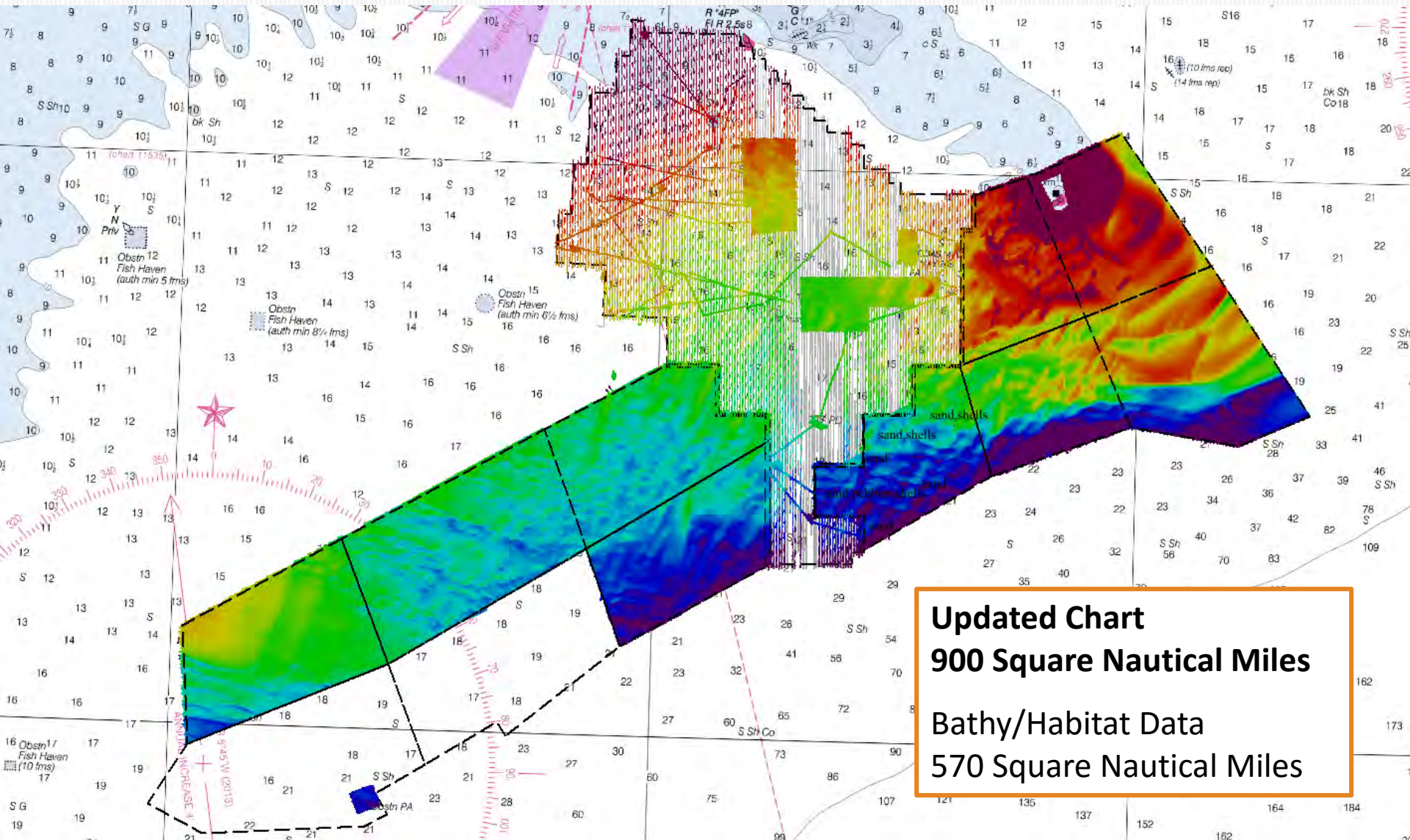


# Ping Once Use Many Times

*Enhancing the Utility of Office of Coast Survey Mapping Products  
for Coastal Science and Management*



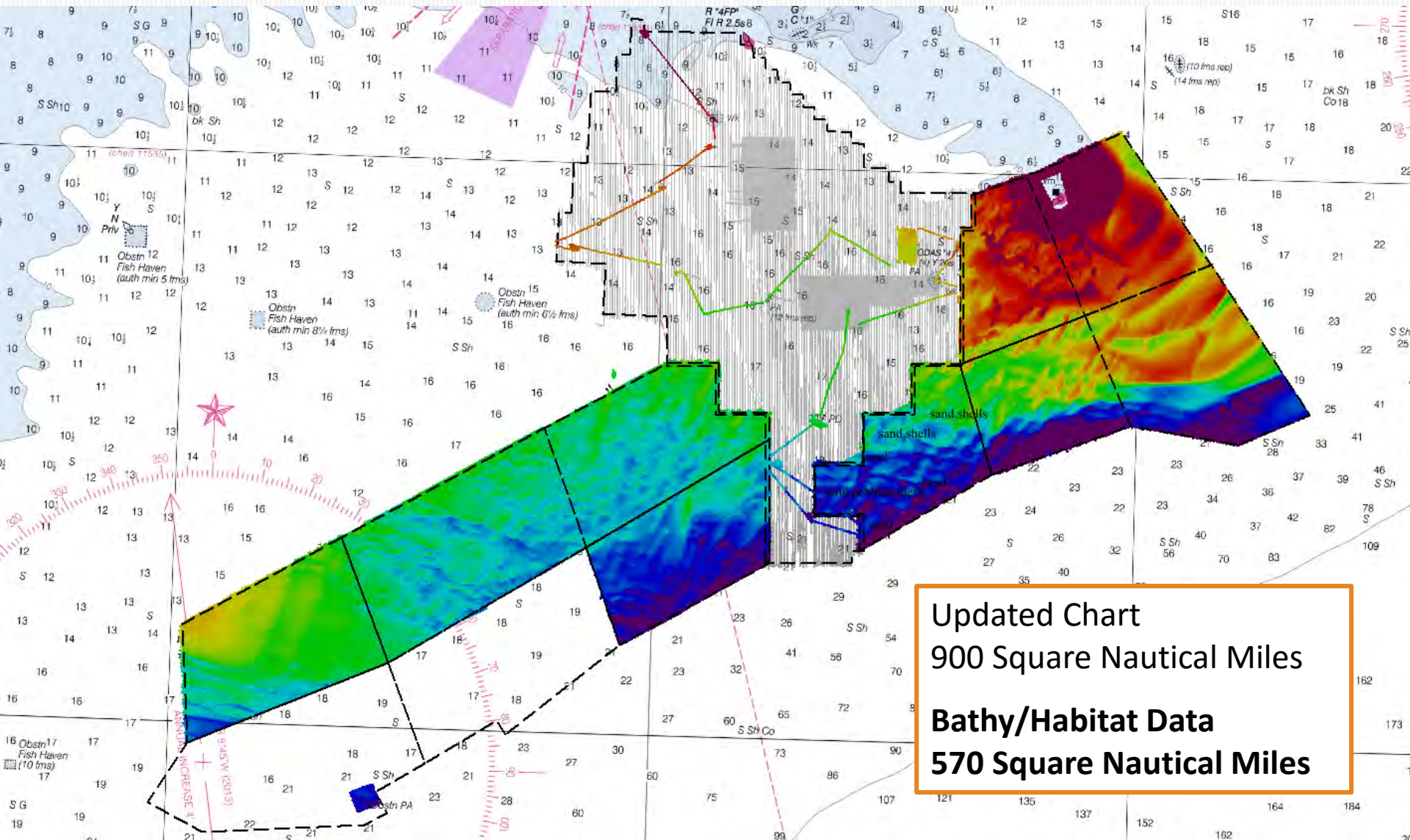
# Wilmington 2016: For the Chart



**Updated Chart**  
**900 Square Nautical Miles**  
**Bathy/Habitat Data**  
**570 Square Nautical Miles**



# Wilmington 2016: For Habitat



Updated Chart  
900 Square Nautical Miles  
Bathy/Habitat Data  
570 Square Nautical Miles

# Outline

- Collaborations – How did this come to be?
  - Who are the main stake holders?
  - Hydrographic Survey Division Prioritization and Planning
- The story of acquisition
  - Wilmington East Call Area 2014 (NCCOS Wind Energy Survey)
  - Approaches to Wilmington 2016 (Coast Survey)
- Habitat products
  - Preliminary results
  - Habitat data uses
- Vision for the future
  - Data discovery
  - Further collaboration



# Collaboration



*OCS HSD – NCCOS – OMAO - UNH NOAA JHC CCOM*

*How did this all come together?*

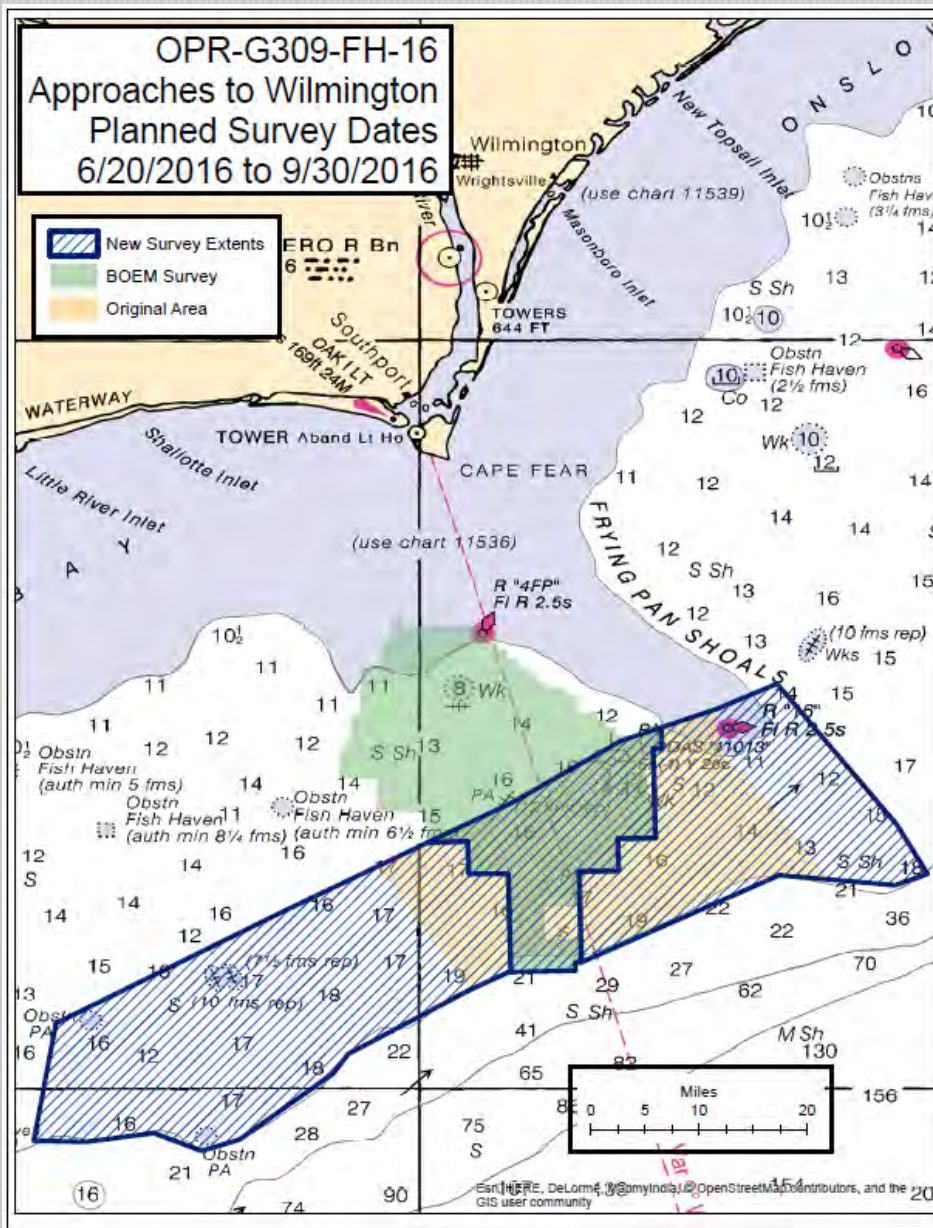


# The Main Cast

- Office of Coast Survey  
*-Safety of Navigation –*
- National Center for Coastal Ocean Services (NCCOS)  
*-Ecological and habitat assessments to support ocean planning and ecosystem management-*
- University of New Hampshire NOAA Joint Hydrographic Center / Center for Coastal & Ocean Mapping (JHC)  
*-Incorporating new developed technology & methods into the field-*
- NOAA Ship *Ferdinand R. Hassler*  
Office of Marine and Aviation Operations (OMAO)  
*-Safely facilitates earth observation-*



# Wilmington 2016 Project Area



# Survey Prioritization and Planning

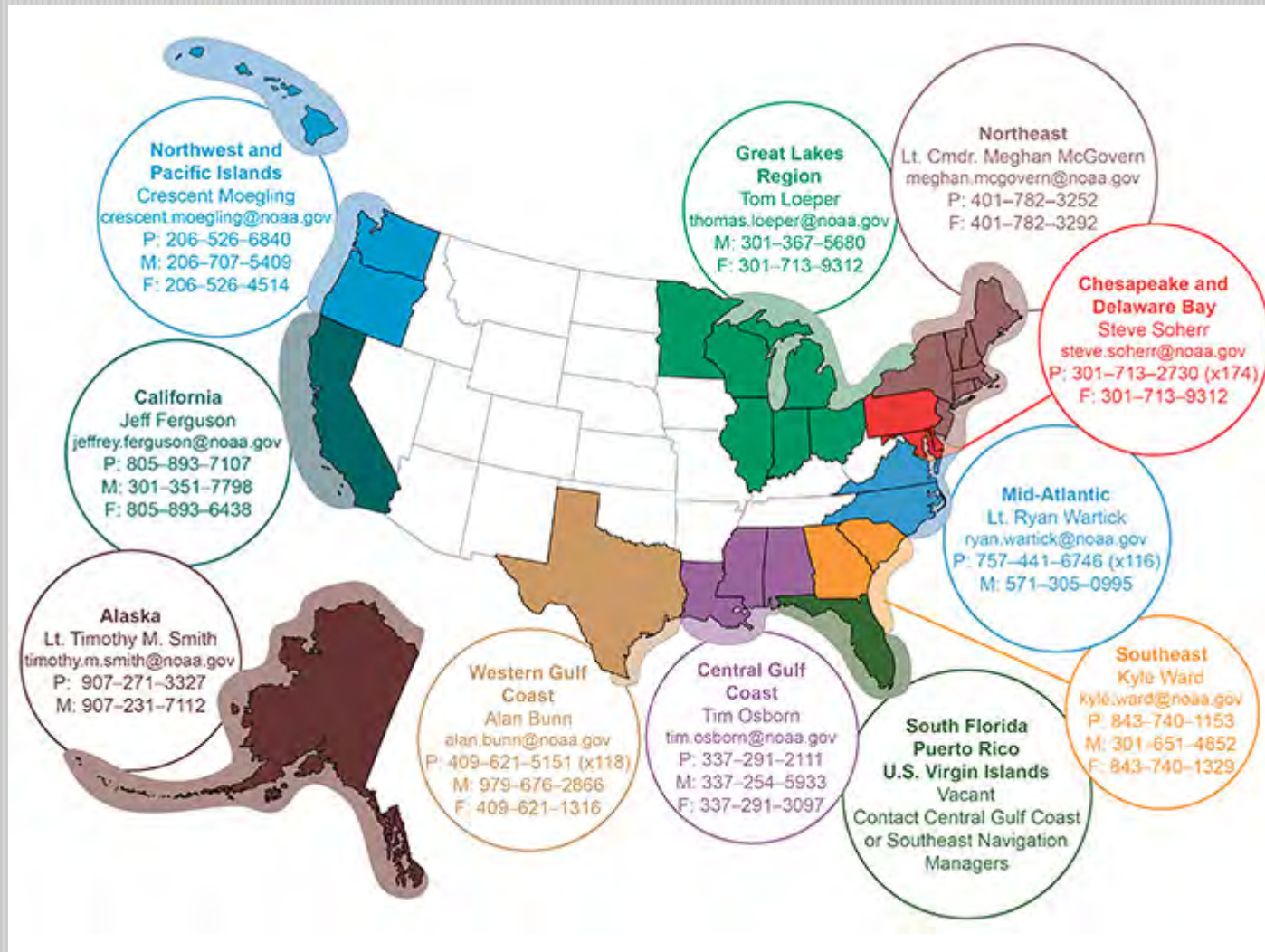


Hydrographic Survey Division - Operations





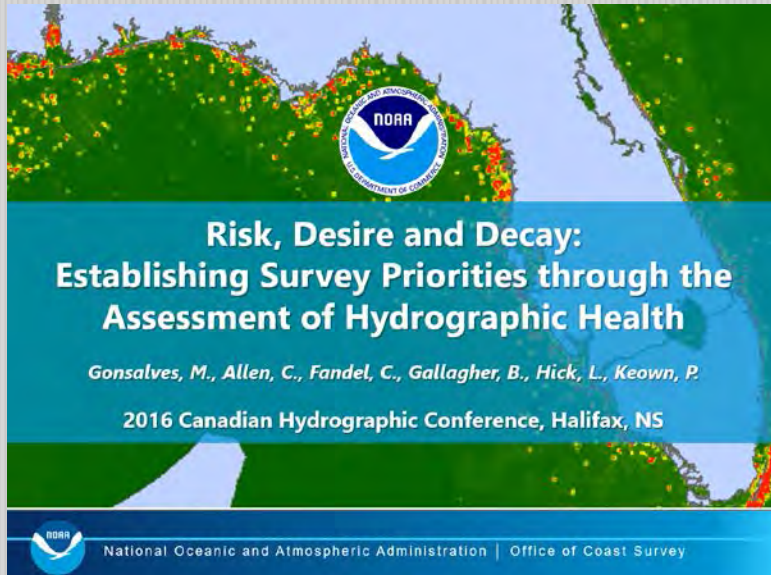
# Navigation Managers – SuRF Requests



<http://www.nauticalcharts.noaa.gov/nsd/reps.htm>

# Hydrographic Health Model

## NOAA Hydrographic Survey Priorities



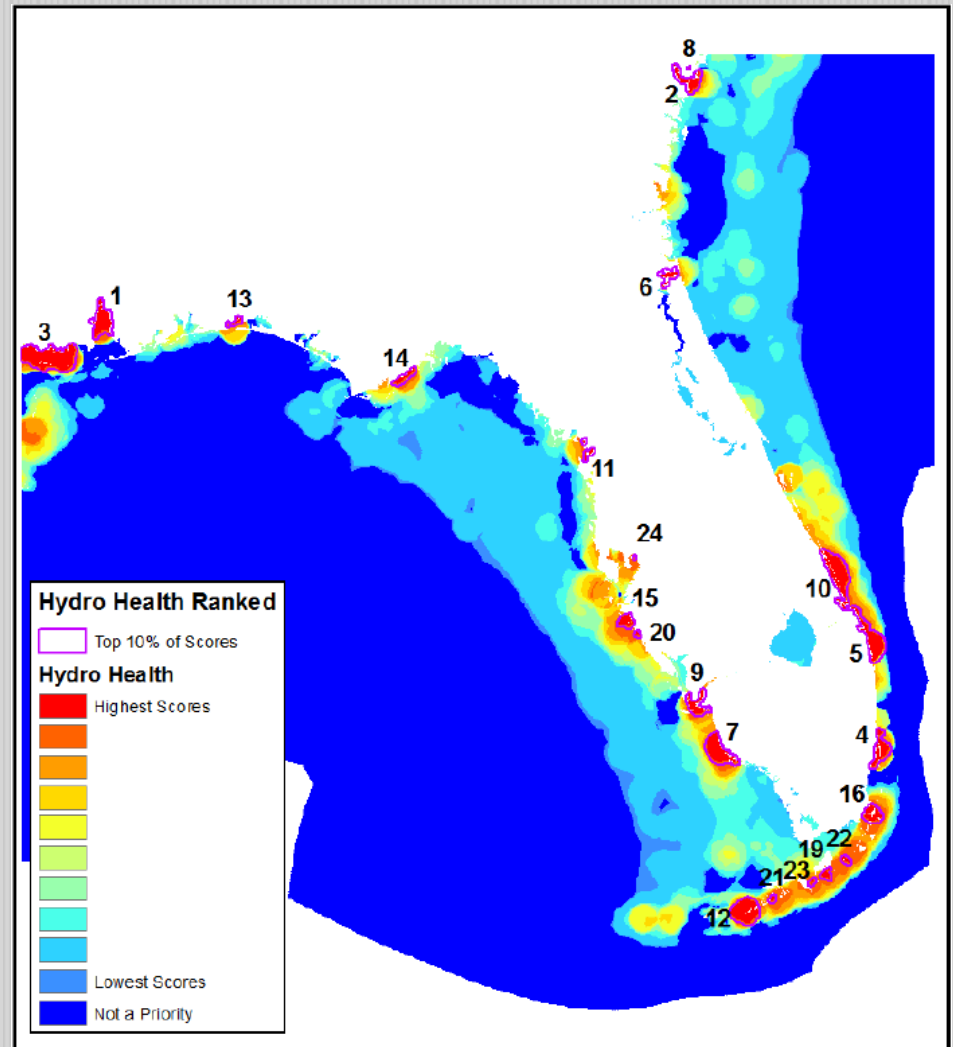
Data type:	Purpose:	Source:
<b>Where are the ships going?</b>		
AIS	Analyze traffic patterns	USCG, Marine Cadastre
AVIS database	Distinguish vessel types; calculate under-keel clearance	USCG
Active Captain reports	Proxy for recreational boaters	Active Captain
<b>What's the present state of hydrography?</b>		
CATZOC	Initial data quality	NOAA
Survey Age	Present data quality	NOAA
<b>Is there a reason to be concerned with the state of hydrography?</b>		
Depth	Identify areas of concern; calculate seafloor complexity	NOAA Charts
Grounding reports	Identify areas of concern	USCG
Charted Hazards	Identify areas of concern	NOAA Charts
Reported Hazards (PA/PD)	Identify areas of concern	NOAA Charts
Natural/Artificial Reefs	Identify areas of concern	NOAA Charts
Sanctuaries	Identify areas of concern	NOAA
Ports	Identify areas of concern	NOAA, USACE
Search & Rescue Stations	Identify areas of concern	USCG
Bottom Type	Identify areas of concern	NOAA Charts
<b>Is there a reason to believe the seafloor is changing?</b>		
Hurricanes	Identify areas of change	NOAA
Tidal Currents	Identify areas of change	Georgia Tech
Marine Debris	Identify areas of change	NOAA Charts

(Risk, Desire and Decay: Establishing Survey Priorities through the Assessment of Hydrographic Health, Gonsalves, Allen, Fandel, Gallagher, Hick, Keown CHC2016)



# Hydrographic Planning

- HSD Priority Areas
- Integrated Ocean and Coastal Mapping (IOCM) Priorities - **Seasketch**
- Resource Availability
  - Platforms
  - Days at Sea / Funding
  - Operational windows
- External office coordination (OMAO, COOPS, RSD, NSD)
  - Resources
  - Scheduling



For more information attend the presentation at US Hydro 2017!



# Story Map NOAA Planned Surveys

Story Map: NOAA Plann × +

noaa.maps.arcgis.com/apps/MapSeries/index.html?appid=c04dbcf9398d4933b9bfacd01758b5e1

## Story Map: NOAA Planned Hydrographic Survey Projects - 2016


NOAA's Office of Coast Survey

North Coast of Kodiak Island | North Coast Unalaska (Dutch Harbor) | **Approaches to Wilmington** | Approaches to Savannah | South Coast of Kodiak Island

### Approaches to Wilmington -- OPR-G309-FH-16

Planned project dates: June 2016 - October 2016  
Planned days at sea: 77  
Area: Approx. 797 square nautical miles


The purpose of this project is to provide contemporary surveys to update National Ocean Service (NOS) nautical charting products. This project will include survey area southeast of North Carolina. Survey areas will address 797 SNM, of which 663 SNM are Priority 1 in accordance with the National Hydrographic Survey Priorities Edition 2012. The project is based on an area identified by the Atlantic Coast Port Access Route Study (ACPARS) conducted by PNNL at the request of the USCG to delineate traffic corridors using AIS. This project will improve the chart for traffic navigating from port to port along the Atlantic Ocean Channel.



NOAA Ship *Ferdinand R. Hassler*

For more information about Coast Survey activities, you can sign up for our [newsletter](#) or [blog](#).

NOAA's Office of Coast Survey is responsible for planning hydrographic surveys. Planned hydrographic surveys are derived from NOAA's Hydrographic survey priorities, constituent requests submitted through navigational managers, and other factors. Note that these plans are tentative and subject to change based on each fiscal year's budget allocation, developing priorities and emerging constituent requests. Planned hydrographic surveys can be accessed via [REST service](#).



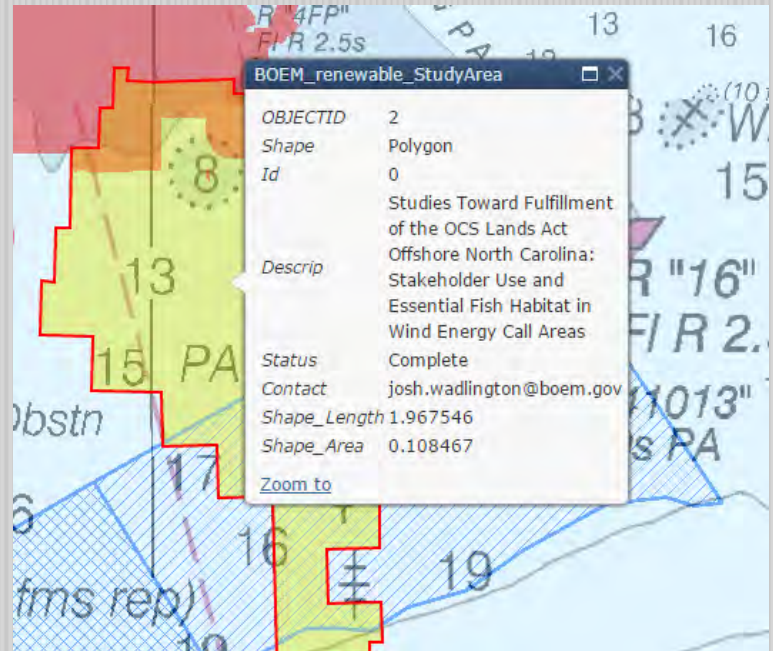
National Oceanic and Atmospheric Administration (NOAA), National Ocean Service (NOS), Office of... esri

NOAA.Maps.arcgis.com



# Project Manager Preparation

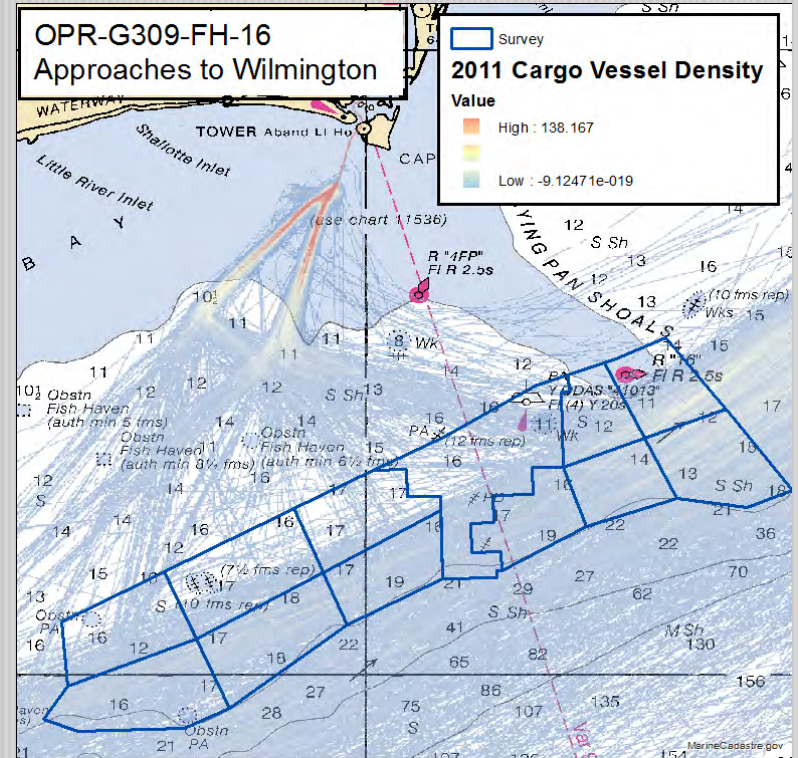
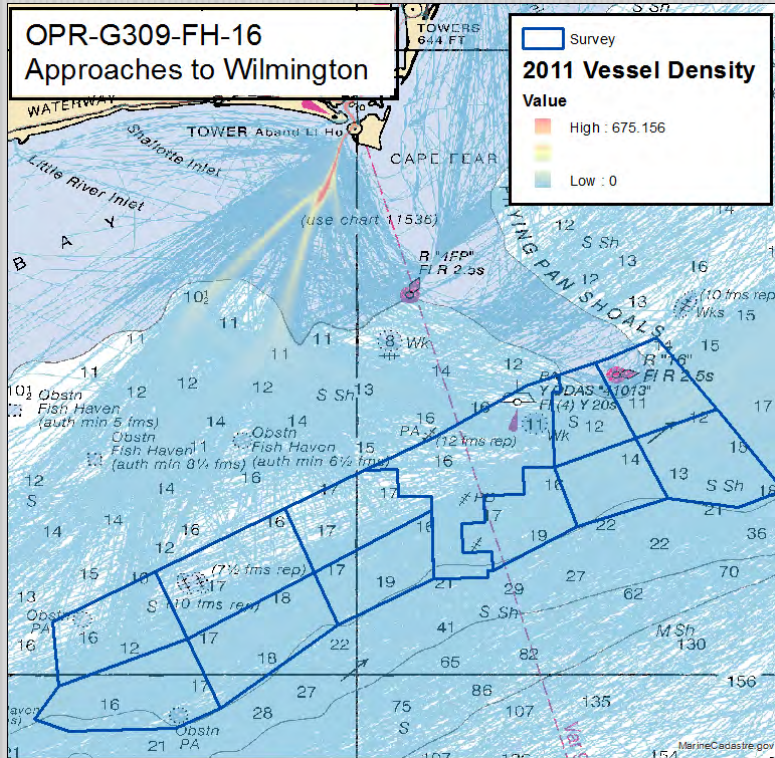
- What data is already available?
  - Historic Chart
  - Outside Source Data
- What priorities can meet (HSD, IOCM, MCD)?
- How many days of survey do we have on project?
- What are the platform's capabilities



## Outside Source Data Resources:

- Survey Index (SURDEX)
- IOCM and [Fedmap.Seasketch.org](https://www.fedmap.seasketch.org/) (image above)
- Word of mouth (Geodynamics, and IOCM Team).

# Where are the ships going?



## 2011 Vessel Density (map service)

# What is the survey age and quality?

Long Bay, 1925

H04523

Lead line survey

By the USCGS S Lydonia

(Sources: Survey Index – SURDEX; and NCEI)



U. S. COAST AND GEODETIC SURVEY

Register No. 4523

STATE NORTH AND SOUTH CAROLINA.

GENERAL LOCALITY ATLANTIC COAST-CAPE FEAR.

LOCALITY LONG BAY-OFFSHORE.

Surveyed by F. G. Engle.

Chief of Party F. G. Engle.

Date July-November 1925

Scale 1:100,000

Protracted by H. G. Warwick.

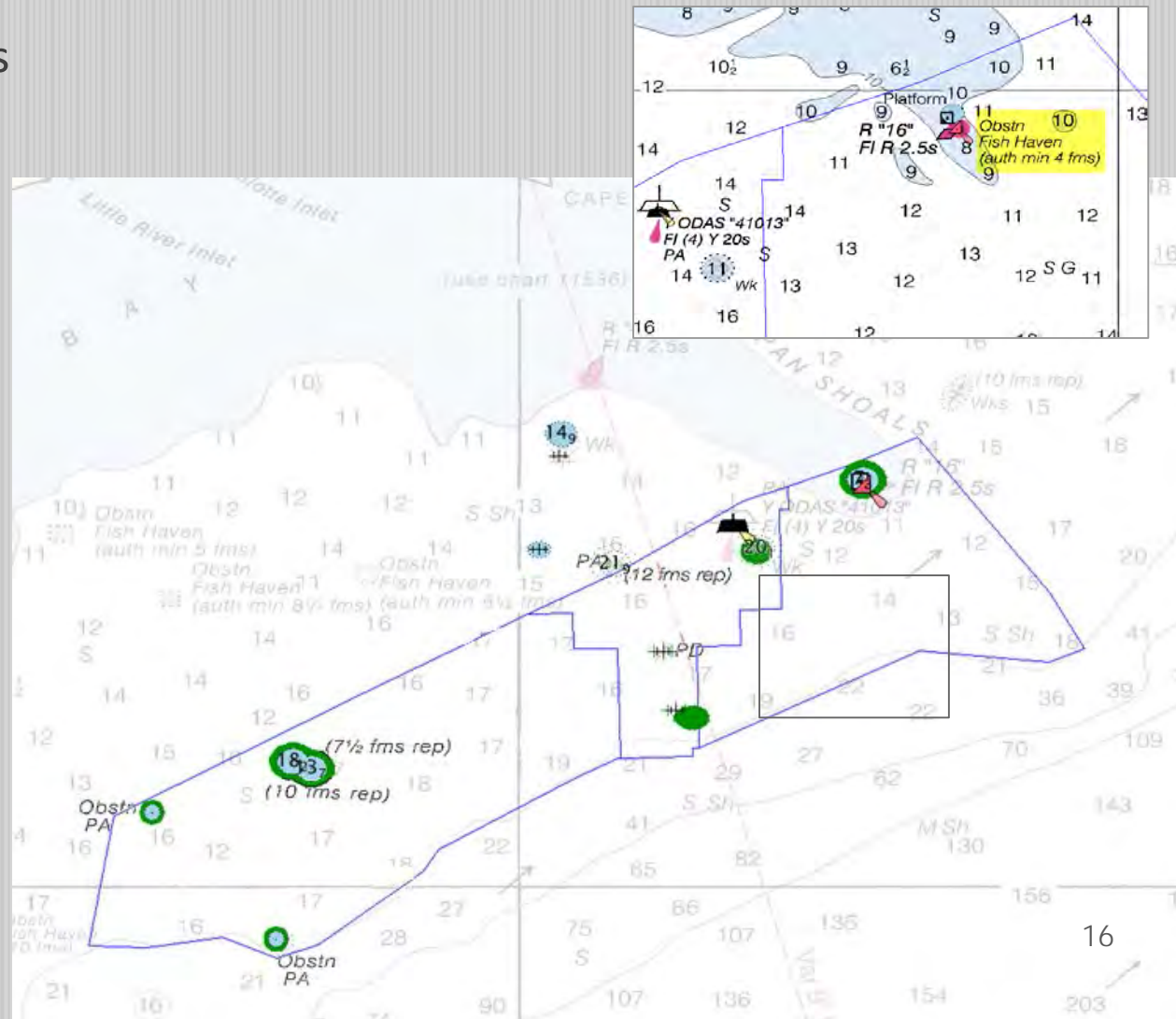
Soundings plotted by V. M. Gibbons.

# What are the charted hazards?

Feature sounding depths are in meters.

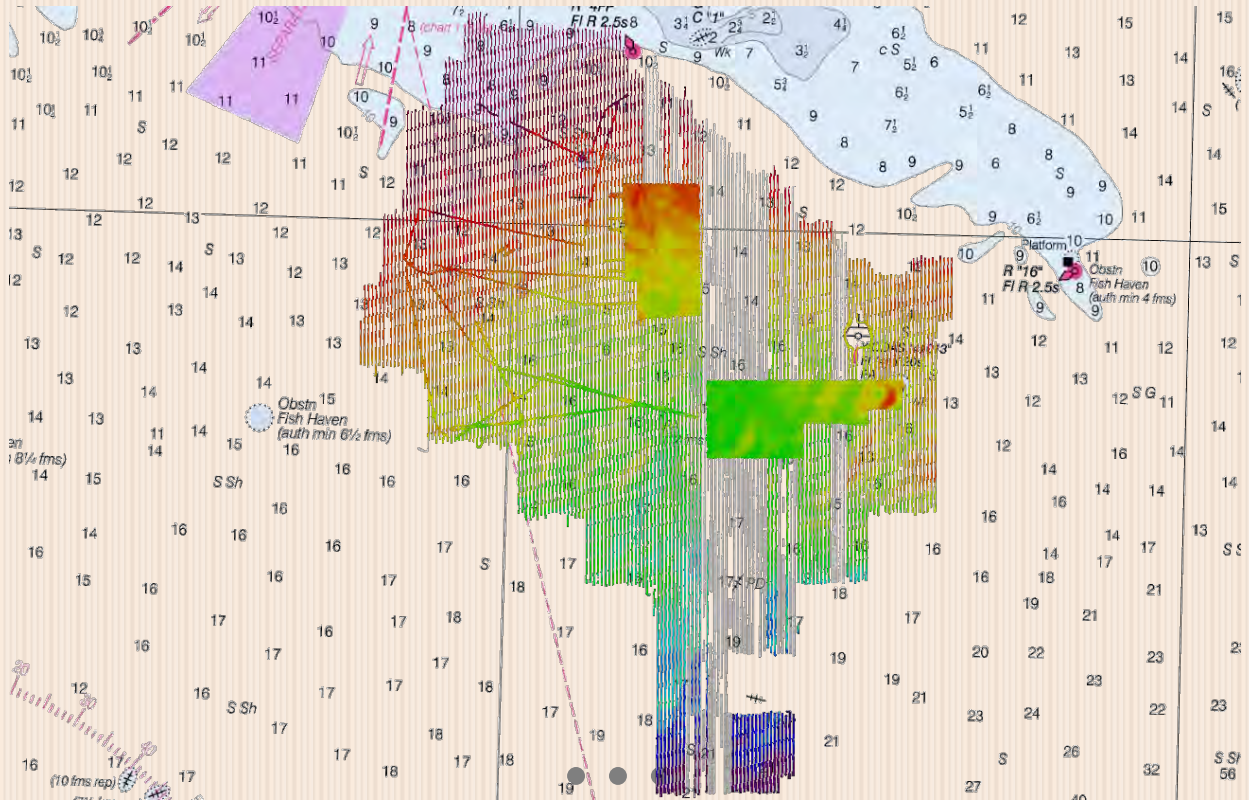
Chart is in fathoms.

- 6 Wrecks
- 2 Obstructions
- 1 Fish Haven Obstruction









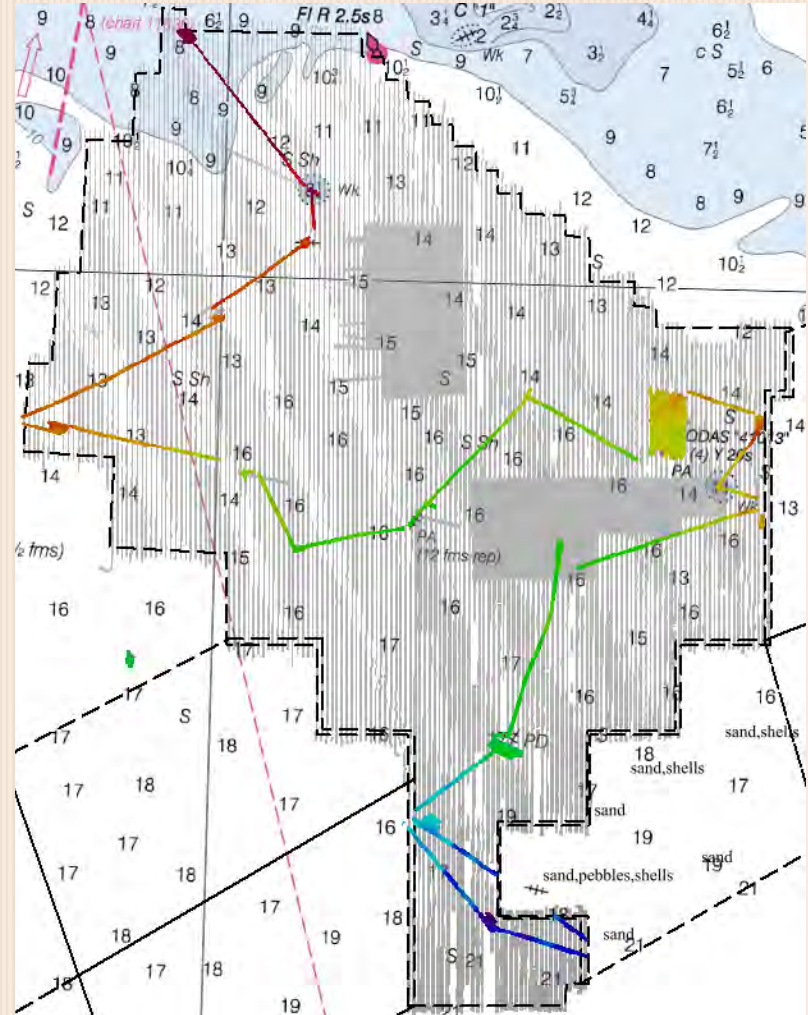
# Wilmington Wind Energy Area

Collected by NCCOS with Geodynamics and *NOAA Ship Nancy Foster*



# Navigational Due Diligence

- Assigned a registry number
- Evaluated
- Developed navigationally significant contacts
- Crossline analysis
- Assured the data was free of flyers and final water levels was applied



A bathymetric map of the Wilmington area, showing depth contours in shades of blue and green. The map is centered on the Wilmington area, with the title 'Approaches to Wilmington 2016' overlaid in white text. A small white asterisk is located below the title.

# Approaches to Wilmington 2016

\*

# *Ferdinand R. Hassler (R250)*

- Small Waterplane Area Twin Hull (SWATH)
- Dual head 7125 MBES Sonar
- Length:  
124 Ft (38m)
- Draft:  
12 ft (3.8m)
- Crew: 14



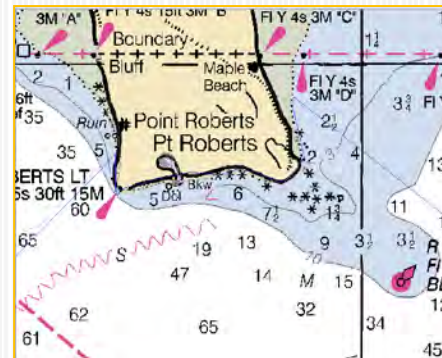
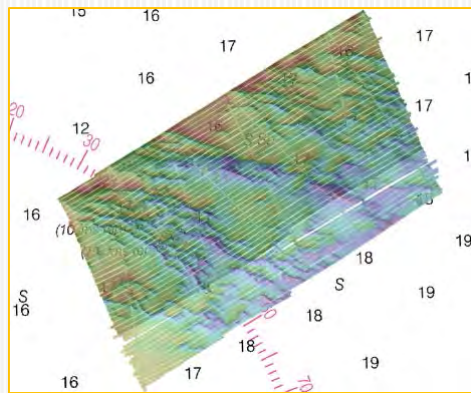
# Some Coast Survey Products

[www.ngdc.noaa.gov](http://www.ngdc.noaa.gov)

- Bathymetry data
- Backscatter
- Bottom Samples
- Sound Speed Profiles

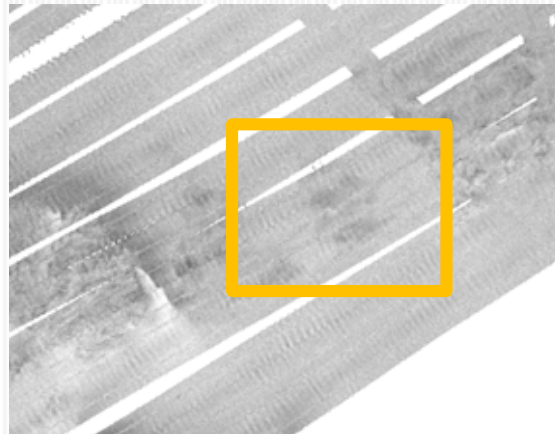
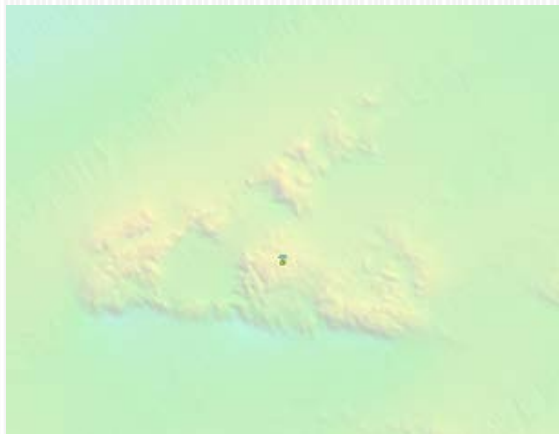
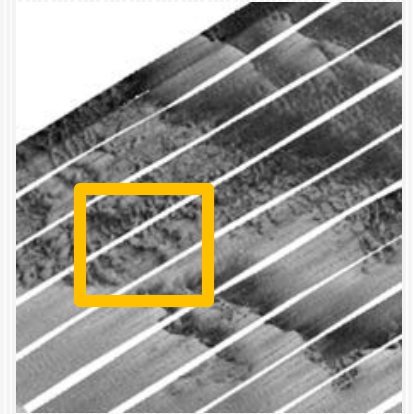
[www.nauticalcharts.noaa.gov](http://www.nauticalcharts.noaa.gov)

- Raster Navigational Charts
- Electronic Navigational Charts
- Coast Pilot

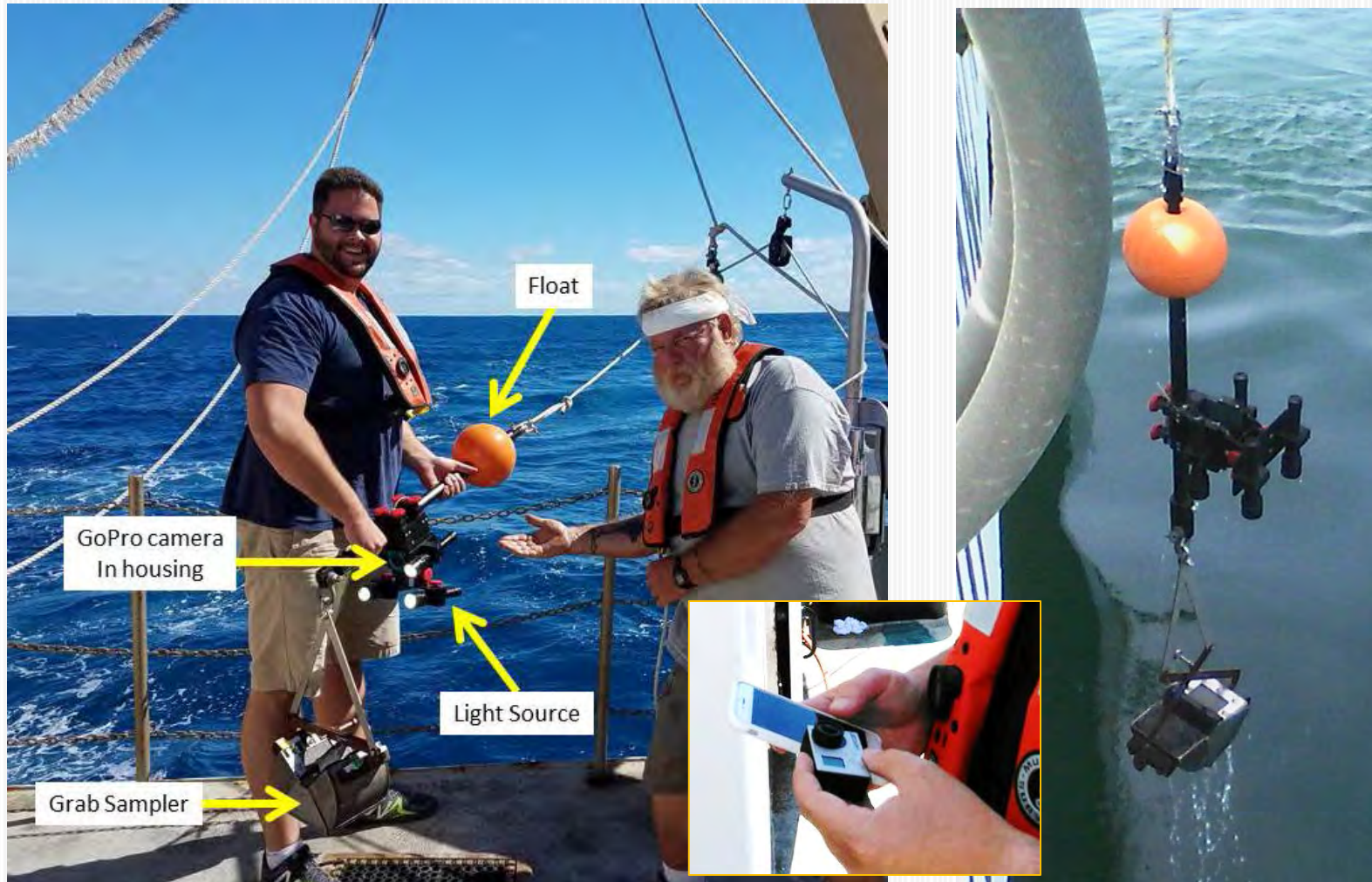


# Field: Smart Collection

- Backscatter mosaic
- Texture targeted bottom samples
- Drop camera images
- Grain size chart



# UNH NOAA JHC CCOM Drop Camera



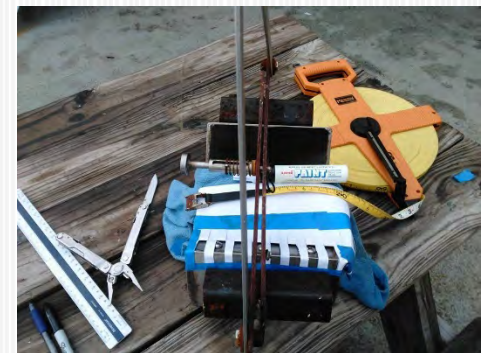
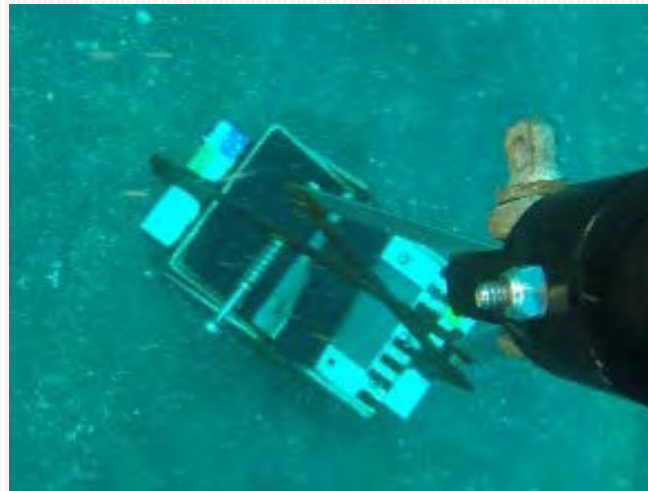
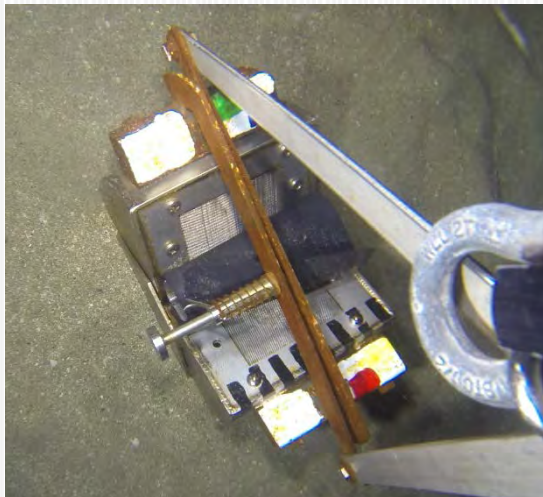
The prototype drop camera connects between the line and the grab sampler, alternatively it can be deployed with a drop frame.





# Bedazzled Bottom Sampler

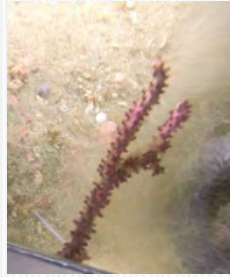
- A scale bar for perspective.
- Color swatches for color correction.
- Rough and fine glitter nail polish for finer sediment comparisons.



# Advantages of Imagery

- Supplemental Identification

- Silt
- Sand
- Hard and Rocky

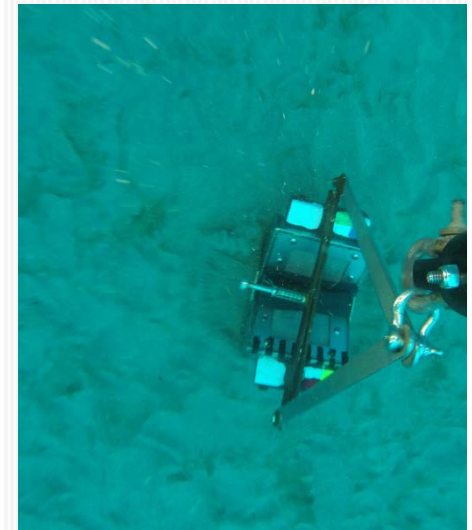
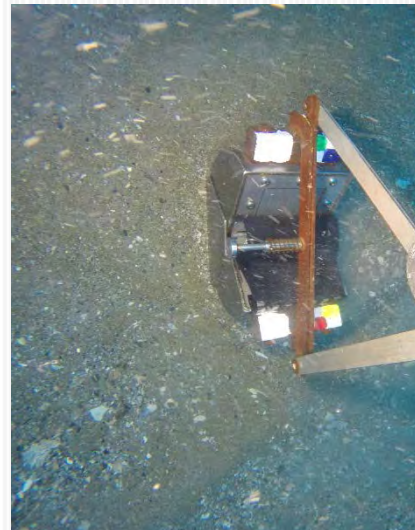
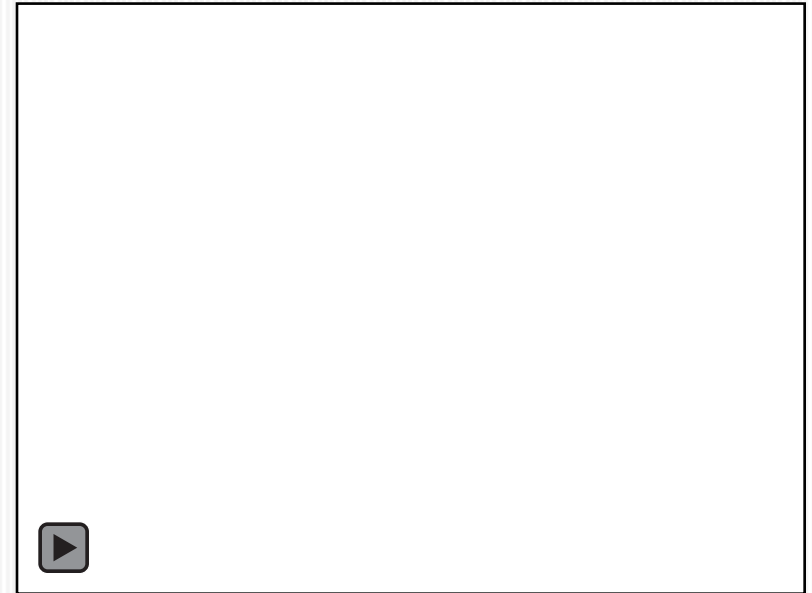
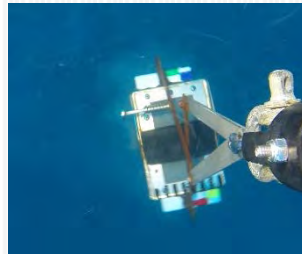


- Provide more context

- Bedforms, Biota
- Homogenous versus mixed

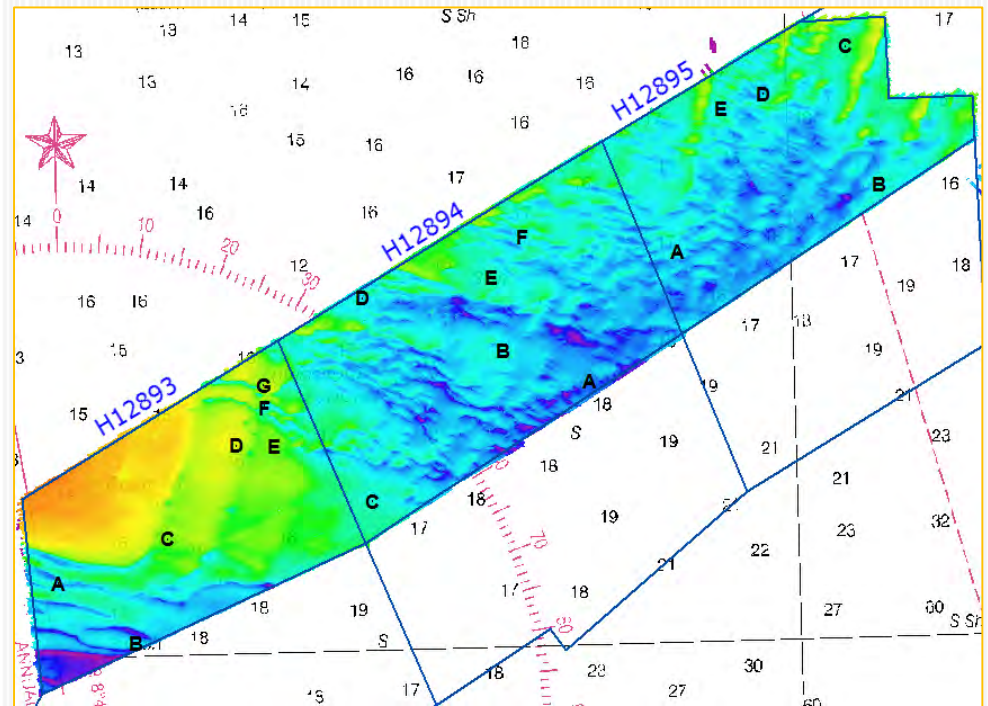
- Images when sampler is empty

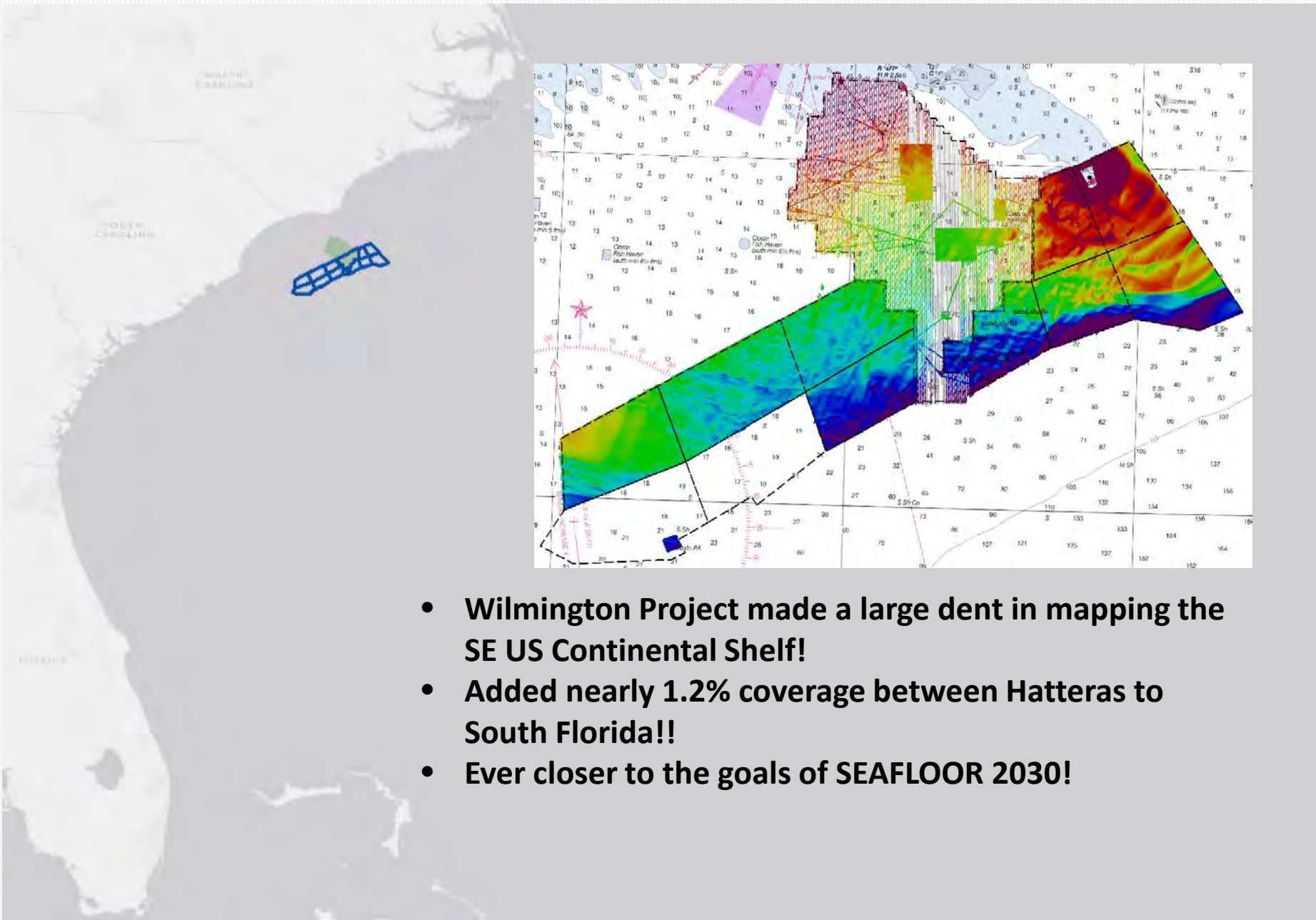
- Hard surface
- Sample Washout



# Deliverables to NCCOS

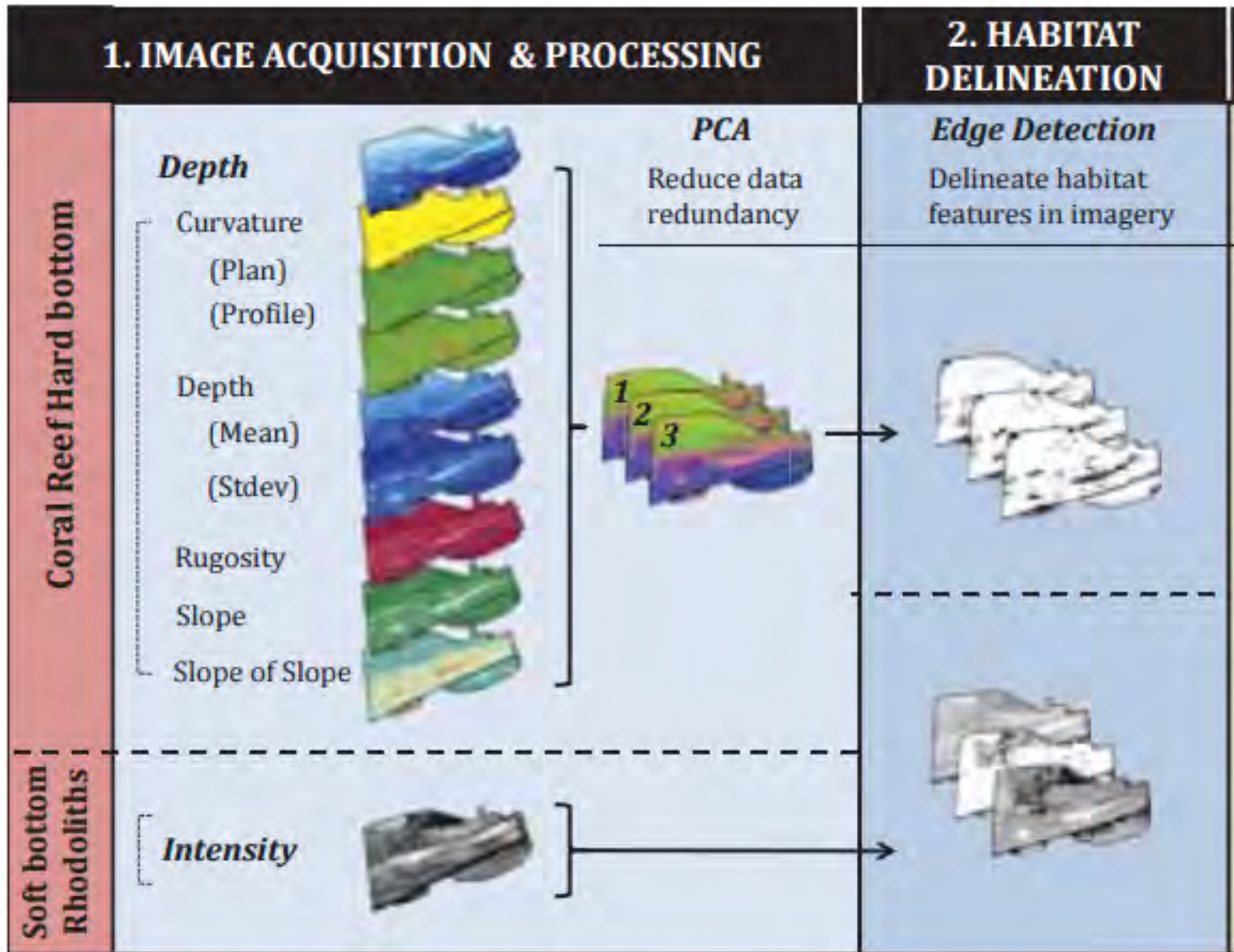
- Backscatter Mosaics
- Bottom sample logs
- Bathymetry (BAG)





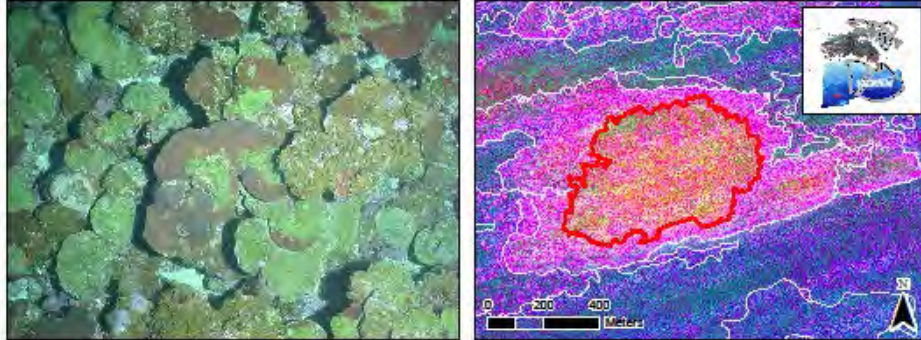
- **Wilmington Project made a large dent in mapping the SE US Continental Shelf!**
- **Added nearly 1.2% coverage between Hatteras to South Florida!!**
- **Ever closer to the goals of SEAFLOOR 2030!**

# Discriminating habitats from acoustic signatures

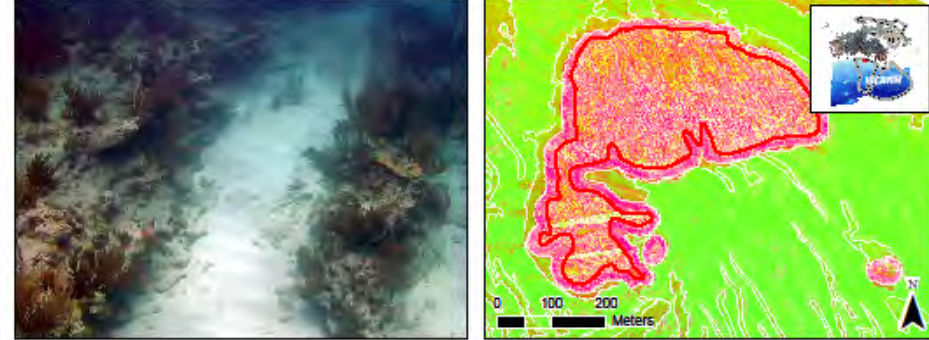


# Acoustic signatures of coral reef habitats

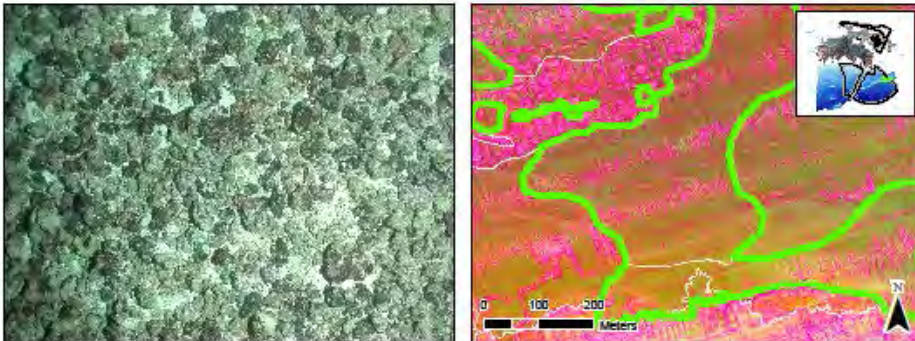
**Aggregate Reef**



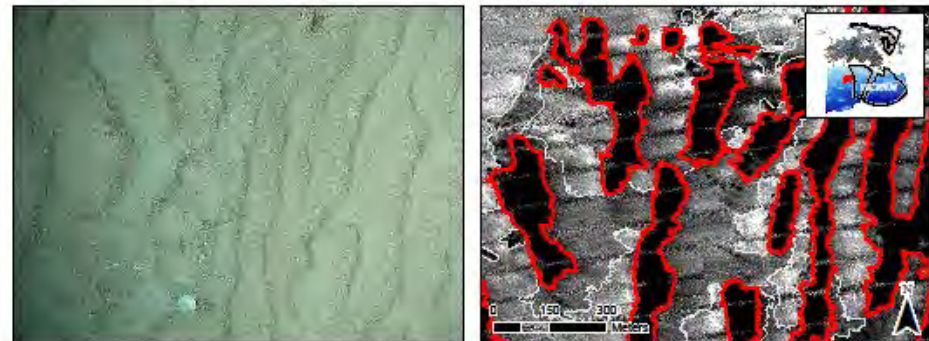
**Spur and Groove**



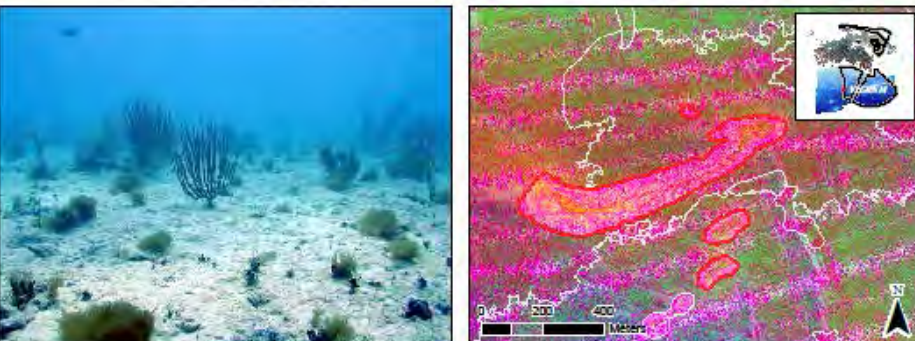
**Rhodoliths**



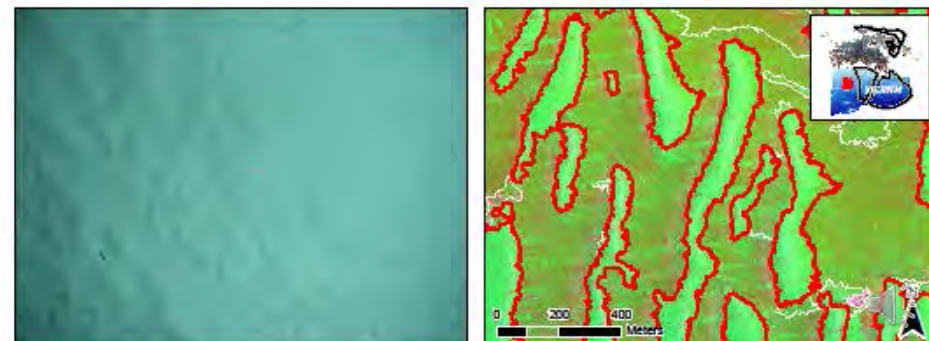
**Coarse Sand waves**



**Pavement w/ soft coral**



**Fine Sand**



# Subtleties of SE US OCS habitats\*

**Ledge**



**Patch Reef**



**Sand**



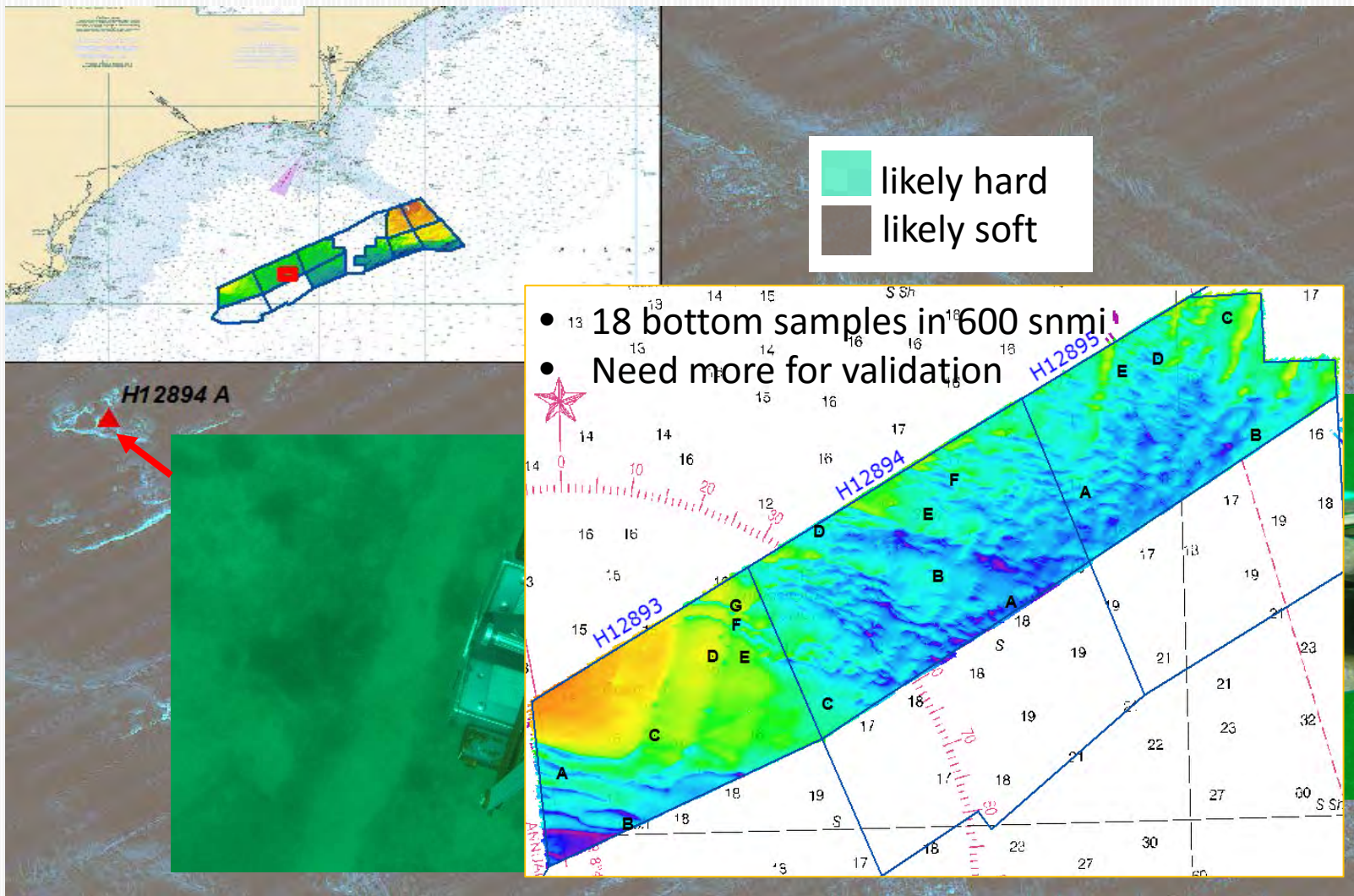
**Pavement**



\* Bold labels indicate Essential Fish Habitat (EFH)

# Wilmington seafloor acoustic signatures

## Hardbottom “shines”





# Habitat Mapping and Related Data Uses

- Ocean planning and Essential Fish Habitat, especially permitting offshore energy facilities and sand resource extraction
- Designing/assessing MPAs and other spatial management zones
- Fishery independent surveys
- Ecological studies on population connectivity



# Archival and Data Discoverability



Where can you go to get the data?



# Traditional Archival NCEI

<http://www.ngdc.noaa.gov/>

The screenshot shows the NOAA Bathymetric Data Viewer interface. The browser address bar displays <https://maps.ngdc.noaa.gov/viewers/bathy>. The NOAA logo and "NATIONAL CENTERS FOR ENVIRONMENTAL INFORMATION" are at the top left. The page title is "Bathymetric Data Viewer". The main content area features a map of the Southeastern United States coastline, showing bathymetric data for Onslow Bay and Long Bay. The left sidebar contains a "Layers" panel with options for "Bathymetric Surveys" (Multibeam, Single-Beam, Trackline) and "Digital Elevation Models (DEMs)". A "Legend" and "More Information" link are also present. The bottom of the map shows coordinates: Position: -78.041, 34.632 and Elevation: 19 meters. A scale bar indicates 60km and 30mi.

<http://www.nauticalcharts.noaa.gov/>

The screenshot shows the NOAA Office of Coast Survey website. The header includes the NOAA logo and "Office of Coast Survey". The main navigation menu lists "Nautical Charts & Pubs", "Surveys & Wrecks", "GIS & Other Products", "Research & Development", "Customer Service", "Business Opportunities", and "Education". The "Nautical Charts & Pubs" section is active, showing options for "Paper Charts (RNC & PDF)", "Electronic Charts (ENC)", "Coast Pilot", and "Help". The main content area features a map of the Southeastern United States coastline with a search bar and a "Map Selection Information" panel on the right. The "Map Selection Information" panel shows details for Chart 11000, including the title "Cove Hattens to Straits of Florida", type "Sailing Chart, International Chart", scale "1:1,200,000", edition "39", and print date "4/3/2011". The "Available Products" section includes links for "View", "Buy", "PDF", "BC", "RNC", and "NM".



NOAA NATIONAL CENTERS FOR ENVIRONMENTAL INFORMATION  
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Marine Geology Data

NOAA > NESDIS > NCEI (formerly NGDC) > Maps > Marine Geology

Layers

- Marine Geology Data Sets/Reports
- Index to Marine and Lacustrine Geological Samples
- NOS Seabed Descriptions from Hydrographic Surveys

Identify Basemap Options

Wilmington

Long Bay

## Marine Geology Datasets

- Sample Listings
- Survey Report
- Project Images

Attributes: Sample: SD00013284.01

NOS Survey ID:	H09400
Sample ID:	SD00013284.01
Latitude:	33.44167
Longitude:	-77.61333
Begin Observation Time:	10/10/1973
Description:	SAND BROWN
Color:	
Nature of Surface:	
Qualifying Terms:	
Data Source:	NMNH

Position: -78.325°, 34.314°  
Elevation:  
30km  
20mi

Legend  
More Information  
Help


Back Zoom to




[Project image.tarball Link](#)

# Digital Coast – Data viewer



Home ▾ FKNMS Groundtruthing Dataviewer

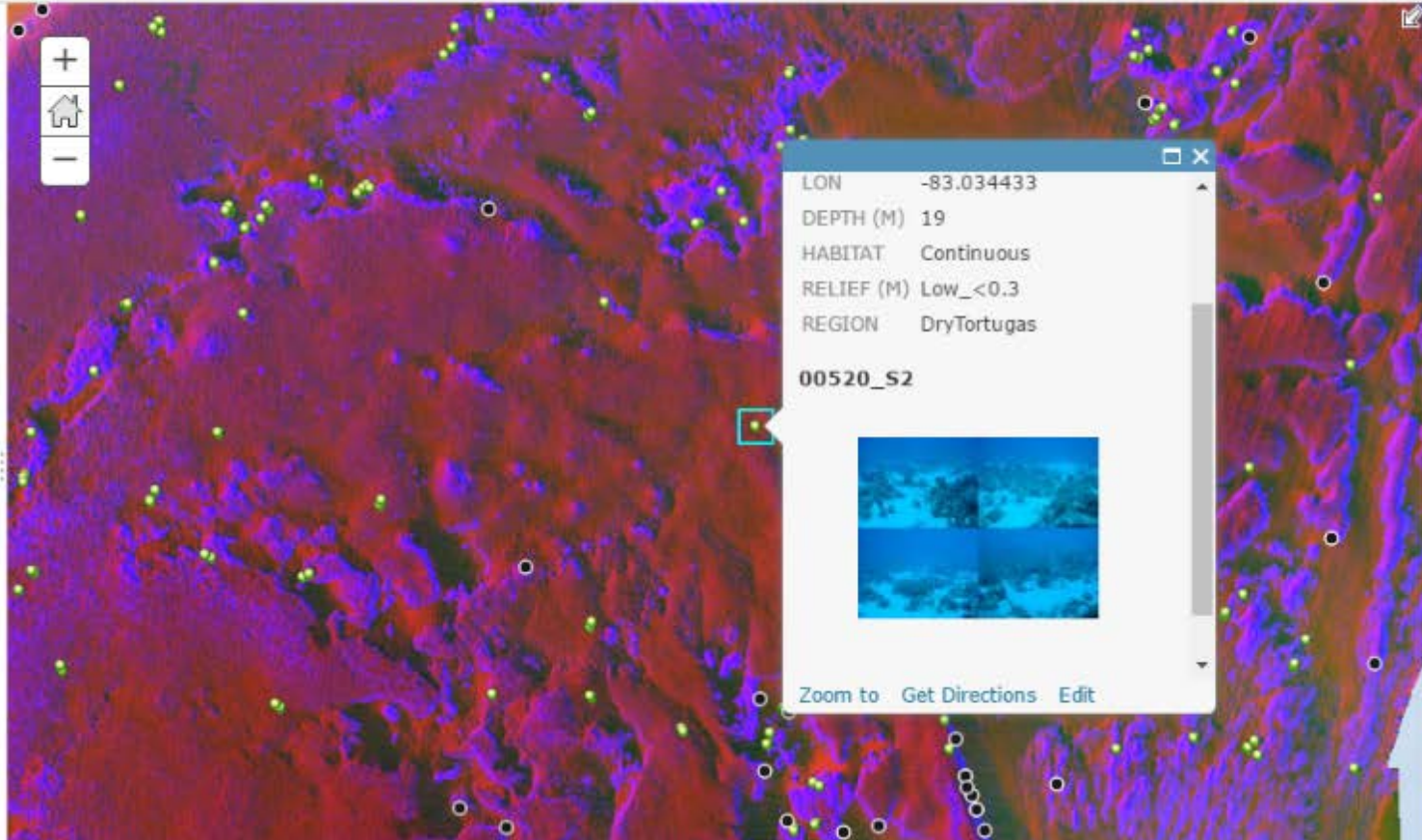
New Map  Chris ▾




Details Add ▾ Edit Basemap Save Share Print Directions Measure Bookmarks Find address or place 

Contents


- FKNMS video 2016
- DT aa 08 11
- RHA HabitatAssessment
- CCFHR Tortugas
- SEFSC points
- Rileys 2013
- Tortugas Survey Priorites
- Areas of Interest
- Tortugas and Rileys Bathymetry
  -  pca
-  Oceans



LON	-83.034433
DEPTH (M)	19
HABITAT	Continuous
RELIEF (M)	Low_<0.3
REGION	DryTortugas

**00520\_S2**



[Zoom to](#) [Get Directions](#) [Edit](#)

# Additional Considerations

## **IHO-S57**

International Hydrographic Organization  
Special Publication 57 – Transfer standard for digital  
hydrographic data for electronic chart systems.



## **CMECS**

Coastal and Marine Ecological Classification Standard

# Future Collaborations?

- **Coast Survey** meets the requirement of sediment types for charting and the resulting bottom samples and backscatter can be used as **preliminary data for classifying the sea floor.**
- Create a **backscatter tile service** accessible from Bathymetry Viewer.
- Create public **image viewer service** that could house our bottom sampler images.
- **NCCOS and partners** conduct seafloor habitat analysis with additional sediment sample **ground truthing and validation.**



# Questions?

OCS / NCCOS / IOCM / OMAO / UNH-NOAA JHC CCOM / NCEI

Thanks everyone! I believe NOAA's strength is in our ability to collaborate, and this project would not have happened without you.

## Acknowledgments



NCCOS: Dr. Chris Taylor

OCS - HSD: GISP Starla Robinson, LCDR Gonsalves, Corey Allen, Kyle Ward,

IOCM UNH-NOAA JHC CCOM: Dr. Juliet Kinney, Michael White

OCS- IOCM: Ashley Chappell, LT Reed

OCS- Atlantic Hydro Branch: LDCR Welton, Vanessa Miller, Matt Wilson, Jeff Marshall, James Miller, Melody Ovard, Brian Mohr.

NOAA Ship Ferdinand R. Hassler: LCDR Jaskoski, LT Morgan – and the rest of the crew!

Augmenting scientists from the Navigation Response Branch (NRB): Lucas Blass and Cody Guilday from

Augmenting crew from NOAA Ship Thomas Jefferson: Head, Seberger, Forrest, Gleichauf, Marcum

Augmenting scientist from Hydrographic Systems and Technology Programs (HSTP): John Doroba

National Centers for Environmental Information (NCEI): LT Baillio, Marcus Cole, Susan Gottfried, Gina Brewer, Jennifer Jenks, Kelly Stroker, Scott Cross

- Ping Once Use Many Times 2017  
Enhancing the Utility of Coast Survey Products for Coastal Science and Management





# Links

- Digital Coast
- SeaSketch  
[Fedmap.Seasketch.org](http://Fedmap.Seasketch.org)
- HSD Planned Surveys Story Map  
<http://arcg.is/1pnDX7m>
- Marine Geology Datasets  
[http://maps.ngdc.noaa.gov/viewers/marine\\_geology](http://maps.ngdc.noaa.gov/viewers/marine_geology)
- Survey Reports  
<https://www.ngdc.noaa.gov/nos/H12001-H14000/H12600.html>
- Sample Listing  
<https://www.ngdc.noaa.gov/geosamples/surveydisplay.jsp>
- Navigational Charts  
[www.nauticalcharts.noaa.gov](http://www.nauticalcharts.noaa.gov)

