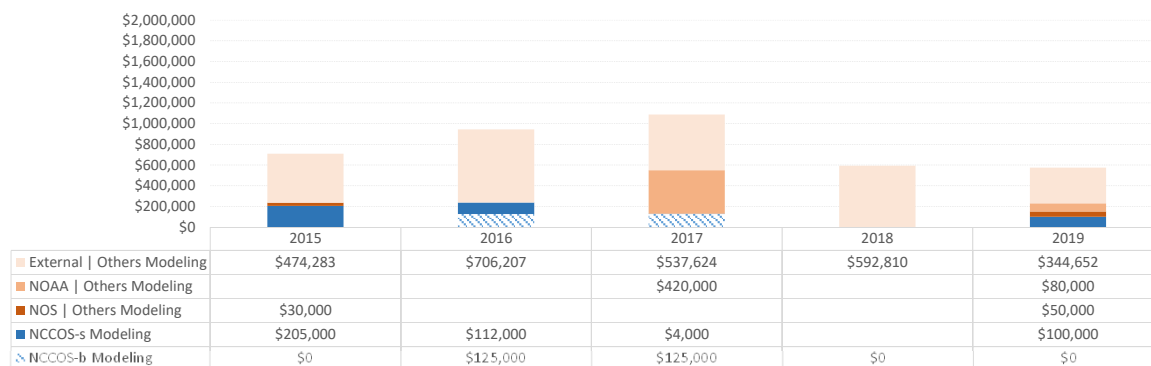
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Biogeography Program By the Numbers | Projects & Funding

PROJECT FUNDING SOURCES & AMOUNTS: PREDICTIVE MODELING (2015-2019)

5-Year Total: \$3.8M | Annual Average: \$767K



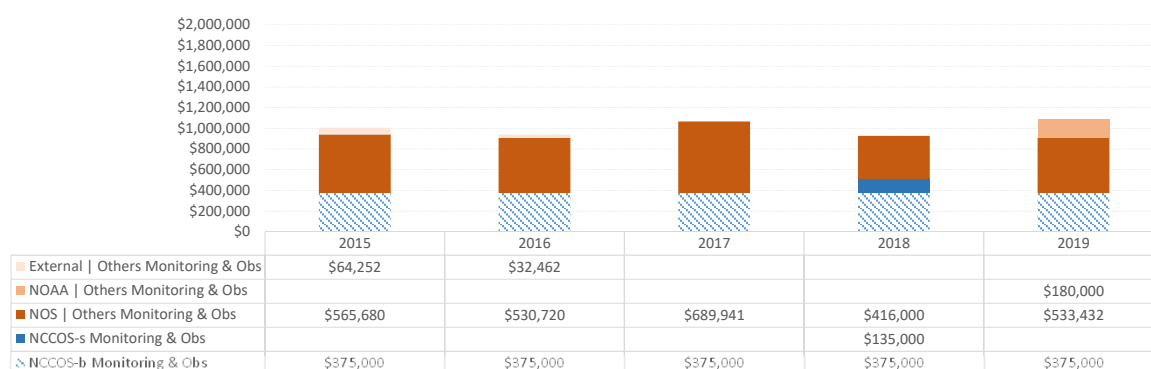
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Biogeography Program By the Numbers | Projects & Funding

PROJECT FUNDING SOURCES & AMOUNTS: OBSERVATION & MONITORING (2015-2019)

5-Year Total: \$3.2M | Annual Average: \$630K



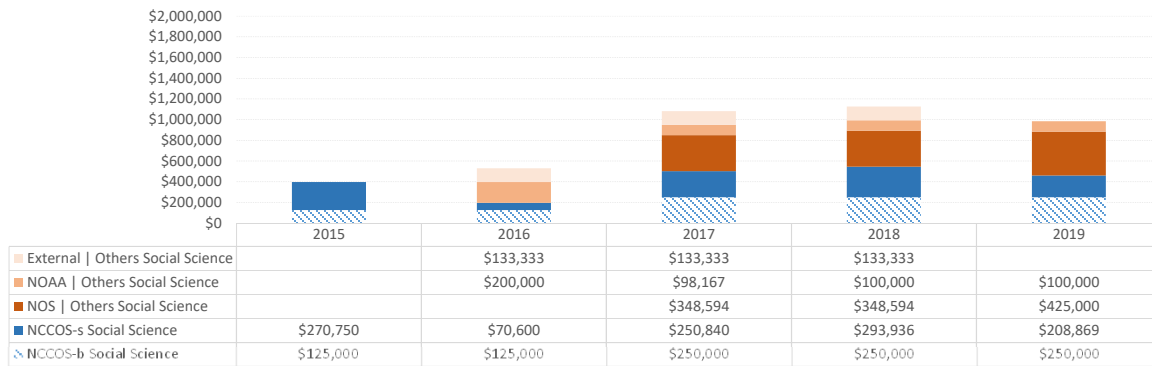
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Biogeography Program By the Numbers | Projects & Funding

PROJECT FUNDING SOURCES & AMOUNTS: SOCIAL SCIENCES (2015-2019)

5-Year Total: \$3.1M | Annual Average: \$623K



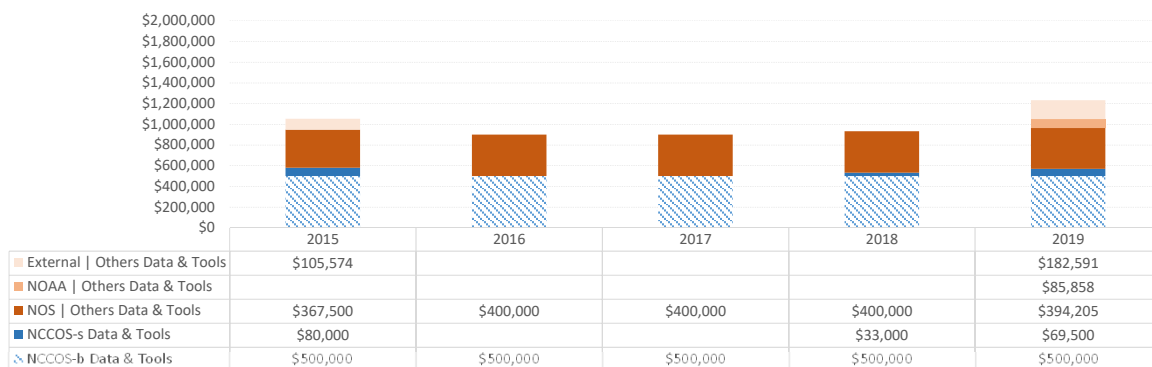
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Biogeography Program By the Numbers | Projects & Funding

PROJECT FUNDING SOURCES & AMOUNTS: DATA & TOOLS (2015-2019)

5-Year Total: \$2.7M | Annual Average: \$547K



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Biogeography Program By the Numbers | Projects & Funding

AVERAGE ANNUAL PROGRAM INVESTMENT (2015-2019)

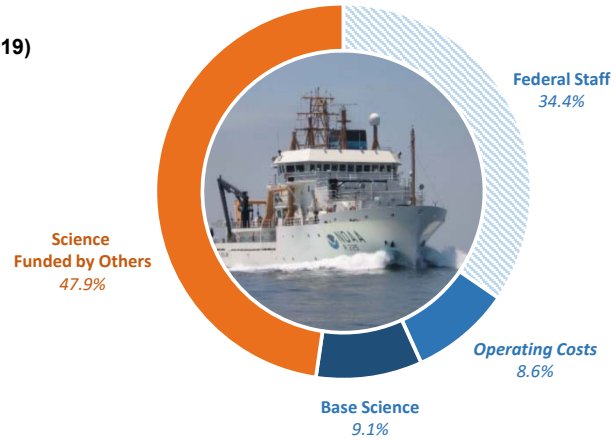
Federal Staff Cost (2019 Dollars)
\$2.8M

Operating Costs: Space & IT Logistics (N=52)
\$700,000 (\$13K per year, per person)

Base Funded Science (5-yr Avg)
\$740,000

Science Funded by Others (5-yr Avg)
\$3,900,000

TOTAL: \$8,140,000



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Biogeography Program By the Numbers | Projects & Funding

Contract Labor
\$3,385,000

Transfers Out
\$420,000

Supplies & Equipment
\$265,000

Contract Travel
\$237,000

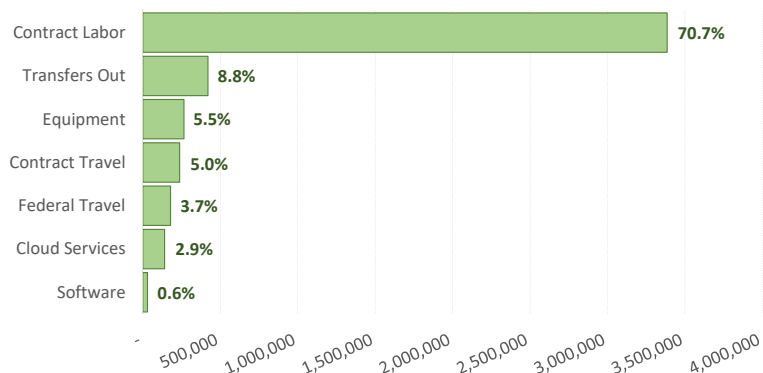
Federal Travel
\$178,000

Cloud Services
\$140,000

Software
\$30,000

Balance: \$130,495 (2.7%)

DISTRIBUTION OF FY2019 SCIENCE FUNDING | \$4,785,495



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