



NOAA Navigation, Observations, Positioning Programs

May 10, 2023

Julia Powell, OCS

Chris DiVeglio, CO-OPS

Mike Aslaksen, NGS

NOAA Organization

Where Coast Survey fits in

**Under Secretary of Commerce for Oceans and
Atmosphere and NOAA Administrator**

Dr. Richard W. Spinrad

Deputy Under Secretary for Operations

Benjamin Friedman

Line Offices

National Ocean Service

Assistant Administrator

Nicole LeBoeuf

Deputy Assistant
Administrator

Paul Scholz

Deputy Assistant

Administrator for Navigation,
Observations, Positioning

Rachael Dempsey

**National Environmental
Satellite, Data and
Information Service**

Assistant Administrator

Dr. Stephen Volz

Deputy Assistant

Administrator

Mark S. Paese

Deputy Assistant

Administrator for Systems

Irene Parker

**Oceanic and
Atmospheric Research**

Assistant Administrator

Dr. Steven Thur

Deputy Assistant

Administrator for Science

Dr. Gary Matlock

Deputy Assistant

Administrator for Programs
and Administration

Emily Menashes

**National Weather
Service**

Assistant Administrator

Ken Graham

Deputy Assistant

Administrator

Mary Erickson

**Office of Marine and
Aviation Operations &
NOAA Corps**

Director

RADM Nancy Hann

Deputy Director

RDML Chad Cary

Deputy Assistant

Administrator for Programs
and Administration, Office

of Marine and Aviation

Operations

Randy TeBeest

National Ocean Service organization

National Ocean Service
Assistant Administrator: Nicole LeBoeuf
Deputy Assistant Administrator - Nav Obs: Rachael Dempsey
Deputy Assistant Administrator: Paul Scholz

STAFF OFFICES

Management and Budget
Cherish Johnson

NAVIGATION, OBSERVATIONS & POSITIONING

Office of Coast Survey
RDML Ben Evans

Office of National Geodetic Survey
Juliana Blackwell

Center for Operational Oceanographic Products & Services
Dr. Marian Westley - *acting*

U.S. Integrated Ocean Observing System Program®
Carl Gouldman

COASTAL SCIENCE & ASSESSMENT

National Centers for Coastal Ocean Science
Margo Schulze-Haugen - *acting*

Office of Response and Restoration
Scott Lundgren

OCEAN & COASTAL MANAGEMENT SERVICES

Office for Coastal Management
Dr. Jeff Payne

Office of National Marine Sanctuaries
John Armor

Coast Survey organization

Office of Coast Survey

Director: RDML Ben Evans
Deputy Director: Lorraine Robidoux

Joint Hydro Center
Co-Director: Andy Armstrong

NOAA IOCM
Coordinator: Ashley Chappell

Deputy Hydrographer
John Nyberg

Resource Management

Marine Chart Division
Chief: CPT Edward Van Den Ameele
Dep. Chief: Sean Leeger

- Six Chart Production Branches, Geo-based
- Nautical Data Branch
- Format and Distribution Systems
- Chart Standards

Hydrographic Surveys Division
Chief: CDR Briana Hillstrom
Dep. Chief: Grant Froelich

- Operations
- Atlantic Hydrographic Branch
- Pacific Hydrographic Branch

Navigation Services Division
Chief: Julia Powell
Dep. Chief: Matt Kroll

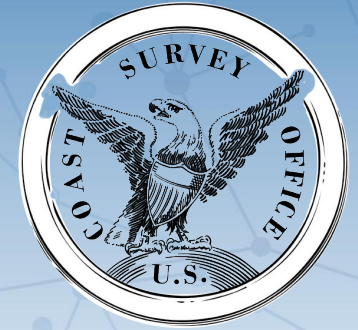
- Nautical Publications
- Customer Affairs
- Navigation Response

Coast Survey Development Lab
Chief: Corey Allen (acting)
Dep. Chief: Scott Sherman (acting)

- Hydrographic Systems and Technology
- Coastal Marine Modeling
- Geospatial Applications Development

Office of Coast Survey

Who We Are



More than two centuries of service

- One of the first U.S. government science agencies
- President Thomas Jefferson created the U.S. Coast Survey in 1807
- Over two centuries later, Coast Survey – now an office within NOAA in the Department of Commerce – continues to provide the navigation products and services that ensure safe and efficient maritime commerce.

U.S. Department
of Commerce

National Oceanic and
Atmospheric Administration

National Ocean Service

Office of
Coast Survey

What we do

Map and Chart

Products

DATA
COLLECTION



PRODUCT
DEVELOPMENT



PRODUCT
DISTRIBUTION



Services

NAVIGATION
RESPONSE



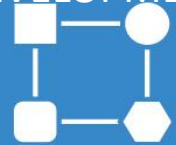
REGIONAL
SUPPORT



TECHNOLOGY
RESEARCH

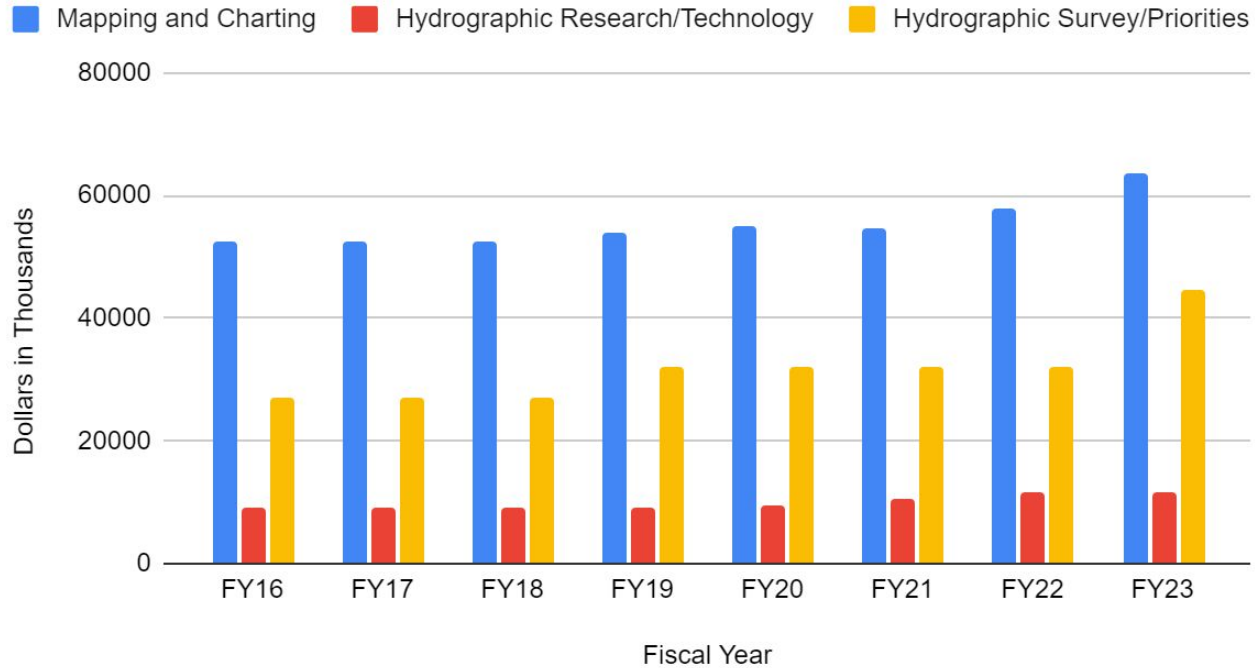


MODEL
DEVELOPMENT



Budget

Office of Coast Survey Budget History

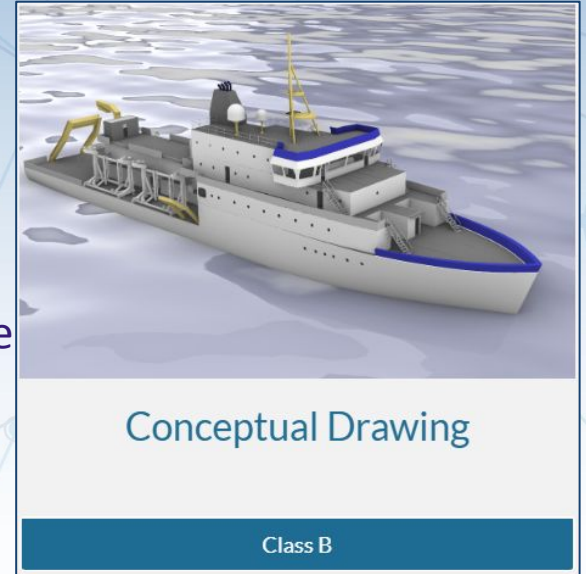


60,000 represents 60 Million Dollars

Budget

FY 2023 Omnibus Appropriation Language

- Full operational funding for Navigation Response Teams
- NOAA Center of Excellence for Operational Ocean and Great Lake Mapping to be co-located at UNH!
- Agreement to execute contract on TWO new class B vessels in FY2023!



What we do

Map and Chart

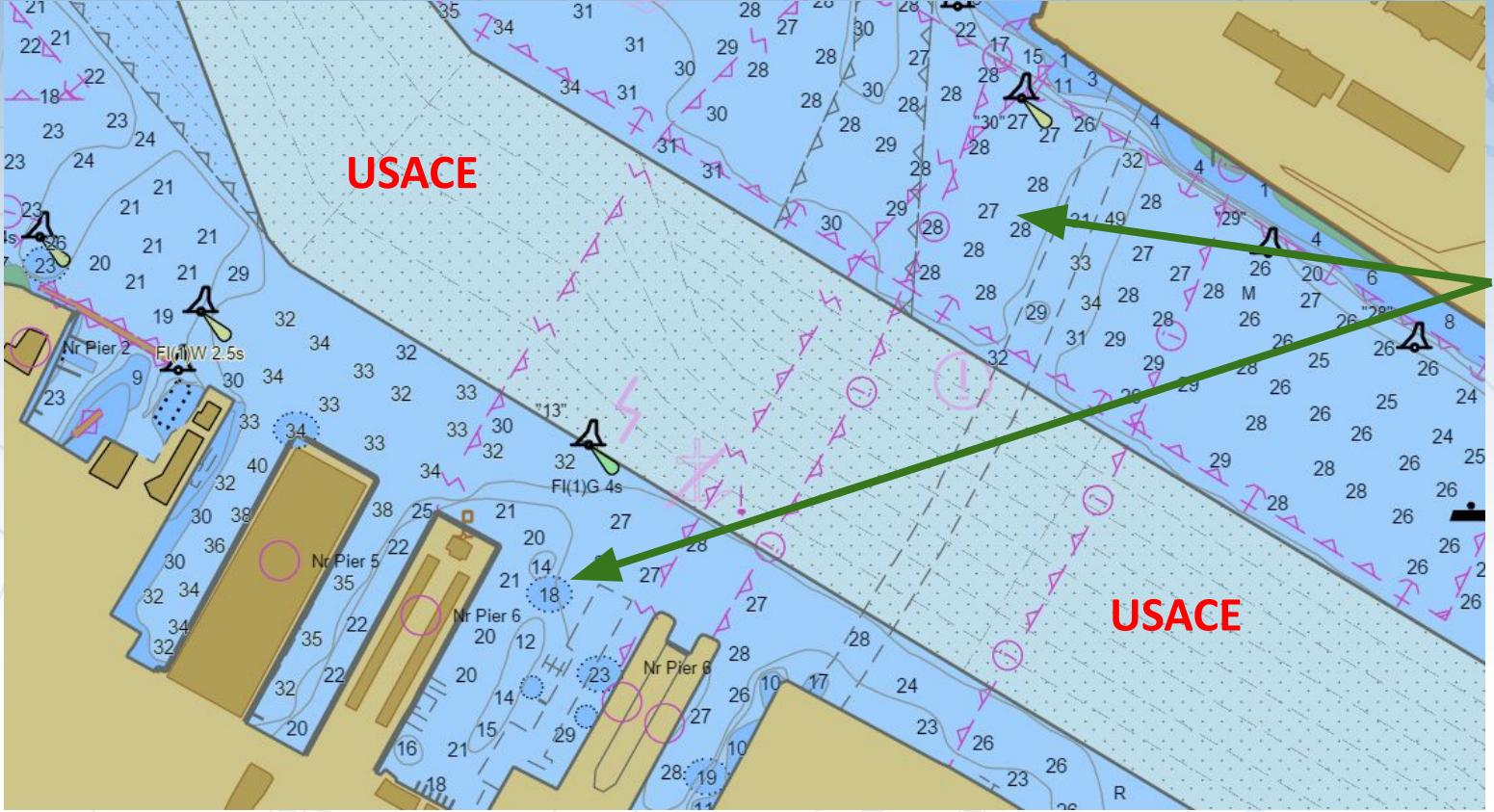
U.S. Exclusive
Economic Zone
3,400,000 snm

Surveyed to “Modern
Standards”
60,000 snm

Average Annual
Hydrographic Acquisition
3,000 snm



Area of Responsibility

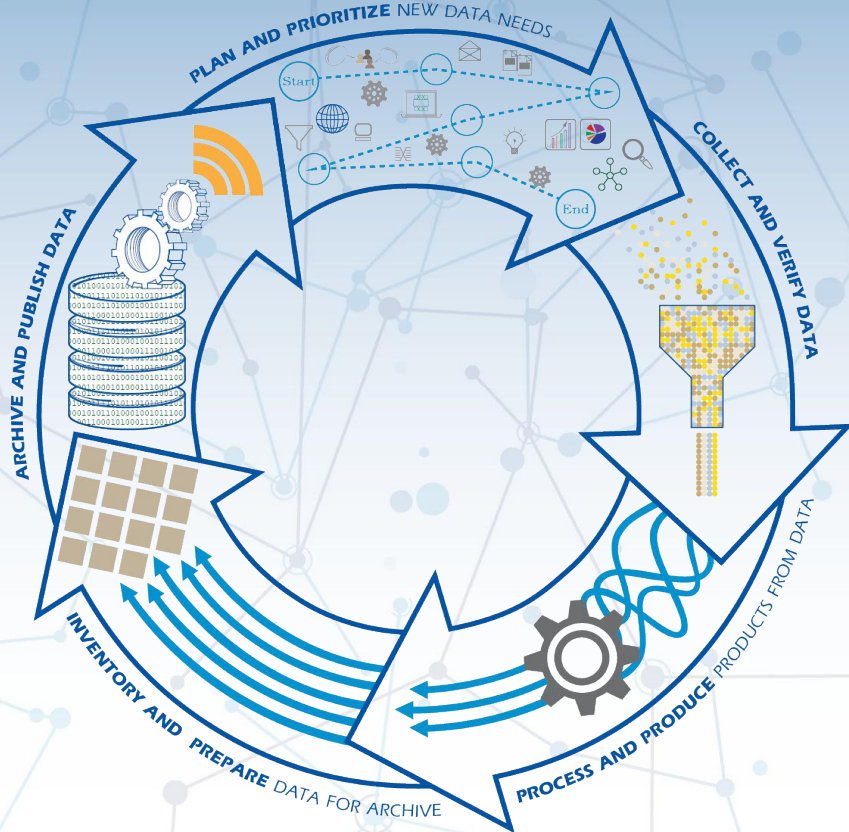


NOAA
Survey

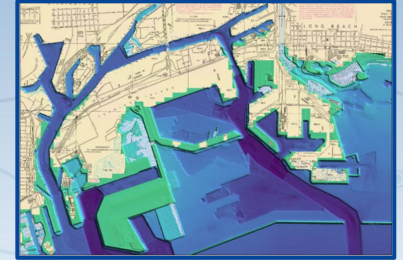
USACE

How we do it

Map and Chart



National Bathymetric Source



Precision Marine Navigation

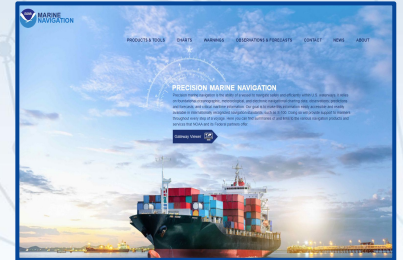
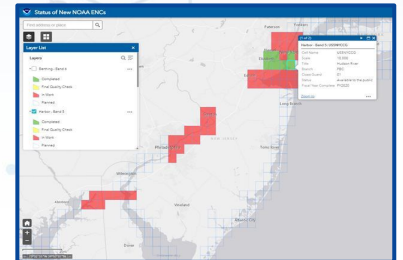


Chart Rescheme



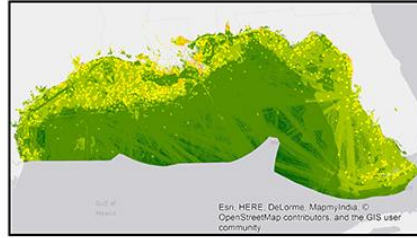
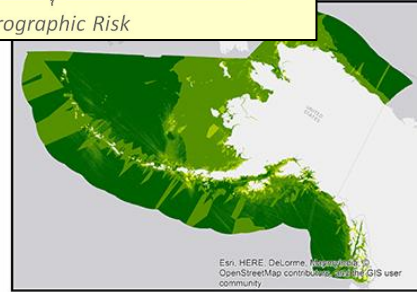
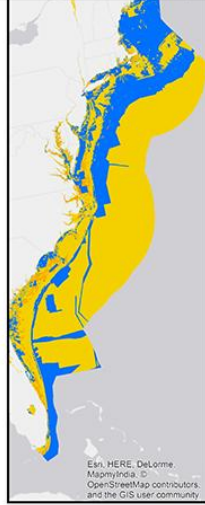
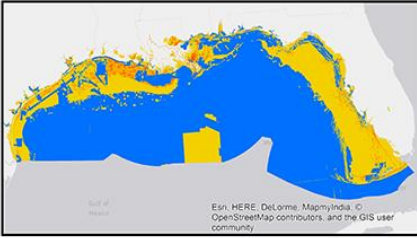
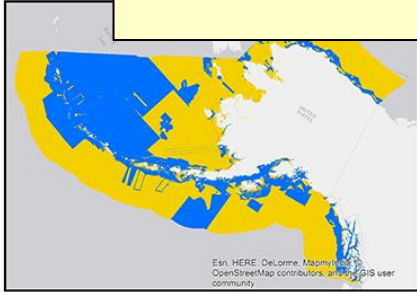
Survey Prioritization

Hydro Health

$$\text{Hydrographic Health} = \underbrace{\left(\text{Desired Survey Score} - \text{Present Survey Score} \right)^2}_{\text{Hydrographic Gap}} \times \underbrace{\sum \left(\text{Consequence} \times \prod (\text{Likelihood}) \right)}_{\text{Hydrographic Risk}}$$

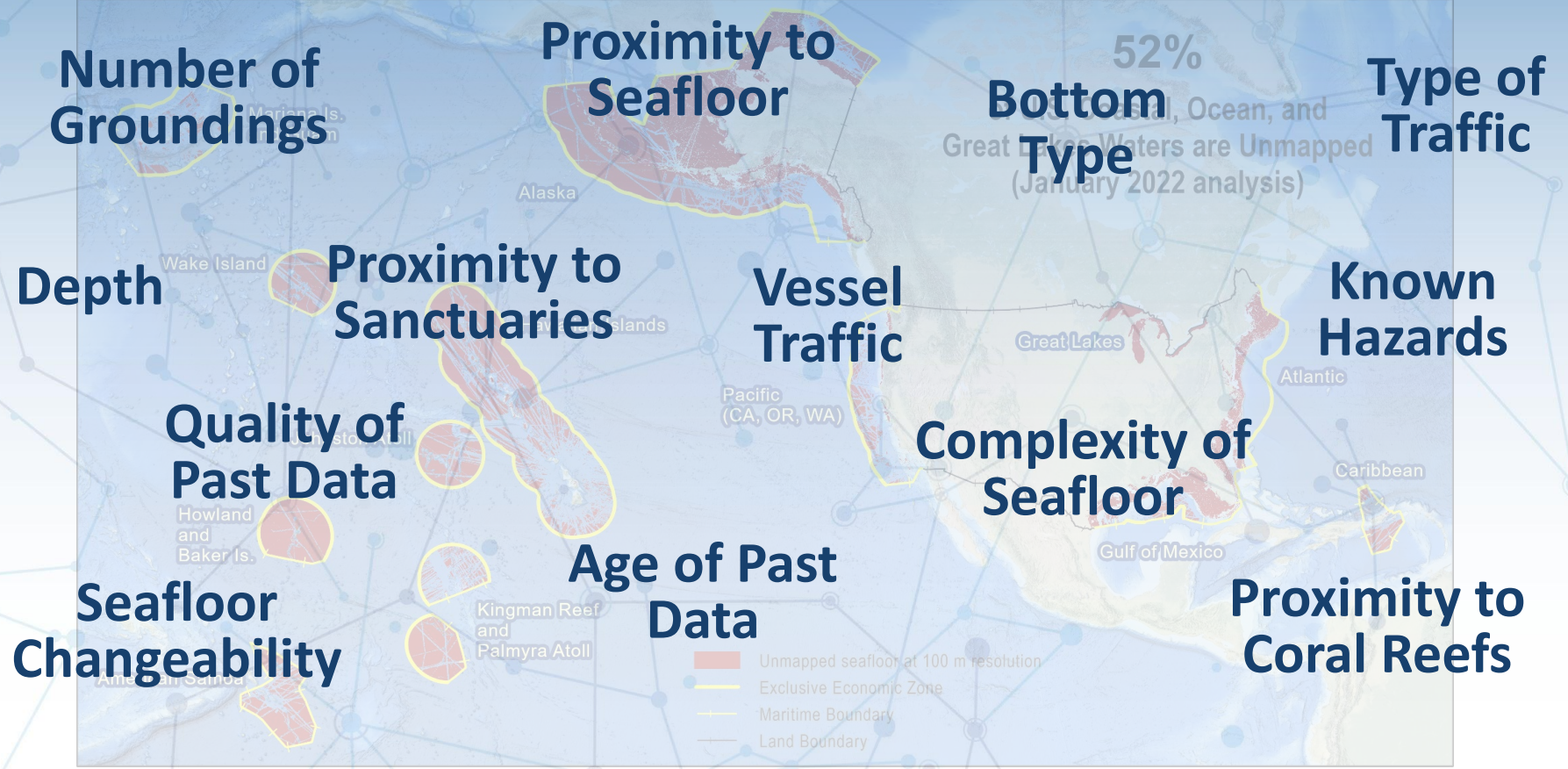
Hydrographic Gap

Hydrographic Risk



Survey Planning

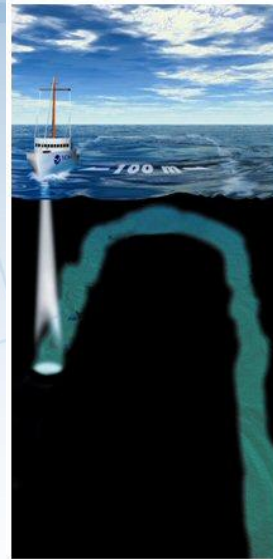
Right Place



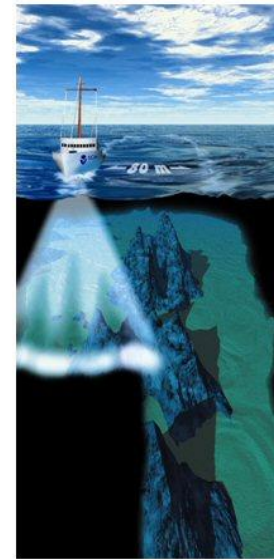
Data Quality

Electronic Nautical Charts CATZOC

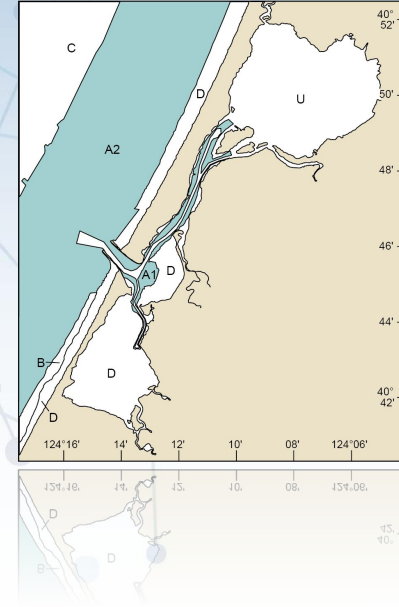
ZOC ¹	Position Accuracy ²	Depth Accuracy ³		Seafloor Coverage	Typical Survey Characteristics ⁵
A1	± 5 m + 5% depth	= 0.50 + 1% d		Full area search undertaken. Significant seafloor features detected ⁴ and depths measured.	Controlled, systematic survey ⁶ achieving high position and depth accuracy
		Depth (m)	Accuracy (m)		
		10	± 0.6		
		30	± 0.8		
		100	± 1.5		
1000	± 10.5				
A2	± 20 m	= 1.00 + 2% d		Full area search undertaken. Significant seafloor features detected ⁴ and depths measured.	Controlled, systematic survey ⁶ achieving position and depth accuracy less than A1
		Depth (m)	Accuracy (m)		
		10	± 1.2		
		30	± 1.6		
		100	± 3.0		
1000	± 21.0				
B	± 50 m	= 1.00 + 2% d		Full area search not achieved. Uncharted features hazardous to surface navigation are not expected but may exist.	Controlled, systematic survey ⁶ achieving position and depth accuracy less than A2
		Depth (m)	Accuracy (m)		
		10	± 1.2		
		30	± 1.6		
		100	± 3.0		
1000	± 21.0				



Single Beam Echo
Sounder Surveys



Multibeam Full
Bottom Coverage



Right Survey Resource, Right Place, Right Time



Rainier
Newport, Oregon - 1968



Fairweather
Ketchikan, Alaska - 1968, 2010



Navigation Response Teams and
uncrewed surface vehicles



Thomas Jefferson
Norfolk, Virginia - 1992



Ferdinand R. Hassler
New Hampshire - 2012



Twin Otters (4)



King Airs (3)



External Source Data



Office of Coast Survey
National Oceanic and Atmospheric Administration

ESD Required Metadata

*Items in red that are completely blank are not ready for submission

- 1. Survey ID:
- 2. Responsible Party/Data Provider:
- 3. Data Provider Contact Number:
- 4. Data Provider Contact Email(s):
- 5. Data Acquisition Team/Alphabet Name?
- 6. Survey Start Date:
- 7. Survey End Date:
- 8. Survey Vertical Datum:
- 9. Survey Horizontal Datum:
- 10. Service Line of Measurement:
- 11. Survey Sensor Type(s) & Model(s):
- 12. Survey Sensor Type(s) & Model(s):

These are not required metadata. For other and optional data items to request, please see [Request Metadata for Submission to NOAA Office of Coast Survey](#)

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Office of Coast Survey
Data Licensing Form

Date:

May provide name and title:

Dataset name and description:

Please make a selection:

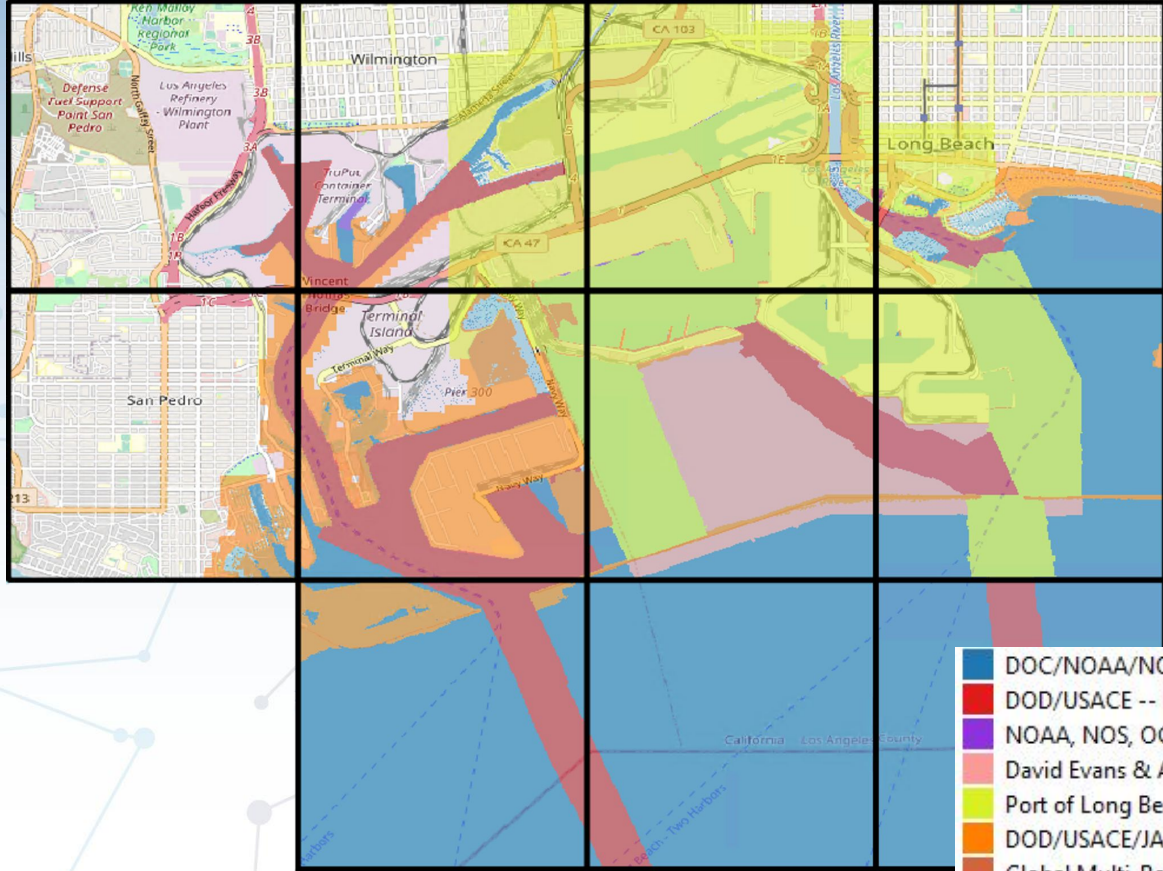
- I warrant that the data are freely shared. I warrant copyright and the data may be used for any purpose, for any purpose, in any form, and for any purpose, without restriction. The license agreement for the data is available at [this link](#).
- I warrant that the data are in the public domain and may be used for any purpose, in any form, and for any purpose, without restriction. The license agreement for the data is available at [this link](#).
- I warrant that the data are NOAA's internal use only. The data will not be publicly released and will only be used for internal business and planning purposes. NOAA will not release the data for other purposes.

Date provided signature:

Author Date: 03/2022

esd.team@noaa.gov

External Source Data (LALB Example)



- DOC/NOAA/NOS/OCS -- Office of Coast Survey
- DOD/USACE -- US Army Corps of Engineers Los Angeles District
- NOAA, NOS, OCS, Hydrographic Surveys Division
- David Evans & Associates, Inc.
- Port of Long Beach
- DOD/USACE/JALBTCX -- Joint Airborne Lidar Bathymetry Technical Center of Expertise
- Global Multi-Resolution Topography Data Synthesis (GMRT)

Navigation Response Teams

- Homeland security
- Re-opening ports after hurricanes and other disasters
- Teams are located around the country conducting routine hydrographic surveys to update NOAA's suite of nautical charts



Mobile Integrated Survey Team (MIST)



Uncrewed Systems

Seafloor Systems EchoBoat 160



Seafloor Systems EchoBoat 240



REMUS 100 AUV



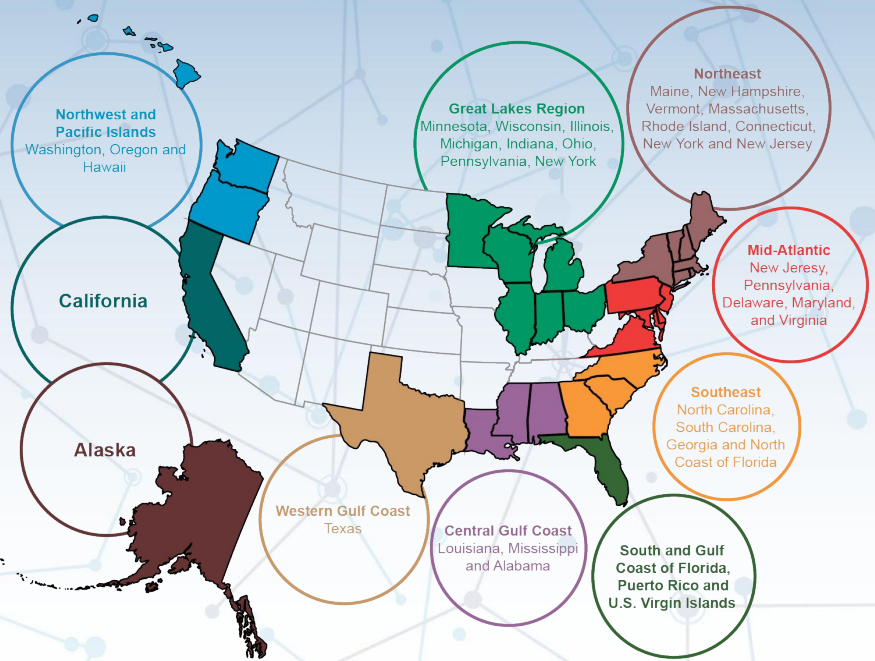
Hurricane Response

NSD Hurricane Ian Response Summary

- **Two Navigation Response Teams and Autonomous Survey Vessel completed 285 LNM of object detection survey over four assigned areas in support of the U.S. Coast Guard and U.S. Army Corps of Engineers.**
- **At least 11 obstructions identified for removal in Fort Myers area along with more than 50 destroyed ATONs reported.**



Regional Navigation Managers



How may we ASSIST you today?

Questions & Comments Report an Error

EMAIL *

VERIFY EMAIL *

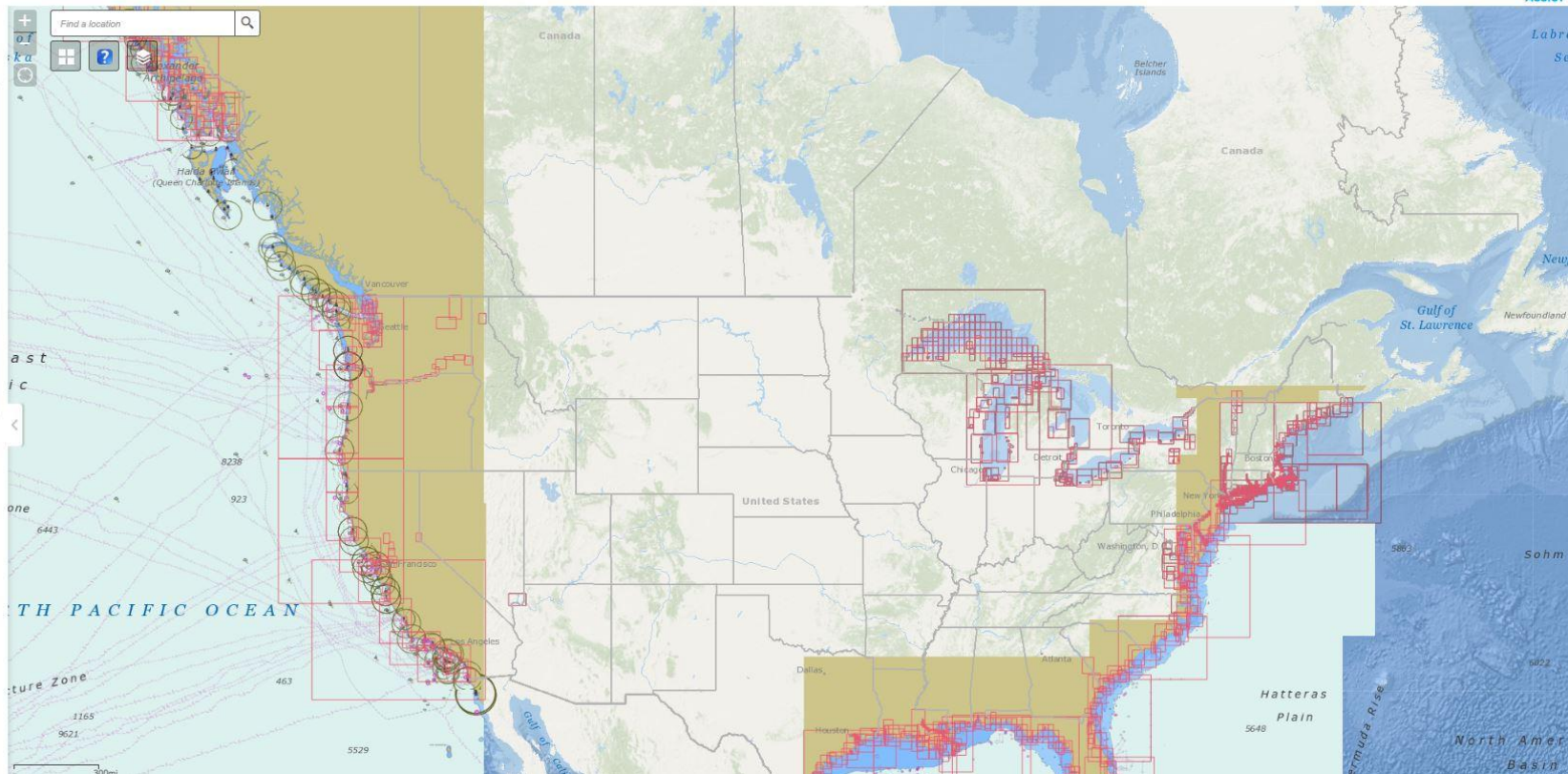
WHAT TYPE OF USER ARE YOU? *

ENTER YOUR COMMENT OR QUESTION *

*required field

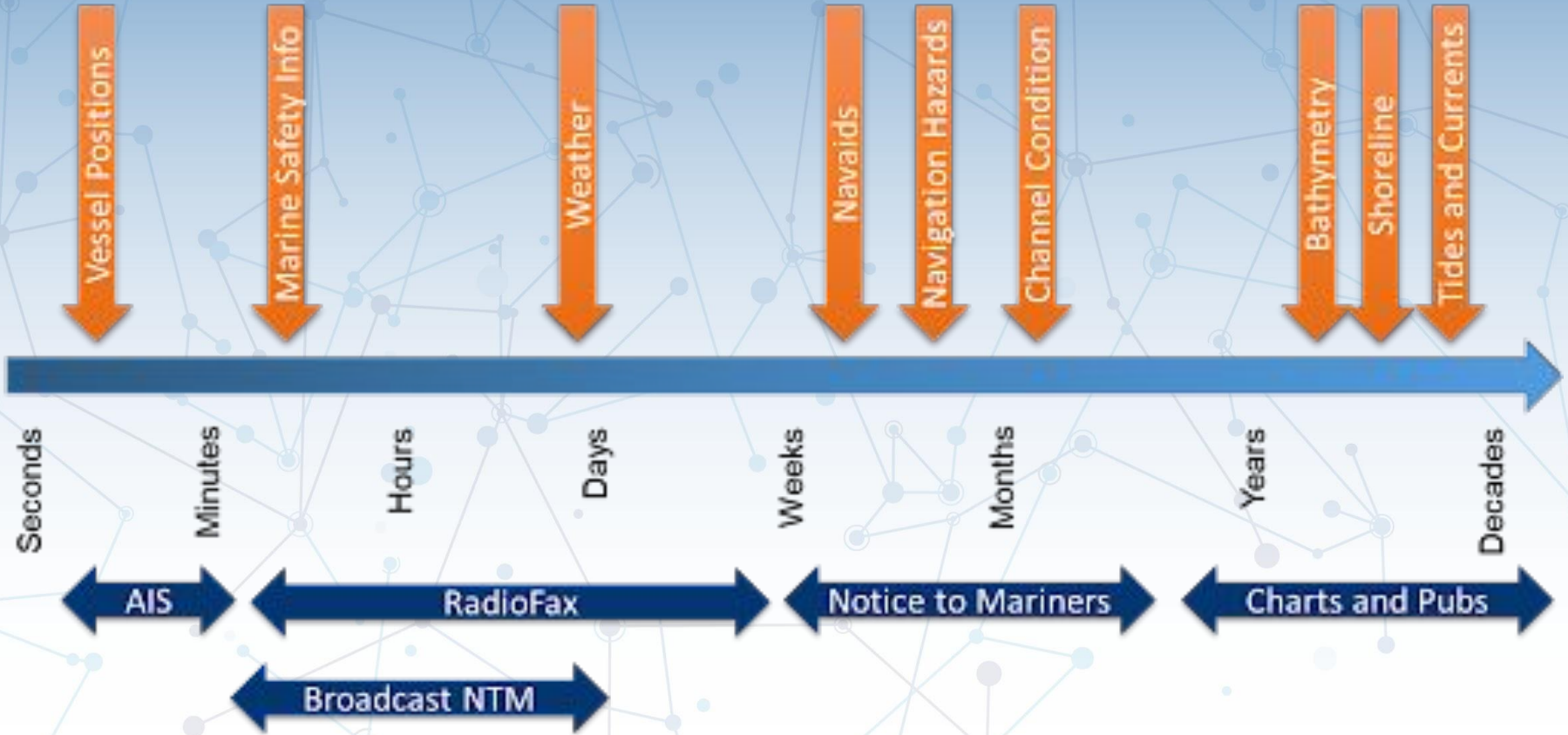
ATTACH FILE(S)

Submit



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Time Scales of Navigation Information 2010



Time Scales of Navigation Information 2025

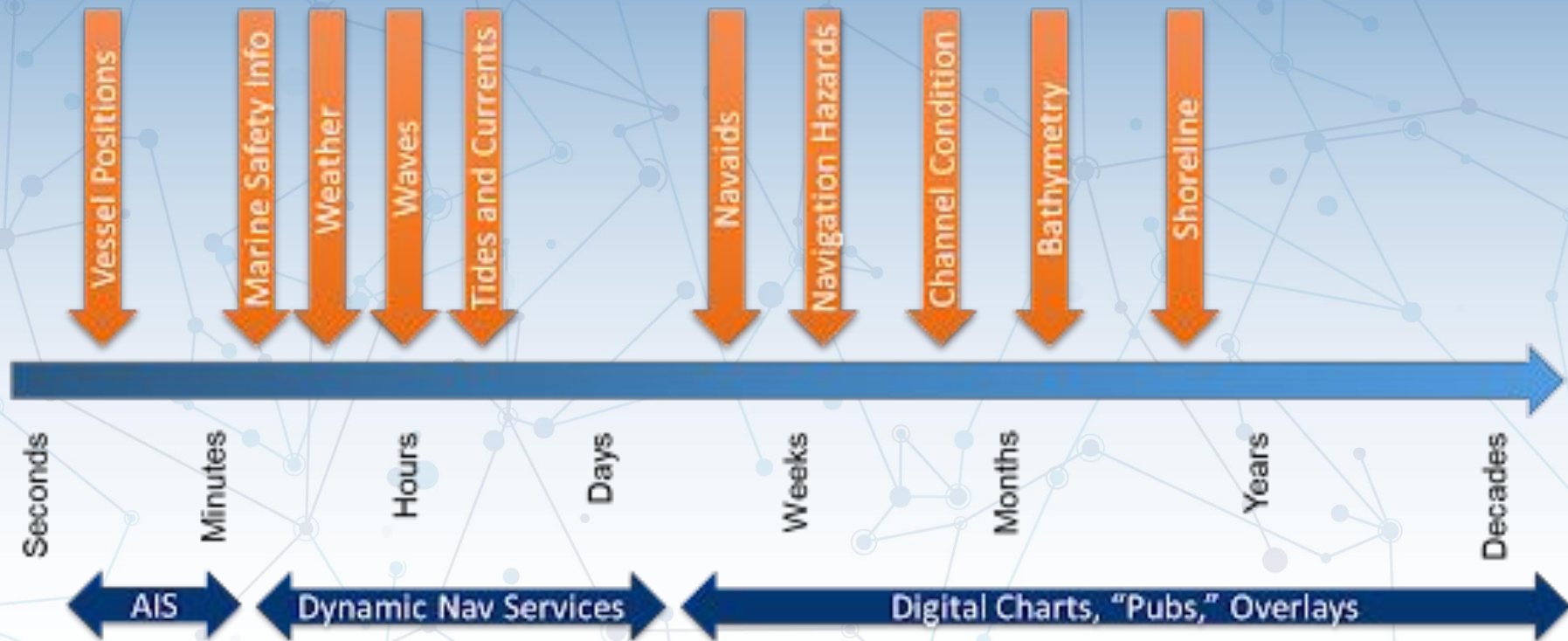
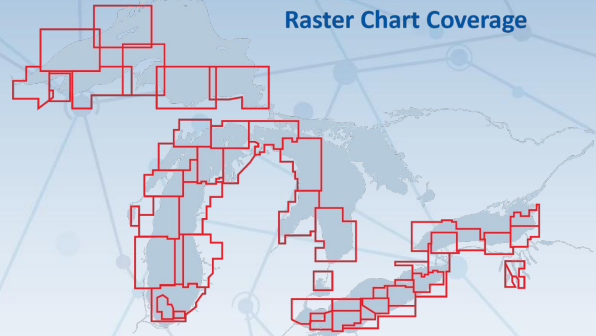
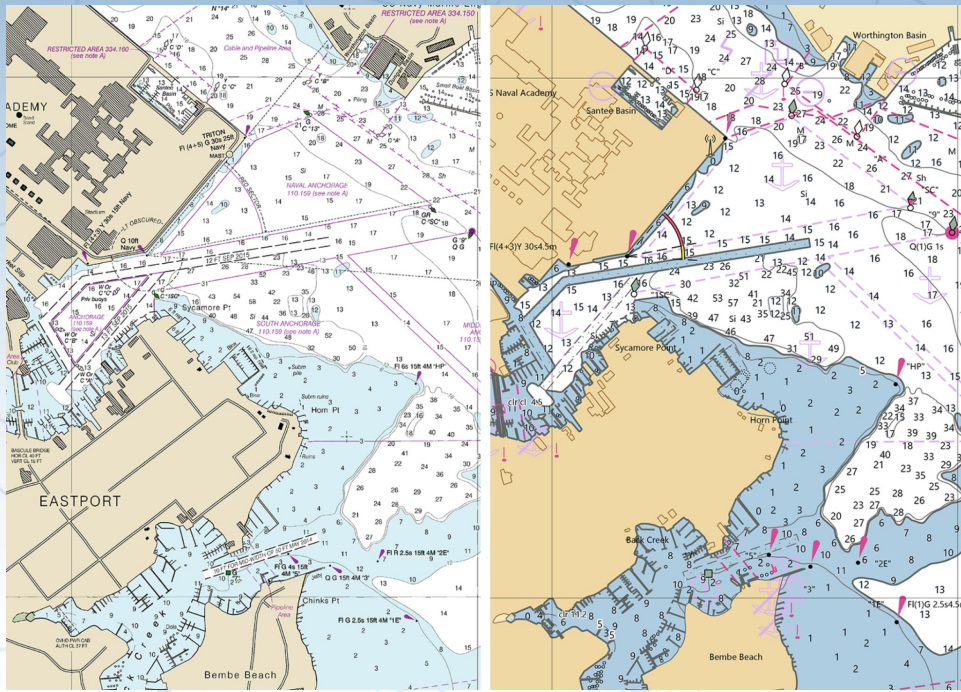
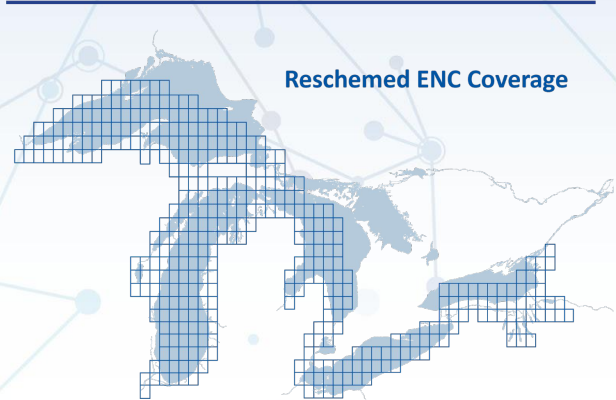


Chart Transition



Raster Chart Coverage



Reschemed ENC Coverage

An image showing NOAA chart 12283 on the left, in comparison to the output from the NOAA Custom Charts application in the same location on the right.

Precision Marine Navigation

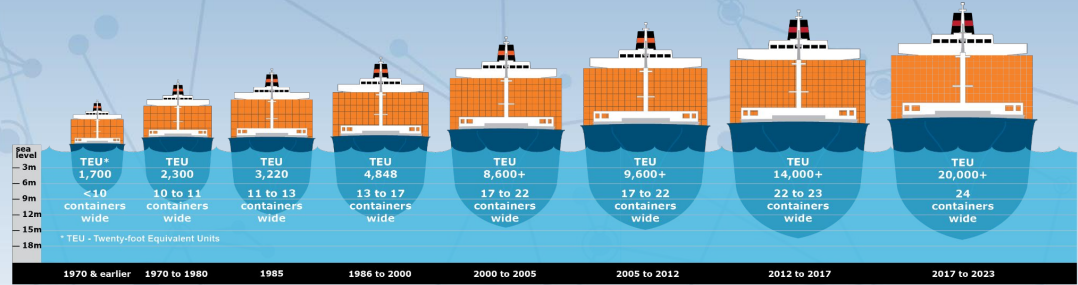
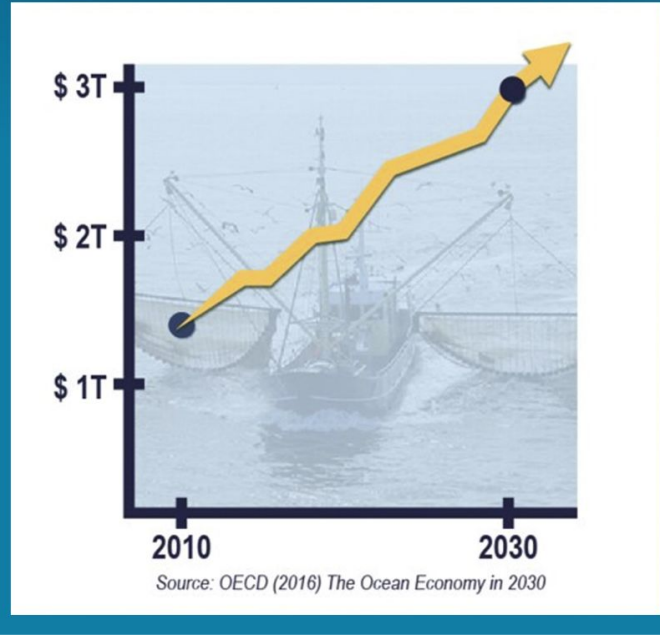


...the ability of a vessel to safely and efficiently navigate within the U.S. EEZ and operate in close proximity to the seafloor, bridges, narrow channels, or other marine hazards.

- Leveraging International Standards (S-100)
- Precision Marine Navigation Data and Dissemination Services
- Machine to Machine capability
- Marinenavigation.noaa.gov Website

The Maritime Economy

Projected Global Growth by 2030



Billions of Dollars in Production

2020



Agriculture Data Processing & Internet Publishing Utilities Marine Economy

Ocean Economy Statistics, BGA/NOAA, 2022

Comparison of Marine Economy with Other Industries

Navigation Data Challenges

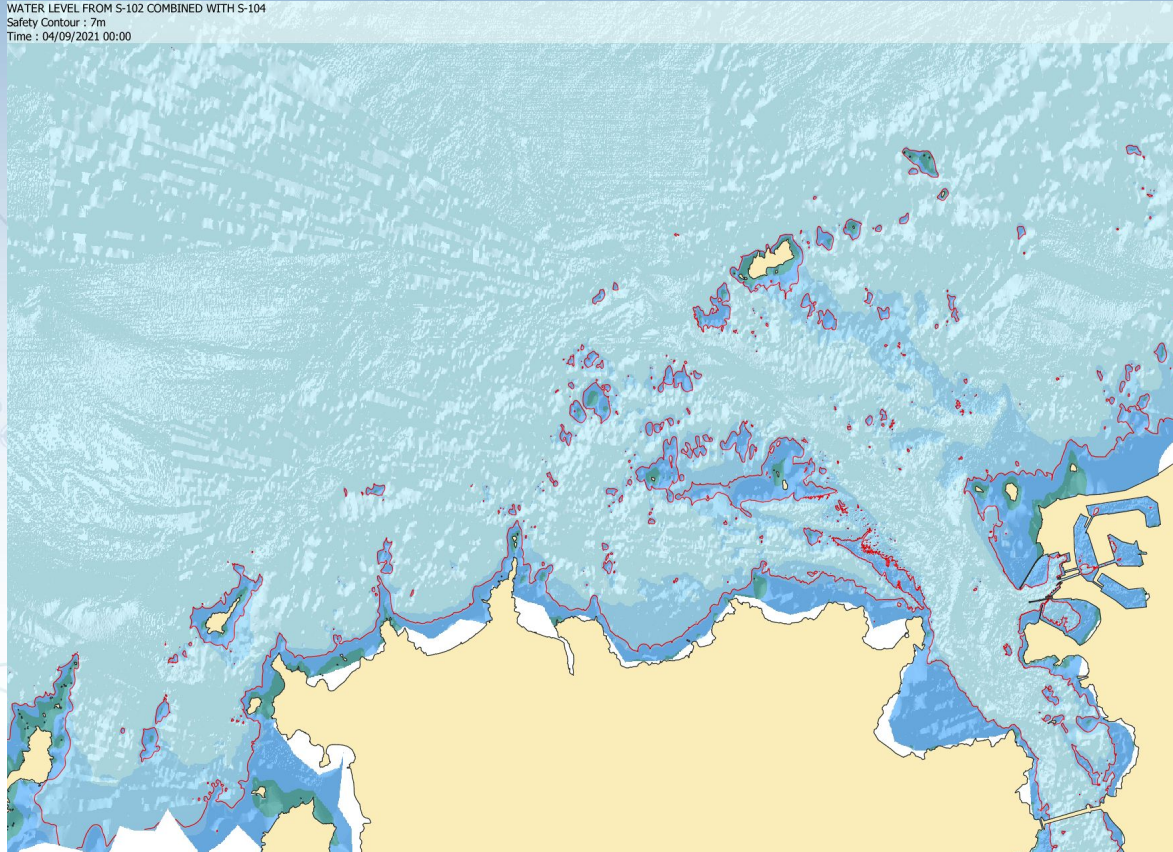
Difficult to access and process NOAA's navigation data, due to:

- Multiple devices and systems required to access the data
- Datasets spread across various websites and data servers
- Datasets are encoded in different formats that are not navigation standards

The collage illustrates various NOAA data sources and their complexity. It features a 'National Data Buooy Center' page with a 'Storm Special' alert for the East Pacific. A 'Ship Observations Report' table shows data for 16 observations from 08032021 1700 GMT to 08032021 1714 GMT. The table includes columns for ship name, hour, lat, lon, speed, depth, and various sensor readings. A 'nowCOAST' map shows coastal observations and forecasts. A 'PORTS' station page for 8771341 Galveston Bay Entrance, TX, shows water levels and meteorological data. An 'OCEAN PREDICTION CENTER' page displays a 'Weather Analysis & Forecasts' map with pressure, wind, and wave data.

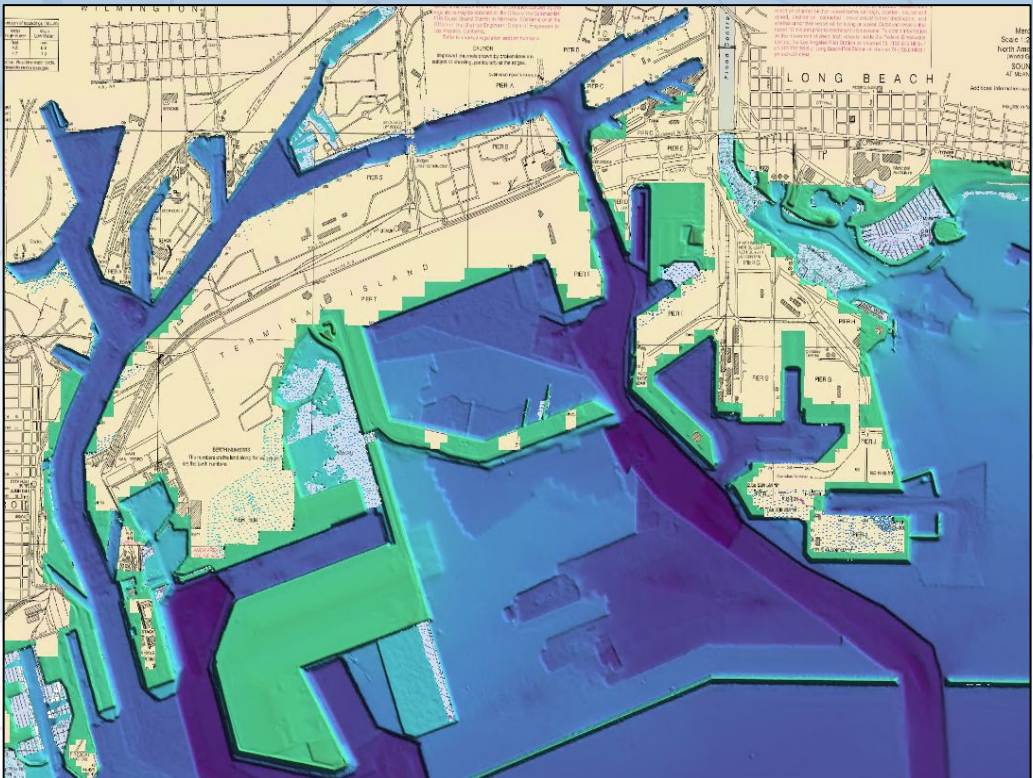
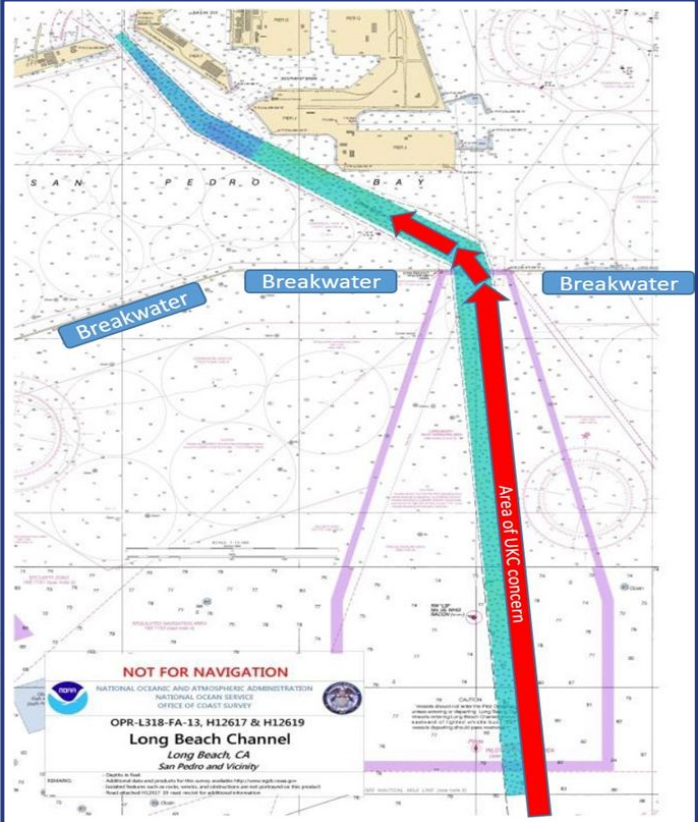
Ship Name	Hour	Lat	Lon	Speed	Depth	CS1	SWHT	DPD	PRES	PTDY	ATMP	WMP	DRAP	WES	TCS	SHR	51PD	51SDR	52HT	52PD
SHIP 30	0803	41.2	-142.7	2.00	0.00	-	-	-	1013.0	-	59.00	-	47.8	58.2	68.8	-	-	-	-	-
COASTWISE	SHIP 37	41.3	-141.3	2.00	0.00	-	-	-	1013.0	-	59.00	-	47.8	58.2	68.8	-	-	-	-	-
SHIP 37	0803	40.2	-140.4	1.00	4.11	-	-	-	1013.0	-	59.00	-	47.8	58.2	68.8	-	-	-	-	-
SHIP 37	0803	42.4	-144.7	1.0	10.0	-	-	-	1013.0	-	59.00	-	47.8	58.2	68.8	-	-	-	-	-

Example: The power of standardized and integrated data



Safety Contour 23 Feet. The amount of allowable draft changes over a period of 24 hours by having both the high resolution bathymetry and water level forecasts integrated into a single display.

PMN LA/LB Project



Return on Investment

Modernizes core navigation products and services for the electronic age

- Pilot project in LA/LB allowed for ships draft to be increased from 65' to 69'
- PORTS systems have led to a 50% decrease in Alisions/Collisions/Groundings
- More efficient ship routing can lead to a 10% reduction in speed leads to a 19% reduction in average emissions
- The maritime community is in the digital age and PMN is designed to leverage NOAA's vast holdings to provide integrated and interoperable information for safe and efficient navigation

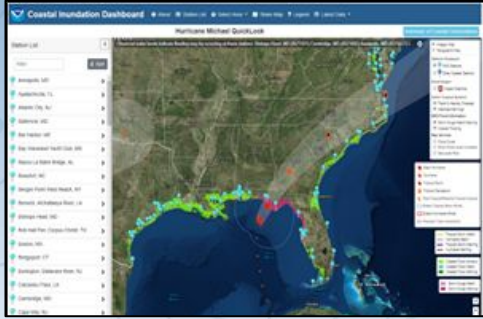
NOAA Physical Oceanographic Real Time System (PORTS[®])



Christopher DiVeglio

Center for Operational Oceanographic Products and Services (CO-OPS)

What is CO-OPS?



Our Mission: Meaningful oceanographic data for the Nation


Authoritative source for accurate, reliable, and timely tides, water levels, currents, and other oceanographic information.

Vision: Supporting the Nation's economy and safeguarding coastal communities with oceanographic information accessible by anyone, at any time, from any place.

Supporting

- Mapping and charting for the nation
- Safe and efficient navigation
- Planning for coastal inundation

NOAA PORTS® Program



PORTS® BY THE NUMBERS

PORTS® is NOAA's Physical Oceanographic Real-Time System; a collaborative program providing oceanographic and meteorological observations for mariners to safely navigate increasingly congested shipping lanes.

35+ new systems established over the last 30 years

90% The percent of cargo transiting in and out of U.S. seaports being served by a NOAA PORTS®

6 MINUTES PORTS® provides data in real-time & collects measurements every

10 Types of Data PORTS® uses emerging technology (e.g. sensors, meters) to measure the following parameters and assist navigators, emergency responders, coastal planners, weather forecasters, recreational users, and scientific researchers.

- Water Levels & Tides
- Waves
- Currents
- Wind
- Air Gap
- Visibility
- Barometric Pressure
- Air & Water Temperature
- Humidity
- Salinity

PORTS® serves 86 of the top 175 US seaports = 49%

Reduced accidents by 50% or more at multiple seaports

Accessible 24 hours a day / 7 days a week via internet or telephone

Generated \$50 million* in economic benefits over a 5-year period

*cumulative benefits for PORTS® in Houston/Galveston, NY/NJ, and Tampa Bay between 2005-2010

https://tidesandcurrents.noaa.gov/ports_info.html

- A domestic shared responsibility partnership program between the National Oceanic and Atmospheric Administration (NOAA) and the maritime community - cost share program
- Provides real-time oceanographic & meteorological observations in seaports across the U.S.
- Systems tailored to the needs of the local community
- All real-time PORTS® information is quality controlled by NOAA 24 hours a day, 365 days a year
- In operation since 1991, PORTS® has a solid reputation among the maritime community as a highly trusted source for real-time information to support safe and efficient maritime commerce.

NOAA PORTS® Program

Existing PORTS® partners are diverse and made up of...

- Harbor pilot associations
- Port Authorities (*18 AAPA member seaports, 46 benefitting*)
- Marine exchanges
- State agencies
- Private industry, including oil and gas industry and shipyards
- Other federal agencies, including U.S. Navy and USACE



Cost Share Model for PORTS®

Local Partner responsibilities:

- Define how many and what real-time sensors go where
- Provide **funding** for the purchase and installation of the stations
- Provide **funding** for the ongoing operation and maintenance of the stations
- Provide **funding** for the recapitalization of the stations

NOAA responsibilities:

- Program management and partner account management
- Manage the installation and operations of real-time PORTS® stations
- Manage and disseminate real-time PORTS data, including providing QA/QC
- Manage national program standards and new technology infusion
- Pay for facilities, telecommunications, field operations, IT infrastructure, and travel

Value and Impact of NOAA PORTS®

Accidents have been reduced at seaports currently served by PORTS®.



Collisions and Groundings

↓ 59% Groundings
(33% when groundings are combined with collisions)

↓ 37% Property damage

↓ 45% Injuries

↓ 60% Deaths

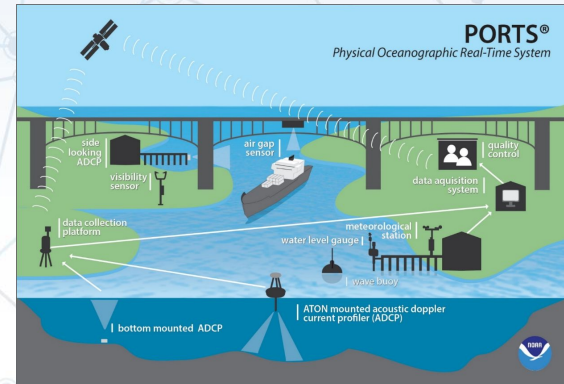
Oil spills have been reduced at seaports currently served by PORTS®.



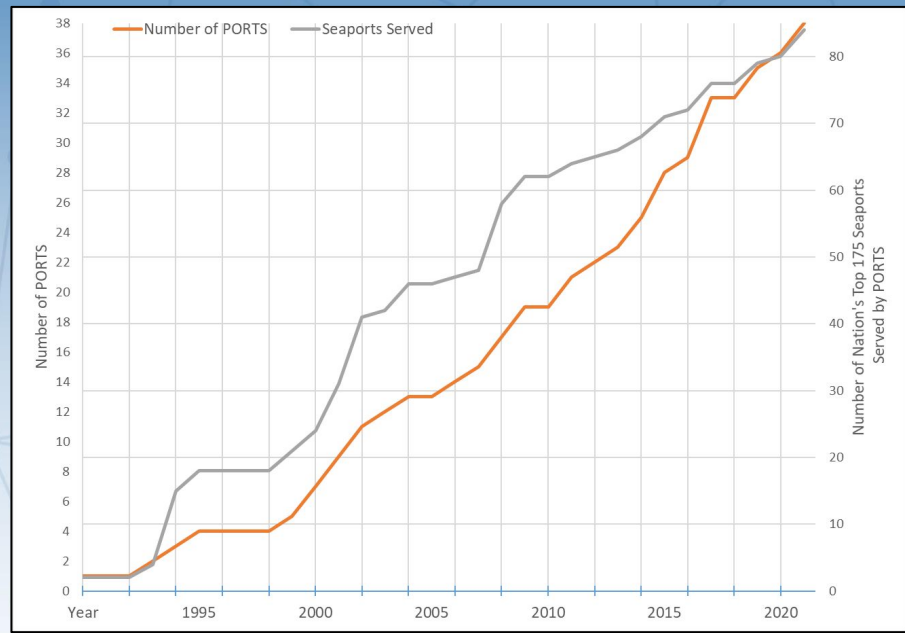
Oil Spills

↓ 21% Reduction in oil releases due to collisions and groundings at seaports currently served by PORTS®.

- In operation since 1991, PORTS® has a solid reputation among the maritime community as a highly trusted source for real-time data
- Estimated \$300 million annual benefit from PORTS® serving the nation's top 175 seaports
- PORTS® information is a major pillar of NOAA Precision Marine Navigation



NOAA PORTS® Program



- **PORTS** currently serves 86 top U.S. seaports or military installations
- Most NOAA PORTS provide data for multiple seaport complexes
- These PORTS® cover seaports with 89% of tonnage and 91% of value of ship-borne international trade
- Exponential program growth driven by ever larger vessels, oil and gas industry, and national security interests

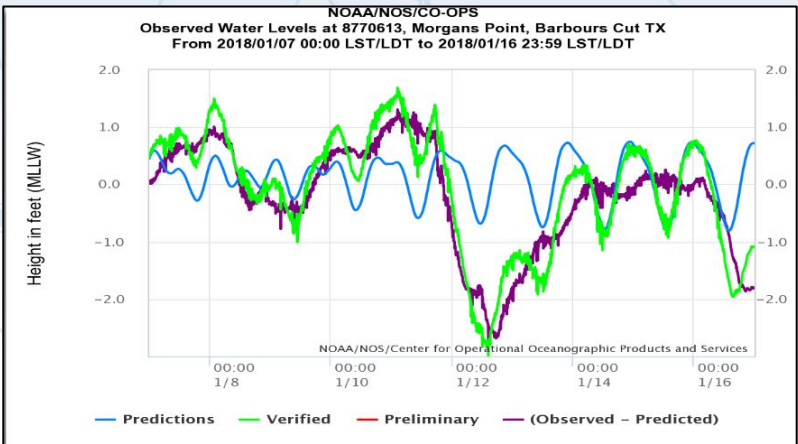
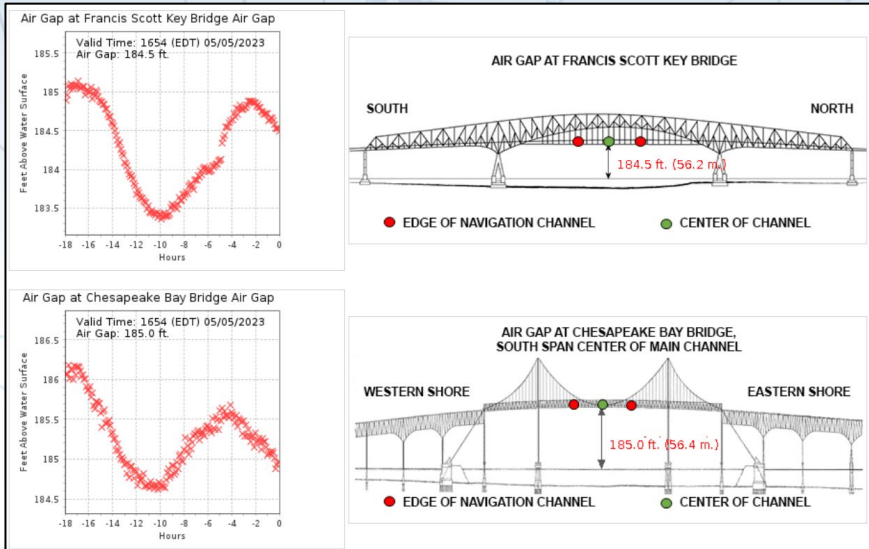
Selected PORTS®	Number of Seaports Served
San Francisco Bay	11
Chesapeake Bay (North and South)	9
Lower Mississippi River	9
Delaware River and Bay	6

What do many of the seaports that PORTS® serve have in common?

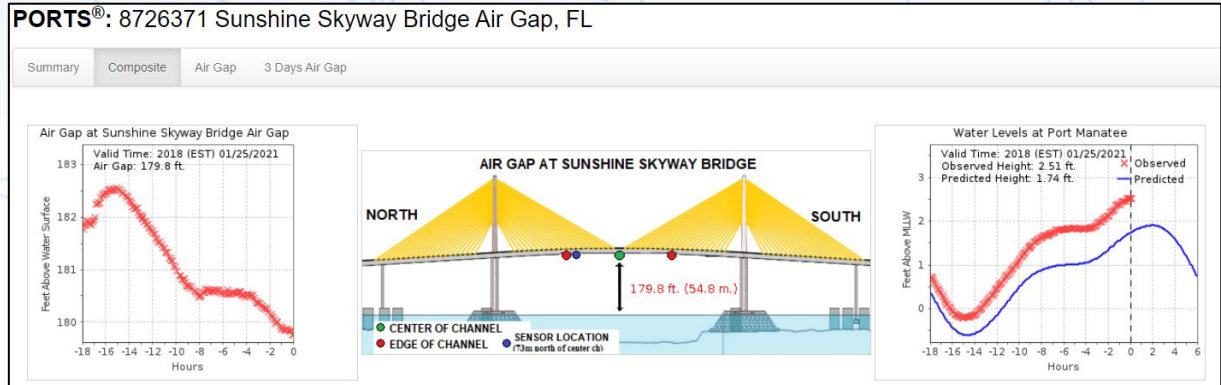
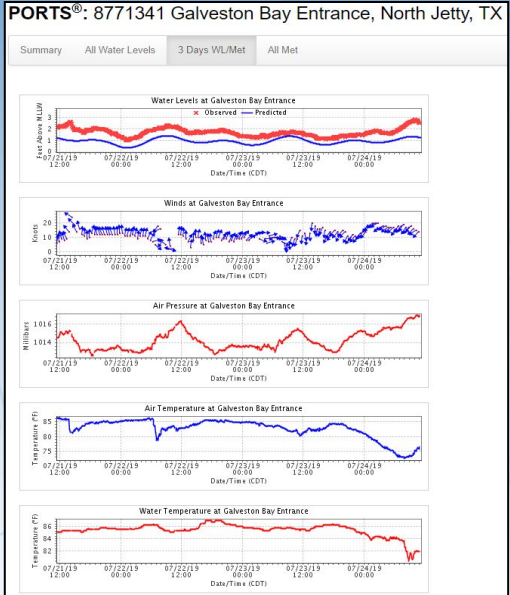
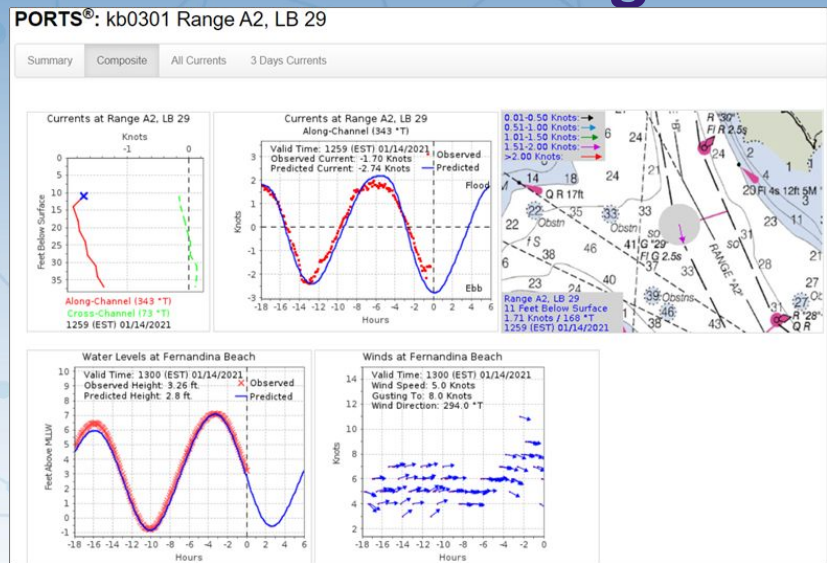
- ✓ Increased calls from much larger vessels
- ✓ Overall growth
- ✓ Diverse navigation channels
- ✓ Harbor deepening ongoing or planned
- ✓ Susceptible to abrupt ocean and weather changes
- ✓ Strong needs for real-time observations

PORTS® in action

- PORTS® real-time observations help to optimize use of the available water depth or the air draft under a fixed bridge.
- Data are used to plan and execute efficient transit scheduling and loading operations, leading to fewer delays and increased number of cargo transports.
- Using just one additional inch of vessel draft may account for several millions of dollars in cargo value per transit.



NOAA PORTS® Program



NOAA/NOS/CO-OPS
Houston/Galveston Bay PORTS®
2019-04-19 12:20 CDT

Data Types

- [Water Levels](#)
- [Winds](#)
- [Air/Water Temp](#)
- [Barometric Pressure](#)
- [Salinity/Specific Gravity](#)
- [Currents](#)

Water Levels (above MLLW)

Manchester	0.3 ft Falling
Morgans Point	0.1 ft Falling
Eagle Point	0.3 ft Falling
Galveston Bay Entra..	-0.3 ft Steady
Pier 21	-0.3 ft Steady

Go to top

Winds

Name	Wind from	Gusts to
Manchester	8 kn NNW	15
Morgans Point	18 kn NW	23
Eagle Point	9 kn NNW	17
Galveston Bay Entra..	23 kn NW	26
Pier 21	16 kn NNW	20

NOAA PORTS® Program

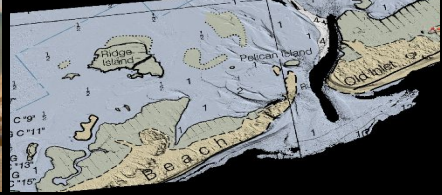
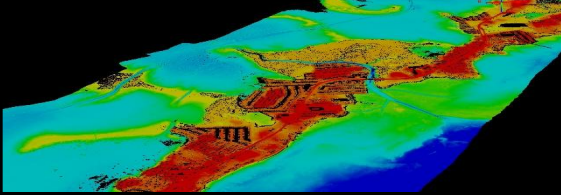
Determine the requirements for a fully built out system

- In order to make a better estimate of the full extent of NOAA appropriations needed to fulfill associated Federal responsibilities, NOAA needs to understand community requirements for a fully built out PORTS® at all 175 top US seaports
- Evaluate equity issues within the PORTS® program

Outline and evaluate governance options

- Outline the pros and cons of the current PORTS® cost-share model
- Outline the pros and cons of a full Federally-funded PORTS® program
- Generate a detailed recommendation for a full Federally-funded PORTS® program governance model
- Evaluate the larger marine navigation community's support for the two governance models
- Evaluate how underserved communities are supported under the two governance models

CO-OPS has awarded a contract and plans to have a final deliverable by the end of 2023



NGS Coastal Mapping Program

Shoreline, Imagery, and Nearshore Bathymetry

Mike Aslaksen

**Remote Sensing Division
National Geodetic Survey**

National Geodetic Survey

Mission: Define, maintain and provide access to the National Spatial Reference System.

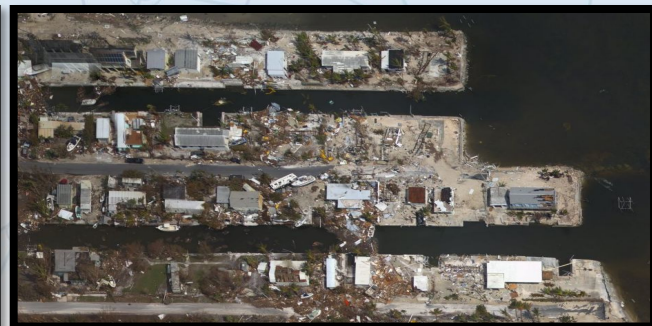
Remote Sensing Division Primary Programs:



Aeronautical Survey
Program



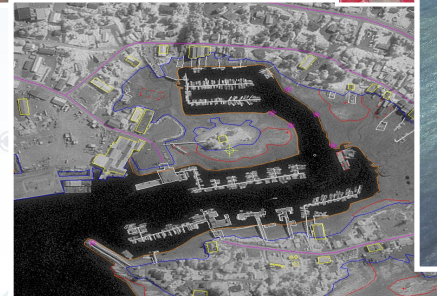
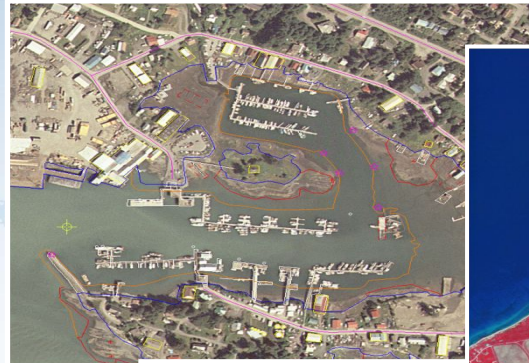
Coastal Mapping
Program



Emergency Response

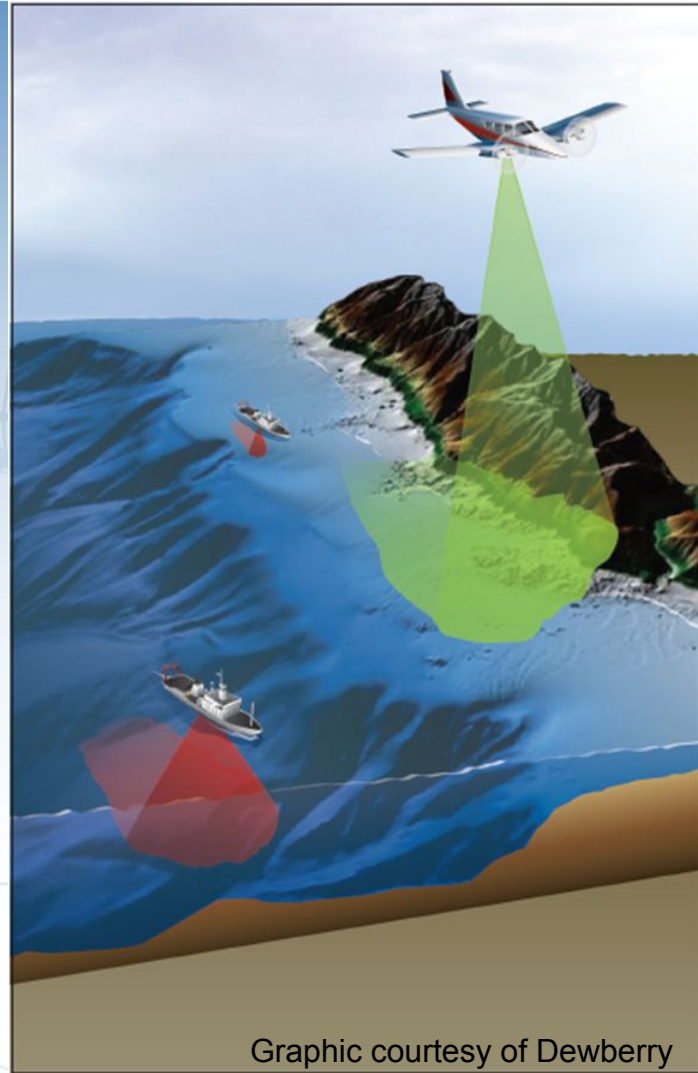
The RSD Coastal Mapping Program

- A congressional mandate to conduct remote sensing surveys of coastal regions of the United States and its possessions for demarcating the nation's legal coastline.
- **Goals:**
 - Provide the Nation with Accurate, Consistent, Up-to-Date National Shoreline
 - Acquire Nearshore Elevation Data
 - Update Nautical Charts and support other applications
- **Sources:**
 - Lidar
 - Digital Cameras
 - High Resolution Satellites



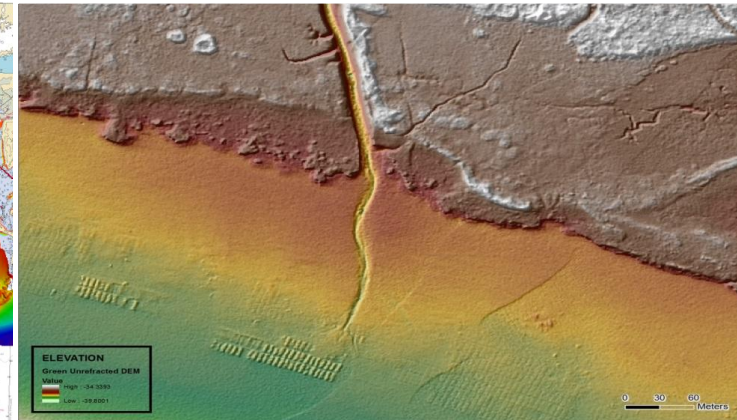
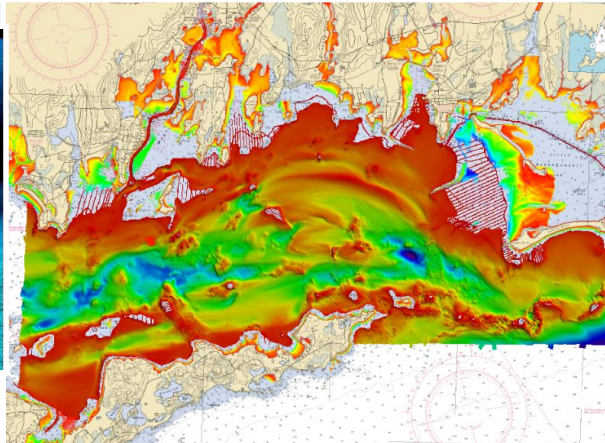
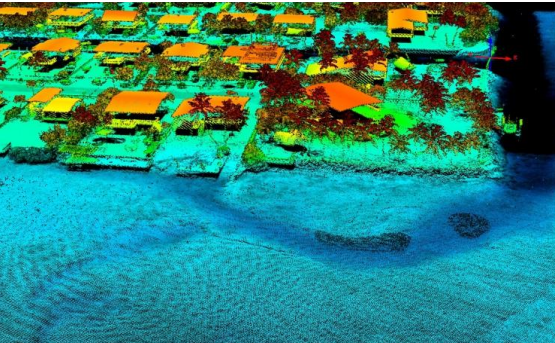
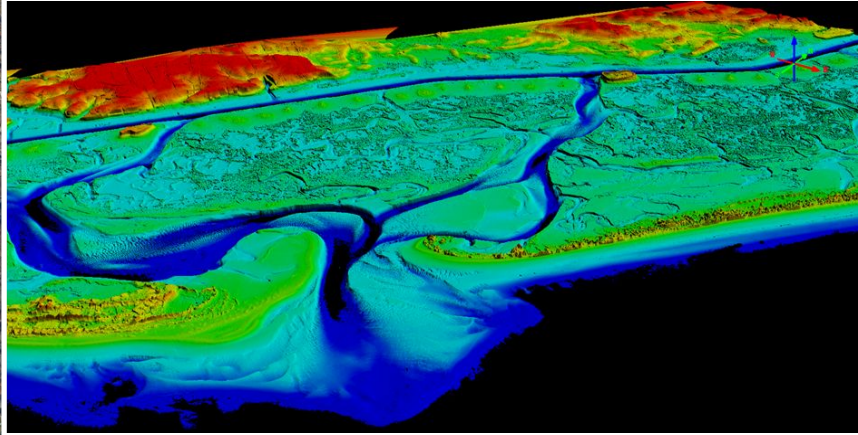
Support of Hydrographic Surveys

- RSD collects nearshore topobathy lidar to the 4m NALL in the year prior to ship ops
- RSD will provide both shoreline and nearshore bathymetry
- Hydro operations will use this data to plan operations and overall situational awareness
- Increases efficiency and safety of launch and ship operations

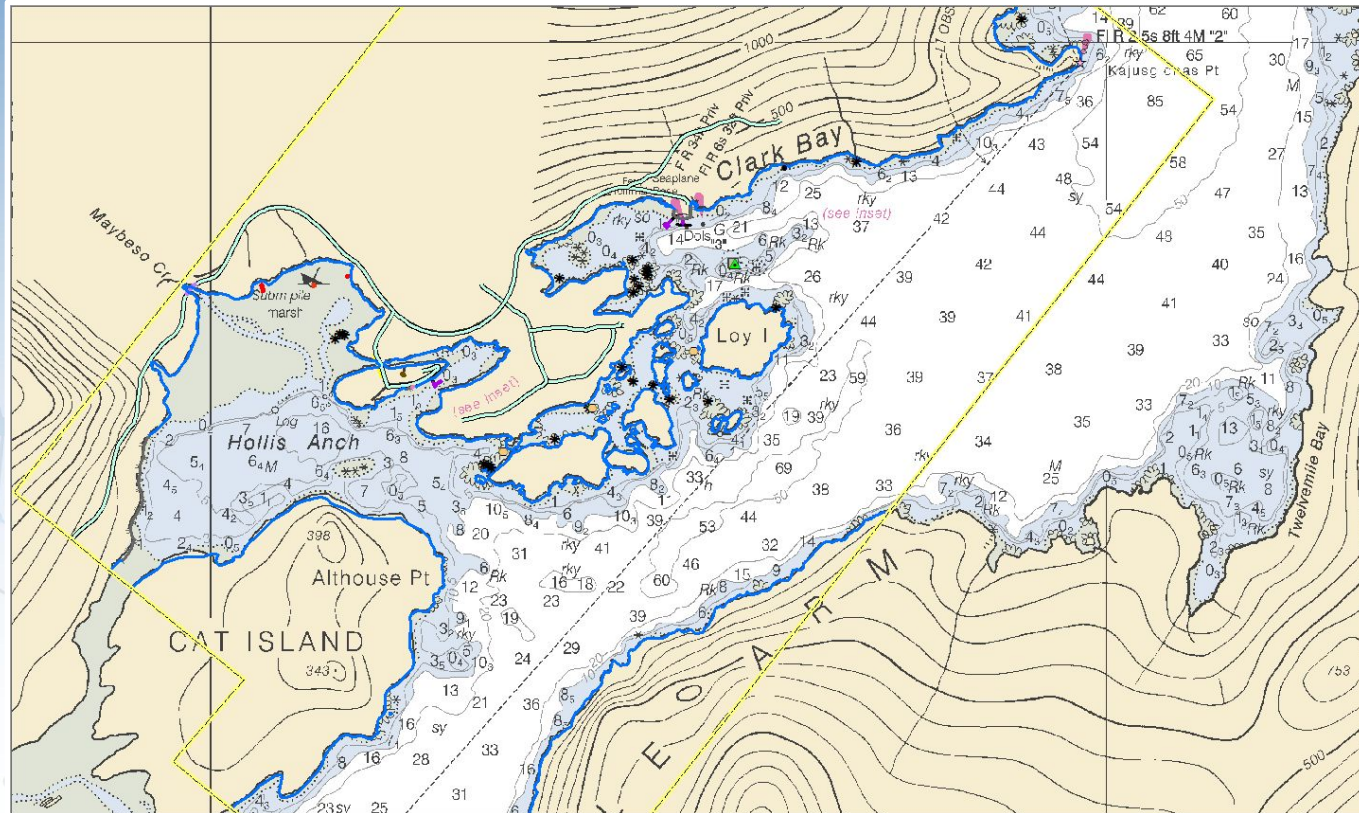


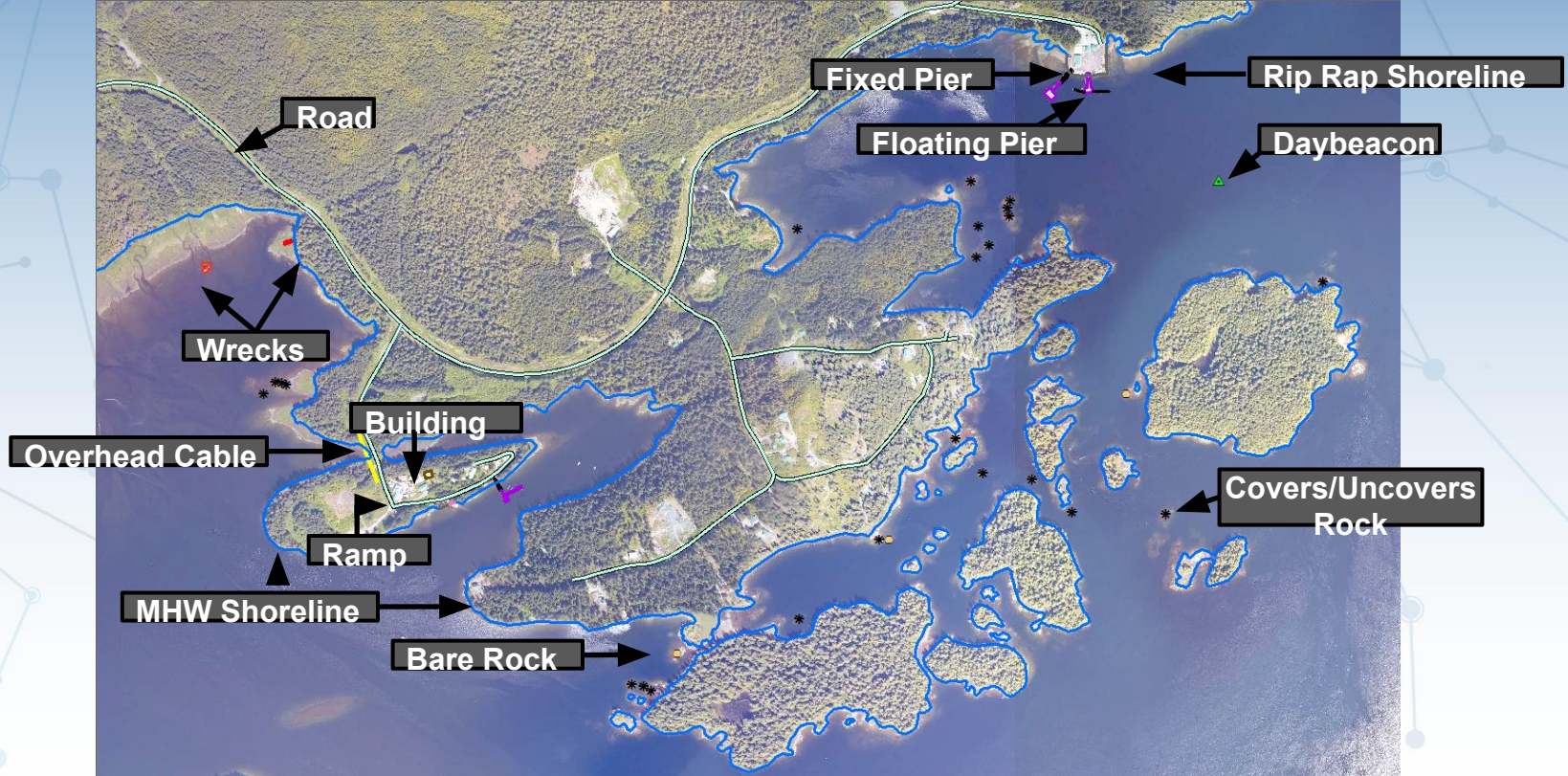
Graphic courtesy of Dewberry

NGS's Topobathy lidar data



Geographic Cells (Nautical Chart Shoreline)





Major 175 Ports (2022)

- Albany, NY
- Alpena, MI
- Anacortes, WA
- Anchorage, AK
- Annapolis, MD
- Apra Harbor, GU
- Ashtabula, OH
- Astoria, OR
- Baltimore, MD
- Bangor, WA
- Barbers Point, Oahu, HI
- Baton Rouge, LA
- Beaumont, TX
- Biloxi, MS
- Boston, MA
- Bremerton, WA
- Bridgeport, CT
- Brownsville/Port Isabel, TX
- Brunswick, GA
- Buffalo, NY
- Buffington, IN
- Burns Waterway Harbor, IN
- Calcite, MI
- Camden-Gloucester, NJ
- Camp Pendleton, CA
- Cape May, NJ
- Charleston, SC
- Charlevoix, MI
- Chester, PA
- Chicago, IL
- Cleveland, OH
- Conneaut, OH
- Coos Bay/Charleston, OR
- Corpus Christi/Port Ingleside, TX
- Detroit, MI

19

Last time Analyzed (FY)

5

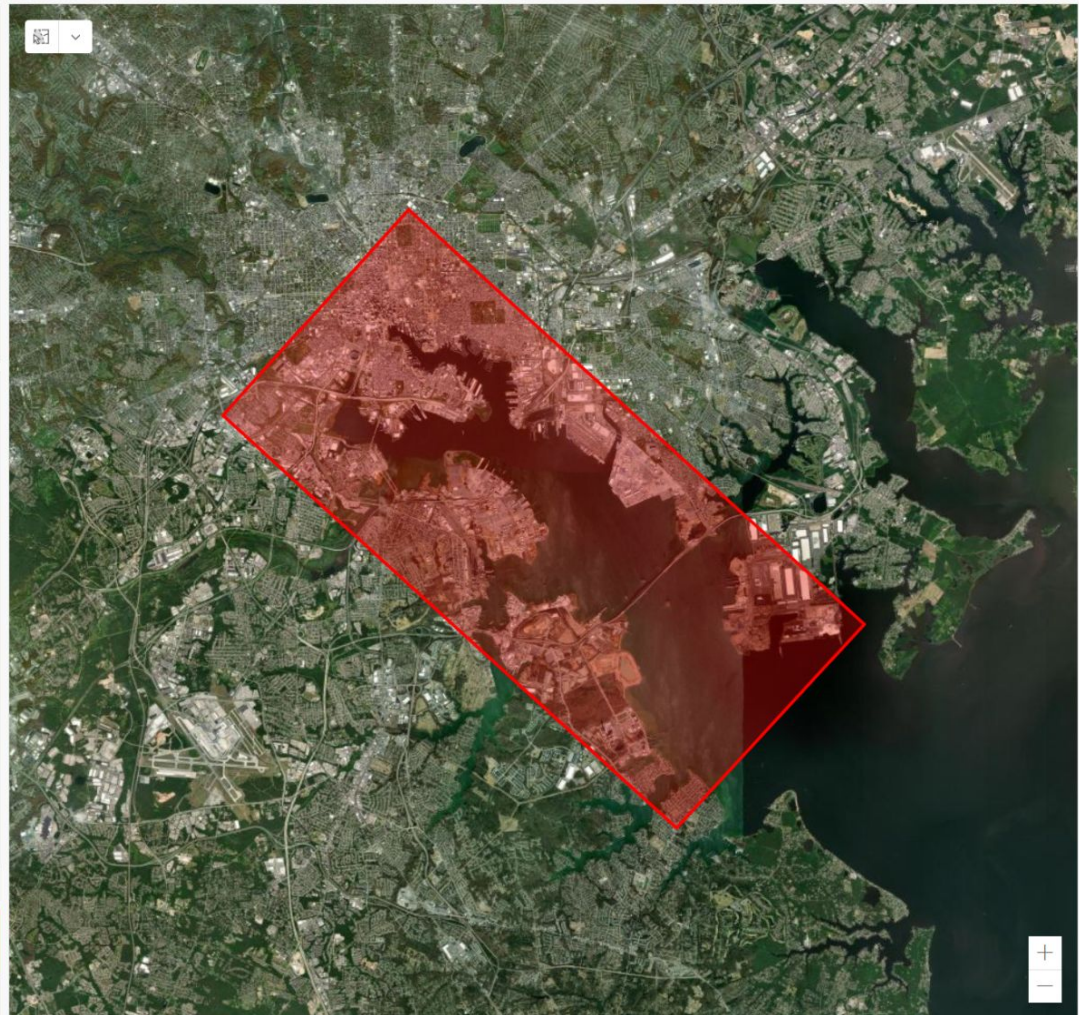
Times Analyzed

Baltimore, MD

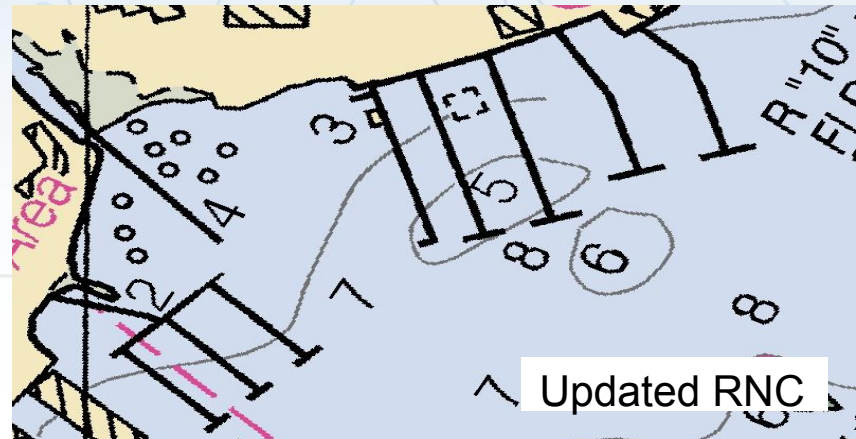
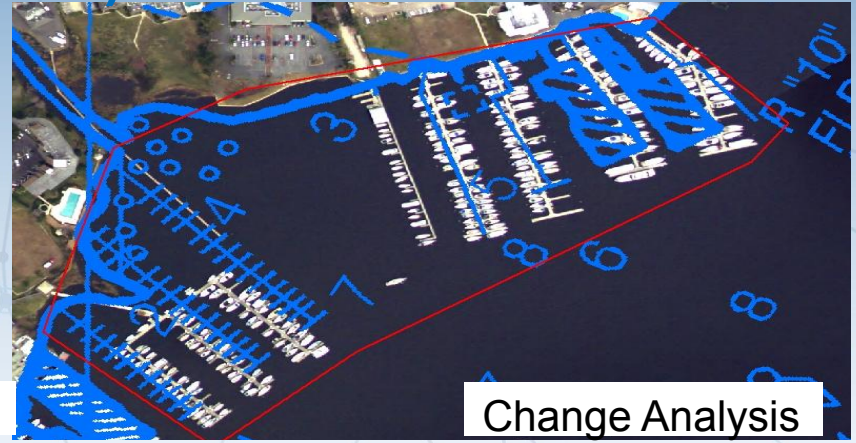
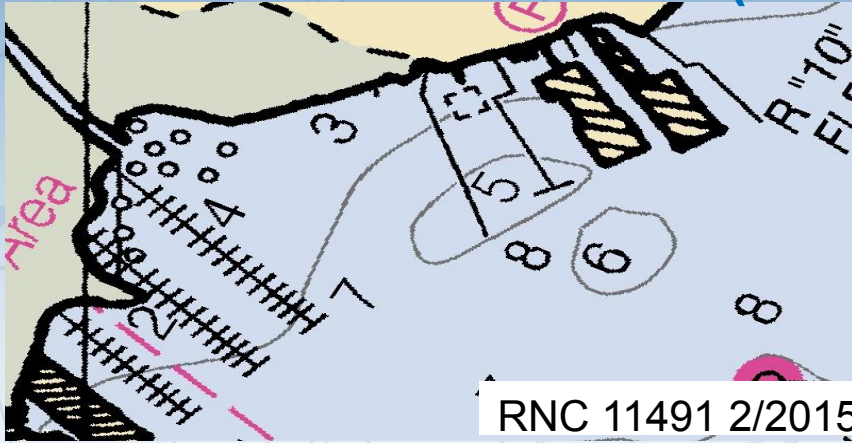
2002	2002
2003	
2004	
2005	2005
2006	
2007	
2008	
2009	
2010	
2011	MD1102
2012	
2013	
2014	MD1401
2015	
2016	
2017	
2018	
2019	MD1901-CS-N
2020	
2021	
2022	
2023	2023

Recommendation

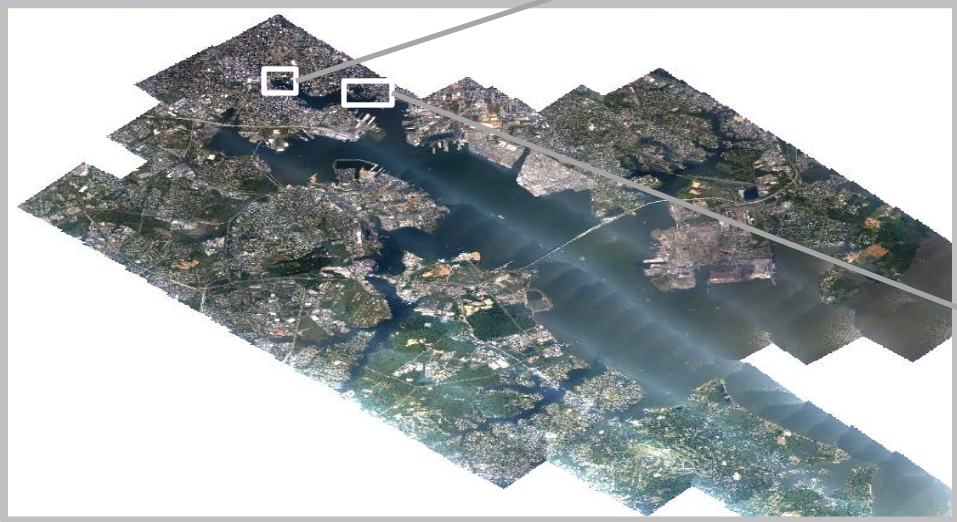
Limited Compilation



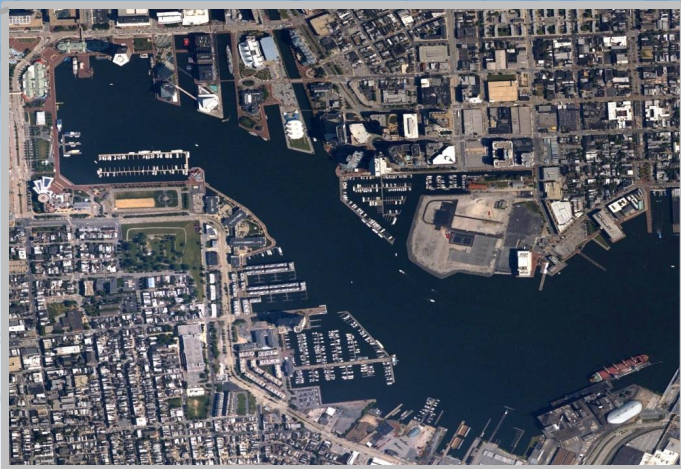
Coast and Shoreline Change Analysis Program (CSCAP)



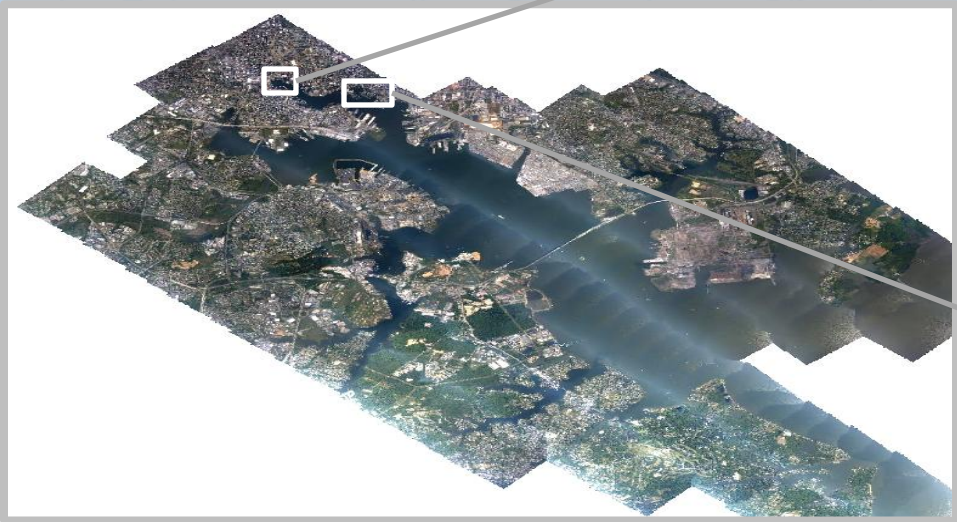
High Resolution Digital Aerial Imagery and Shoreline



Baltimore, MD



High Resolution Digital Aerial Imagery and Shoreline

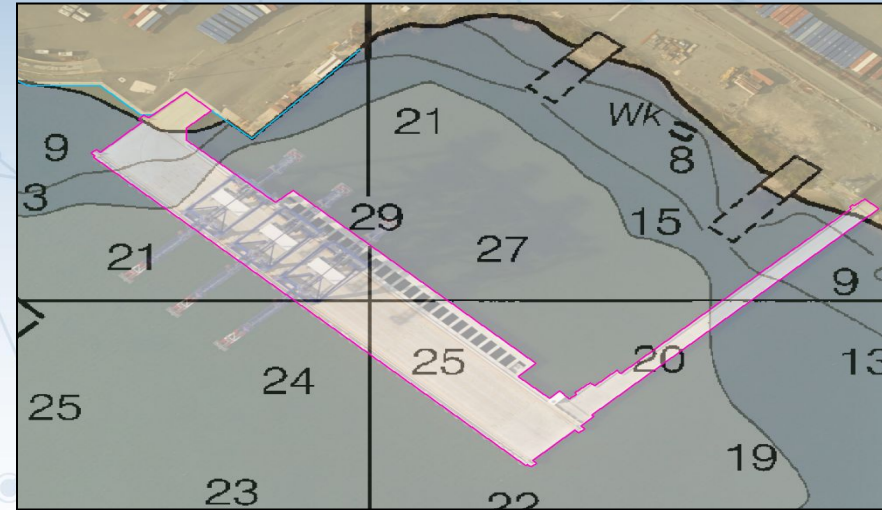


Baltimore, MD



Shoreline Update Expedite (SUE)

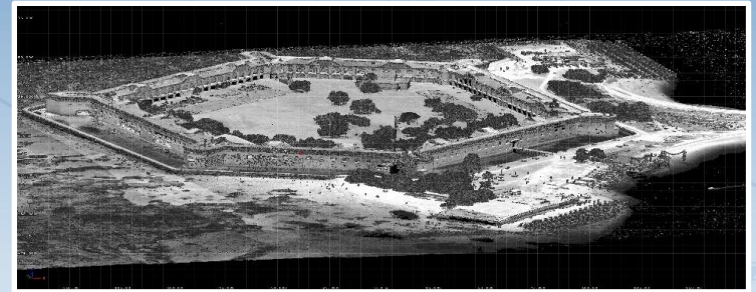
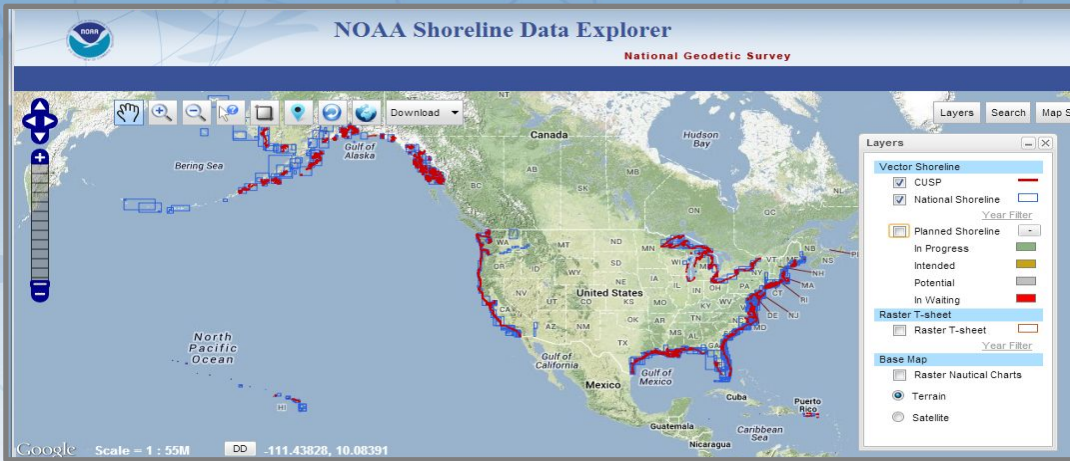
- **Goal:** to provide the requested updates within 1-2 workdays.
- **Example workflow:**
 - Received request from MCD on Thu. Aug. 23, 2018 for an update to chart 25670, depicting a large uncharted pier.
 - Determined that RSD aerial imagery flown on 9/24/17 in response to Hurricane Maria had captured the new pier.
 - Compiled the features in ArcGIS using the orthoimagery accessed directly through the NGS Storm Imagery web map tile service (WMTS), and delivered the shapefile to MCD just 3 5 hours after their request



SUE-00022

Isla Grande, San Juan, PR

Distribution of Data



Shoreline (<http://www.ngs.noaa.gov/NSDE/>)

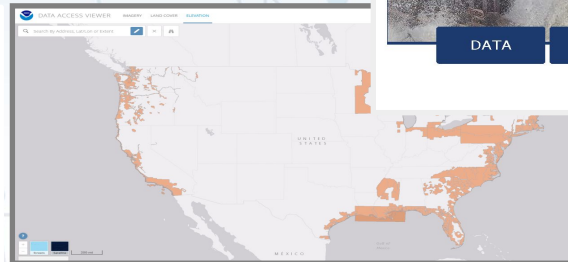
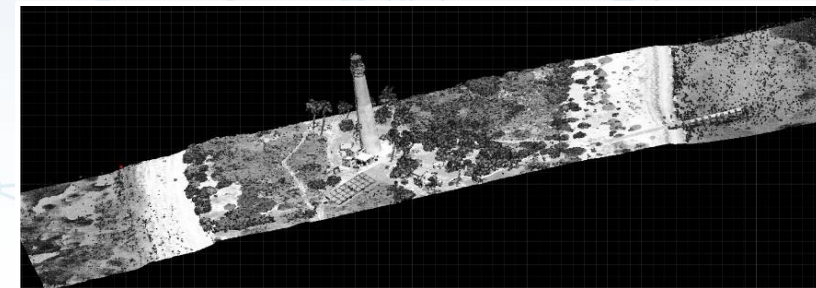
DigitalCoast
OFFICE FOR COASTAL MANAGEMENT

More Than Just Data
Dive into the Digital Coast to Get the Data, Tools, and Training Communities Need to Address Coastal Issues.

DATA TOOLS TRAINING STORIES TOPICS

Lidar and
Imagery:

<https://coast.noaa.gov/digitalcoast/>



Emergency Response



Remotely sensed data is acquired to support NOAA's homeland security and emergency response requirements.

NOAA maintains the capability to provide tools, technology, and expertise in a timely and efficient manner.



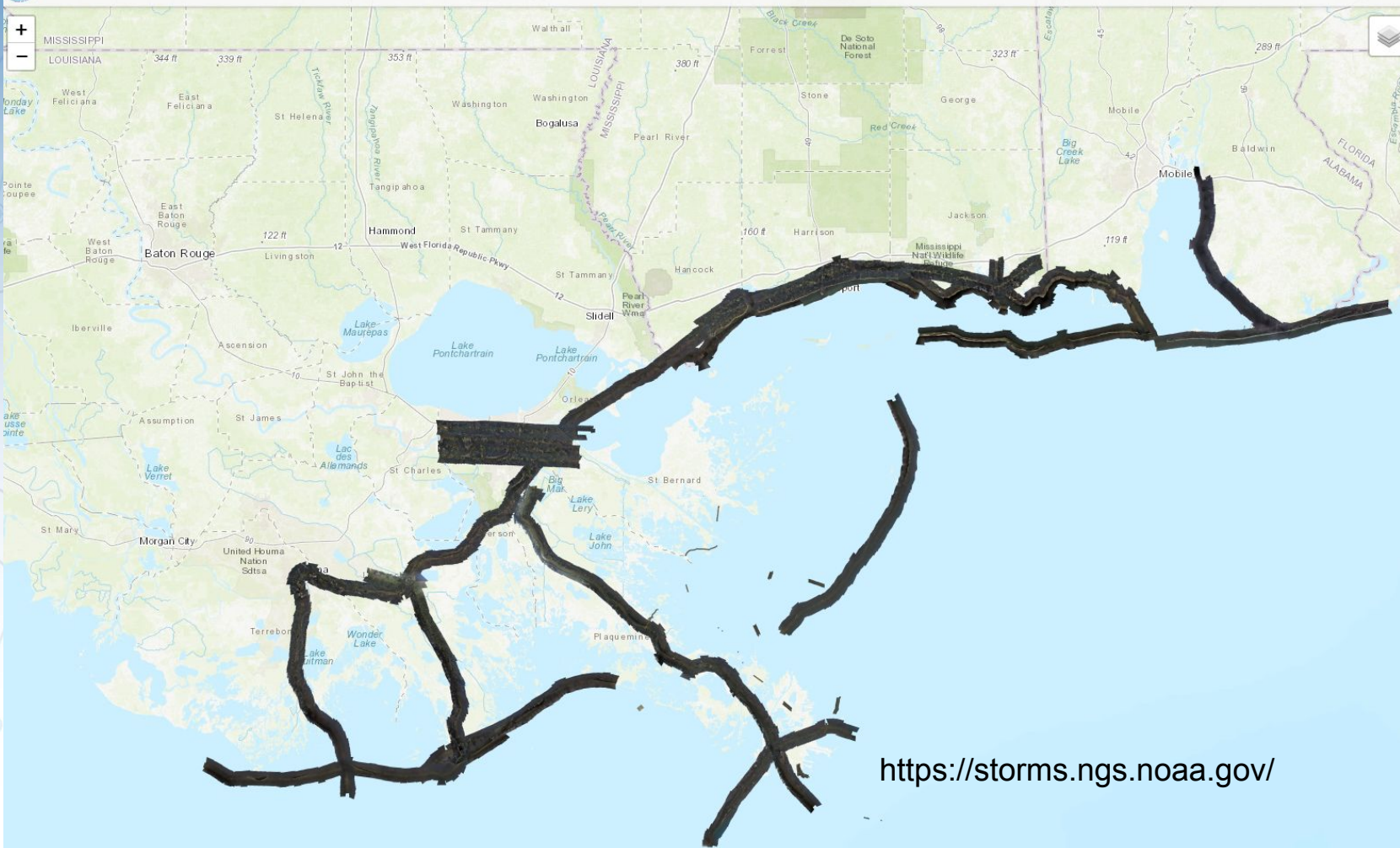
The remotely sensed data collected is disseminated to federal, state, and local government agencies as well as the general public to facilitate support efforts.

New Camera System

Digital Sensor System (DSS) V6 (King Air)

- 150MP RGB camera (x2)
- 100MP NIR camera (x2)
- Nadir and Oblique orientations







Questions