Florida Coastal Mapping Program Summit Report 2022

Thank you sponsors!

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This report is available at FWRI and FIO websites below:

https://fcmap-myfwc.hub.arcgis.com/ https://www.fio.usf.edu/research-programs/florida-coastal-mapping-program/

Acknowledgements

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Executive Summary

The Florida Coastal Mapping Program (FCMaP) is an initiative between Federal and Florida State agencies and institutions to coordinate and facilitate the collection and accessibility of Florida coastal seafloor data in order to fill priority areas and gaps. FCMaP established an office at the Florida Institute of Oceanography (FIO) and activities are guided by the FCMaP Science and Technical Advisory Council (STAC) and FCMaP's 5-year Strategic Plan published in 2022.

The primary purpose of the 2022 FCMaP Summit was to bring together stakeholders to present updates to mapping frameworks, annual mapping activities, and discuss future plans and strategies to achieve a mapped Florida.

The FCMaP Annual Summit was held on 30 November 2022 and 1 December 2022 at the Florida Fish and Wildlife Research Institute (FWRI) in St. Petersburg, Florida. Stakeholder groups represented were a mix of Government (federal, state, local), academia, private Industry and non-profit. Event sponsorship was provided by Woolpert, APTIM, Dewberry, and BOEM. With in-kind support from NOAA, FIO, and USF (COMIT).

The theme for November 30th was "Mapping Framework" and covered State and Federal agency updates and discussions of mapping specifications and mapping location prioritization for Florida. Keynote speakers Ashley Chappell and Meredith Westington (NOAA, OCS, IOCM) discussed interagency mapping efforts to support NOMEC, highlighting other regional mapping programs, and the development of the Standard Ocean Mapping Protocol (SOMP). STAC members presented on the 5-year Strategic Plan, role of the FCMaP office, and updates to the data footprint inventory and mapping standards. Specifications for bathy lidar collection and the results of the 3D nation study, which assessed the requirements and benefits of topo-bathy data were presented. Finally, breakout groups revisited offshore mapping priorities developed 3 years ago, in particular depths 20-200m that may not be mapped by the DEP Florida Shoreline Mapping Initiative (FSMI). The general consensus was that holding a prioritization that focused on this depth range might yield different results and that there are multiple stakeholder groups that would benefit from these maps.

The December 1st presentations and discussions focused broadly on "Mapping Activities". Keynote speaker, Jennifer Jencks, from NOAA NCEI, presented on crowd sourced bathymetry (CSB) to encourage innovative supplementary data gathering. A CSB panel involved experts in CSB technology development, regional initiatives, and data management and use. Participants agreed that CSB offers untapped resources, particularly in Florida where there is an active professional and recreational boating community. CSB challenges to overcome include technology and data accessibility and availability and public perception. A series of Federal, state, and academic mapping updates were provided to raise awareness of recent or upcoming mapping in Florida State waters. The Florida State Mapping Initiative (FSMI) presentation highlighted the plans for data archiving and accessibility on a hub site, which was followed by an open discussion of community data product plans and needs from the FSMI data. A key takeaway is that additional funding sources and partnerships need to be sought to create products for specific uses and to consider mapping specifications that accommodate interests to extract information such as seagrass coverage or assess minimum flows and water levels prior to collection. A presentation on LiDAR mapping analysis to determine Hurricane Ian's Impact on the geomorphology of the southwest Florida coast provided an introduction to a discussion of storm response mapping needs. The key points from the discussion included the many drivers for updated data including understanding debris hazards, damage assessments particularly for coastal communities, locating sand resources, and habitat impacts. The importance of accessible baseline data to allow for pre- and post- storm comparisons was highlighted.

Action Items

DAY 1

- There was a general agreement that offshore deep-water prioritization would be beneficial. A series of virtual events will be scheduled for these areas to be reevaluated.
- Reprioritizing areas of importance and relevant data types needs to be done consistently. A complete yearly prioritization is not feasible; however, it is possible to distribute an annual "check-in" survey. This annual survey will help determine if there are any major priority changes. For example, if there are major storm events in a particular region or if funding goals shift towards a particular area of interest. Annual surveys can also be used to drive important topics to be addressed at the FCMaP Annual Summit.

Day 2

- Crowd-sourced bathymetry was deemed an underutilized resource particularly in the state Florida where there is a large active professional and recreational boating community. There was an agreement by participants to initiate a trial run of CSB in the Tampa Bay area. Initial efforts will focus on testing data loggers and data uploading within professional organizations and agencies and then growing the program out to the public.
- Further analysis of the FSMI and resulting products should be conducted to understand the full scope of the community's need for data. The large amount of State funds being invested warrants an intensive scoping of the community's needs to produce the best mapping products. STAC has five state and four federal representatives that meet monthly and will aid in initiating an analysis by determining what the "important questions" are that need to be asked. Once these questions are determined an effort will be made to collectively produce a list and circulate it out to the necessary groups. There may also be an option, depending on funding, for FCMaP to conduct a workshop in order to help derive questions. Funding options to consider for the workshop should include NOAA RESTORE as there is a rolling opportunity for data synthesis.
- FCMaP should determine annual needs for mapping (re)surveys through communications with constituents. Needs for surveys may shift in response to storms and/or changes in planned use (e.g., wind farm or aquaculture siting).

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Appendix E: Participant List

Abbreviations

BOEM	Bureau of Ocean Energy Management
COMIT	Center for Ocean Mapping and Innovative Technologies
CSB	Crowdsourced bathymetry
DCDB	Data Centre for Digital Bathymetry
DEM	Digital elevation model
FCMaP	Florida Coastal Mapping Program
FDEP	Florida Department of Environmental Protection
FGUC	Florida Gulf Coast University
FLRACEP	Florida RESTORE Act Centers of Excellence Program
FSMI	Florida State Mapping Initiative
FWRI	Florida Wildlife Research Institute
GIO	Geographic Information Office
GLOS	Great Lakes Observing System
IHO	International Hydrographic Organization
IOCM	Integrated Ocean & Coastal Mapping
JALBTCX	Joint Airborne Lidar Bathymetry Technical Center of Expertise
LiDAR	Light detection and ranging
NEEA	National Enhanced Elevation Assessment
NCEI	National Centers for Environmental Information
NOAA	National Oceanic and Atmospheric Administration
OCS	Office of Coast Survey
SJRWMD	Saint John's River Water Management District
Sonar	Sound navigation and ranging
SPCMSC	St. Petersburg Coastal and Marine Science Center
STEM	Science, Technology, Engineering and Mathematics
SVP	Sound velocity profile
TBBEx	Tampa Bay Bathymetry Experiment
UF	University of Florida
UNH-CCOM	University of New Hampshire Center for Coastal and Ocean Mapping
USACE	U.S. Army Corps of Engineers
USACE NCMP	U.S. Army Corps of Engineers National Coastal Mapping Program
USF	University of South Florida
USGS	U.S. Geological Survey

Introduction

This report provides a summary of the 2022 FCMaP Summit and the resulting discussions and strategies needed to continue advancing the goal of acquiring consistent, high-resolution seafloor data for Florida's seafloor during the upcoming decade. The results of this Summit will continue to aid in the formation of a unified inventory of existing Florida seafloor mapping data and provide innovative ways to fill data gaps. Data gaps are critical unknowns impacting a wide variety of stakeholders. Once mapped, data will provide guidance in numerous fields ranging from navigational safety and emergency response to benthic habitat identification, and infrastructure, resource, and environmental management support.

Florida Institute of Oceanography (FIO) hosted the FCMaP Summit on November 30 and December 1 2022, at the Florida Fish and Wildlife Conservation Commission-Fish and Wildlife Research Institute in Saint Petersburg, Florida. In addition to in-person convening in the 3rd floor conference room, the Summit accommodated virtual participants via GoToMeeting. This hybrid format allowed full in-person and virtual participation in plenary sessions, live polls, and discussions. A total of 122 (in-person and virtual) participants were in attendance. In-person attendance was capped at 65 due to space capacity. Day 1 had 59 in-person and 54 virtual participants and day 2 had 63 in-person and 56 virtual participants. The annual theme was "Achieving A Mapped Florida," which aimed to encourage action plan development through inspiring key note presentations, informational plenary presentations, online polling, and discussions. Day one focused on mapping framework updates, while day two built community awareness of mapping activities. The full agenda is included in Appendix A.

Day 1 (November 30, 2022)

National Strategy for Ocean Mapping, Exploring, and Characterizing the United States Exclusive Economic Zone (NOMEC) and Regional Mapping Initiatives

Keynote Speakers: Ashley Chappell and Meredith Westington (NOAA OCS & IOCM)

The U.S. debuted the NOMEC Strategy in 2020. Covering the U.S. EEZ, there are five goals emphasizing federal government coordination; mapping; exploration and characterization; advancing science and technology; and public and private partnerships. With respect to the mapping goal, NOMEC seeks to map waters deeper than 40m meters by 2030 and waters shallower by 2040. Ocean mapping is defined as the data needed to understand seafloor characteristics such as depth, topography, bottom type, sediment composition and distribution, and underlying geologic structure.

Bathymetry is foundational mapping data. As of January 2022, 52% of U.S. oceans, coasts and Great Lakes remain unmapped (IOCM, 2022: https://iocm.noaa.gov/documents/mapping-progress-report2022.pdf). NCEI and Digital Coast are the key repositories to archive these data. If you have data to share, please let us know.

To advance the mapping goals, NOMEC has three key objectives: (1) establish a standard ocean mapping protocol (SOMP); (2) make data usable and available; and (3) coordinate and execute regional mapping campaigns. The SOMP includes specifications and best practices for bathymetry, backscatter, water column data, sidescan sonar imagery, sub-bottom profiler, and magnetometer data. Supporting the data usability and availability objective, the need for good metadata and public access is emphasized throughout the SOMP. The SOMP will be released for public comment in March 2023.

Regarding regional mapping campaigns, the mantra "all hands on deck" is really required to reach NOMEC's ambitious mapping goals and timeline. Pre-dating the strategy, there are three regional mapping campaigns already tackling NOMEC goals—EXPRESS on the West Coast, Lakebed 2030 in the Great Lakes, and FCMaP in Florida. Seascape Alaska is a new regional mapping campaign that is also built around advancing the NOMEC Strategy. EXPRESS has been successful due to the active participation of its members and leveraging knowledge about ship schedules to complete its objectives. Lakebed 2030 has recently completed a spatial priorities study and published a cost and approaches document to help communicate why mapping is important and how it might be achieved. Crowd-sourced bathymetry is also advancing in the region. Seascape Alaska is the newest effort of the four ongoing champaigns. Similar to EXPRESS, it is a "coalition of the willing," but the group is open to both government and non-government participants. Working alongside the Alaska coastal mapping initiative, Seascape Alaska is supported by a spatial priorities study, a partner finding tool and a budding lidar mapping plan of action. You can follow these regional activities at regional activities.

Florida Coastal Mapping Program (FCMaP): Updates and Accomplishments

Cheryl Hapke (USFSP CMS and COMIT)

Florida Coastal Mapping Program is here to benefit Florida mapping stakeholders. FCMaP has adopted NOAA IOCM's "Map Once, Use Many Times" approach, which in turn will help support NOMEC Goal 2: the coordination mapping efforts to completely map U.S. waters deeper than 40m by 2030 and waters 0-40m deep by 2040, as well as supporting FSMI and other mapping efforts.

FCMaP accomplishments from 2017 to 2022 include:

- Formation of a Steering Committee and identification of a multi-agency technical team (2017)
- Holding an initial Stakeholder Workshop, which led to the decision to undertake a formal statewide mapping prioritization (2018)
- Creation of the FCMaP HUB (https://fcmap-myfwc.hub.arcgis.com/)(2018)
- Conducting a statewide prioritization process that involved holding 5 workshops across the state (2019)
- Conducting an analysis of prioritization and gaps (2020)
- Developing language that resulted in the Florida legislature awarding $100M to FDEP for seafloor mapping (2021)
- Dissolving Steering Committee and standing up the FCMaP STAC that developed specific terms of reference to define their role (2022)
- Developing a 5-year strategic plan (2022)
- Annual Mapping Summits and Forums (2018-2022)
- Hiring a FIO FCMaP Program Coordinator (2023)

FCMaP STAC 5 Year Plan and Strategy was discussed (https://fcmap-myfwc.hub.arcgis.com/) and outlines a portfolio of coordination that includes:

- **Data awareness** – Provide access to and promote awareness of data archives, information and tools relevant to bathymetric mapping.
- **Community of Practice** – Coordinate across a diverse portfolio of private and public stakeholders in the realm of bathymetric mapping.
- **Innovation** – Encourage innovation throughout data collection and processing.
- **Engagement** – Provide forums to facilitate sharing of information, knowledge exchange, and partnerships across stakeholder community.
- **Implementation** – Communicate out to stakeholder community and provide an advisory role.

FCMaP Office and Coordinator Role

Nicole Raineault (FIO and COMIT)

Florida Institute of Oceanography (FIO) is a 32-member consortium of Florida's publicly funded universities and other members with a stake in ocean Science, Technology, Engineering and Mathematics (STEM) research and education. The Florida RESTORE Act Centers of Excellence Program (FLRACEP) is the Centers of Excellence Research Grant Program for Florida, hosted by FIO. RESTORE research disciplines include mapping and FLRACEP has funded some seafloor mapping research in the past. Currently there are eight active research projects and another $2.8 million in funding will be awarded in spring 2023 to establish 3 Centers of Excellence focused on restoration impacts.

The FCMaP office at FIO will leverage FIO's network and assets to meet the FCMaP goal of facilitating the State's mapping community through communication, raising awareness of data and products, networking across the community, and coordinating the prioritization of critical data needs. A goal of increasing awareness of the importance of seafloor mapping data to many stakeholders will help to bolster support for additional funding to fully map state waters.

Project Footprint Inventory and Mapping Standards

Rene Baumstark (FWRI)

The FCMaP Hub is currently hosted by FWC FWRI. The Hub is a publicly accessible, centralized location to learn about FCMaP, access information and the mapping inventory, and stay connected. Products include the strategic plan, StoryMap, publications and reports, GIS data for the prioritization results, web mapping applications, and the project footprint inventory (multibeam and lidar). The FCMaP data inventory is comprised of light metadata and footprints only for data collected in the year 2000 or later. The goal is to raise awareness of mapping data and gaps and provide guidance on general standards to ensure accessible, consistent, high-resolution bathymetry. General standards are needed because approaches to collecting and processing data will differ based on use.

Topobathy Lidar Specifications

Jennifer Wozencraft (USACE)

Joint Airborne Lidar Bathymetry Technical Center of Expertise (JALBTCX) bathytopo lidar specification started at the request of USGS for an inland lidar bathymetry specification. It serves as the basis for the lidar section and bathymetry chapter in the SOMP for Interagency Working Group on Ocean and Coastal Mapping. This is a collaboration between USACE, NAVOCEANO, NOAA and USGS. The central objective of bathymetric and topobathymetric surveys is to obtain clean, seamless (i.e., free of gaps or discontinuities) topographic-bathymetric data across the intertidal zone and shallow nearshore zone. Bathymetric and topobathymetric lidar flights must be carefully managed around water clarity, areas of low bottom reflectivity, such as mud or submerged aquatic vegetation and surface foam and entrained bubbles from breaking waves. Preferred conditions include low water flow conditions (e.g. acquisition during the dry-season), low wind and wave conditions, ice-free water conditions, and low bio-mass submerged aquatic vegetation.

3D Nation Elevation Requirements and Benefits Study

Sue Hoegberg (Dewberry) and Ashley Chappell (NOAA IOCM)

The National Enhanced Elevation Assessment (NEEA) was a requirements and benefits study conducted about 10 years ago wherein a wide variety of stakeholders including federal, state, and local agencies, as well as tribes and private and nonprofit groups identified over 600 activities that would significantly benefit from elevation data that was better than what was available at the time. The stakeholders identified $1.2 Billion in annual benefits from updated data. NEEA included a benefit-cost analysis of over 25 possible implementation scenarios for a national elevation program. The scenario with the highest benefit-cost ratio evolved into the 3DEP program. The 3DEP Program's main goal is to complete the first ever national baseline of high-resolution elevation data collected in a timeframe of less than a decade and it is nearing completion.

USGS and NOAA decided to join together to better understand 3D Data technical requirements from the tops of the mountains to the depths of the seas, including inland rivers and lakes. When asked what was needed 94% of their mission critical activities required inland topography, 61% inland bathymetry, 49% nearshore and 27% offshore bathymetry.

The study found that just over half of users are working on areas from 1 to 1000 sq miles and that when working with 3D elevation data, 68% of users are working with smaller features. When asked about what types of 3D features respondents need to discern from their elevation data, the greatest response required bare earth ground. Similarly, from bathymetry, most respondents require the ability to see the bottoms of the rivers, lakes, or the ocean. However, many respondents also need to be able to discern the tops of things – buildings, vegetation, and submerged structures and vegetation. Respondents were asked to rank the relative importance of update frequency, vertical accuracy, and geographic coverage. Update frequency ranked the highest over vertical accuracy and geographic coverage. The top five business use needs were flood risk management, infrastructure and construction management, water supply and quality, and urban and regional planning. The report was published September 2022. NOAA and USGS are using the study results to begin to determine program direction(s) and USGS plans to develop a next generation 3DEP call for action this coming fiscal year.

Offshore Mapping Prioritization

Rene Baumstark (FWRI)

This presentation was an overview for the upcoming discussion where participants were asked to provide feedback on prioritization maps developed in 2019. In that prioritization all of Florida's State waters were included, but this discussion focused on the zone of 20-200 m, which is unlikely to be mapped by the Florida State Mapping Initiative (FSMI). The 2019 mapping prioritization was conducted to guide decision-making knowing there would be relatively limited resources to map the State's waters.

Needs were prioritized by allocating coins based on:

- Priority location
- Degree of priority (# of coins/cell)
- Reason it is a priority (mapping need)
- What is the priority (map products)

The results are shown using a Normalized Priority Index in which 35% of cells did not receive any coins and nearshore areas (0-20 m water depths) had high coin concentrations. Of the six priority mapping need categories, the highest rankings were for habitat mapping and coastal geomorphology and resource management. Of the priority mapping products, bottom type - multibeam backscatter and bottom type - side-scan sonar ranked highest.

Discussion: Offshore Mapping Prioritization

Groups were asked to provide feedback on prioritization maps that were developed three years ago, focusing on the 20-200 m depths, which may not be mapped by the FSMI, in order to assess whether or not the past prioritizations hold true today.

Virtual Discussion Summary

Online participants met to discuss offshore mapping prioritization as a whole for the State of Florida. It was emphasized that there are multiple needs and uses for mapping data including artificial reef and aquaculture siting, post-storm environmental mapping, and sand resourcing. Additional data from sub-bottom is critical for identifying and characterizing sand resources.

West Coast Discussion Summary

In order to gain support to map beyond 20 m depth, stakeholders were asked to revisit the prioritization to make the case for the importance of seafloor mapping data to support multiple uses. For example, there is a need for a sub-bottom data and geologic sampling to support sand resource identification and management. The USGS is interested in understanding the distribution of critical minerals that are locked up in sands. Additionally, the aquaculture industry and management agencies would benefit from additional mapping data. Offshore aquaculture lease sites are being explored in areas that straddle coastal to offshore zones. Severe storm impacts may necessitate re-evaluation of priorities more frequently and it is likely that sandy bottoms out to a depth of 30-40 m may need to be re-mapped.

New priorities to consider regarding siting and permitting artificial reef were suggested. Data can help locate high relief areas, which rule out future artificial reef permit areas while areas lacking hardbottom and high relief help pinpoint areas of interest for further investigation by SCUBA diving bottom surveys.

Access to seafloor data will reduce boat time and dive time. Areas inshore but also offshore to 60 m would be helpful.

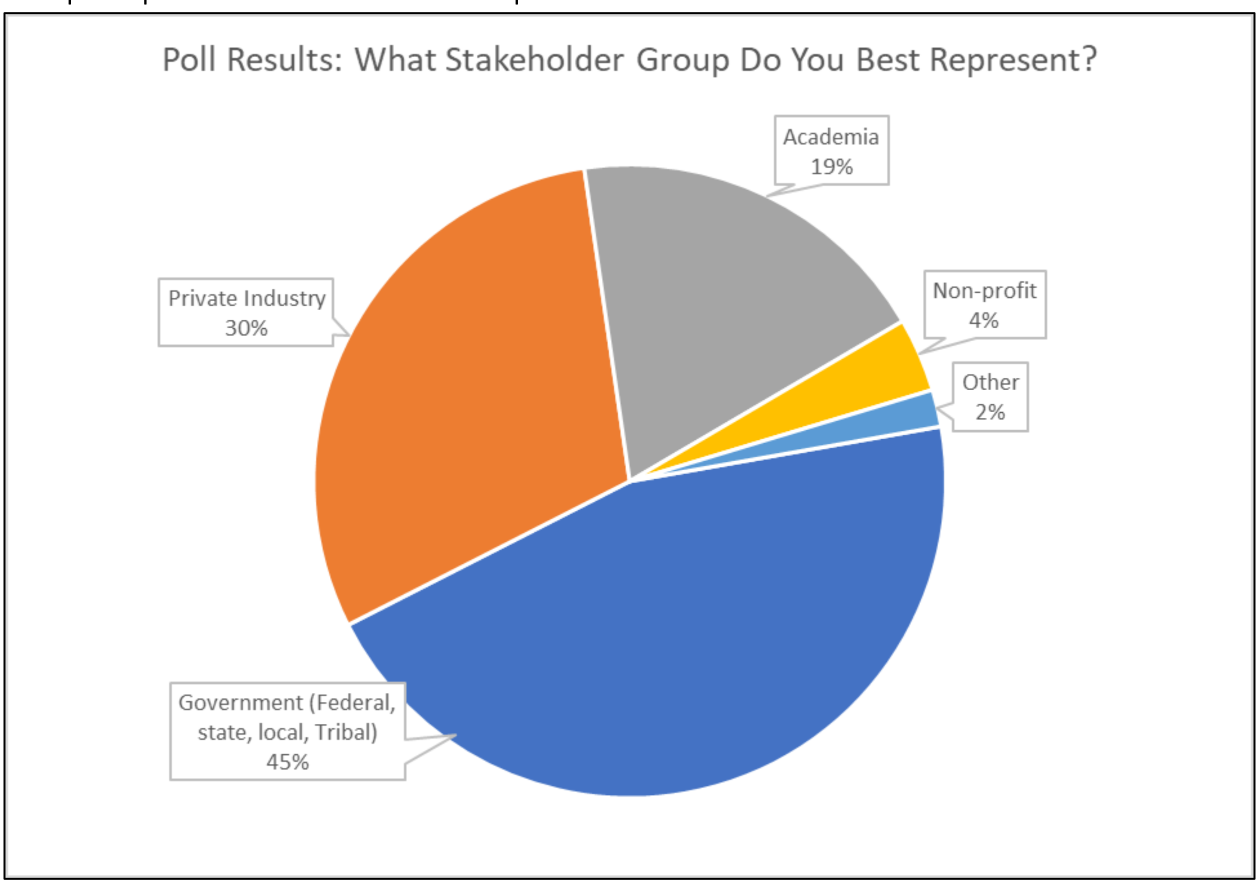
Finally, a discussion of mapping strategy would benefit from further discussion during an offshore mapping reprioritization session. Recognizing the large cost and time needed to map the entire west Florida Shelf, it was suggested that offshore mapping focus on the deepest regions, followed by mapping perpendicular cross-lines across the width of the shelf to identify areas of interest for additional mapping. The crossing line data could then be analyzed for AOIs for further surveys.

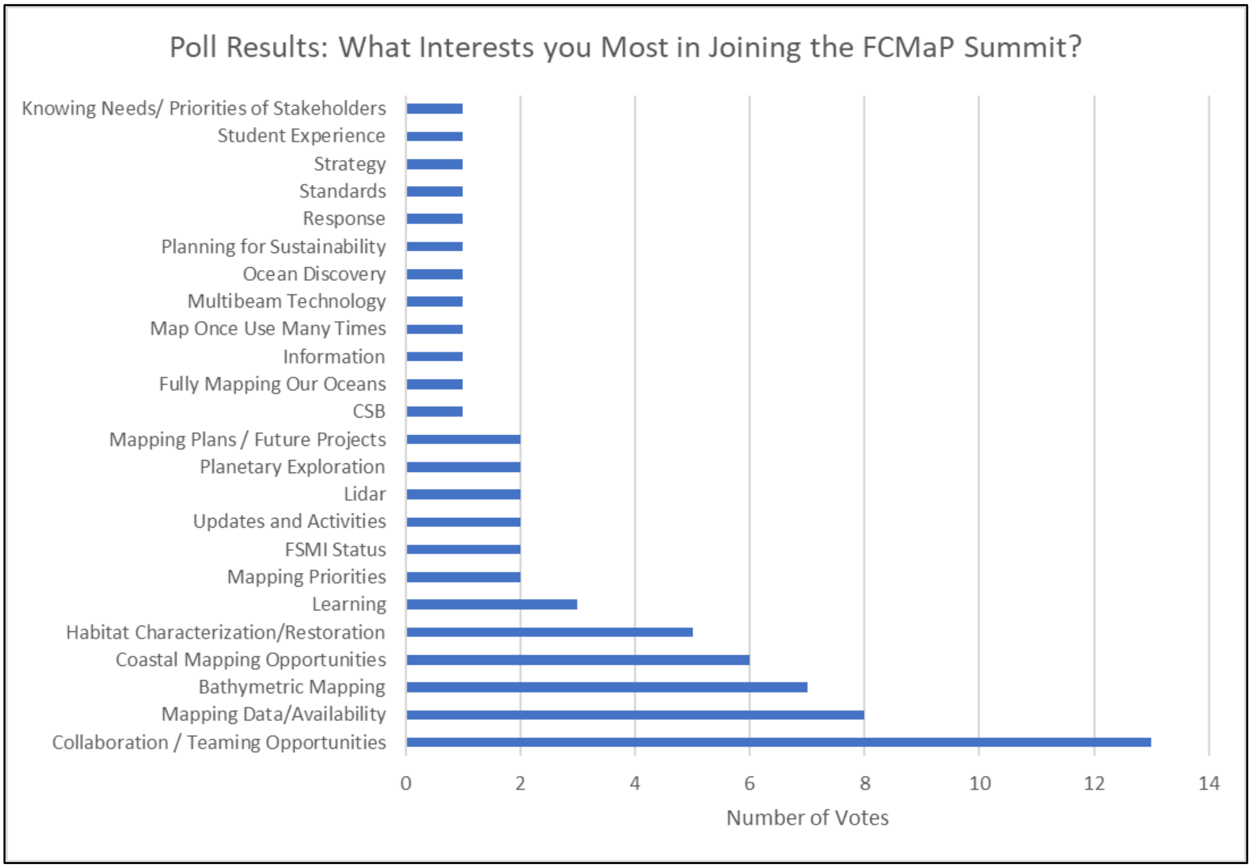
East Coast Discussion Summary

The group agreed that a reprioritization focusing only on offshore waters would be helpful. Mapping in areas where potential wind farms may be sited was a suggested priority. Also, the FCMaP priority index was organized across all regions, but it was suggested that doing a heatmap from East to West might be a good way to map out priorities. Offshore wind is being considered in Southeast Florida, and while there are currently no leases in place, maps are needed to evaluate environmental impacts. It was noted that there have been discussions of floating platforms being considered on the East coast.

Poll Results

Polling was initiated during sessions by the summit facilitator for users to vote via phone or web browser using Mentimeter. Interactive polling questions were created in advance of the summit and responses from participants were downloaded and reported after the summit.





Day 2 (December 1, 2022)

IHO Crowdsourced Bathymetry Initiative: Encouraging Innovative Supplementary Data Gathering

Keynote speaker Jennifer Jencks, NOAA NCEI

The focus of the keynote presentation was the International Hydrography Organization's (IHO) Crowdsourced Bathymetry (CBS) initiative, specifically, encouraging innovative supplementary data gathering. CSB is the collection of depth measurements from vessels, using standard navigation instruments, while engaged in routine maritime operations. CSB provides low quality data but at a relatively low cost and will aid in identifying uncharted features. Primary examples are Canada's use of CSB to update inside passages successfully and a CSB-informed publication of Notices to Mariners.

However, large questions exist about how to best collect and contribute data. IHO guidance provides information about "Trusted-Nodes," which are organizations, companies or universities serving as data liaisons between the data collectors and the Data Center of Digital Bathymetry (DCDB). The Seabed 2030 Project is an example of a current Trusted Node. This project intends to facilitate field trials to accelerate CSB activity, collect data in data-scarce areas and to encourage excitement about the initiative. Funded CSB programs already in place include Greenland Institute of Natural Resources with 30 data loggers deployed, the Institute for Maritime Technology and South African Navy Hydrographic Office with 100 data loggers deployed, and the Bureau of Maritime Transportation in Palau with 100 data loggers received for deployment.

Obstacles surrounding CSB are quite substantial: 1) Technology costs need to be minimized but balanced with regard to functionality, 2) Data Sharing (i.e., DCDB hosts cloud data, users can get grid at DCDB), 3) National Policies, and 4) Public Perception, which is different for each possible user (i.e., Marine contractors, fisheries, cruise ships, software industry etc.).

A CSB panel discussion followed the keynote presentation to discuss a Florida-based CSB initiative and ways to overcome some of the obstacles.

Crowd-sourced Bathymetry Panel

Panelists: Jennifer Jencks (NCEI); Tim Kearns (GLOS); Sarah Grasty (USF/COMIT); Brian Calder (UNH-CCOM).

The CSB panelists discussed ways to obtain data, incentives for the public to help with data collection, international data availability and permissions for use, and considerations for determining the areas that are best suited for CSB. Both panelists and participants agreed that CSB can help tap under-utilized resources, particularly in Florida where there is a large active professional and recreational boating community, but starting a successful program is not without challenges.

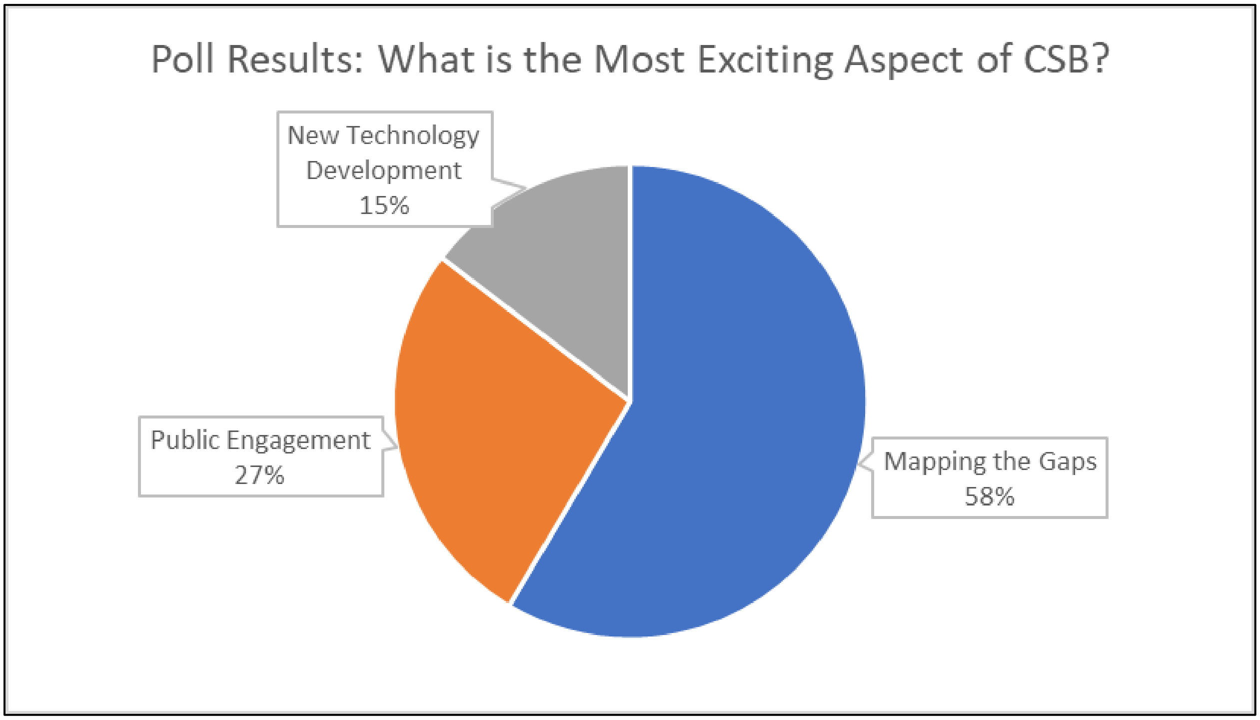
Technologies to aid data collection were discussed. Likely the technology will need to be low cost. The open-source "WIBL" is an example developed by Dr. Brian Calder and is made from commercially available, off-the-shelf parts. WIBL can help address scaling for large-scale production, but requires a user to upload the data periodically, which can be a barrier. Whereas commercial companies that sell their own loggers, such as the ones from Orange Force Marine, have an automatic upload capability and an established data pipeline to DCDB, but do not allow users to directly access the data. Technology that works with popular navigation brands such as Garmin might improve adoption of dataloggers, as anything requiring purchase or changing of existing vessel systems is an added barrier.

Strategy about how to deploy data loggers to maximize data gap filling was discussed. By grouping types of data collectors and their typical routes, plans to gain coverage in particular areas can be made (e.g., fishermen versus cruise lines). Boat rental companies could be a good source of data collection by engaging in an agreement that puts loggers on a large fleet of rental boats.

Potential incentives for recreational boaters and understanding barriers to establishing CSB programs should be addressed. Continuously logging and sharing all data might be a barrier to use by some (e.g., not giving away favorite fishing grounds), so ability to stop logging or non-attribution of data collector should be considered. Mobile application development for data viewing or gap-finding might be user-friendly and incentivize data collection.

Tampa Bay was discussed as a great candidate for CSB given the size of the recreational and agency boating community. Student involvement through a national program was thought to be a possible route to expanding the initiative across Florida.

Technical aspects of compliance with mapping accuracy standards, ancillary measurements and corrections, and verification of metadata were also discussed. DCDB will accept all data as-is for a user's discretional use. Innovative applications of Hydroball buoy data for water level corrections or glider data to correct for SVP errors were mentioned as possibilities within the Tampa Bay area.



Federal & Academic Mapping Updates

Nine lightning talks were presented in an effort to describe what's been mapped in the past year and near-term plans. Presentations are available in Appendix B. The list of projects and/or organization and presenter is below.

1. Florida-based hydrographic survey operations (Paul Turner, NOAA IOCM)
2. Supplemental lidar: Big Bend & Keys (Stephen White, NOAA)
3. FL Keys/South Florida (Chris Taylor, NOAA)
4. Topobathy collection (Jennifer Wozencraft, USACE)
5. Terrestrial 3DEP (Xan Fredericks, USGS)
6. Big Bend & Tampa Bay/COMIT (Sarah Grasty, USF)
7. Indian River Lagoon water management (Charles (Chuck) Jacobi, St. Johns Water Management District)
8. USGS (Jim Flocks, USGS St Petersburg Coastal and Marine Science Center)
9. Benthic mapping framework (Bradley Ennis, UF)

Florida State Mapping Initiative (FSMI)

Kimberly Jackson, FDEP

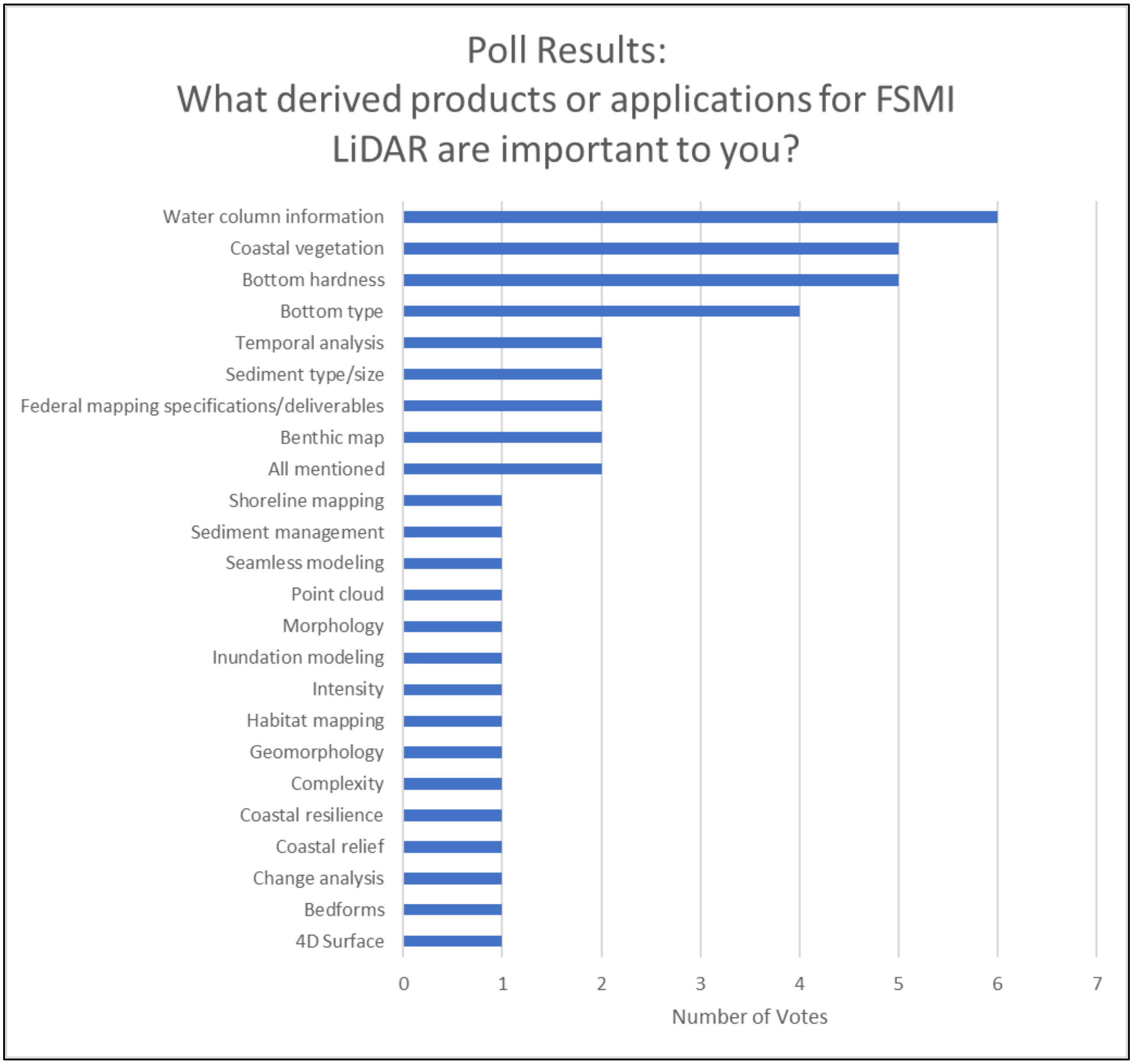
The Florida Geographic Information Office (GIO) is central to the geospatial data coordination for the FSMI. In 2022, the GIO are identifying existing coastal mapping data to integrate into FSMI. This entails literature review, inventory of repositories, addressing evaluation factors (data age, data quality, minimum mapping unit, data access), verifying stakeholder priorities (river mouth and estuaries, nearshore 0 – 20 meters in depth and Offshore 20 – 200 meters), and adjusting for timing and cost (value for price). There is a FSMI dashboard with links to reference data and current statistics for areas showing amount collected and total versus remaining. There is also a Florida GIO initiatives tab. The FSMI is looking to better establish priority areas for data collection, which led into the open discussion below.

Discussion: Florida Seafloor Bathymetry and FSMI Data Product Plans & Needs

The first discussions surrounded whether to consider all of Florida as coastal. Louisiana decided to consider the lower 30% of the state to be coastal. Similarly, given the severe storm history should Florida inland waterways be considered, and should considerations be made beyond barrier islands and into the intercoastal?

Participants were prompted to go to the FSMI site to look at the inland line and layover areas they are interested in. If there is anything mislabeled or cut off, the FSMI team would like to have these errors passed on to them. The data portal does not currently automatically update but Azure is working on auto transfer. There is a great need for different perspectives on what is needed from these tools and how they will be used. Size estimates for Azure size cloud storage is in sq. km. estimates. There are a lot of projects in small areas, so estimates are orders of magnitude different, and it would be helpful to have project estimates in sq. km.

The group agreed on the need to generate a list of research questions to help grow collaborations and provide access to under-researched databases as well as the use of different datums. Current specifications are NAVD88 but there is significant improvement in the new datums.



Discussion: Data collection and data products

- Given there will be many contractors collecting data it's important to establish the possible best practices for edge mapping.
    - The CoNED model is an applied project to take terrestrial lidar and merge it with bathymetric lidar for seamless transitions between the two. There is a 1-m output with geospatial metadata. The USGS CoNED Viewer can be used to download DEMs and metadata.
        - It is possible to use the CoNED approach or overlap with surveys that have been done prior to data collection (for example, 1-km of overlap with junction analysis used for post-hurricane Sandy data collection).

    - Data availability and web services are both being researched. COMIT is looking at how to fill in those holes and can make this a priority.
    - When lidar is collected it is important to also collect orthoimagery. These types of data allow more to be done with models and with imagery.
- There is interest in shallow water bathymetry, particularly close to barrier islands.
- Interest in determining how to merge products from different mapping initiatives such as NOAA's BlueTopo and the FSMI products.
- Flexibility for data collection should be considered in terms of timing and location to ensure the highest quality data is collected (taking into account things like water quality/clarity, etc.)
- Multiple uses of the lidar data include use by the Water Management Districts to determine minimum flow and water levels and to map the seagrass extents.
    - Need to also collect RGB spectrum imagery to capture some of this information, which is not part of the FSMI specification.
- A strategy for selecting critical areas for repeat lidar surveys could help inform coastal change analysis.
- Outstanding question: Where will data analysis funds to generate products from FSMI data come from?

Mapping Hurricane Ian's Impact on the Geomorphology of the Southwest Florida Coast

Michael Savarese, FGCU

(AUTHOR'S NOTE: data are currently proprietary and not yet vetted and should not be used for decision-making or as the basis for further scientific investigation).

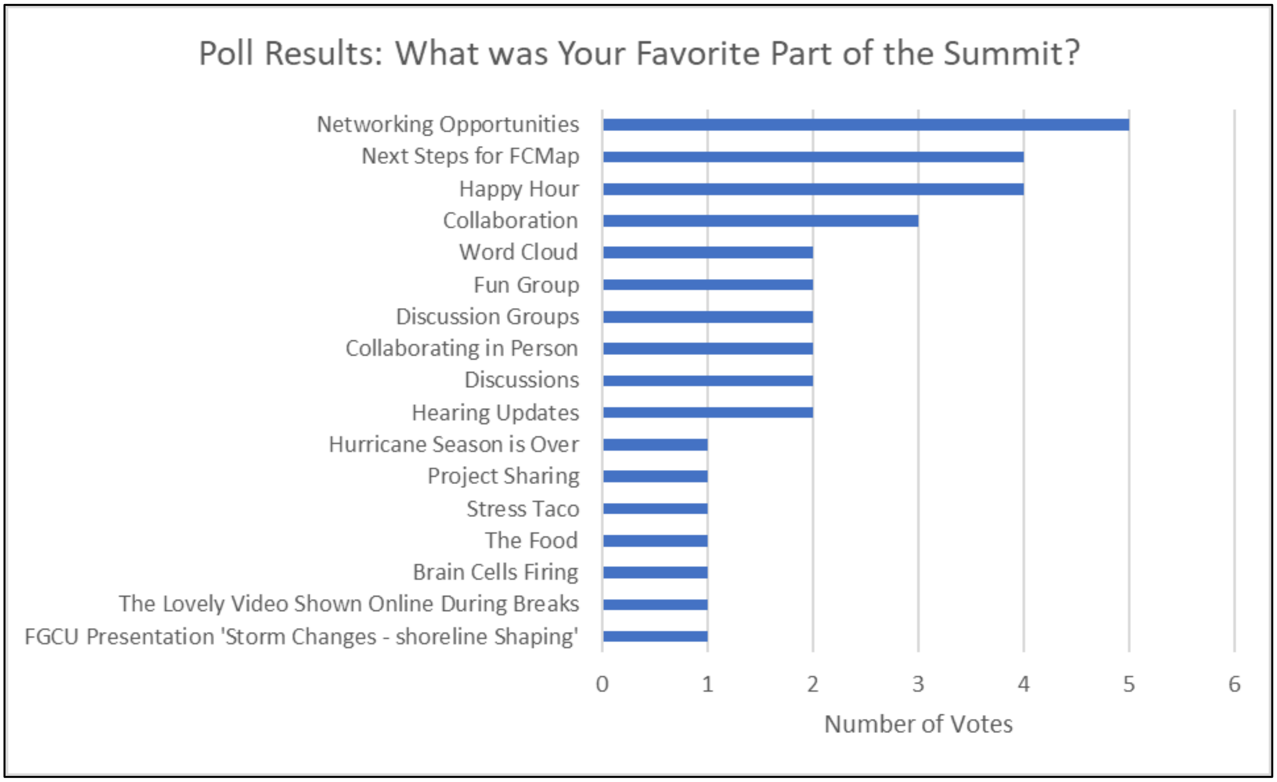
The methods used to assess Hurricane Ian's geomorphic impacts include: 1) Ground-penetrating radar (GPR) to identify subsurface lithosomes and their stratigraphic and structural relationships, and 2) UAV-based lidar to produce high-resolution DEMs to extract beach profiles and quantify volumetric change. Examples of Hurricane Ian erosion were seen on Sanibel Island and surrounding barrier islands. By combining GPR with lidar you can increase temporal understanding to predict future changes.

Discussion: Storm Response

The discussion focused on how to determine the new shoreline/coastal equilibrium post-storm. Comparing recent baseline data to post-storm data is the only way to know how much the system was changed. If new baseline data is needed there also needs to be an understanding of the optimum time for collection, the frequency, and desired locations of the surveys. This information as a planning and procedural document would help rapid response efforts immediately after a storm event. With regard to any current post-storm data collection, there is funding from FEMA, however the USACE doesn't budget to revisit areas. The USACE currently compares insulted coasts versus healed coasts.

Summit Summary - Open Discussion

While there is a broad applicability of seafloor mapping data, the process from data collection to processing to product creation is complex. Wider use of mapping data will only be possible if this pipeline can be simplified. FCMaP plans to take on this challenge by communicating data and data product availability and showcasing the novel uses of data. FCMaP also aims to increase stakeholder engagement including academic institution involvement and local governments (which could potentially be a resource for high importance reconnaissance surveys).



Action Items

DAY 1

- There was a general agreement that offshore deep-water prioritization would be beneficial. A series of virtual events will be scheduled for these areas to be reevaluated.
- Reprioritizing areas of importance and relevant data types needs to be done consistently. A complete yearly prioritization is not feasible; however, it is possible to distribute an annual "check-in" survey. This annual survey will help determine if there are any major priority changes. For example, if there are major storm events in a particular region or if funding goals shift towards a particular area of interest. Annual surveys can also be used to drive important topics to be addressed at the FCMaP Annual Summit.

Day 2

- Crowd-sourced bathymetry was deemed an underutilized resource particularly in the state Florida where there is a large active professional and recreational boating community. There was an agreement by participants to initiate a trial run of CSB in the Tampa Bay area. Initial efforts will focus on testing data loggers and data uploading within professional organizations and agencies and then growing the program out to the public.
- Further analysis of the FSMI and resulting products should be conducted to understand the full scope of the community's need for data. The large amount of State funds being invested warrants

an intensive scoping of the community's needs to produce the best mapping products. STAC has five state and four federal representatives that meet monthly and will aid in initiating an analysis by determining what the "important questions" are that need to be asked. Once these questions are determined an effort will be made to collectively produce a list and circulate it out to the necessary groups. There may also be an option, depending on funding, for FCMaP to conduct a workshop in order to help derive questions. Funding options to consider for the workshop should include NOAA RESTORE as there is a rolling opportunity for data synthesis.

- FCMaP should determine annual needs for mapping (re)surveys through communications with constituents. Needs for surveys may shift in response to storms and/or changes in planned use (e.g., wind farm or aquaculture siting).

Appendices

Appendix A:

FCMaP 2022 Summit Agenda

FLORIDA COASTAL MAPPING PROGRAM 2022 SUMMIT

November 30 - December 1, 2022

Location:
Florida Fish and Wildlife Research Institute, 3rd floor conference room
100 8th Avenue SE
St. Petersburg, FL 33701
GoToMeeting registration: https://attendee.gotowebinar.com/register/7061988790130945036

AGENDA

Wednesday, November 30, 2022
DAY 1: MAPPING FRAMEWORK

1:00 – 1:10 PM	*Welcome & Agenda *Facilitator: Jenna Tourje-Maldonado, Facilitator*
1:10-1:40 PM	Keynote: NOMEC and Regional Mapping Initiatives *Presenters: Ashley Chappell and Meredith Westington, NOAA IOCM*
1:40 – 2:00 PM	FCMaP Updates and Accomplishments *Presenter: Cheryl Hapke, USF*
2:00 – 2:10 PM	FIO FCMaP Office and Coordinator Role *Presenter: Nicole Raineault, FIO*
2:10 – 2:25 PM	Project Footprint Inventory and Mapping Standards *Presenter: Rene Baumstark, FWRI*
2:25 – 2:40 PM	Topobathy Lidar Specifications *Presenter: Jennifer Wozencraft, USACE*
2:40 – 2:55 PM	3D Nation Study Results *Presenter: Sue Hoegberg, Dewberry and Ashley Chappell, NOAA IOCM*
2:55 – 3:10 PM	Offshore Mapping Prioritization *Presenter: Rene Baumstark, FWRI*
3:10 – 3:20 PM	***BREAK**
3:20-4:00 pm	Offshore Mapping Prioritization Discussion Break-Out Groups

1. *Gulf Coast FL*
   Lead Facilitator: Cheryl Hapke, Support: Nicole Raineault

2. *Atlantic Coast FL*
   Lead Facilitator: Rene Baumstark, Support: Cat Dietrick

3. *Online participation*
   *Facilitator: Xan Fredericks***

4:00-4:40 pm Report Outs

4:40-4:45 pm Day 1 Wrap Up
Presenter: Jenna Tourje-Maldonado

5:00-7:00 pm Mixer (Sponsored by Woolpert)
Location: Maritime and Defense Technology Hub (450 8th Ave SE, St Petersburg, FL)

Thursday, December 1, 2022
DAY 2: MAPPING ACTIVITIES

8:30 – 9:00 AM Light breakfast & coffee *(provided)*

9:00 – 9:05 AM Welcome Day 2
Presenter: Jenna Tourje-Maldonado

9:00 – 9:30 AM Keynote: Crowd Sourced Bathymetry (CSB)
*Presenter: Jennifer Jencks, NOAA NCEI***

9:30 – 10:30 AM *CSB Panel Discussion
*Panelists: Jennifer Jencks (NCEI)**; Tim Kearns** (Great Lakes Observing System/Lakebed 2030); Sarah Grasty (USF/COMIT)**; Brian Calder (UNH-CCOM)***

10:30 – 10:45 AM **BREAK**

10:45 – 12:00 PM Lightning Talks: Federal and Academic Mapping Updates

1. *NOAA (Paul Turner, NOAA IOCM)*
2. *Supplemental lidar: Big Bend & Keys (Mike Aslasken, NOAA)*
3. *BlueTopo (Katrina Wyllie, NOAA OCS)***
4. *FL Keys / South Florida (Chris Taylor, NOAA)***
5. *Topobathy collection (Jennifer Wozencraft, USACE)*
6. *Terrestrial 3DEP (Xan Fredericks, USGS)***
7. *USGS (Jim Flocks, USGS St Petersburg Coastal and Marine Science Center)***
8. *Indian River Lagoon (Chuck Jacoby, SJRWMD)*

9. *USF COMIT (Sarah Grasty, USF)***
10. *UF Benthic framework (Anna Braswell, UF)*

12:00 – 1:00 PM Lunch *(provided)*

1:00 – 1:30 PM Florida State Mapping Initiative
*Presenter: Kimberly Jackson, FDEP***

1:30 – 2:30 PM ***Group Discussion: Florida Seafloor Bathymetry
Facilitator: Rene Baumstark, FWRI

2:30 – 2:45 PM **Networking and Coffee Break**

2:45 – 2:55 PM Hurricane Ian LiDAR
Presenter: Mike Savarese & Dhruv Bhatt, FGCU

2:55 – 3:45 PM ***Group Discussion: Storm Response
Facilitator: Cheryl Hapke, USF

3:45 – 4:00 PM Open comment and discussion
Facilitator: Jenna Tourje-Maldonado

4:00 – 4:05 PM Wrap Up
Presenter: Jenna Tourje-Maldonado, Kearns & West

**Poll Everywhere , **Remote Presenter*

Thank you to our sponsors!

2022 FCMaP Mapping Summit organizing committee: Cheryl Hapke (USF), Nicole Raineault (FIO), Rene Baumstark (FWRI), Meredith Westington (NOAA), Ashley Chappell (NOAA), Xan Fredericks (USGS)

Appendix B:

FCMaP Summit Presentations

(Shared with permission)

Florida Coastal Mapping Program Summit 2022

Thank you sponsors!

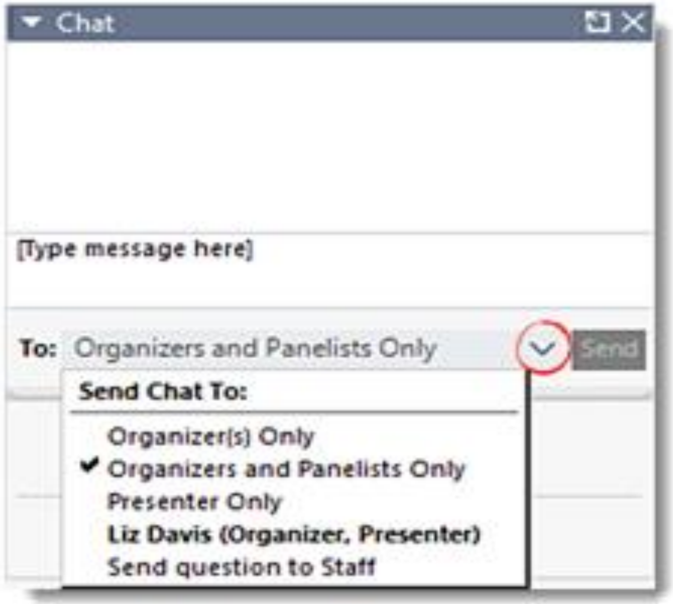
Hybrid and In-Person Integration

- The facilitator will note virtual attendee questions and comments
- The facilitator will provide the opportunity for virtual attendees to ask questions and unmute when they raise their hand
- Virtual presenters will present via GoToWebinar
- In-person and virtual attendees will be able to communicate back and forth through the OWL system and GoToWebinar
- Both in-person and virtual attendees will be able to respond to the polls

GoTo Webinar Logistics

Interaction: We encourage you to engage with your fellow attendees, the speakers, and the organizers

- Please utilize the chat box and keep your microphone muted and your camera off unless prompted otherwise by an organizer.
- Please use the **“chat box”** function in your menu on the right to send messages to “organizers” for technical questions, or “panelists and organizers” to chat with all virtual attendees or choose a particular attendee to chat privately with.
- Use the “raise hand” function and an organizer will be with you shortly.
- We will only be opening up questions after each talk, but please feel free to submit them during the presentations and the organizer will address them out loud during discussion times.
- Feel free to type in follow up questions to any discussion you are a part of!



GoTo Webinar Logistics

Agenda and Handouts: You can find the full agenda in the “handouts” in your GoToWebinar menu pane to the right.

Follow up: Written comments are always welcome, now and later, **chapke@usf.edu**

If you are having trouble with your connection, please email **amber.butler@noaa.gov**

Productive Conversations

- Let’s talk
- “Honor” the agenda
- Participate actively and respectfully
- Raise your hand to speak – facilitator will call on you in order
- Speak clearly into the mic/phone/owl for others to hear you
- Enjoy our time together

Agenda – Day 1

Mapping Framework

1:00 – 1:10 PM	Welcome and Agenda Overview
1:10 – 1:40 PM	Keynote: NOMEC and State Mapping Initiatives
1:40 – 2:00 PM	FCMaP STAC and Strategic Plan
2:00 – 2:10 PM	FIO FCMaP Office and Coordinator Role
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2:55 – 3:10 PM	Offshore Mapping Prioritization

Agenda – Day 1

Mapping Framework

3:10 – 3:20 PM	Break
3:20 – 4:00 PM	Offshore Mapping Prioritization Discussion Breakout Groups
4:00 – 4:40 PM	Breakout Group Report Outs
4:40 – 4:45 PM	Day 1 Wrap Up
5:00 – 7:00 PM	Mixer

Agenda – Day 2

Mapping Activities

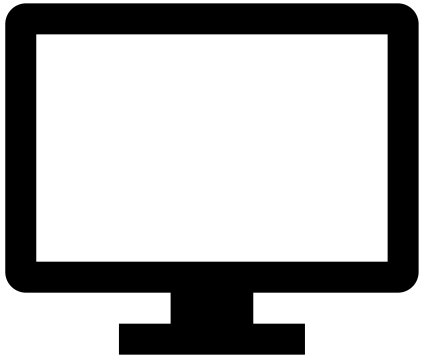
9:00 – 9:05 AM	Welcome and Agenda Overview
9:05 – 9:30 AM	Keynote: Crowd Sourced Bathymetry
9:30 – 10:30 AM	CSB Panel Discussion
10:30 – 10:45 AM	Break
10:45 – 12:00 AM	Lightning Talks: Federal and Academic Mapping Updates
12:00 – 1:00 PM	Lunch

Agenda – Day 2

Mapping Activities

1:00 – 1:30 PM	Florida State Mapping Initiative
1:30 – 2:30 PM	Group Discussion: Florida Seafloor Bathymetry
2:30 – 2:45 PM	Networking and Coffee Break
2:45 – 2:55 PM	Hurricane Ian LiDAR
2:55 – 3:45 PM	Group Discussion: Storm Response
3:45 – 4:00 PM	Open Comments and Discussion
4:00 – 4:05 PM	Wrap Up

Poll Everywhere Instructions



BY BROWSER
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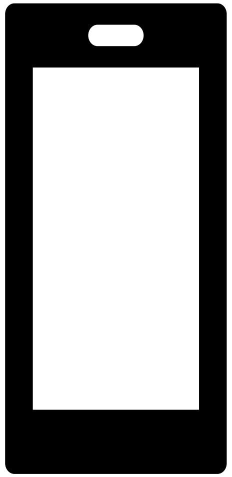
on your internet browser.



BY SMART PHONE
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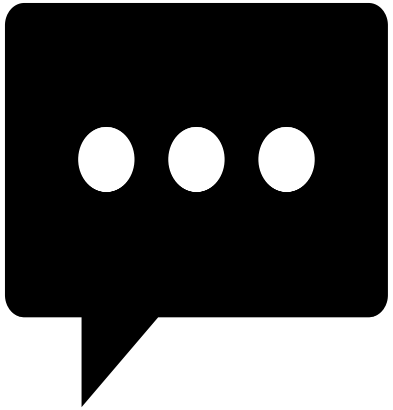
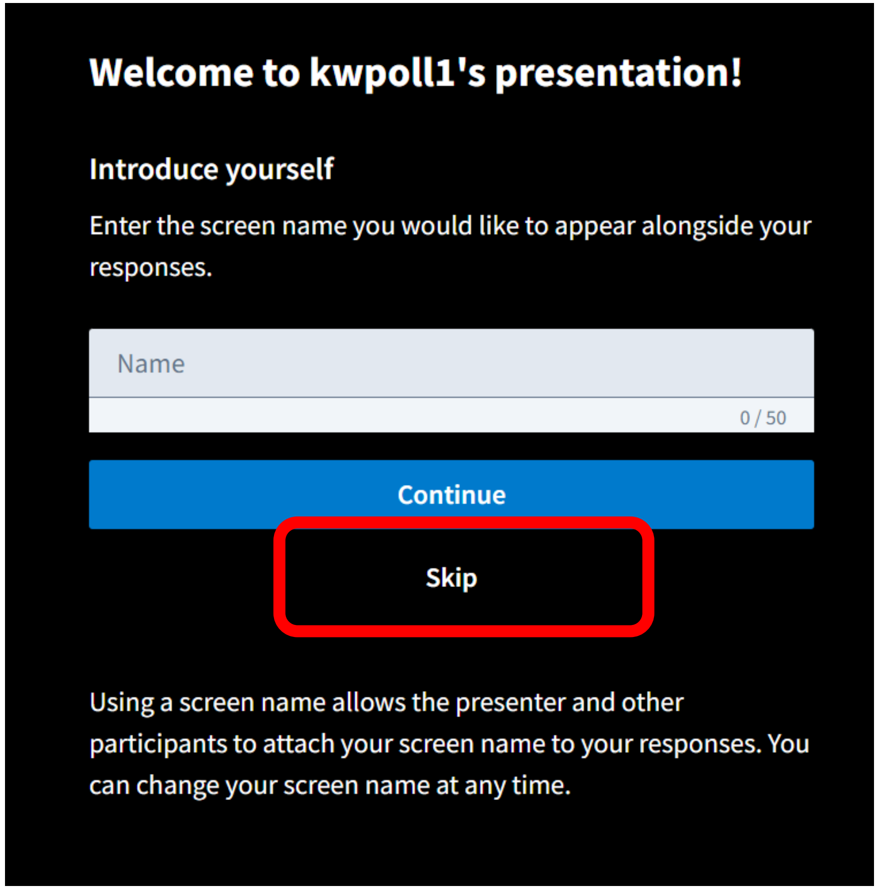


BY TEXT MESSAGE
Text **kwpoll1** to 22-333 on your
mobile device.

Use an underscore (“_”) or tilde (“~”) between words to submit them as a single word cloud response

Poll Everywhere Instructions

Desktop or mobile internet browser



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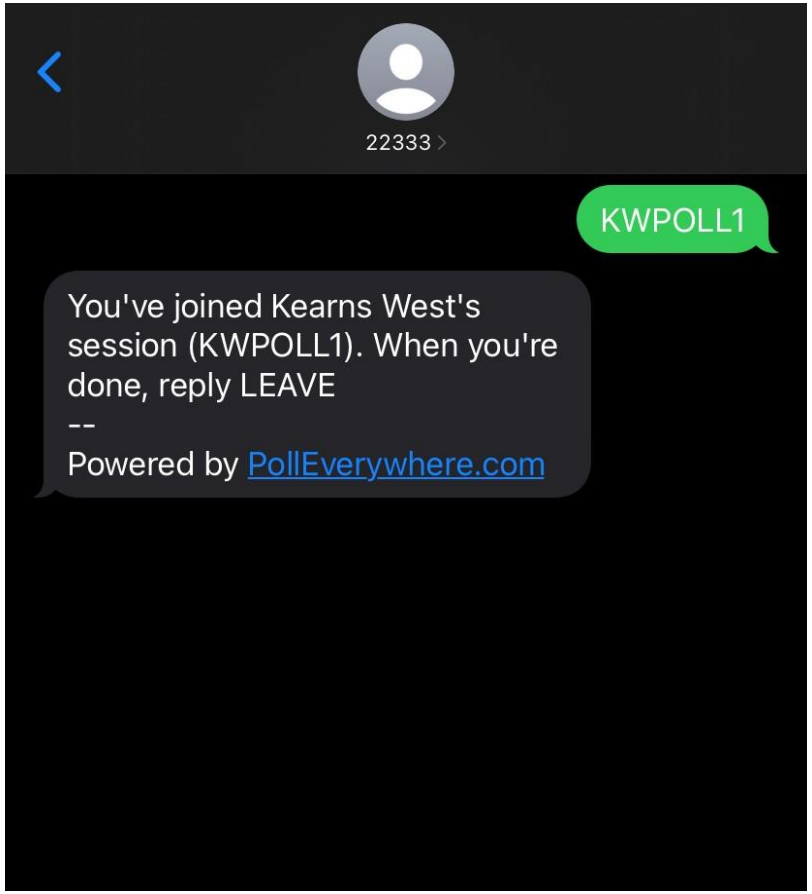


What stakeholder group do you best represent?

Government (Federal, state, local, Tribal)

Academia

Private Industry

Non-profit

Other

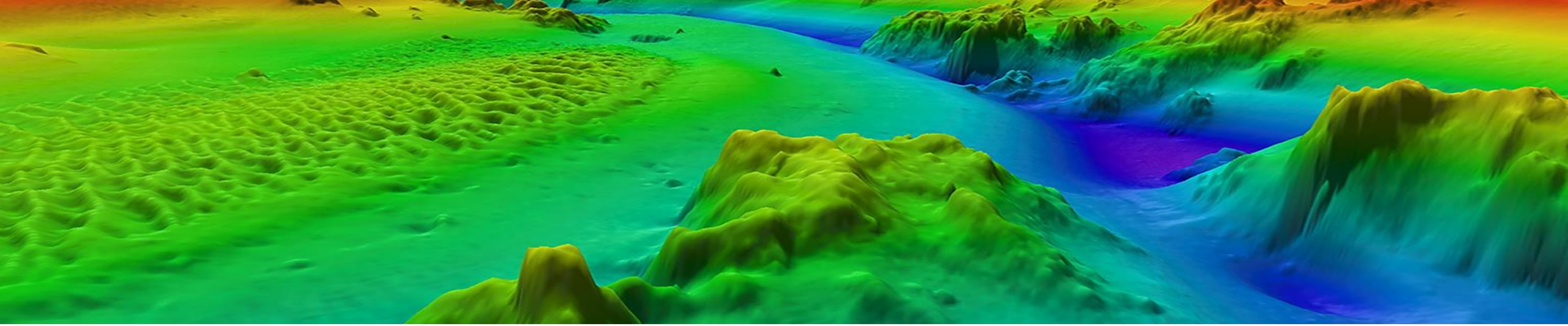
Start the presentation to see live content. For screen share software, share the entire screen. Get help at **pollev.com/app**

What interests you most in joining the FCMaP Summit?

Introductions

Keynote

Meredith Westington and Ashley Chappell, NOAA IOCM



National Strategy for Ocean Mapping, Exploring and Characterizing the United States Exclusive Economic Zone and Regional Mapping Initiatives

Ashley Chappell and Meredith Westington
NOAA Office of Coast Survey, Integrated Ocean and Coastal Mapping

Outline

Update on NOMEC

→ What NOMEC is, what is new, where we are headed

Current state of progress within U.S. waters

→ How are we doing relative to our goals?

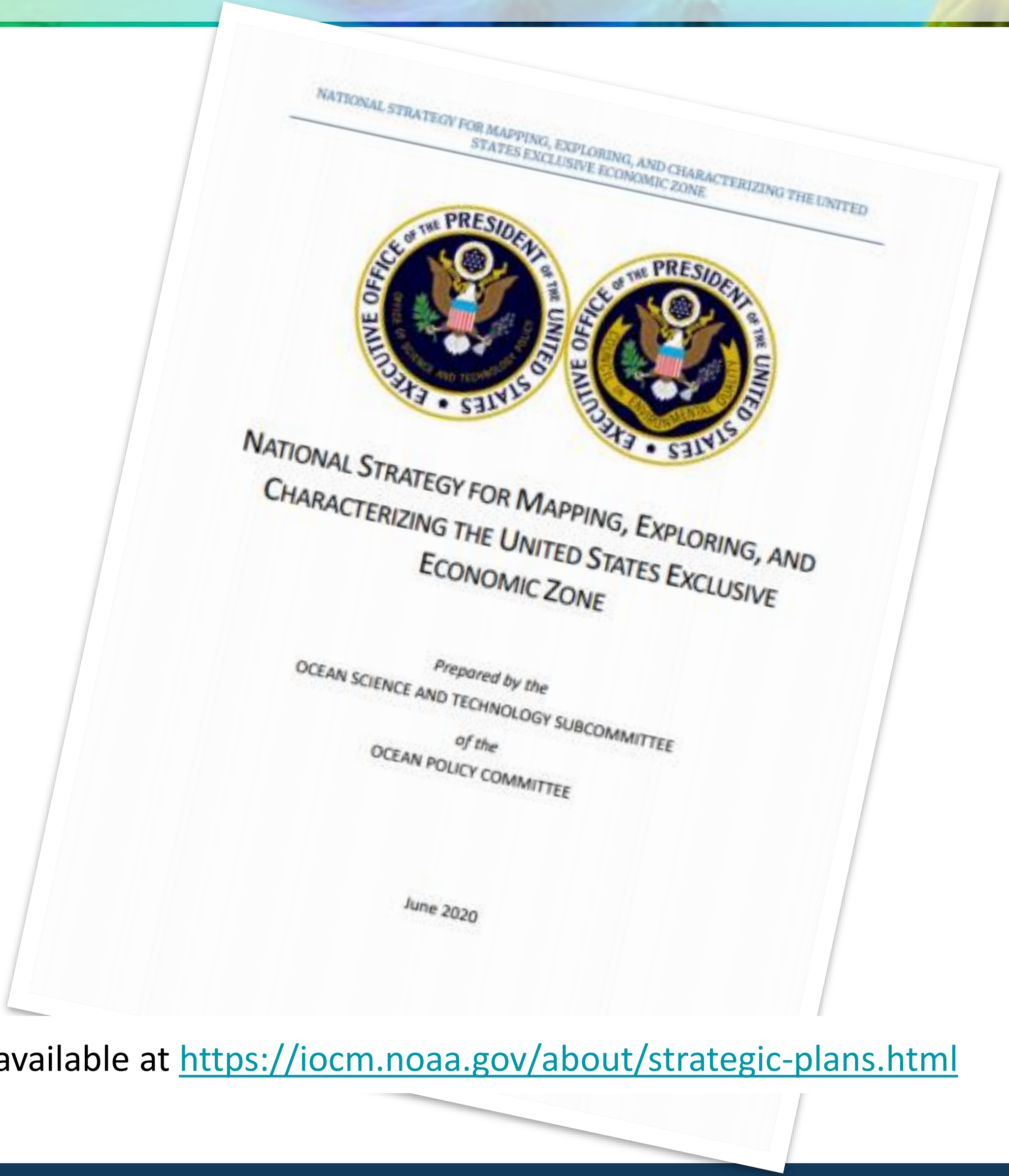
Regional Mapping Initiatives

→ Approaches to filling the gaps

NOMEC Strategy

“Mapping, exploring, and characterizing the ocean and coastal shoreline advances scientific understanding, safeguards the Nation’s economic prosperity, and promotes the health and security of our people. This knowledge is essential to advancing America’s understanding of the marine environment and addressing sustainable ocean resource management.”

-- National Ocean Mapping, Exploring, and Characterization of the U.S. EEZ (NOMEC)


NATIONAL STRATEGY FOR MAPPING, EXPLORING, AND CHARACTERIZING THE UNITED STATES EXCLUSIVE ECONOMIC ZONE

NATIONAL STRATEGY FOR MAPPING, EXPLORING, AND CHARACTERIZING THE UNITED STATES EXCLUSIVE ECONOMIC ZONE

Prepared by the
OCEAN SCIENCE AND TECHNOLOGY SUBCOMMITTEE
of the
OCEAN POLICY COMMITTEE

June 2020

Plans available at https://iocm.noaa.gov/about/strategic-plans.html

Goals of the NOMEC Strategy

GOALS

1. Coordinate Interagency Efforts and Resources to Map, Explore, and Characterize the United States EEZ
2. Map the United States EEZ
3. Explore and Characterize Priority Areas of the United States EEZ
4. Develop and Mature New and Emerging Science and Technologies to Map, Explore, and Characterize the United States EEZ
5. Build Public and Private Partnerships to Map, Explore, and Characterize the United States EEZ

What is Ocean Mapping?

Ocean mapping provides comprehensive data and information needed to understand seafloor characteristics such as depth, topography, bottom type, sediment composition and distribution, and underlying geologic structure.

Interagency Effort

Interagency Working Group - Ocean and Coastal Mapping at https://iocm.noaa.gov/about/iwg-ocm.html

NOMEC Goal 2

Map the U.S. EEZ

2.1 Establish a Standard Ocean Mapping Protocol

2.2 Coordinate & Execute Campaigns to Map the U.S. EEZ

2.3 Make Data Usable and Available

S
O
M
P

This protocol includes specs and best practices for the following (7) primary features:

- Bathymetry data
- Seabed backscatter
- Water column data
- Sub-bottom profiling
- Side scan sonar
- Magnetometer data
- Data management

SOMP Federal Register Release for Public Comment: Feb 2023 Target Date

NOMEC Goal 2

Map the U.S. EEZ

- 2.1 Establish a Standard Ocean Mapping Protocol
- 2.2 Coordinate & Execute Campaigns to Map the U.S. EEZ
- 2.3 Make Data Usable and Available

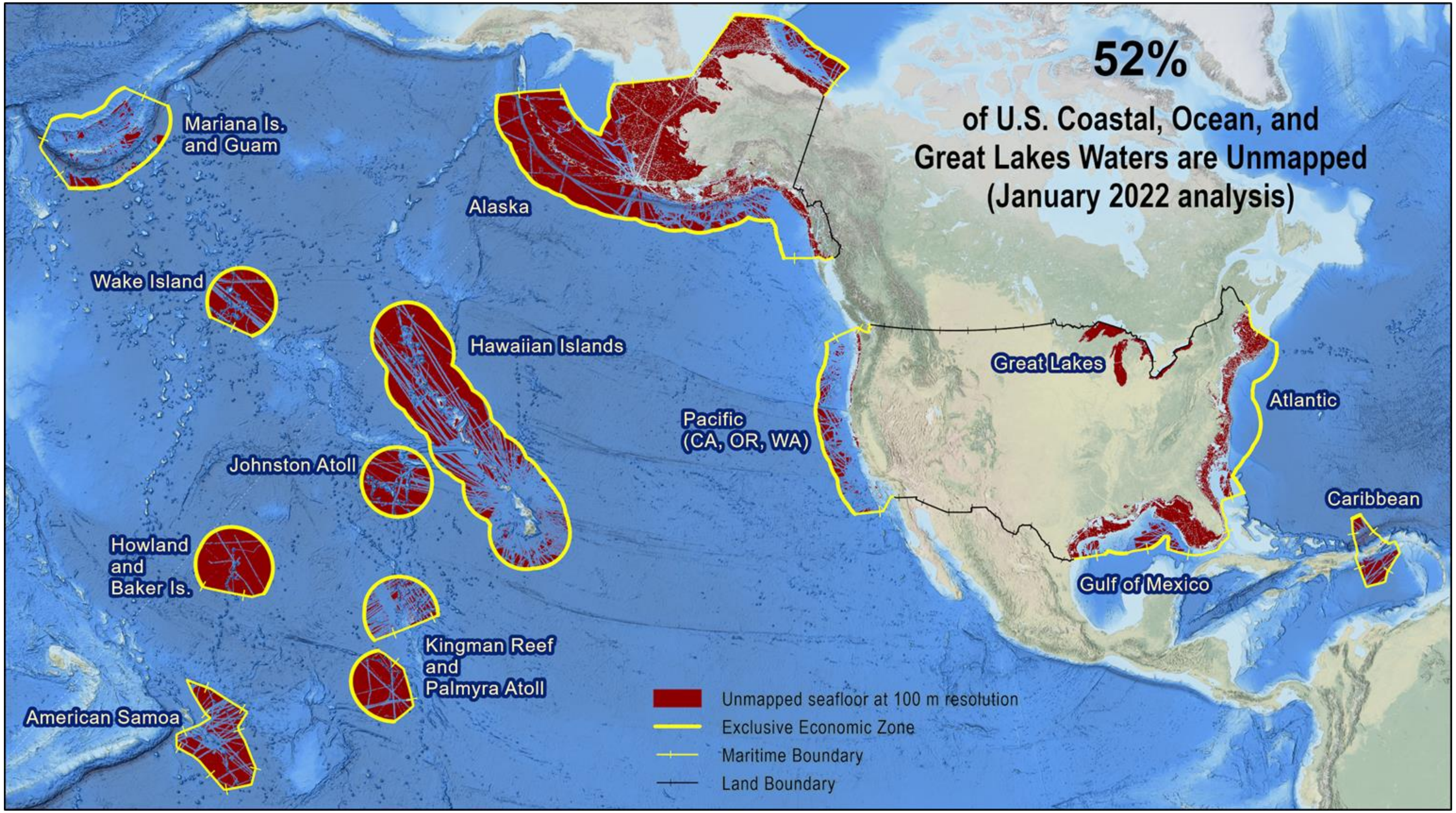
Purpose: promote efficient, effective, and comprehensive mapping of the United States EEZ

Progress Report on Unmapped U.S. Waters

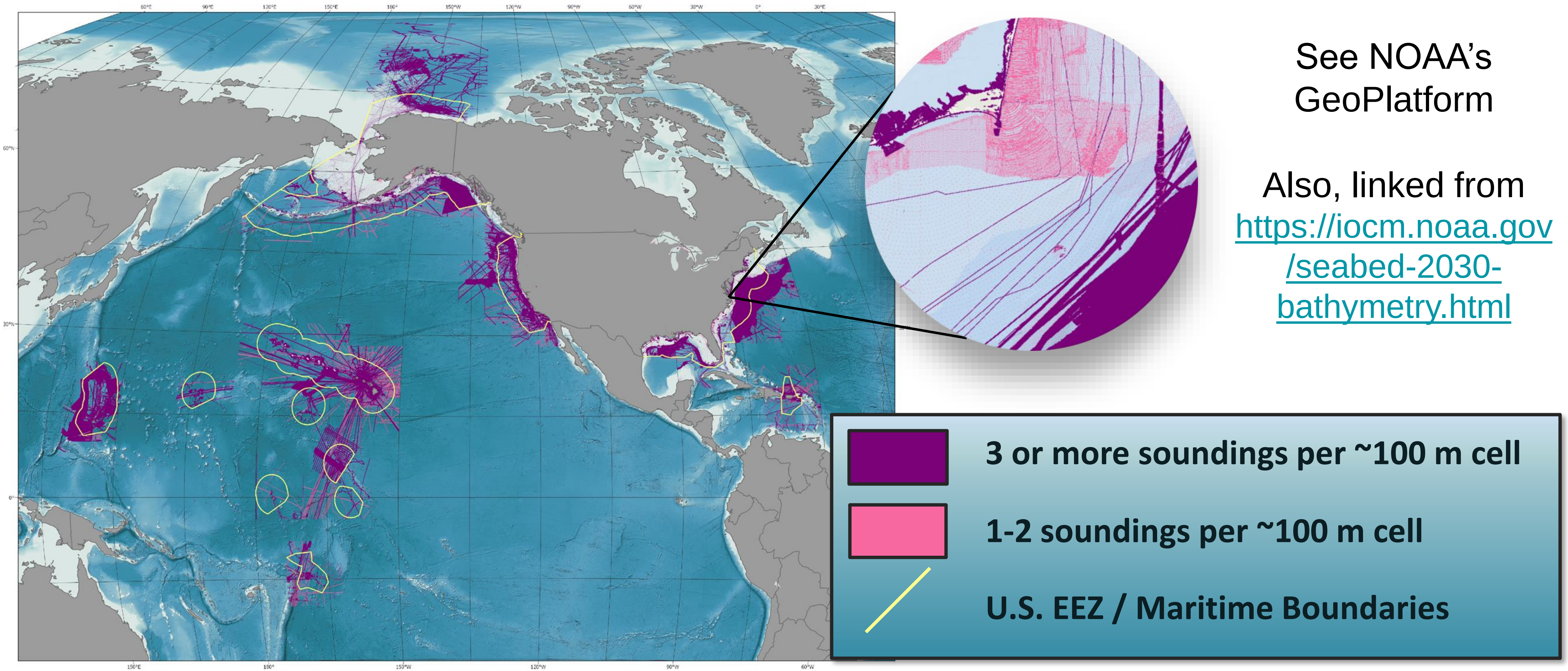
Update!
3rd Annual Report released in March 2022

Last year, we were at 53% unmapped.

Reports located at https://iocm.noaa.gov/seabed-2030-status.html



U.S. Bathymetry Gap Analysis Web Service



See NOAA's GeoPlatform

Also, linked from https://iocm.noaa.gov/seabed-2030-bathymetry.html

FCMaP Updates and Accomplishments

Cheryl Hapke, USF

The Florida Coastal Mapping Program (FCMaP): Updates and Accomplishments

Cheryl Hapke, Ph.D.

Chair, FCMaP Science and Technology Advisory Council

November 30, 2022

2022 FCMaP Mapping Summit

Coordinating across Federal and Florida State agencies, and other stakeholders, to build a comprehensive understanding of the Florida coastal seafloor.

Florida Coastal Mapping Program

Science and Technical Advisory Council

Chair: Cheryl Hapke, University of South Florida St Petersburg College of Marine Science
Co-Chair: Rene Baumstark, FL Fish and Wildlife Conservation Commission - Fish & Wildlife Institute
Co-Chair: Ashley Chappell, NOAA Office of Integrated Ocean and Coastal Mapping

Florida Institute of Oceanography
Monty Graham
Nicole Raineault

Florida Department of Environmental Protection
TBD

Florida Fish & Wildlife Research Institute
Rene Baumstark

Florida Department of Transportation
Brett Wood

Florida Division of Emergency Management
Jason Ray

U.S. Army Corps of Engineers
Jennifer Wozencraft
Lauren Reichold

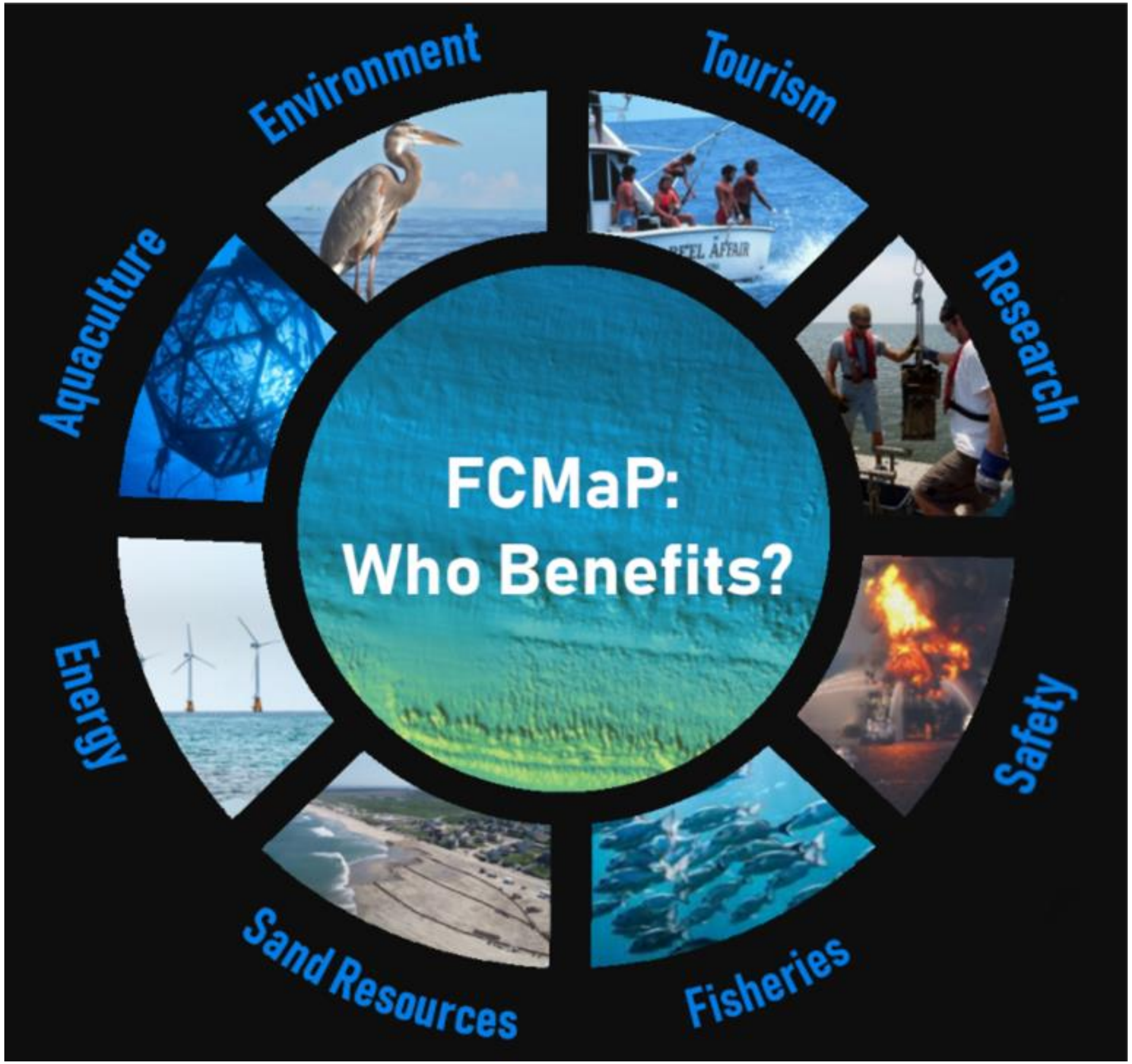
National Oceanic and Atmospheric Administration
Ashley Chappell
Paul Turner

U.S. Geological Survey
Xan Fredericks

U.S. Bureau of Ocean Energy Management
Jeff Reidenauer

Florida Coastal Mapping Program – Who Benefits?

- Adopt NOAA's "Map Once, Use Many Times" approach
- Support NOMEC Goal 2: Coordinate mapping efforts to completely map U.S. waters deeper than 40m by 2030 and waters 0-40m deep by 2040
- Support FSMI and other mapping efforts
- Florida stakeholder prioritization is highest priority



FCMaP Accomplishments

2017: Form Steering Committee and identify agency Technical Team

- Compile inventory of existing coastal seafloor mapping data
- Populate portal with footprints and metadata
- Conduct gap analysis

2018: First Stakeholder Workshop – led to decision to undertake statewide Prioritization

- 5 regional workshops
- Solicitation of priorities via online participatory GIS tool

2020: Analysis of prioritization and gap analysis

- FCMaP HUB created – Inventory, prioritization results, Story map
- March 2020 Mapping Summit and Dec 2020 Mapping Forum

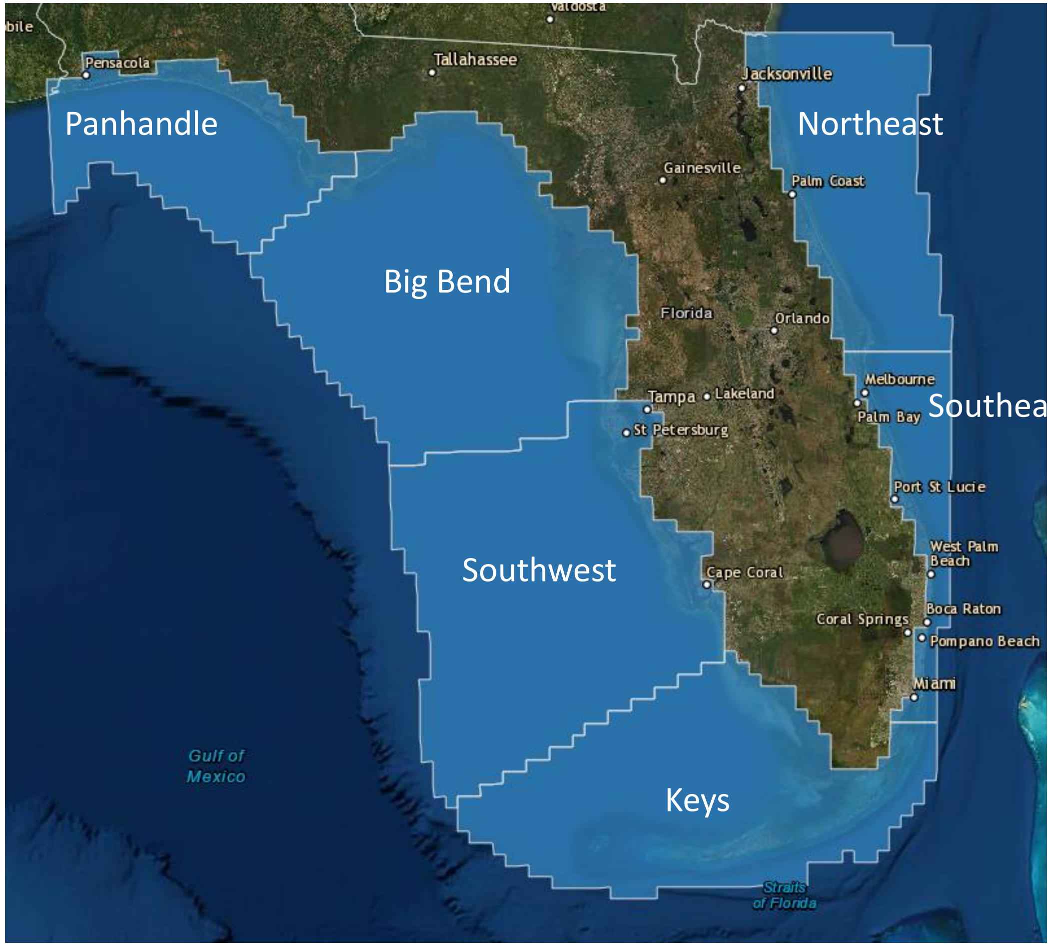
2021: FL Legislature awards $100M to FDEP for seafloor mapping

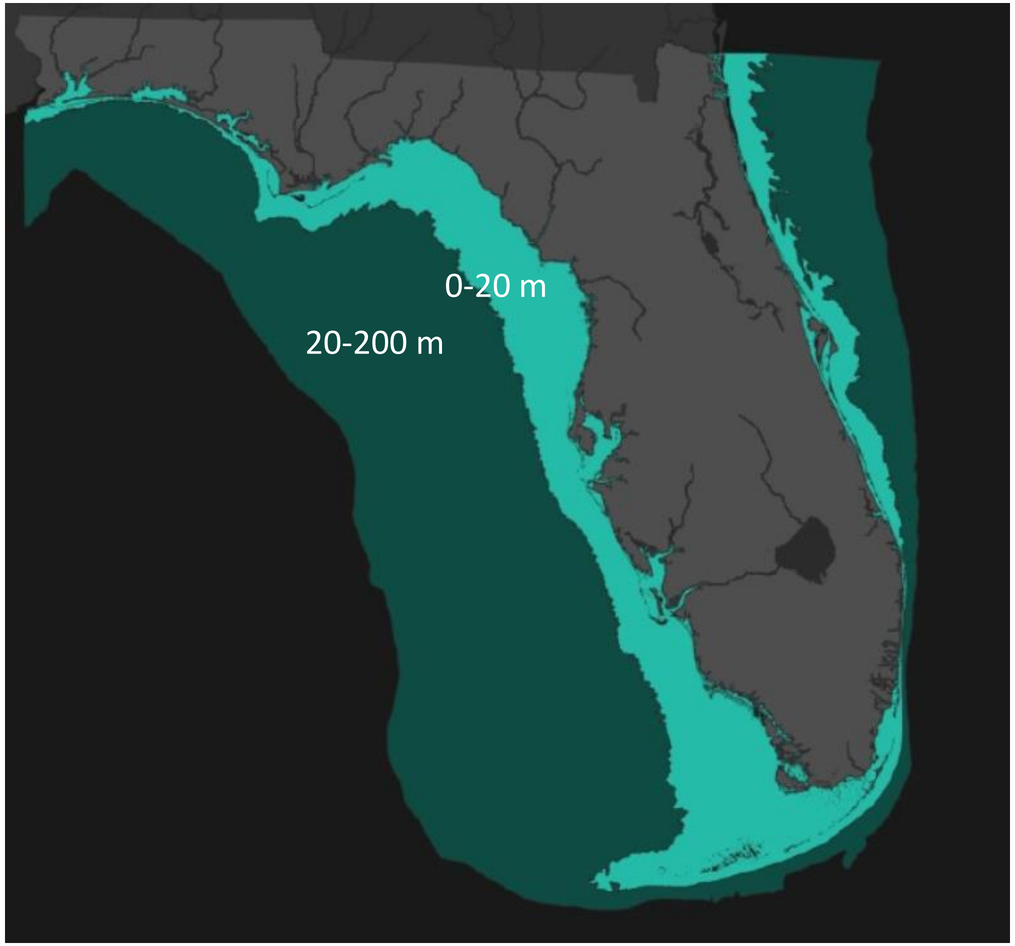
- Create FCMaP STAC, dissolve steering committee
- FCMaP Office established within FIO
- Dec 2021 Mapping Summit

2022: Develop strategic plan

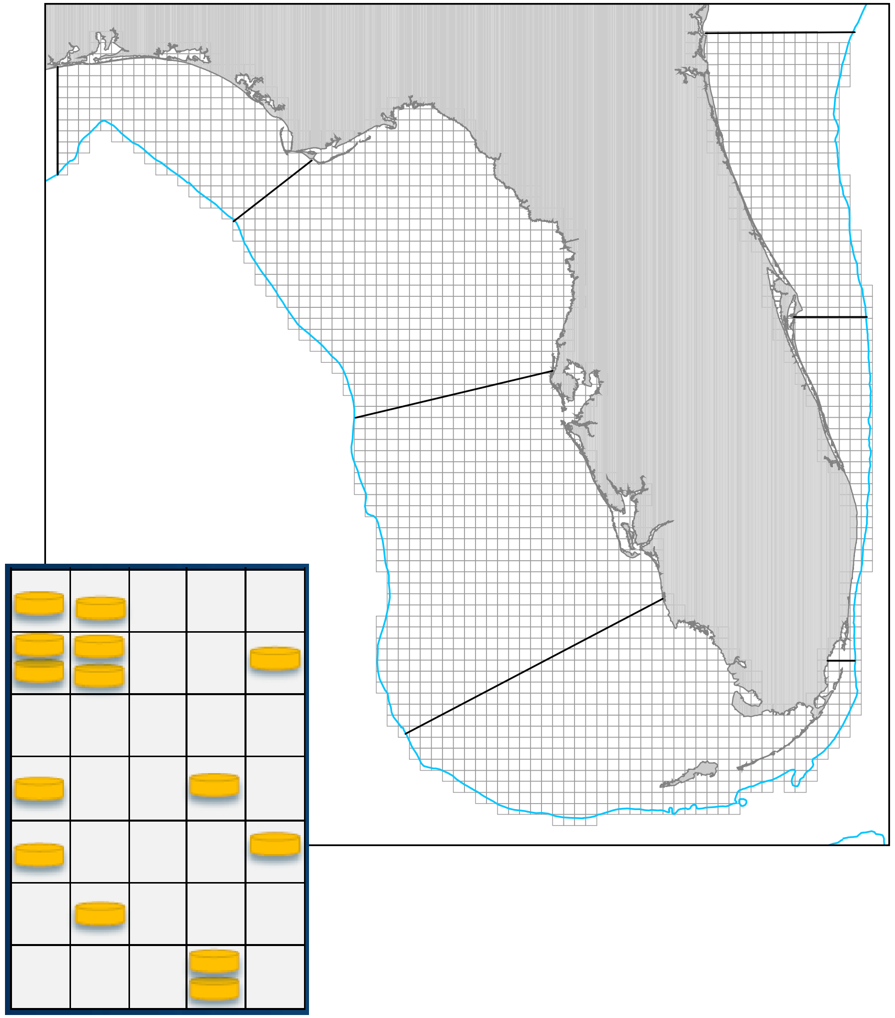
- Coordinator position, regular newsletter to stakeholders
- Dec 2022 Mapping Summit (hybrid)
- Yearly inventory updates

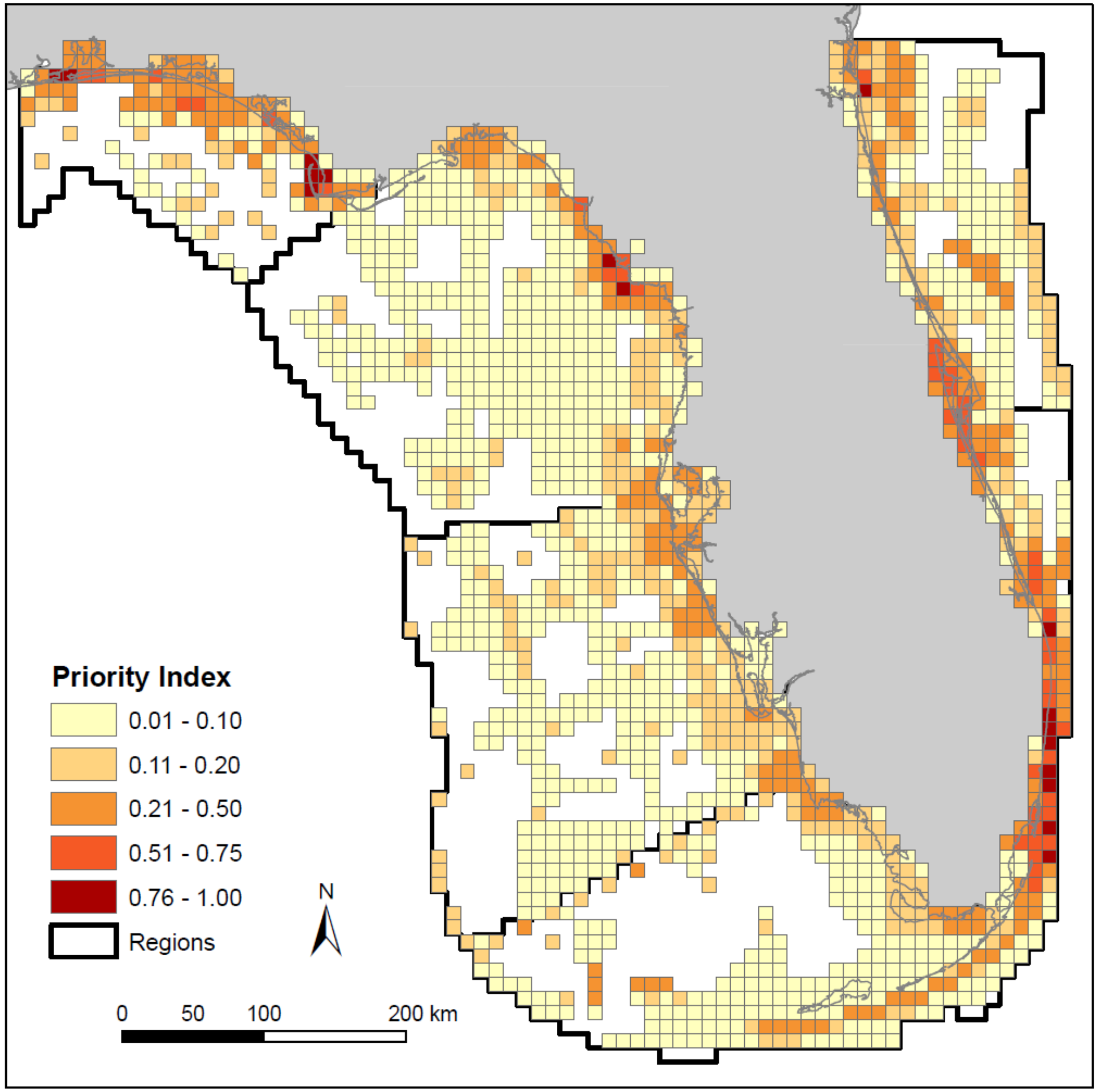
FCMaP Prioritization Regions and Depth Zones





Stakeholder Mapping Prioritization





FCMaP 5-year Strategic Plan

FCMaP Portfolio of Coordination

Data Awareness

Provide access to and promote awareness of data archives, information and tools relevant to bathymetric mapping

1. Maintain data portal to provide access to coordination efforts (i.e. prioritization results, project footprints)
2. At the completion of the FSMI*, undertake a new gap analysis
3. Maintain an inventory of mapping data and products resulting from FSMI and other efforts
4. Advocate for standardized mapping protocols that meet stakeholder requirements
5. Advocate for data archiving in a centralized national repositories (i.e. NCEI)

Community of Practice

Coordinate across a diverse portfolio of private and public stakeholders in the realm of bathymetric mapping

1. Encourage collaboration across public and private entities
2. Provide guidance on policies and procedures on data quality standards
3. Enable the broadest array of data collection to meet multiple stakeholder uses
4. Coordinate with related efforts including NOMEC, Seabed 2030, AK Mapping Program, and 3D Nation
5. Provide technical assistance for regional and statewide mapping programs such as FSMI
6. Engage related communities of practice

Innovation

Encourage innovation throughout data collection and processing

1. Champion the development, testing, deployment, and/or use of cutting-edge technologies and techniques
2. Develop incentives for testing, evaluating and adopting new technologies
3. Encourage involvment of vessels of opportunity
4. Facilitate innovation in data applications (i.e. derivative products)

Engagement

Provide forums to facilitate sharing of information, knowledge exchange, and partnerships across stakeholder community

1. Organize and facilitate stakeholder meetings at least yearly for information sharing
2. Be an effective vehicle for communication among partners
3. Maintain a web presence to inform community of mapping updates, events, publications, and products
4. External communication advocating the importance of seafloor mapping and data products
5. Identify and engage nontraditional stakeholders

*Florida Seafloor Mapping Initiative (FDEP)

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Implementation

.....in process

- FCMaP coordination -> FIO FCMaP Office
  - Hire coordinator
  - Communicate out to stakeholder community
- STAC -> primary advisory role

https://fcmap-myfwc.hub.arcgis.com/

Thank you!

FIO FCMaP Office and Coordinator Role

Nicole Raineault, FIO

FCMaP Office & Coordinator Position

Nicole Raineault, Ph.D.

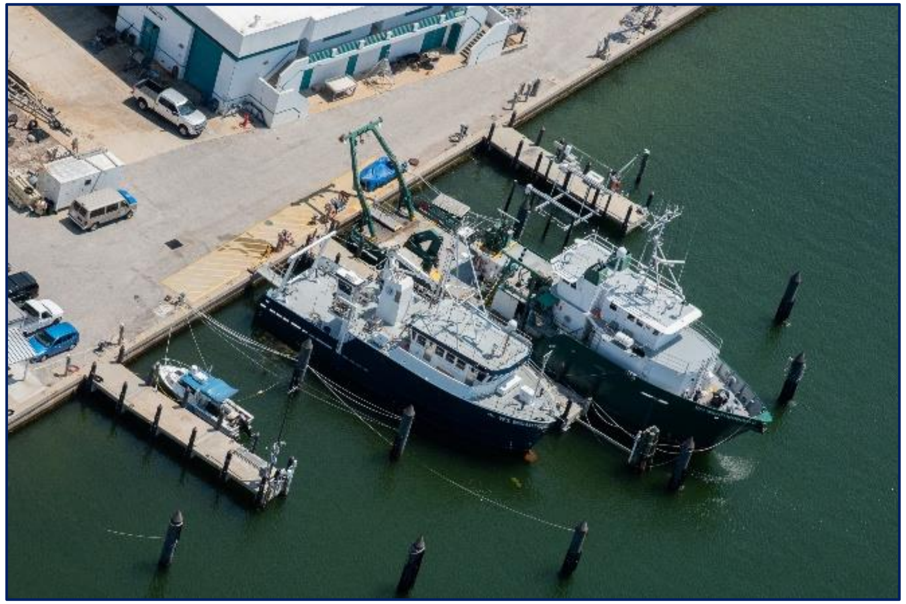
Chief Scientist

Florida Institute of Oceanography

November 30, 2022

What is FIO?

- A 32-member consortium of Florida's publicly funded universities and other members with a stake in ocean STEM research and education.
- State considers us as an *Academic Infrastructure Support Organization* (or AISO) for the State University System (SUS)
- Largest academic research vessel fleet in Florida: 2 large coastal-class Research Vessels, a fleet of smaller boats, and a full-service marine laboratory in Long Key, FL.
- Hosted at USF (St Petersburg Campus) under Academic Affairs.



FLORACEP
FLORIDA RESTORE ACT CENTERS OF EXCELLENCE PROGRAM

Centers of Excellence, 2015 - Present

By the Numbers

- **18** Centers of Excellence
- **$6 Million** in grants awarded
- **137** PIs, co-investigators, collaborators, consultants
- **>60** students/post-docs
- **>40** publications
- **8** active projects funded
- **$2M** RFP IV funding
- New 5-year award to include several RFPs

Compatible Goals

Be a major social and economic engine creating robust global, national, and regional partnerships to build a prosperous and sustainable future for our regional communities and the State of Florida.

A coordinating body of Federal and State agencies and institutions to promote and facilitate the collection and dissemination of Florida coastal seafloor data to fill priority areas and gaps within 10 years

Similar Missions

FIO serves as an enabler, facilitator, and coordinator across academia, state, and federal agencies, ocean science organizations, and the private sector.

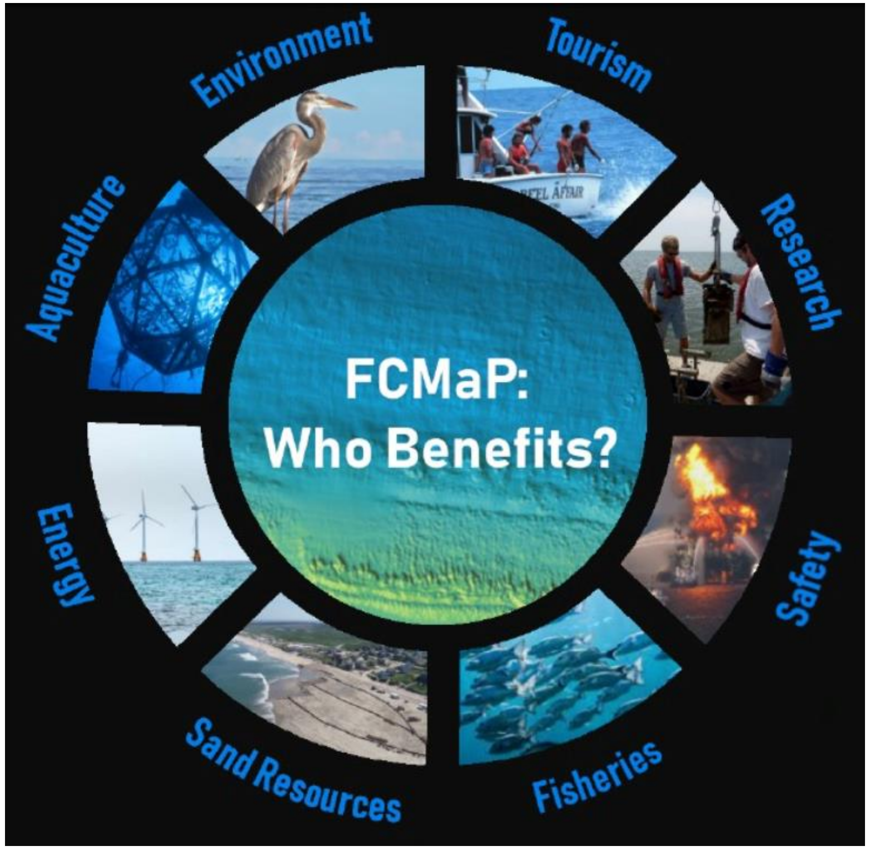
Coordinate across Federal and FL State agencies, and other stakeholders, to build a comprehensive understanding of the Florida coastal seafloor

Leverage FIO to meet the vision of FCMaP

Accessible, high resolution seafloor data of Florida's coastal waters to support infrastructure, benthic habitat mapping, restoration projects, resource management, emergency response, and coastal resiliency and hazard studies for the citizens of Florida

Program Coordinator joining soon!

- End-user & stakeholder engagement
- Communication: newsletter, StoryMaps, participation in meetings
- Coordination: annual Summit, workshops
- Data awareness: FCMaP data hub
- Engagement: outreach to the public
- Work with FCMaP STAC to carry out strategic plan



"Enabling excellence in coastal and ocean science and education"

Here to serve the mapping community

Contact: nicoleraineault@usf.edu

Thank you!

Project Footprint Inventory and Mapping Standards

Rene Baumstark, FWRI

Project Footprint Inventory and Mapping Standards

René D. Baumstark, Ph.D.

FWC – Fish & Wildlife Research Institute

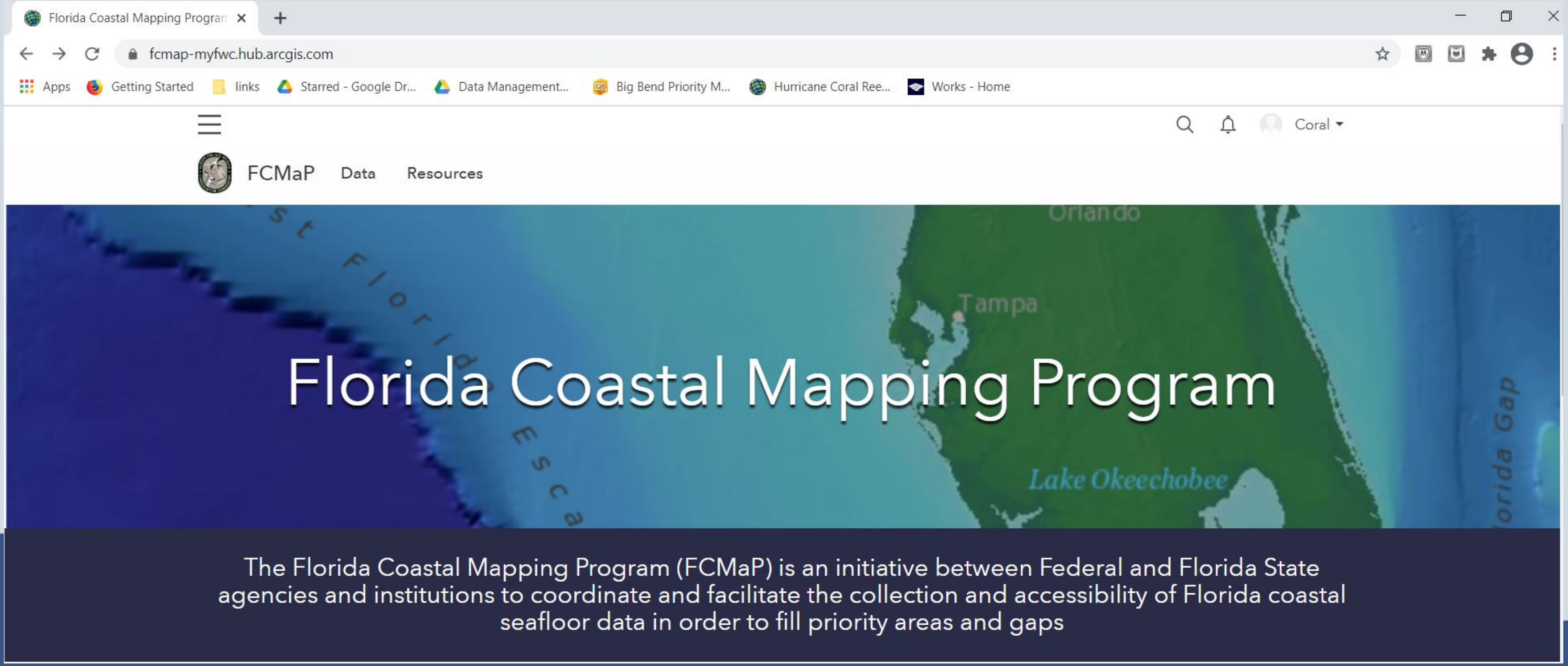
FCMaP Hub

A Centralized Location to

- Learn about FCMaP
- Access information
- Stay connected

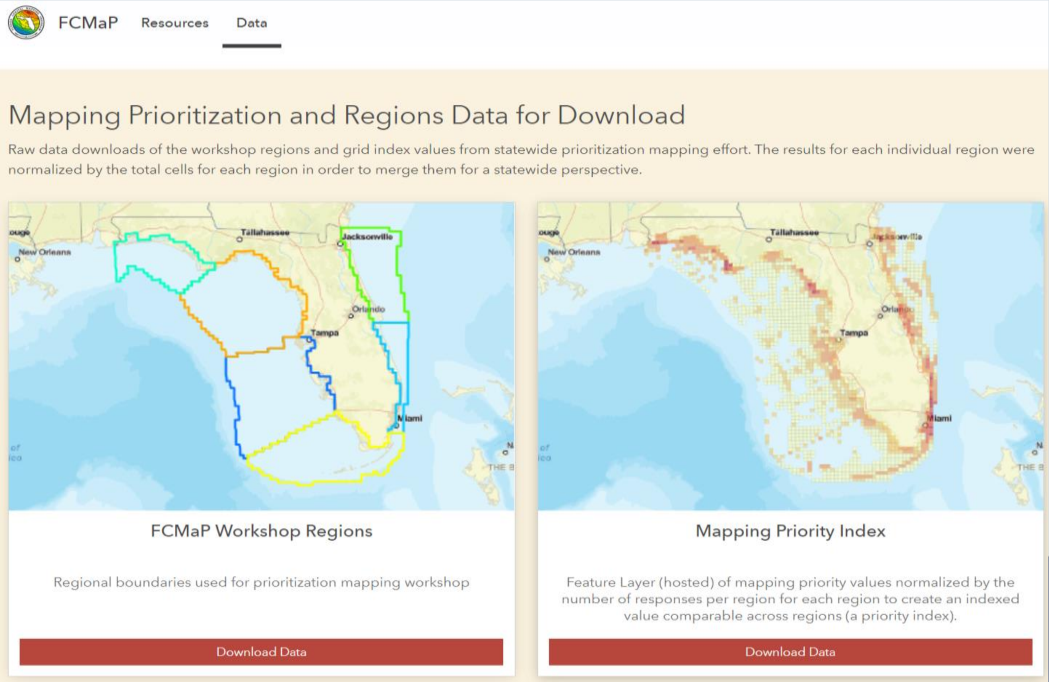
- ArcGIS.com
- Publicly accessible
- Cross referenced

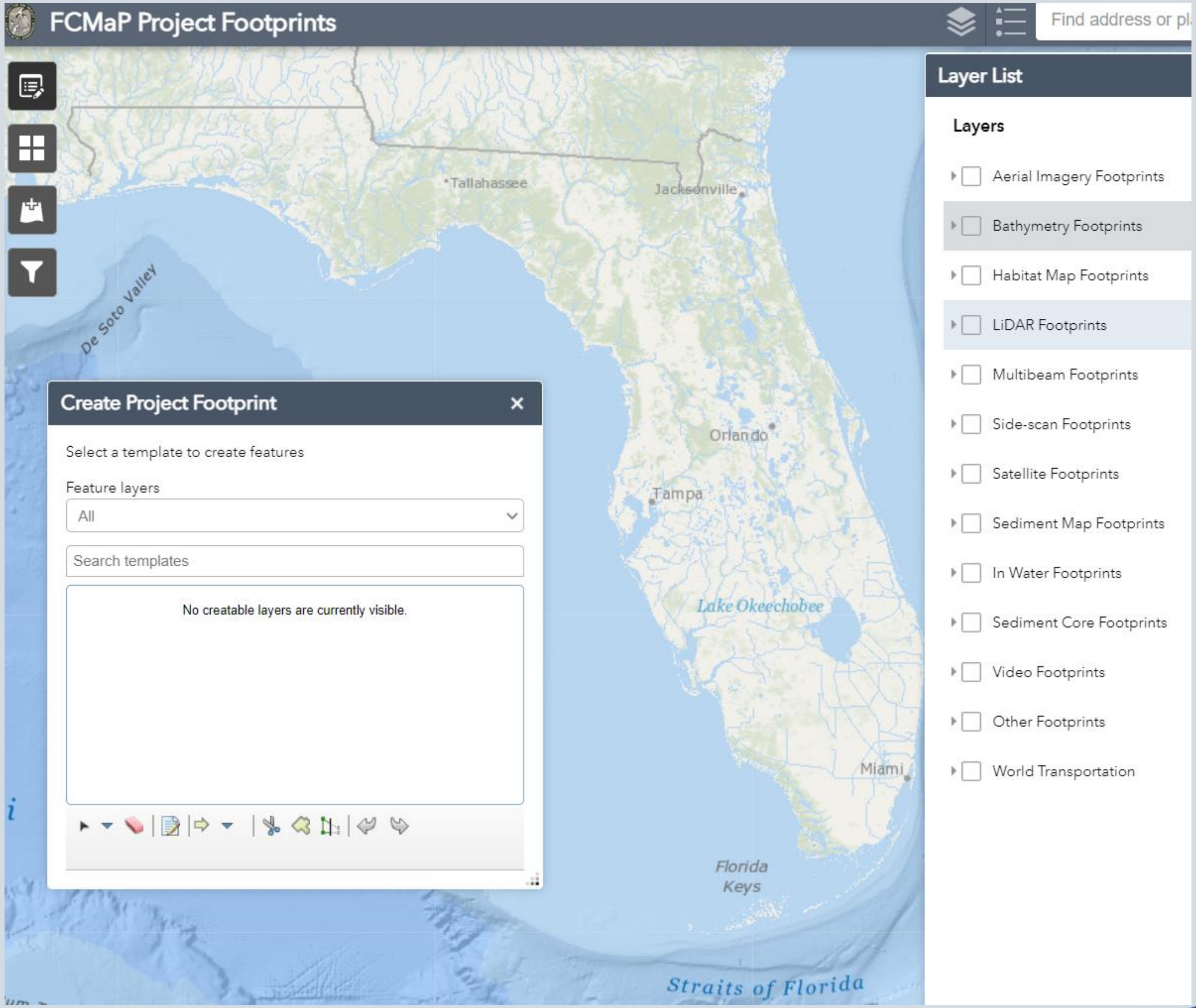
https://fcmap-myfwc.hub.arcgis.com/



FCMaP Hub

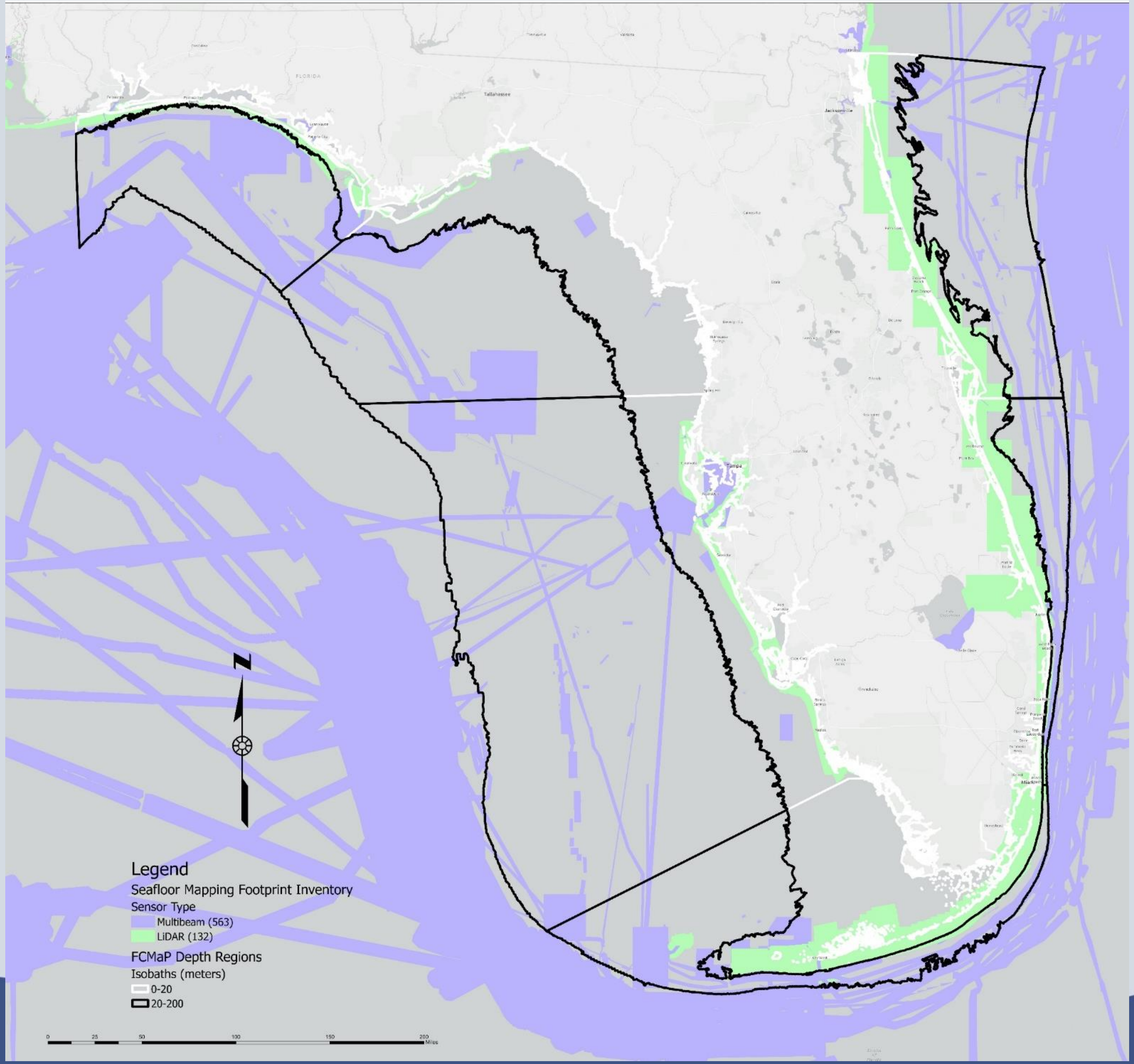
- Strategic plan, Story map, Reports, GIS data download (prioritization, footprints), Web mapping applications
- Create Project footprints





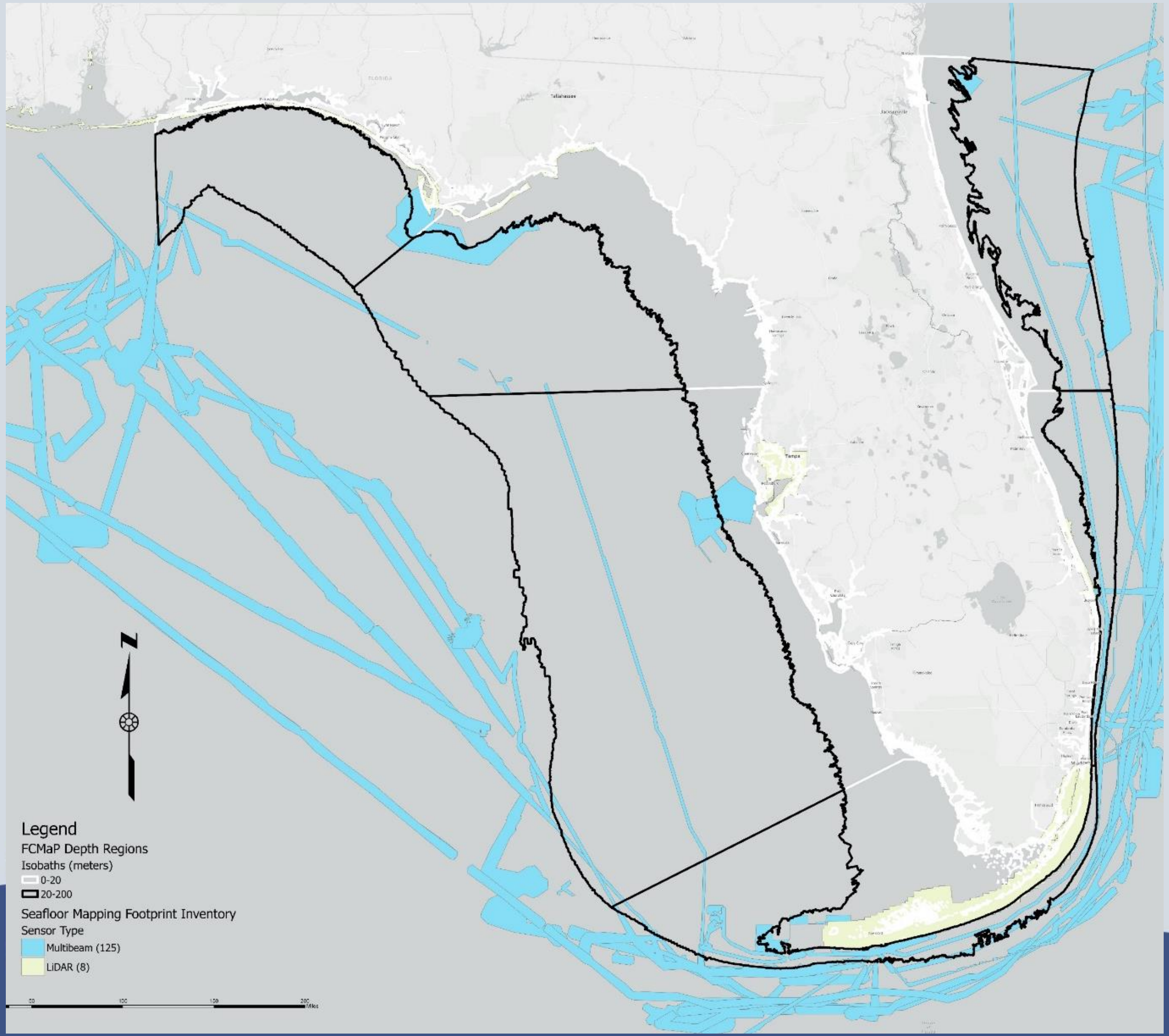
Project Footprint Inventory

- Multibeam and LiDAR
- Not comprehensive



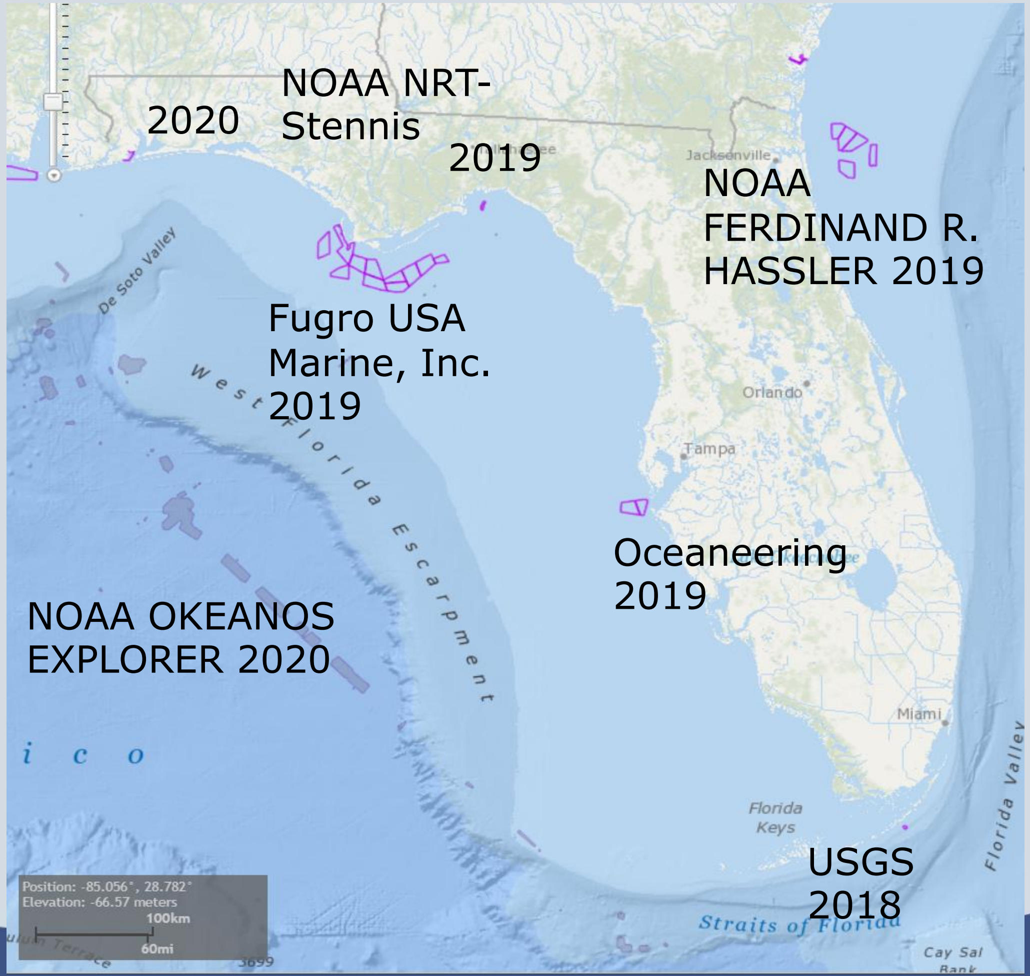
Project Footprint Inventory

Added since 2018 workshop



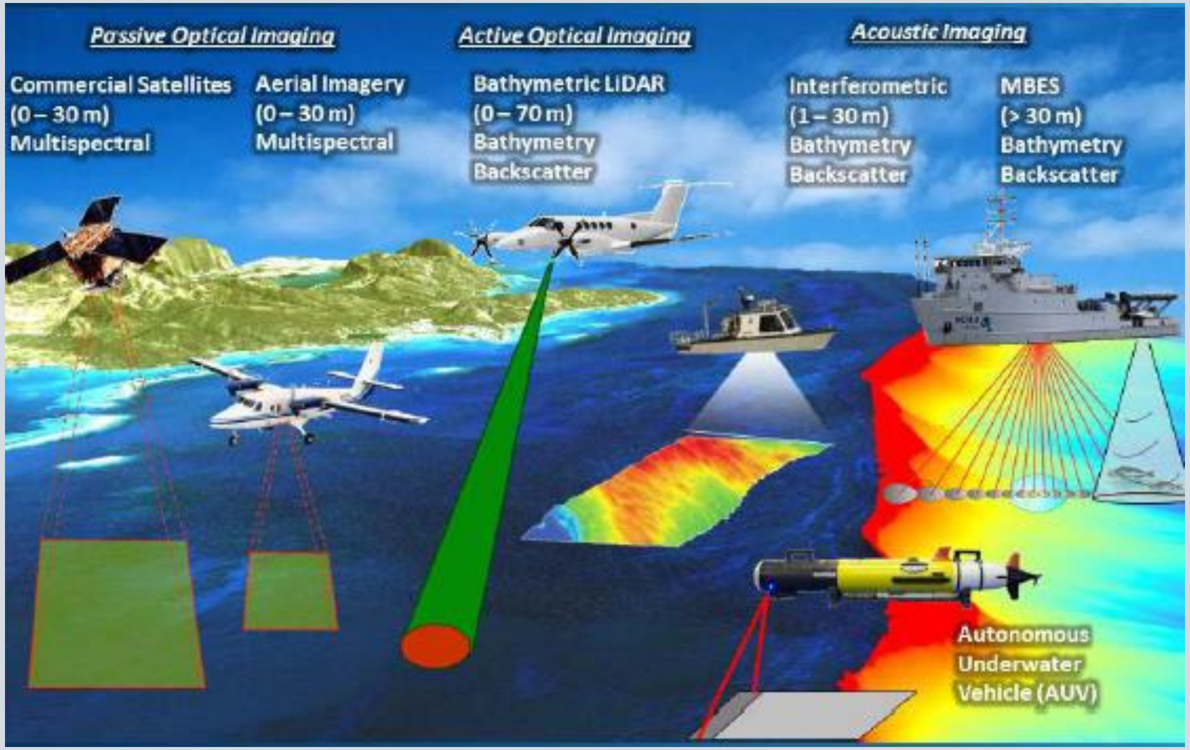
Added since 2021 workshop

Multibeam - NOAA Bathy data viewer



Mapping standards

- Goal is accessible, consistent, high-resolution bathymetry
  - Minimum 1 data point/10 sqm
- Best available
- Nearshore versus Offshore
  - Airborne LiDAR – optically shallow
  - Vessel based Acoustics – Deep water
- Derived products
  - DEMs, Seafloor characterization (structure, substrate, biological cover…)




Aquaculture
Environment
Tourism
Research
Energy
Sand Resources
2017 BEACH
RENOURISHMENT
PROJECT
Public Meeting
Fisheries
Safety

Tobopathy Lidar Specifications

Jennifer Wozencraft, USACE

JALBTCX bathytopo lidar specification

Contributors

- USACE
  - Jennifer Wozencraft
  - Chris Macon
  - Nick Johnson
  - Charlene Sylvester
- NAVOCEANO
  - Steven Posey
  - Matt Thompson
  - Sheldon Powe
  - Tommy Dye
- NOAA
  - Mike Aslaksen
  - Stephen White
  - Jamie Kum
- USGS
  - Jeff Danielson
  - Jim Kaufmann
  - Josh Nimetz
  - Jason Stoker

Details

- Started at the request of USGS for an inland lidar bathymetry specification
- Also serves as basis for lidar section, bathymetry chapter, Standard Ocean Mapping Protocol for Interagency Working Group on Ocean and Coastal Mapping
- Started with the USGS 3DEP spec
- Added in elements from the International Hydrographic Organization Standards for Hydrographic Surveys
- Added in standard practice among the agencies
- Removed irrelevant pieces
- Agreed on a table of specifications (parameters and values) for lidar bathymetry to accompany existing QL levels for topography
- Agreed on a point cloud classification scheme
- Plan is to circulate for comment next year

Parameter											
THU (Constant, m)	20m	10m	5m	2m	1m	0.5m	0.2m				
THU (Variable, m, Depth Dependent)	0.1	0.05	0.02	0.015	0.01	0.005	[illegible]				
TVU (Constant, m) *a* in *sqrt(a^2+(b*d)^2))*	2m	1m	0.5m	0.3m	0.25m	[illegible]2m	0.15[illegible]				
TVU (Variable, m, Depth Dependent) *b* in above (S-44)	0.023	0.02	0.013	0.01	0.007[illegible]	0.0[illegible]	0.002				
Sample Density* (Samples / m^2) (or feature detection requirement)*	0.02	0.05	0.1	0.2	0.5	[illegible]	2	5	10	20	
System performance (secchi factor or Kd*MaxDepth) (@15%reflectance)	5	4	3	2.[illegible]	[illegible]	1.5	1.25	1	0.75	0.5	
Grid Resolution	10m	5m	2[illegible]								
Sample Density (Samples per node)	<1	1	2								
Intensity Processing Level	Level 0 raw intensity		Le[illegible] in[illegible] cc[illegible]								

Table 5. Bathymetric/topographic light detection and ranging data classification scheme.

[illegible]	Description
1*	Processed, but unclassified
2*	Bare earth ground
7	Low noise (low or high; manually identifie[illegible] necessary)
9	Water (topographic se[illegible]or)
17	Bridge d[illegible]
18	High noise (high manua[illegible]dentified, [illegible] necessary)
20	Ignored ground (*typically br[illegible]ne proximity*)
21	Snow [illegible] *and identi[illegible]le*)
22	Temporal exclusion (topographic s[illegible]nsor) *t[illegible]ca[illegible] favored data in intertidal zones*)
40*	Bathymet[illegible] Submerge[illegible] opography (e.g., seafloor or riverbed)
41	Water Surfa[illegible] (sea/river/[illegible]ke surface [illegible]m bathymetric or topographic-bathymetric lidar; distin[illegible]om Poi[illegible] whic[illegible]s used in topographic-only lidar and only [illegible]ignates [illegible]r," not "water surface")
42	Deri[illegible] surfac[illegible]nthetic water surface location used in computing refraction at water surface)
43	Submerged obj[illegible]t, not otherwise specified (e.g., wreck, rock, submerged piling)
44	IHO S-57 object, not otherwise specified
45	No-botto[illegible] (bathymetric lidar point for which no detectable bottom return was received)
64	Submerged Aquatic Vegetation
65	Denotes bathymetric bottom temporal changes from varying lifts, not utilized in bathymetric point class

** Minimum requirement, others may be specified*

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JALBTCX
Joint Airborne Lidar Bathymetry Technical Center of Expertise

Relative vertical accuracy (Data processing and handling)

- Relative vertical accuracy refers to the internal geometric quality of a lidar dataset without regard to surveyed ground control. The preferred form of relative vertical accuracy assessment is computation of Total Propagated Uncertainty (TPU). In absence of validated TPU, an acceptable alternative is computation of intraswath and interswath precision.

Total Propagated Uncertainty

- TPU may be calculated using parametric uncertainty estimates, such as those in NOAA's TPU tool “cBlue” (reference). Delivery will be:
    1. Outputs from the cBlue tool
    2. 1m x 1m raster models (GeoTIFF format).
    3. Tiles shall be 5000m x 5000m, without overlap
- Manufacturer computed TPU may also be acceptable, but must be validated by comparing TPU surfaces to surfaces of standard deviation

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Quality level—bathymetry (Data collection)

- *IHO Order 2* (orange)
- *IHO Order 1a/b, Bathy QL 4b* (blue; blue circle)
- *IHO Special Order, Bathy QL 0b/1b* (green; green circle)
- *IHO Exclusive Order* (yellow)
- *Bathy QL 2b/3b* (red circle)

$$vertical\ accuracy\ at\ 95\%\ confidence = \sqrt{a^2 + (b * d)^2}$$

$$eg.\ Bathy\ QL\ 2b$$
$$vertical\ accuracy\ at\ 95\%\ confidence = \sqrt{.30^2 + (.0130d)^2}$$

Parameter							
THU (Constant, m)	20	10	5	2	1	0.5	0.25
THU (Variable, m, Depth Dependent)	0.1	0.05	0.02	0.01	0.005	0.0025	0.0001
TVU (Constant, m) *a* in *sqrt(a^2+(b*d)^2))*	z1	0.5	0.3	0.25	0.2	0.15	0.1
TVU (Variable, m, Depth Dependent) *b* in above equation	0.023	0.02	0.013	0.01	0.0075	0.004	0.002
Sample Density (Samples / m^2)	0.04	0.25	2	3	5	10	20
System performance (secchi factor or Kd*MaxDepth) (@15%reflectance)	4	3	2.5	2	1.5	1.25	1

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Absolute vertical accuracy (Data processing and handling)

- Bathymetric check points may also be collected in shallow water (wading depths) in order to assess sub-surface accuracy of the bathymetric LiDAR. The feasibility and number of check points/cross sections will depend on public accessibility (such as boat ramps), bottom stability, and radio range on the RTK rover. The use of boats or other water-based platforms to establish bathy control points is not scoped. The techniques for establishing all ground check points will be outlined in the Report of Survey, including the identity, locations, and position residuals of all GCPs used to evaluate survey accuracy.

- Bathymetry may be assessed for absolute vertical accuracy.
- Two additional absolute accuracy values shall be assessed and reported:
- Bathymetric vertical accuracy for the point data.
- Bathymetric vertical accuracy for the DEM.
- The minimum bathymetric vertical accuracy requirement for all data, using the ASPRS methodology, are listed in table 1.
- Bathymetric vertical accuracy for the point data shall be assessed by comparing check points surveyed for Bathymetric vertical accuracy assessment (see Check Points) to a triangulated irregular network (TIN) constructed from bathymetric and ground-classified lidar points in those areas.
- Bathymetric vertical accuracy for the DEM are assessed by comparing check points to the final bare-earth surface.

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Seamless data collection (Data collection)

- The overarching objective of bathymetric and topobathymetric surveys is to obtain clean, seamless (i.e., free of gaps or discontinuities) topographic-bathymetric data across the intertidal zone and shallow nearshore zone.
- Careful planning shall be conducted to ensure complete data coverage except in the most extreme circumstances.
- Bathymetric and topobathymetric lidar flights must be carefully managed around the following environmental conditions:
    - water clarity;
    - areas of low bottom reflectivity, such as mud or submerged aquatic vegetation;
    - surface foam and entrained bubbles from breaking waves;

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Data voids

- Data Collection
- A data void is any area greater than or equal to (4 × ANPS)^2, which is measured using first returns only.
- Data voids within a single swath are not acceptable, except in the following circumstances:
  - where caused by water clarity;
  - where caused by areas of low bottom reflectivity, such as mud or submerged aquatic vegetation;
  - where caused by surface foam and entrained bubbles from breaking waves; or
  - where appropriately filled in by another swath.
- For projects designed to achieve the required ANPS through multiple coverage, the entire DPA shall be covered with the designed number of swaths. Areas meeting the size threshold defined above for single coverage that are not covered by the designed number of swaths are data voids (figures 1-3).

- Digital Elevation Model Surface Treatments
- Areas with no returns > 9 square meters identified as data voids.
- Delineate voids by triangulating bathymetric bottom points with an edge length maximum of 4.56 meters.
- The resulting void shapefile will be used to control the extent of the delivered topo-bathymetric model and to avoid false triangulation across areas in the water with no returns.
- Maybe address reasons for voids in lidar mapping report?

* Need to reconsider data void values based on design density-scale

* Add void reasons lidar mapping report deliverable

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Collection Conditions (Data collection)

- Atmospheric conditions shall be cloud and fog free between the aircraft and ground during all collection operations.
- Ground conditions will be snow free. Very light, undrifted snow may be acceptable with prior approval.
- Ground conditions shall be free of extensive flooding or any other type of inundation.
- Leaf-off vegetation conditions are preferred.
- Penetration to the ground shall be adequate to produce an accurate and reliable bare-earth surface for the prescribed QL.
- Low water flow conditions are preferred.
- Low wind and wave conditions are preferred.
- Water condition shall be ice-free.
- Acquisition during the dry-season is preferred.
- Submerged aquatic vegetation should be at low-bio-mass.
- Collections planned for leaf-on collections shall be approved by the USGS–NGP/3DEP prior to issuance of a task order or contract.

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Water clarity in rivers (Data collection)

- The river portion of the bathymetry collection shall have a clarity requirement. The water must be of acceptable clarity conditions in order to collect. The Contractor will monitor and analyze water clarity trends using real-time water quality monitoring stations located along the river gradient. Gaging stations can be used to help determine optimal conditions.
- The Contractor will make a recommendation on optimal water clarity threshold that will be approved by agency leads and project partners prior to bathymetric data collection.

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Point classification
(Data processing and handling)

- **The minimum required classification scheme for bathymetric lidar data is found in table 2, and includes codes 1, 2, and 40.**
- **All points that fall within the minimum classification scheme (table 4, codes 1, 2, & 40) and not flagged as withheld shall be properly classified.**
- **Accuracy of point classification into classes beyond the minimum scheme (table 4, codes 1, 2, & 40) will not be assessed.**

Code	Description
1*	Processed, but unclassified
2*	Bare earth ground
7	Low noise (low or high; manually identified, if necessary)
9	Water (topographic sensor)
17	Bridge deck
18	High noise (high manually identified, if necessary)
20	Ignored ground (*typically breakline proximity*)
21	Snow (*if present and identifiable*)
22	Temporal exclusion (topographic sensor) *typically nonfavored data ir intertidal zones*)
40*	Bathymetric Point, Submerged Topography (e.g., seafloor or riverbed)
41	Water Surface (sea/river/lake surface from bathymetric or topographic-bathymetric lidar; distinct from Point Class 9, which is used in topographic-only lidar and only designates “water,” not “water surface”)
42	Derived water surface (synthetic water surface location used in computing refraction at water surface)
43	Submerged object, not otherwise specified (e.g., wreck, rock, submerged piling)
44	IHO S-57 object, not otherwise specified
45	No-bottom-found (bathymetric lidar point for which no detectable bottom return was received)
64	Submerged Aquatic Vegetation
65	Denotes bathymetric bottom temporal changes from varying lifts, no utilized in bathymetric point class

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Intensity values (Data collection)

- Data recorded during collection should support processing to intensity or reflectance.
- Intensity values are required for each topographic return and each bottom return where water conditions allow.
- The intensity values recorded in the LAS files shall be normalized to 16 bit, as required by the LAS specification version 1.4–R15 (ASPRS, 2011).
- Intensity shall be processed as specified according to the definitions in the table below (Kashani et al. 2015).

Intensity processing level	definition
Level 0	raw intensity linearly scaled to 16-bit
Level 1	intensity correction (i.e., correction for range, angle of incidence)
Level 2	intensity normalization (i.e., histogram normalization to match adjacent flight strips or data collected across different days, sites, following the level 1 processing)
Level 3	full, rigorous radiometric correction and calibration to obtain “true” surface reflectance (generally unattainable, due to lack of manufacturer-proprietary system information and full environmental characterization)

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Other changes

- Added

- Alternate use of ISO metadata standard
- Delivery of waveforms in well-documented formats other than LAS *.wdp

- Removed

- Deliverables
  - Breaklines
- Digital elevation model surface treatments
  - Bridges
  - Hydro-flattening

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Follow-on activities

- Best practices for developing bathy lidar specifications to meet project needs
- Implementation guidance for consistency among providers:
    - Computation and reporting of accuracy
    - Computation and delivery of intensity
    - Validation and delivery of Total Propagated Uncertainty
    - Standardize metadata deliverable
    - Standardize a survey point deliverable
- Connect to ASPRS where applicable
- Align with Canadian appendix on bathytopo lidar

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3D Nation Study Results

Ashley Chappell, NOAA IOCM
Sue Hoegberg, Dewberry

3D Nation Elevation Requirements and Benefits Study

Study Leads

INTERAGENCY WORKING GROUP ON Ocean and Coastal Mapping

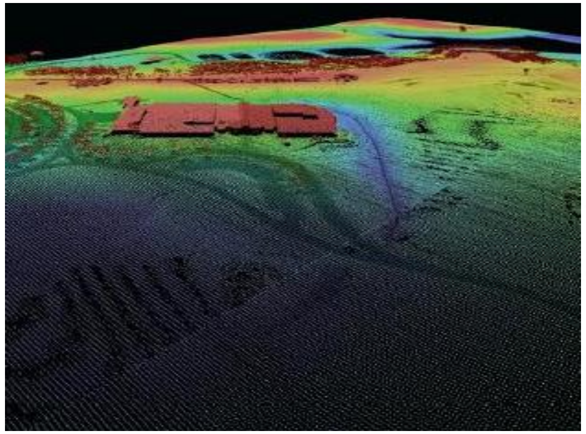
Dewberry

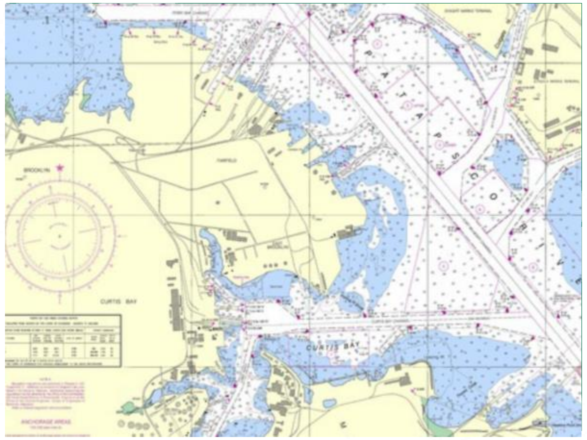
USGS science for a changing world

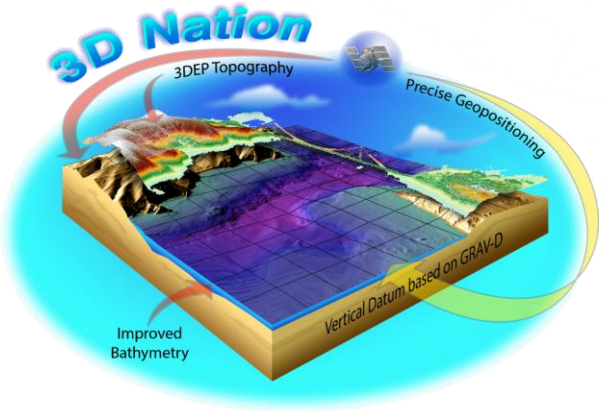
The National Map

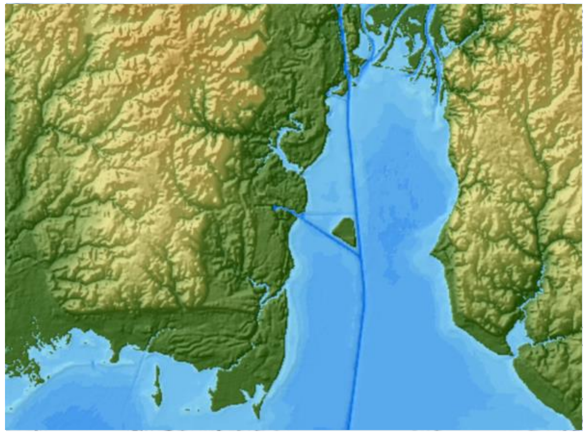
Your Source for Topographic Information

3DEP









3D Nation - Builds a modern elevation foundation from the peaks of our mountains to the depths of our waters for stronger, more resilient communities and U.S. economy.

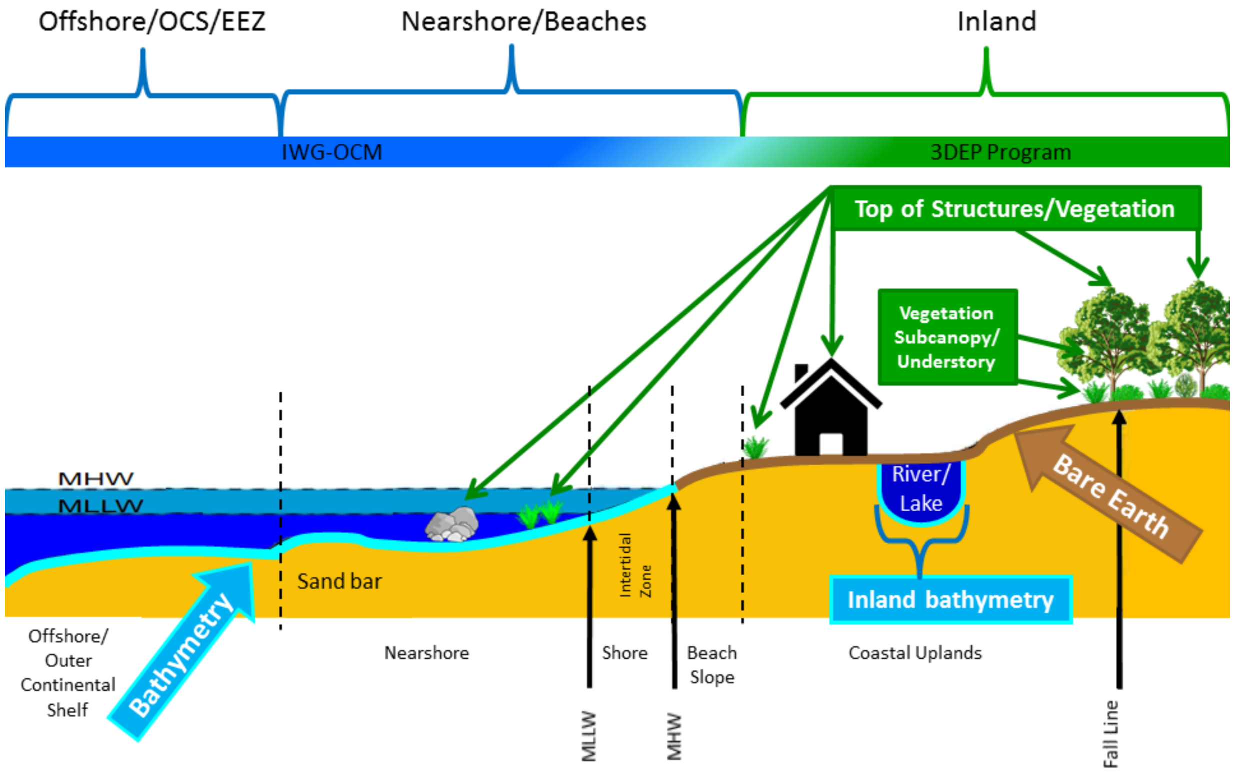
Ashley Chappell, NOAA

Sue Hoegberg, Dewberry

Mapping a 3D Nation: Study Goals

Understand 3D Elevation Data Requirements

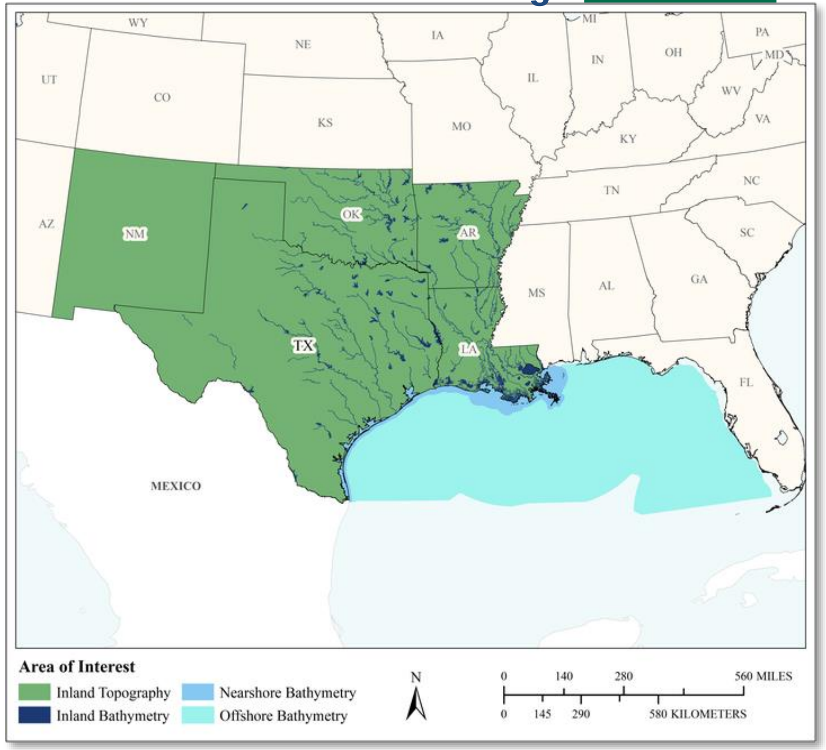
- Understand inland, nearshore, and offshore elevation data requirements and benefits
- Understand how requirements and benefits dovetail in the coastal zone
- Improve understanding of needs to guide planning for NOAA and the next generation of 3DEP for USGS after completion of nationwide coverage
- Gather technology-agnostic user information to assess new technologies against requirements and tradeoffs between different approaches



Study Terminology

- 3D elevation data
  - **Topographic** – precise 3D measurements of the terrestrial terrain
  - **Bathymetric** – 3D measurements of underwater depths and topography
- Mission Critical Activity (MCA)
  - Activity that uses some form of elevation data, including derivative products, to accomplish a Business Use.
  - *Mission Critical* - Indispensable/essential for effective/efficient operations in accomplishing the core mission of the organization.
- Business Use (BU)
  - Ultimate use of services/products from the MCA to accomplish an organized mission.

MCA: Environmental Modeling



Examples

BU	**Flood Risk Management**
MCA	dam break modeling & inundation mapping

BU	**Marine and Riverine Navigation & Safety**
MCA	commercial shipping

USGS science for a changing world · The National Map Your Source for Topographic Information · Dewberry · Interagency Working Group on Ocean and Coastal Mapping · NOAA

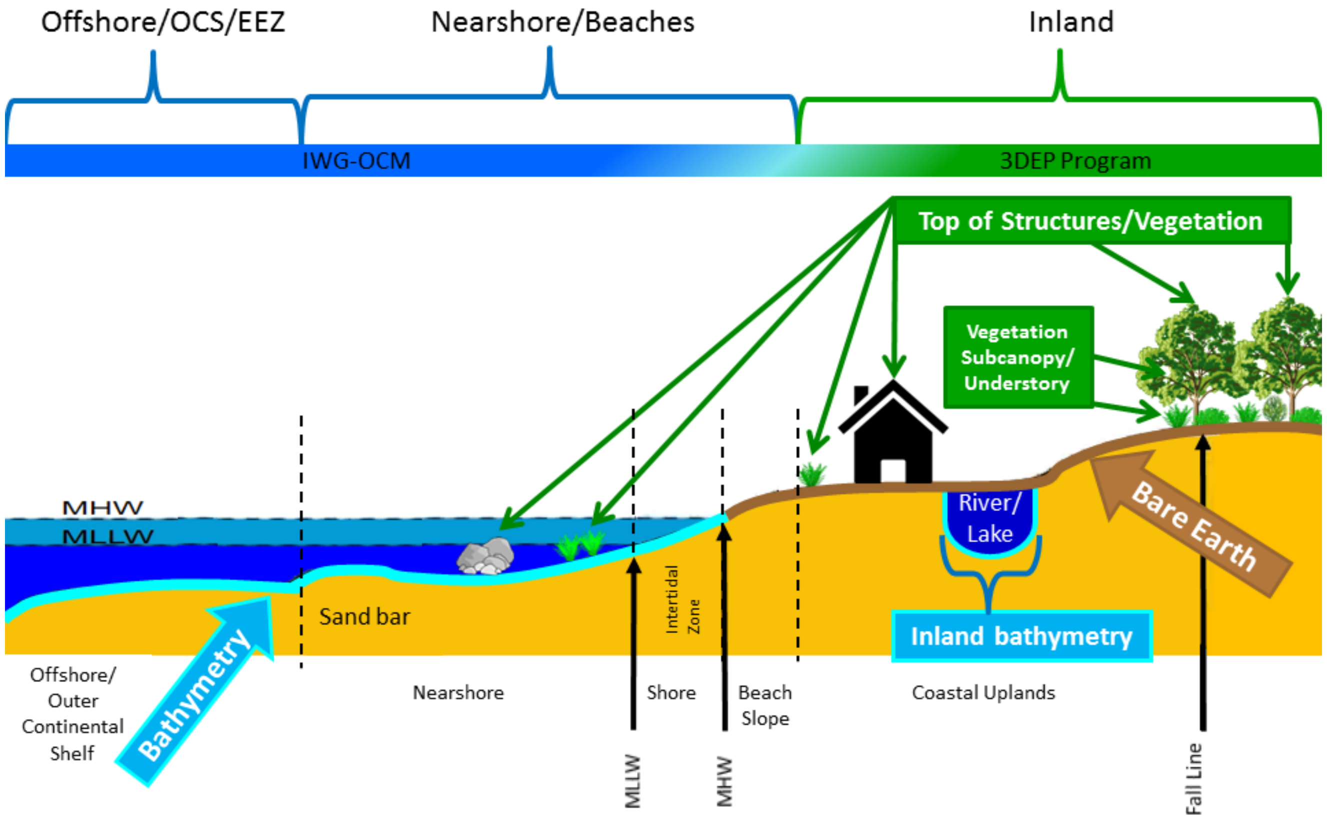
What We Asked About

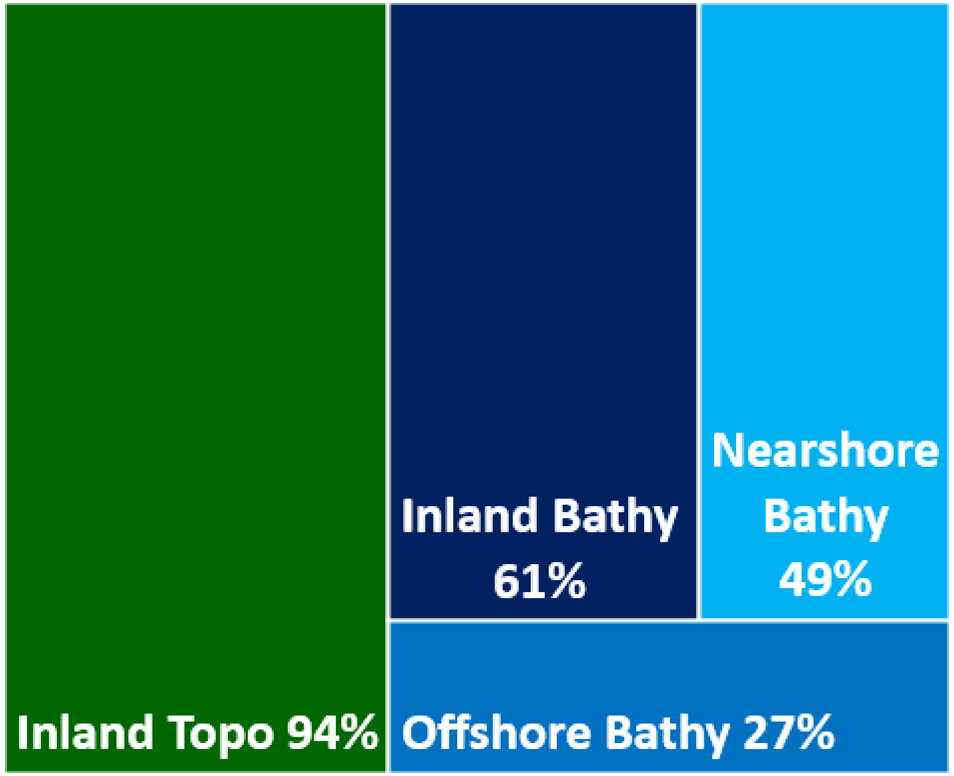
3D Elevation Data Needs

- Geographic extent of MCA
- Characteristics of 3D elevation data needed to perform the MCA
  - Quality Level/IHO Order
  - Update frequency
  - Acceptable error (Horizontal & Vertical)
  - Beach profile
  - Cross sections/transects
  - Hydrologic processing
  - Tide correction
  - Seamlessness
  - Data products
  - Integration with other datasets

- Benefits of having 3D elevation data
  - Operational Benefits - Time or cost savings, mission compliance
  - Customer Service Benefits - Products or services, response or timeliness, customer experience
  - Societal Benefits (not quantified) - Education or outreach, environmental, public safety, including lives and property

Multiple Geographies Allowed per MCA





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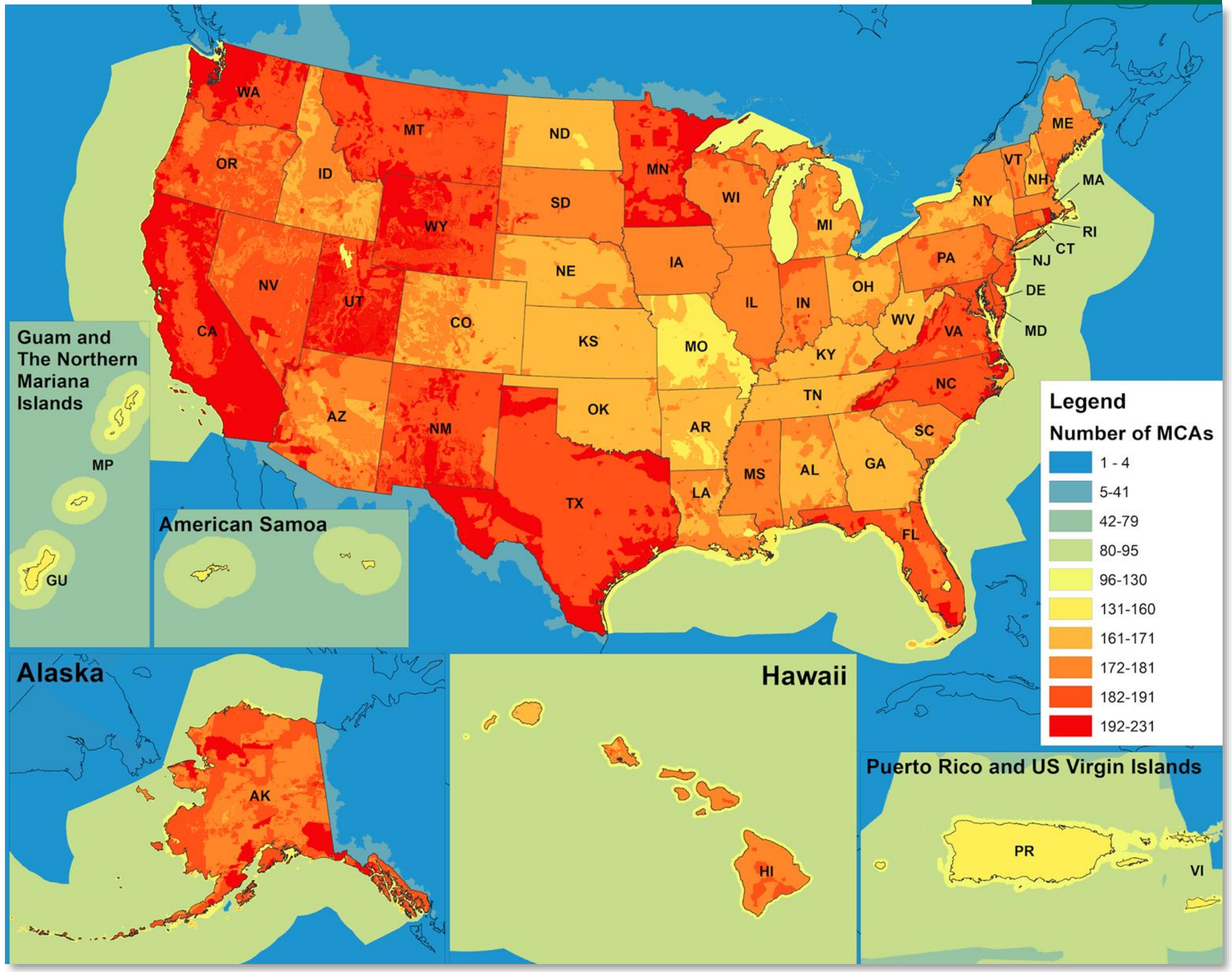
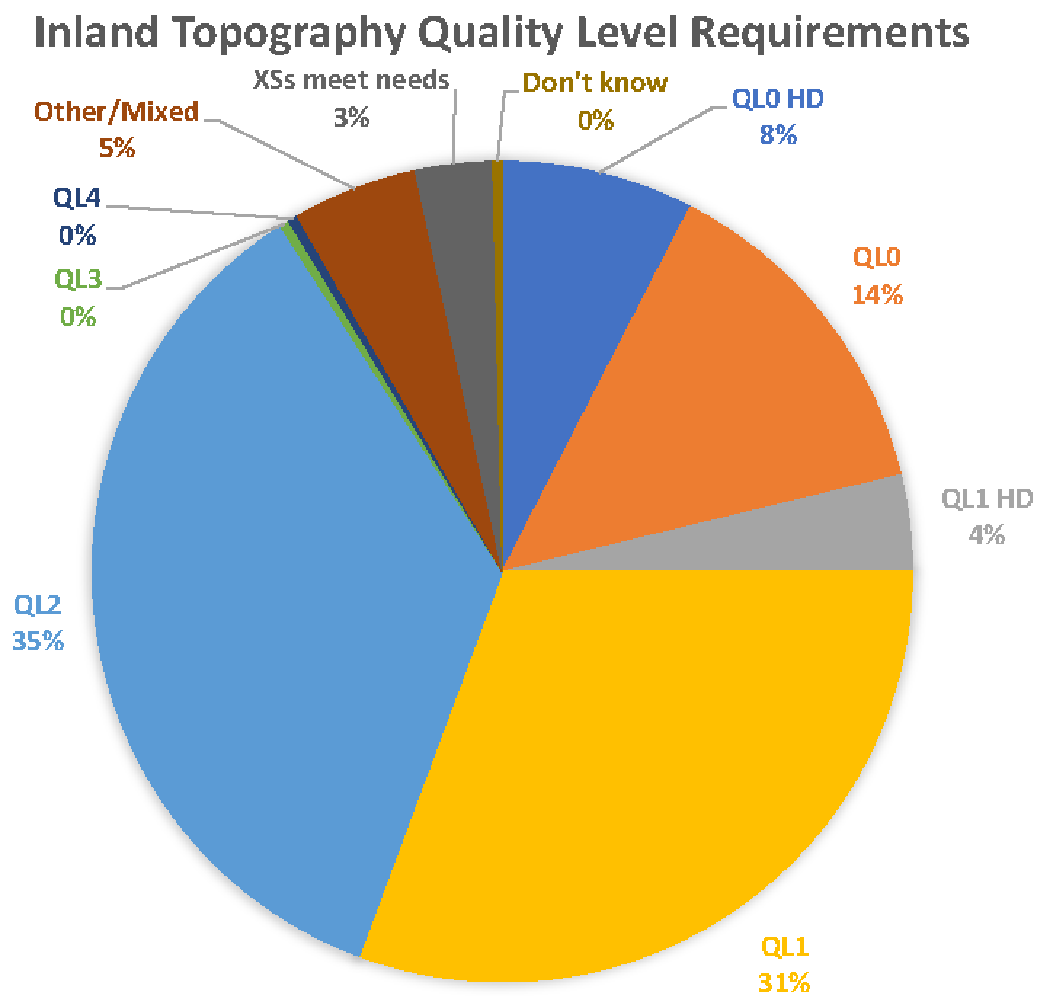
Study Results

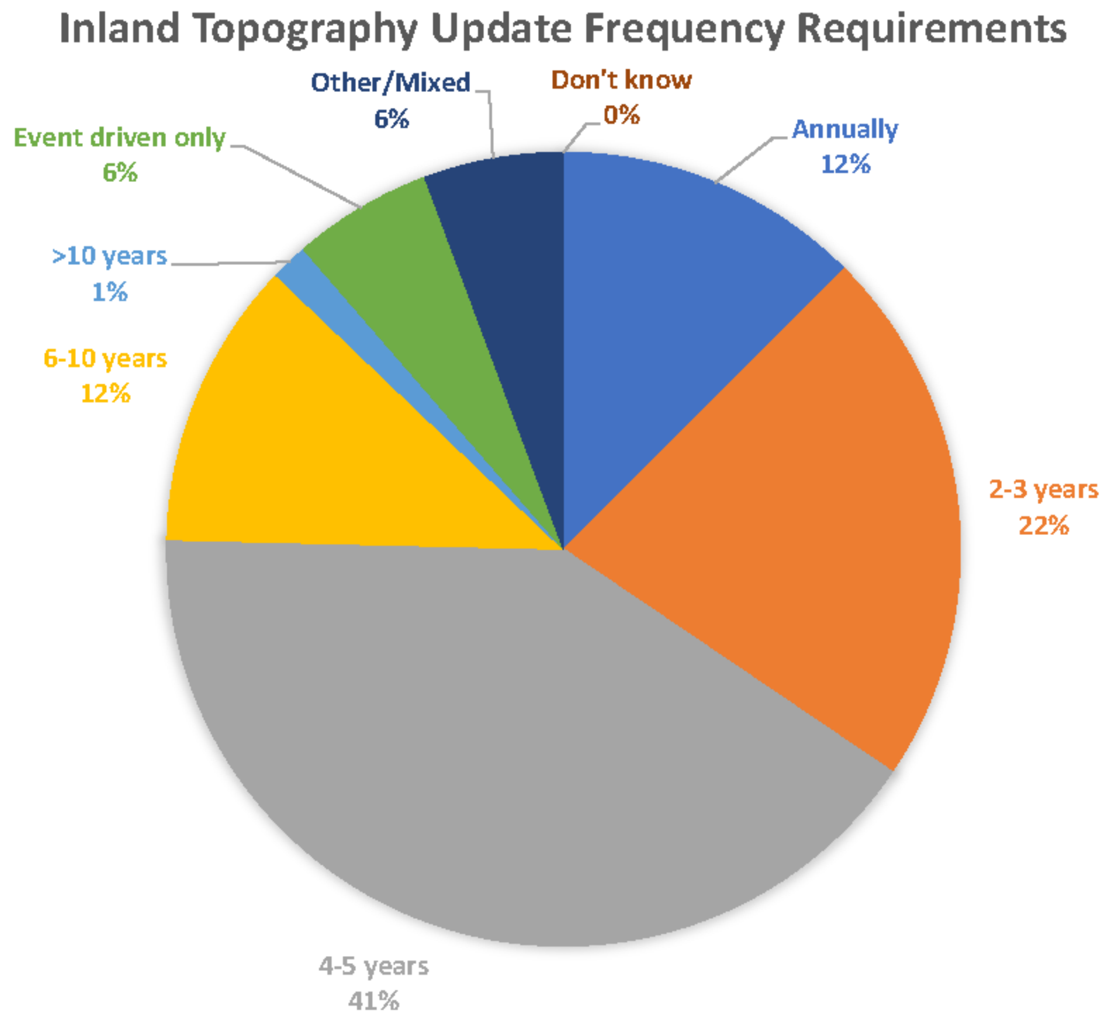
- Respondents
  - 45 Federal agencies
  - 56 State, 99 Local, 8 Tribal governments
  - 10 Non-Governmental Orgs
  - 14 Academics
  - 34 Private companies
- 1,350+ Mission Critical Activities binned into 30 different business cases and 4 Geography Types

Number of MCAs - by Area of Interest

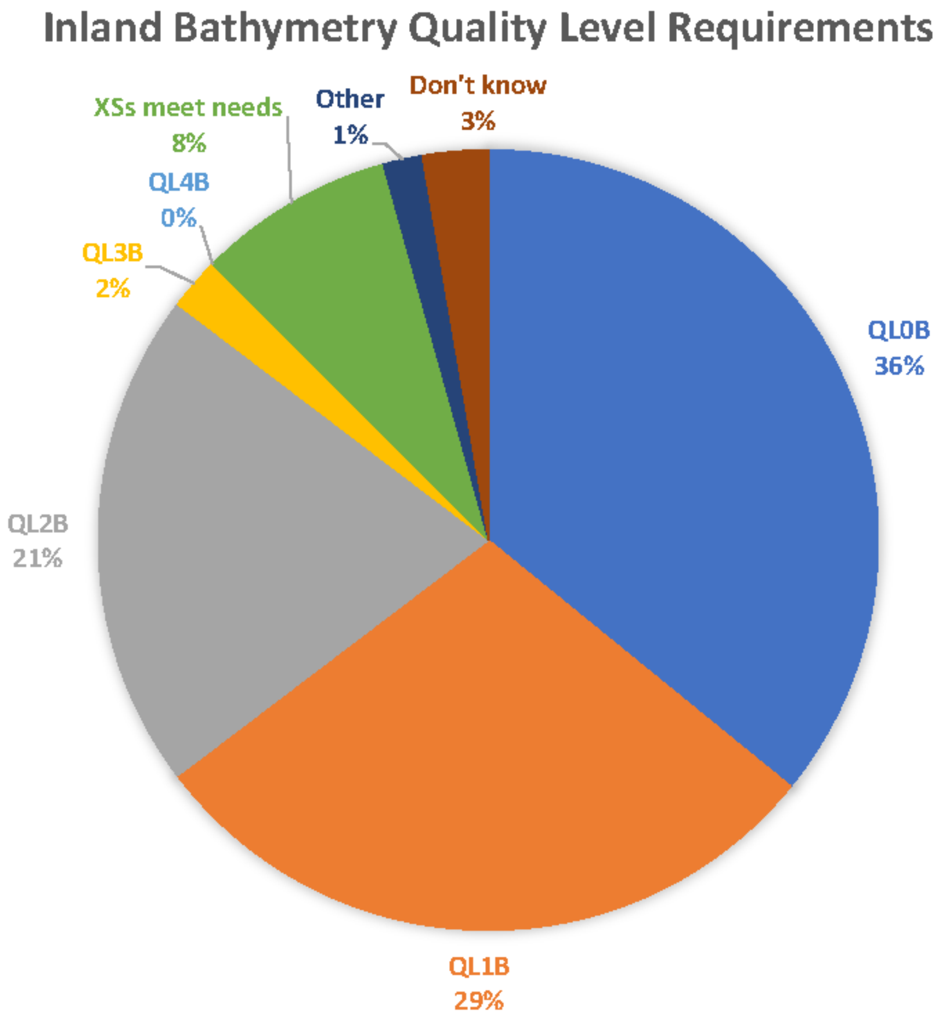


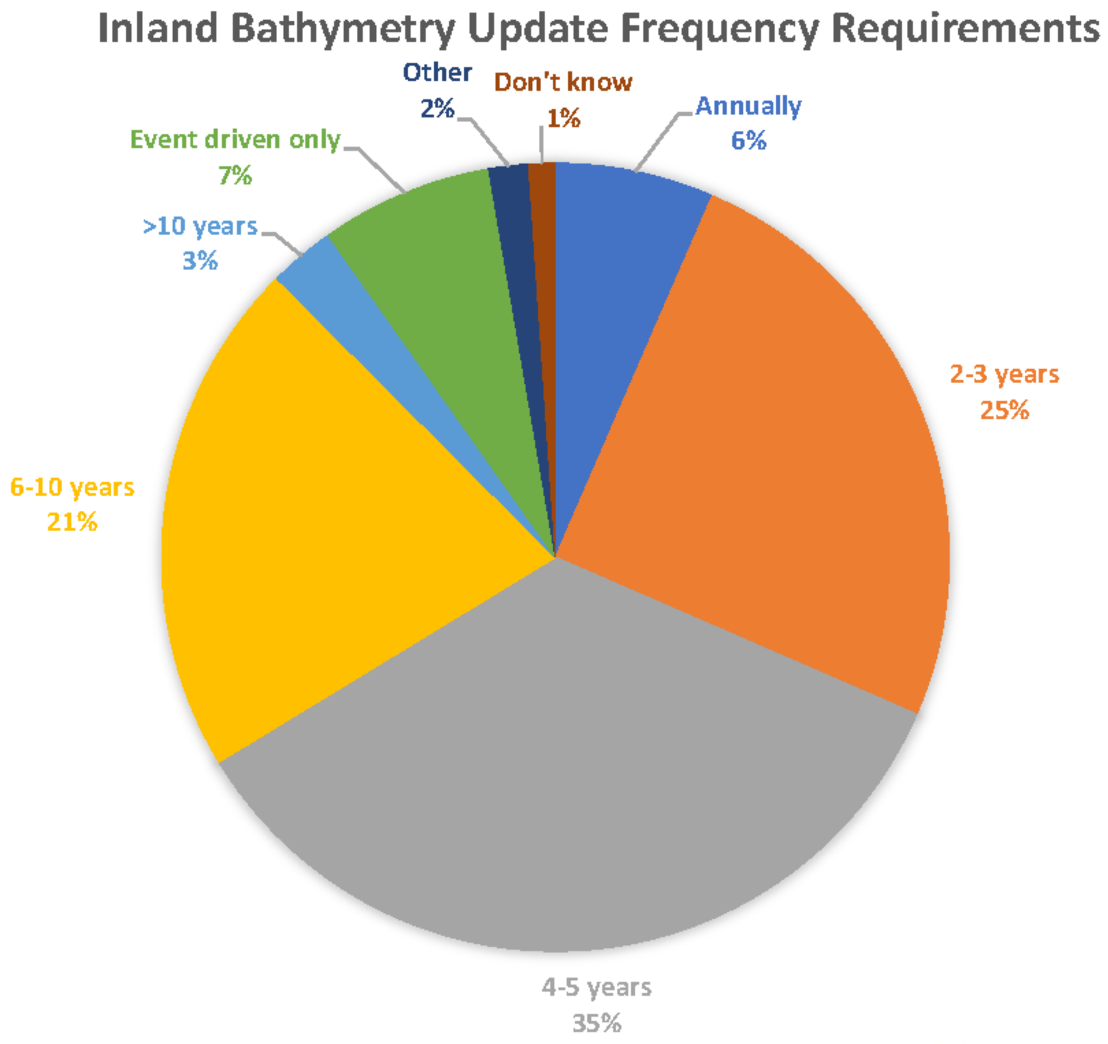
Florida Inland Topography Requirements





Florida Inland Bathymetry Requirements





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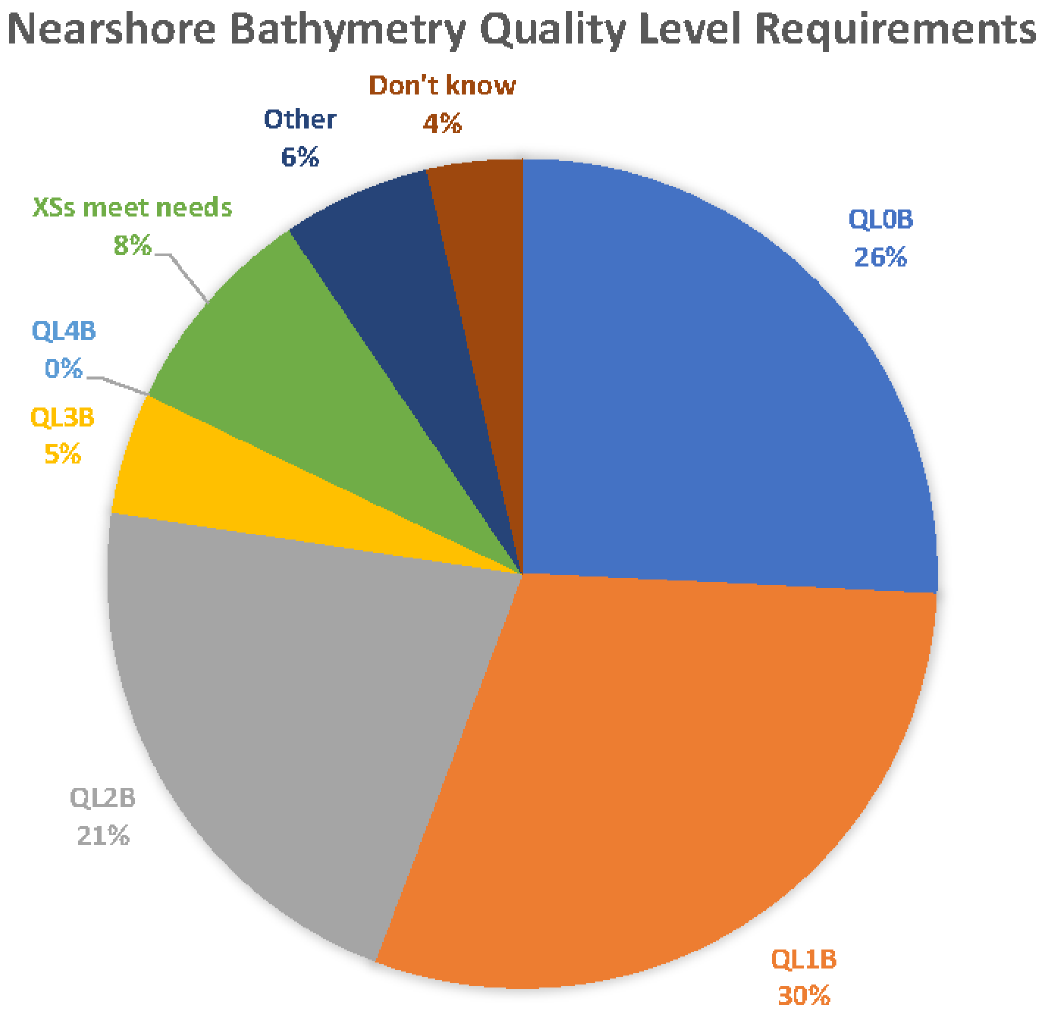
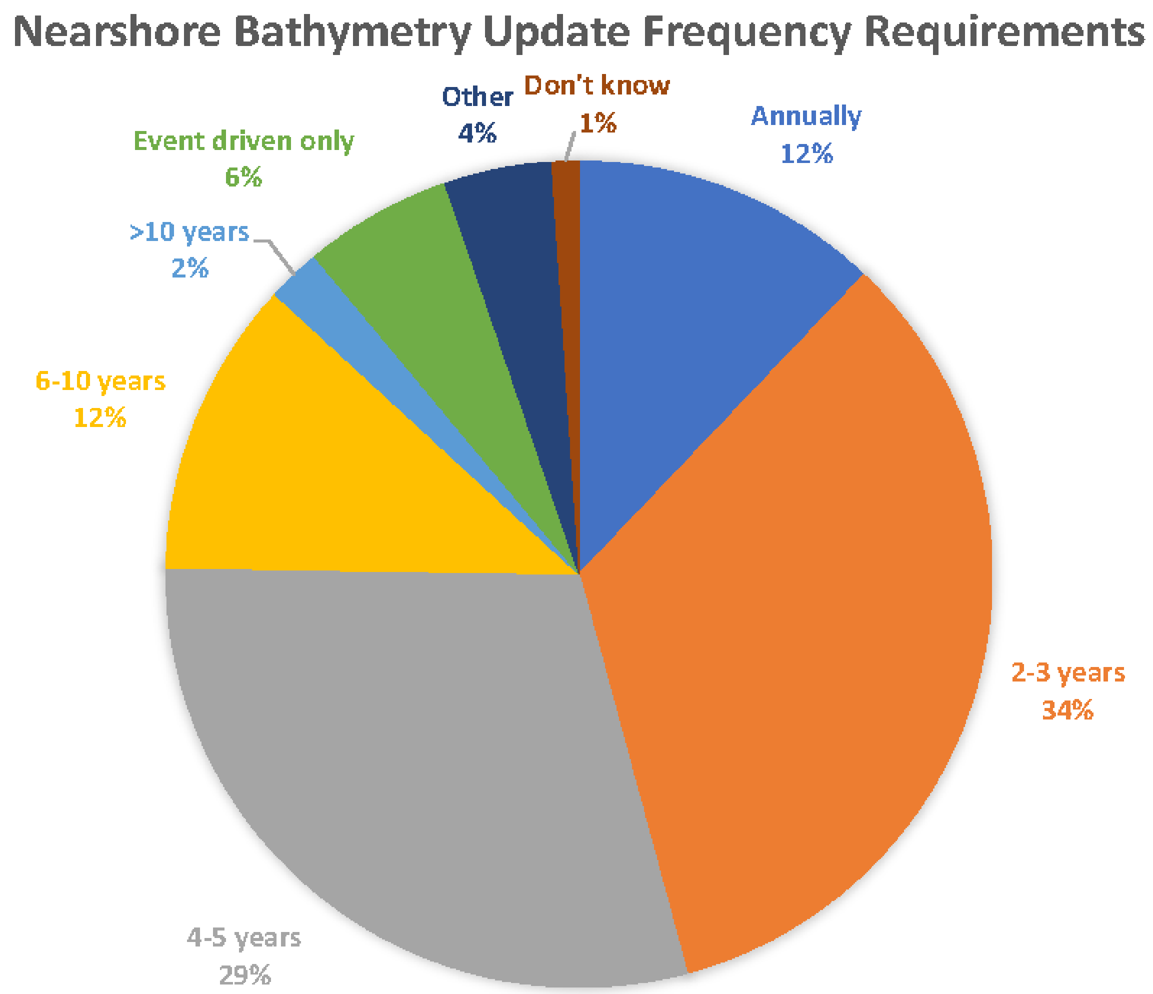
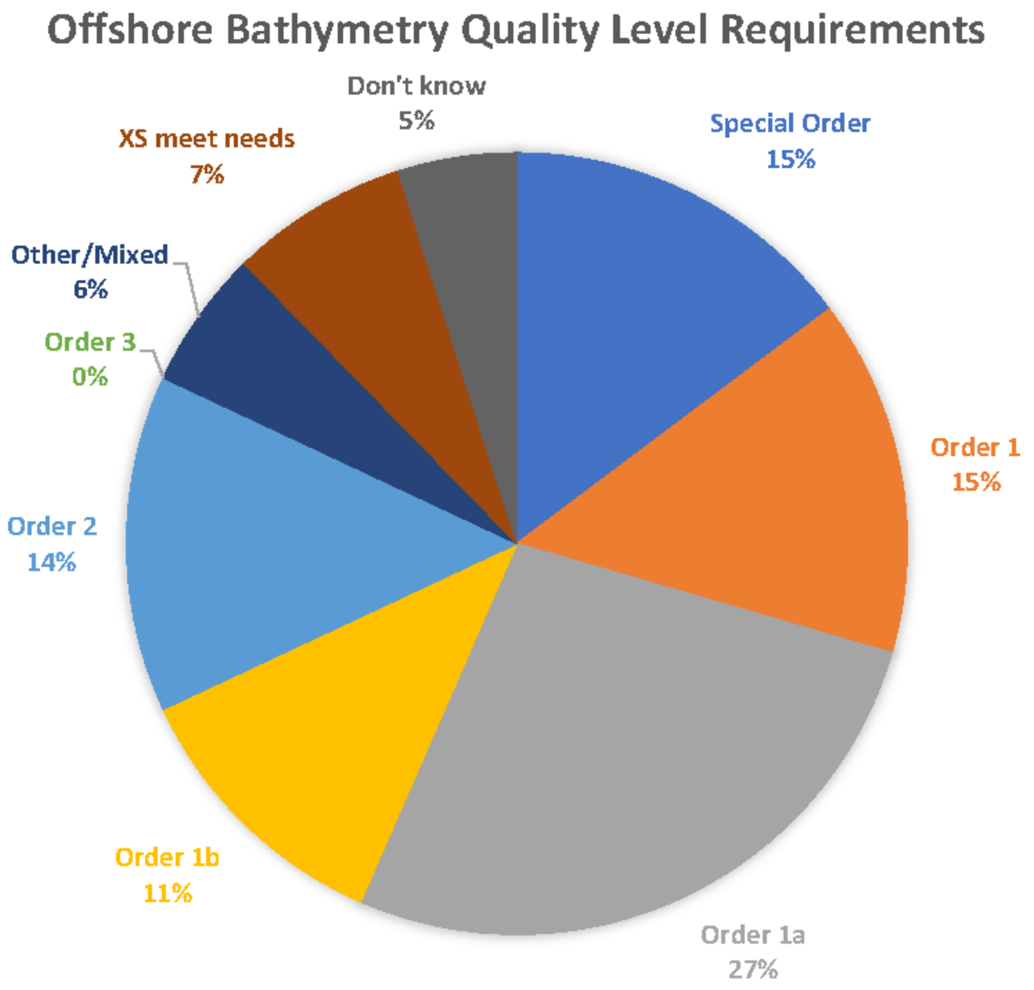
+

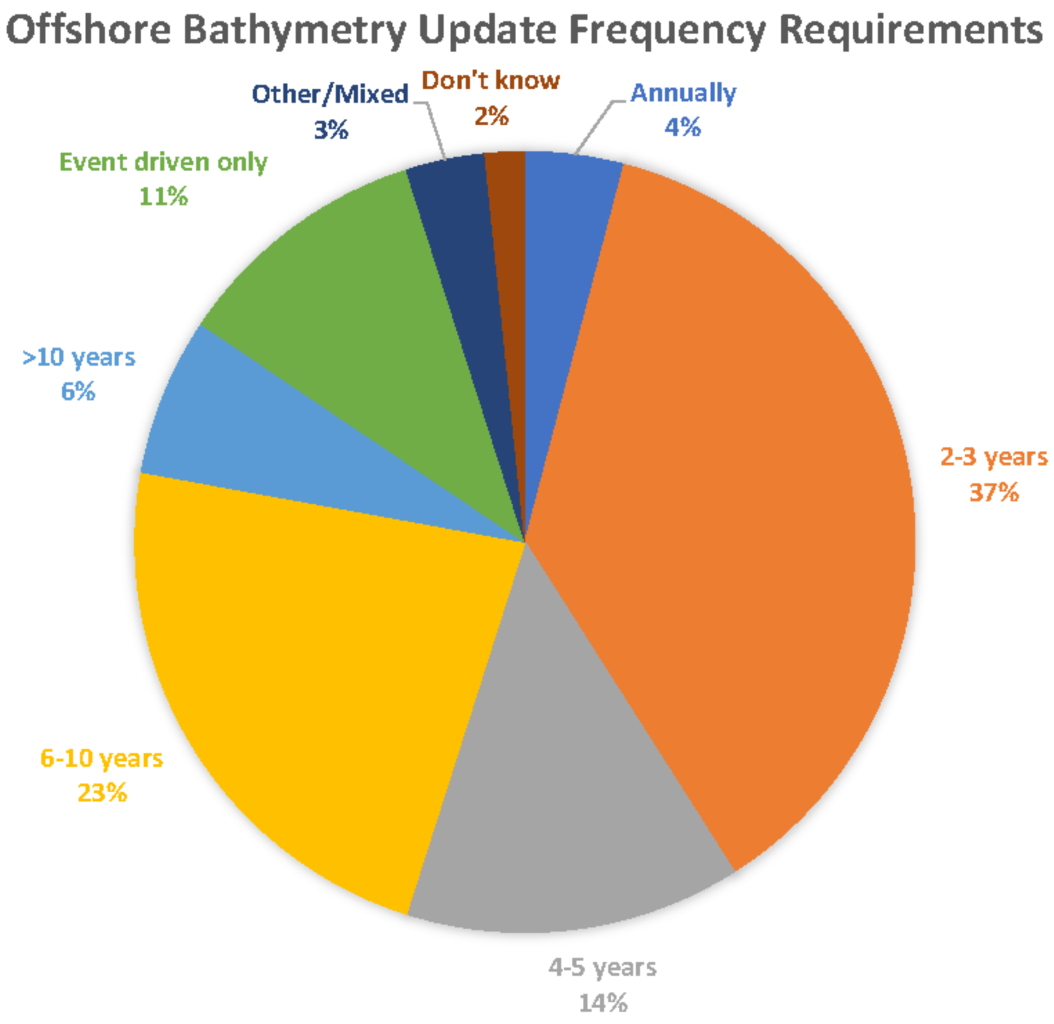
Florida Nearshore Bathymetry Requirements





Florida Offshore Bathymetry Requirements





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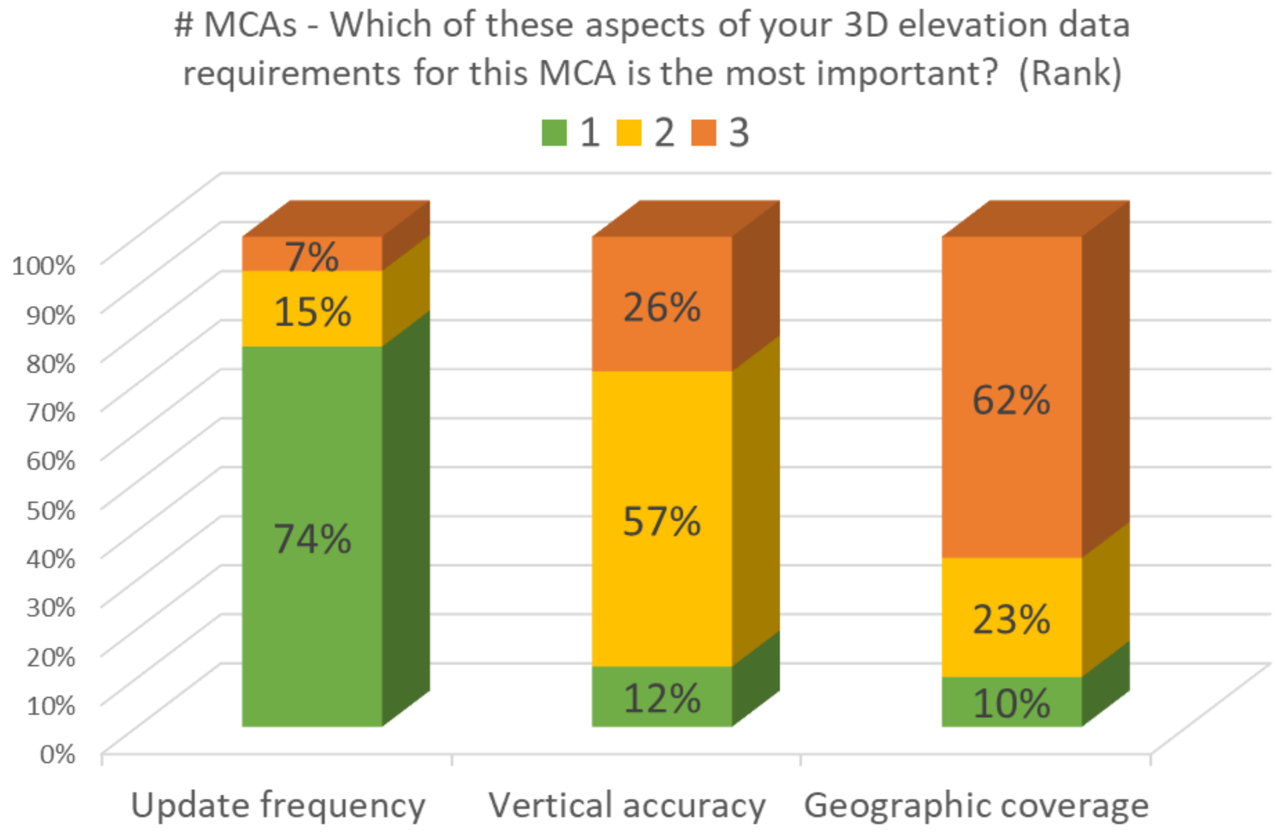
Ranked Importance of Key Requirements

All Geographies



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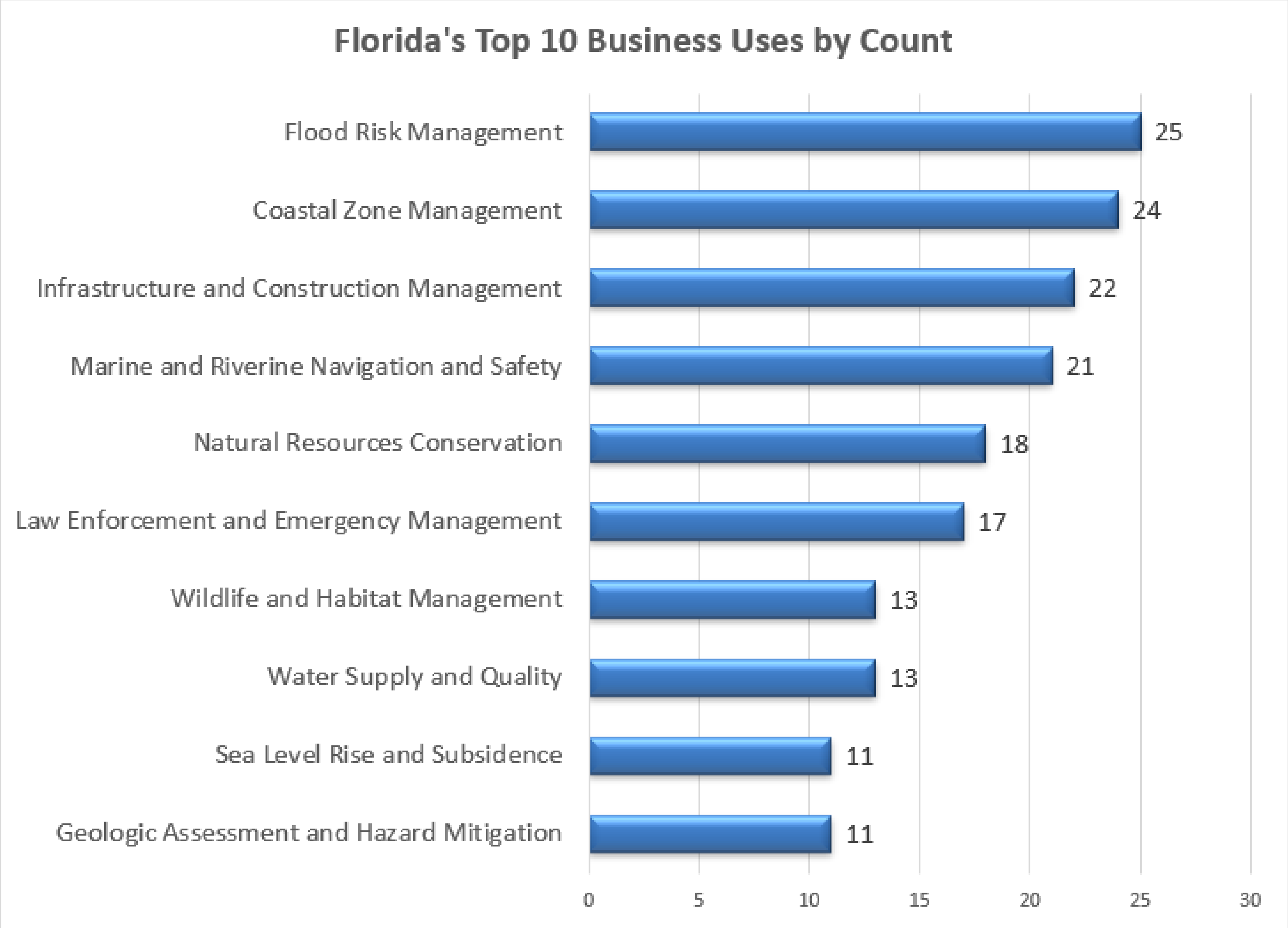
Florida Top 10 Business Uses



Future Annual Benefits

Annual Dollar Benefits by Organization and Geography Type

Organization Type	Future Annual Benefits
Federal agencies	$5.84B
State, regional, county, local, and tribal government	$7.68B
Not-for-profit and private entities	$0.04B
Total	**$13.56B**

Geography Type	Future Annual Benefits
Inland topography	$9.99B
Inland bathymetry	$0.86B
Nearshore bathymetry	$2.55B
Offshore bathymetry	$0.16B
Total	**$13.56B**

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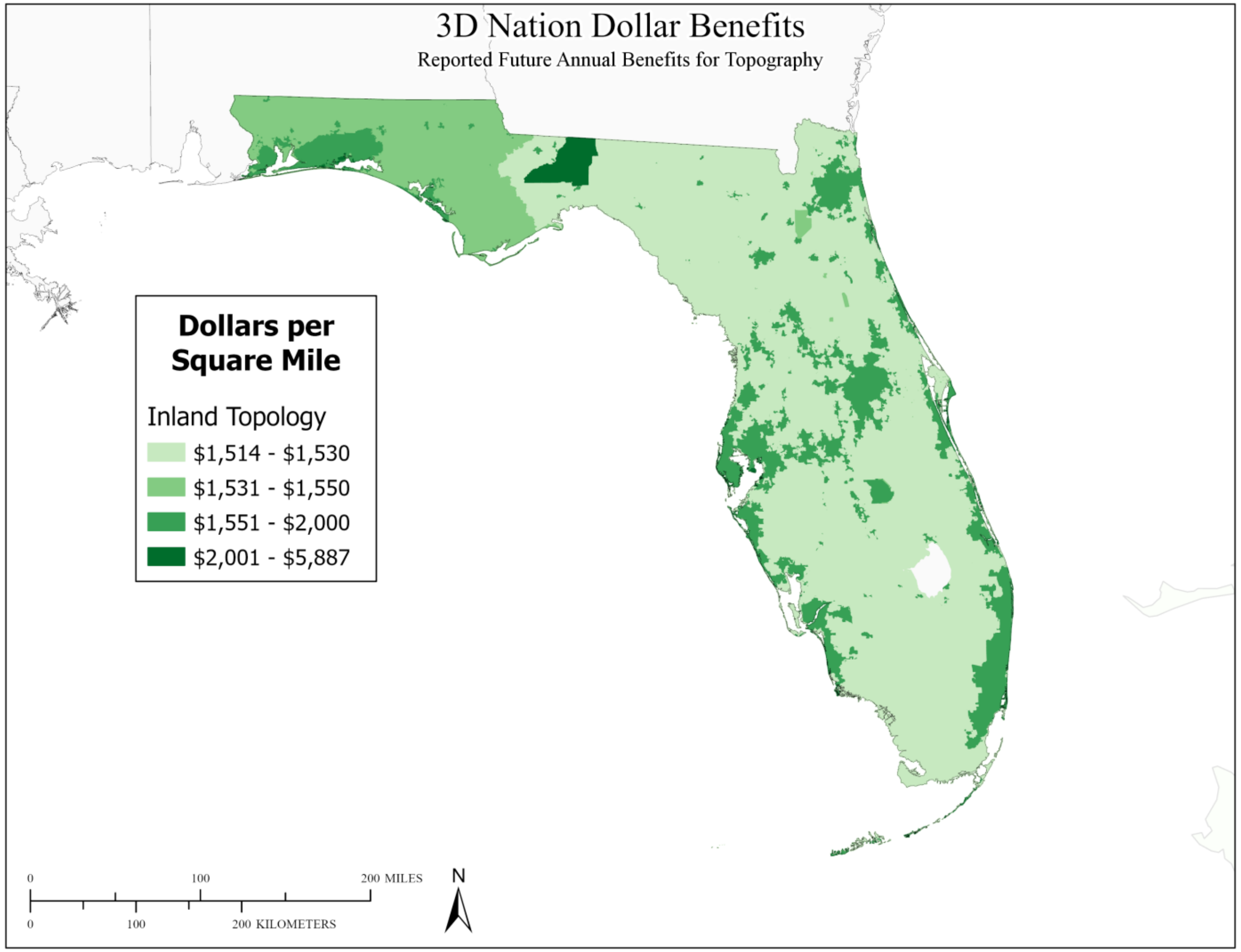
Florida Dollar Benefits – Inland Topography



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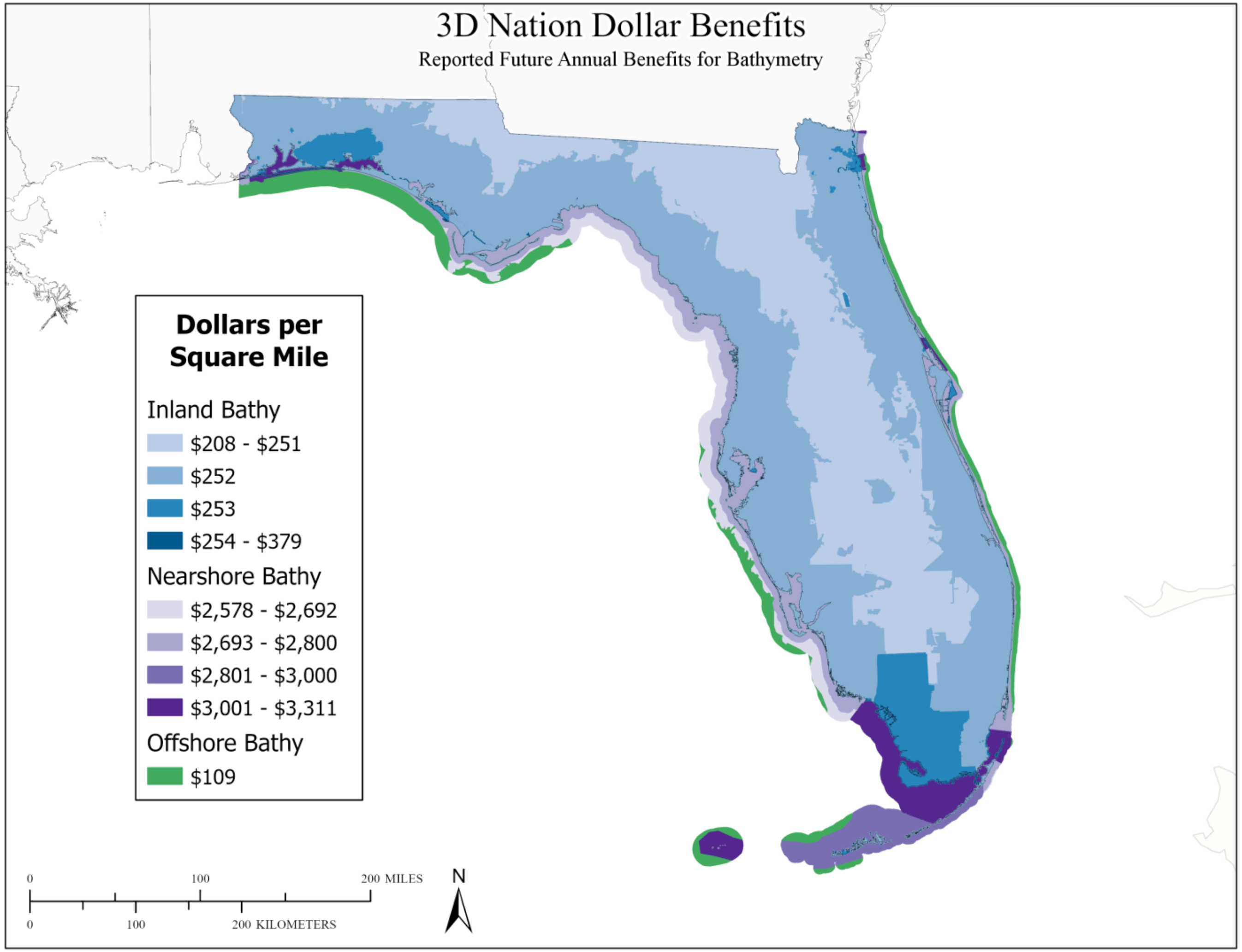
Florida Dollar Benefits – Bathymetry



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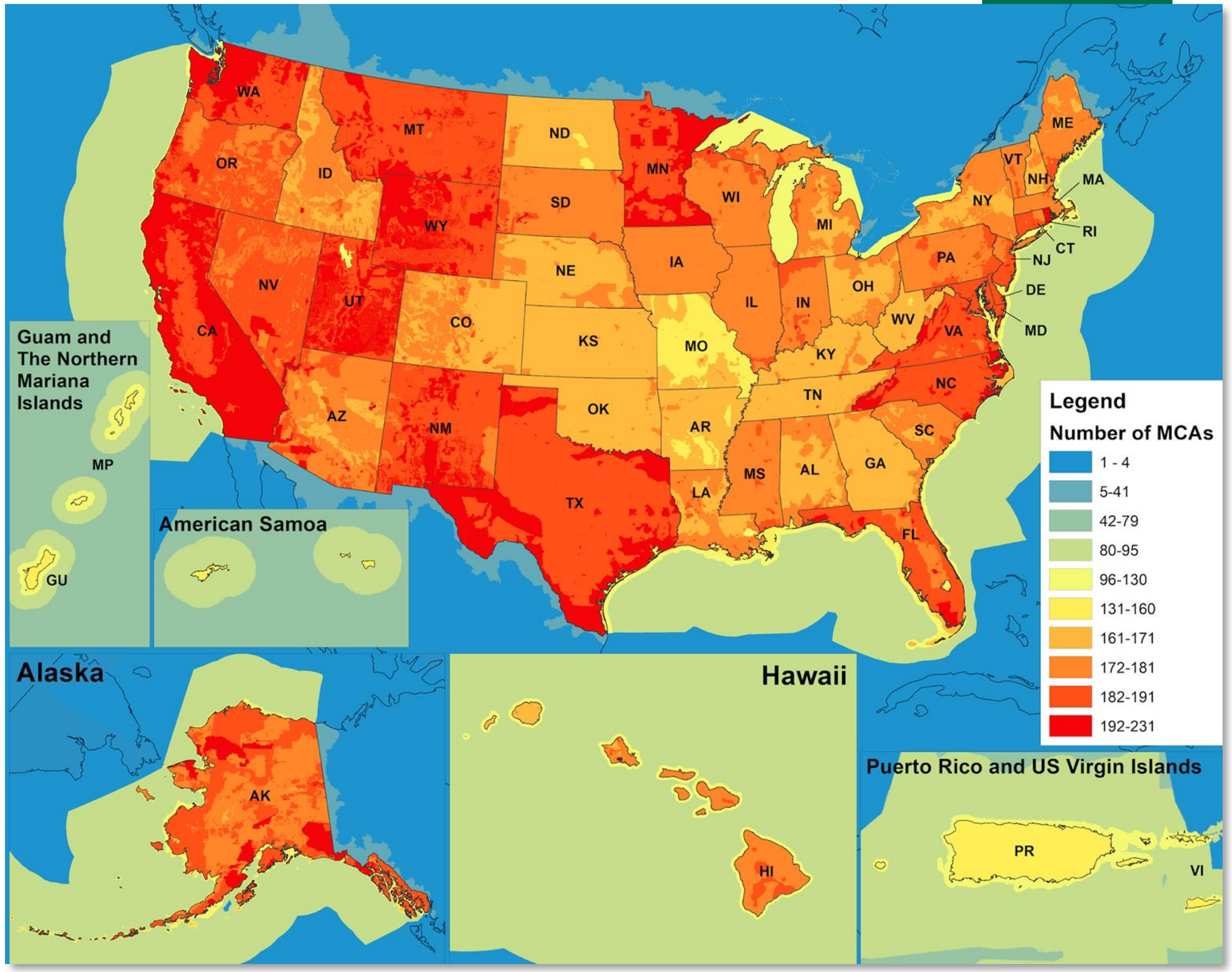
Benefits Are Likely Underestimated

- Respondents were hesitant to estimate benefits from data they do not have yet or use regularly. 3DEP data are better known and understood than bathymetry.
- Missing input from smaller private firms and individual users:
  - Only one small engineering firm responded to the 3D Nation Study, indicating millions of dollars in annual savings from the availability of public domain elevation data. If many of the 24,000 other engineering firms and 16,000 land survey firms had similarly responded, the annual benefits would have been billions of dollars higher.
- Missing future annual dollar benefits from key industries:
  - Commercial timber
  - Precision agriculture
  - Fish and seafood aquaculture
  - Mining
  - Wind energy
  - Oil and gas
  - Motor vehicle manufacturers
  - Shipping, boating, fishing, and cruise lines
  - Port and harbor managers
  - Engineering and surveying
  - Real estate, banking, mortgage, and insurance
  - Telecommunications

Geospatial Benefit Cost Analyses

- All user requirements and benefits are tied to geospatial AOIs
- 1km grid overlaid on land and water areas
- Requirements, benefits, and costs are calculated per grid cell and aggregated to HUC, state, and national scales
- Cost information derived from data provided by the Government
- Reduced Value Multipliers applied
- Scenarios were run for all combinations of QL and update frequency plus some mixed QLs/update frequencies



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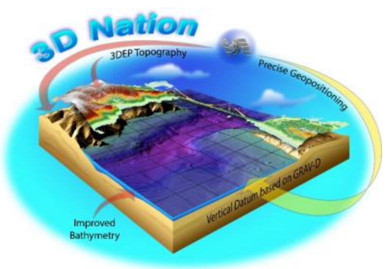
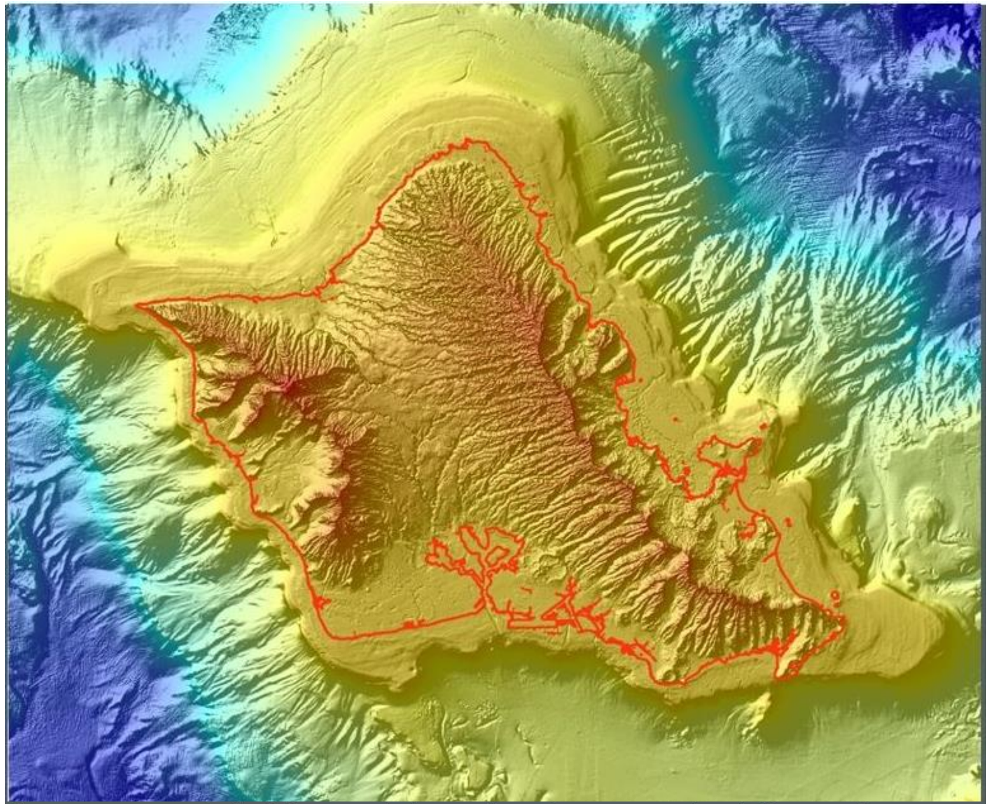
What’s Next for the 3D Nation Study?

- **Publish** Study report – *Published Sept 2022*
  - https://usgs.gov/3DEP/3DNationStudy
- **Determine** program direction using study results

Thank You



3D Nation - Builds a modern elevation foundation from the peaks of our mountains to the depths of our waters for stronger, more resilient communities and U.S. economy.



Integrated 1-Meter Topobathymetric Elevation Model (TBDEM) for Oahu, Hawaii (USGS CoNED)

Image: Coastal National Elevation Database (CoNED)

Study Report

https://usgs.gov/3DEP/3DNationStudy

Questions?

Whole study: shoegberg@dewberry.com
Topography & Inland Bathymetry: 3dep@usgs.gov
Nearshore & Offshore Bathymetry: iwg-ocm.staff@noaa.gov

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Offshore Mapping Prioritization

Rene Baumstark, FWRI

Offshore mapping prioritization

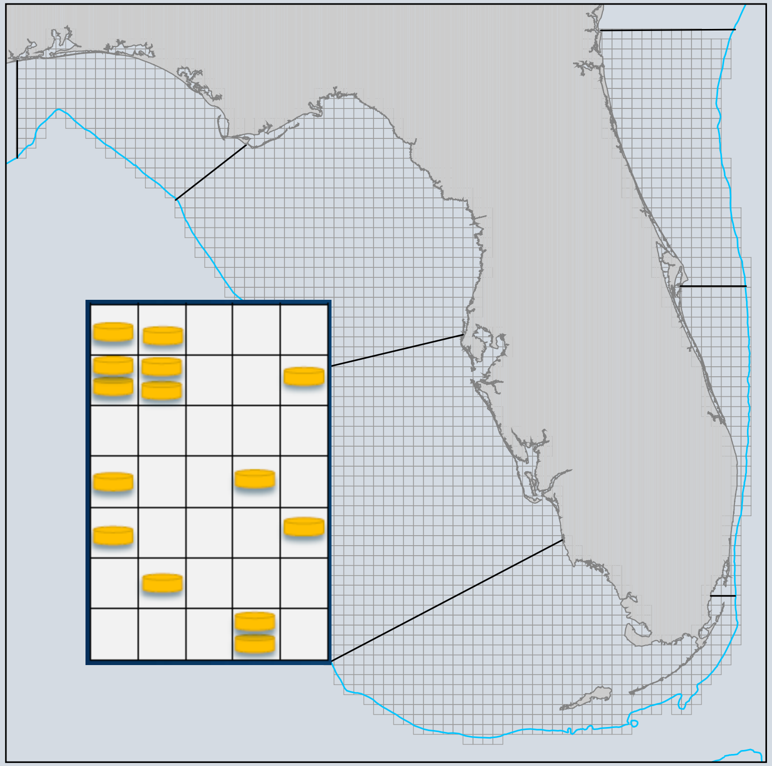
René D. Baumstark, Ph.D.
FWC, Fish & Wildlife Research Institute

Objective

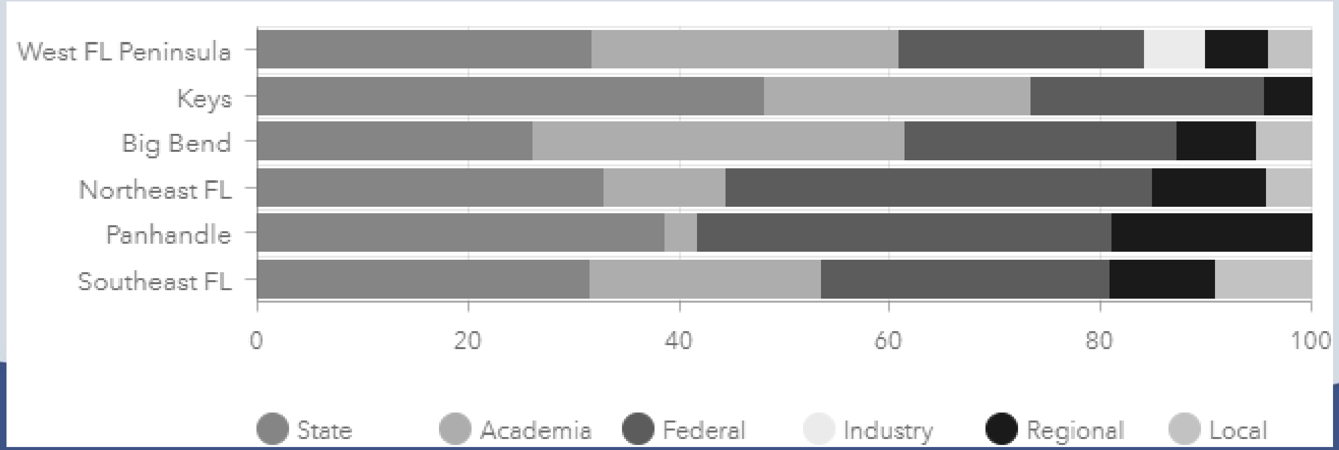
- Feedback on prioritization maps developed 3 years ago, particularly in deep water (20-200m) that may not be mapped by FSMI.

Provide an overview for discussion

Mapping Prioritization Process



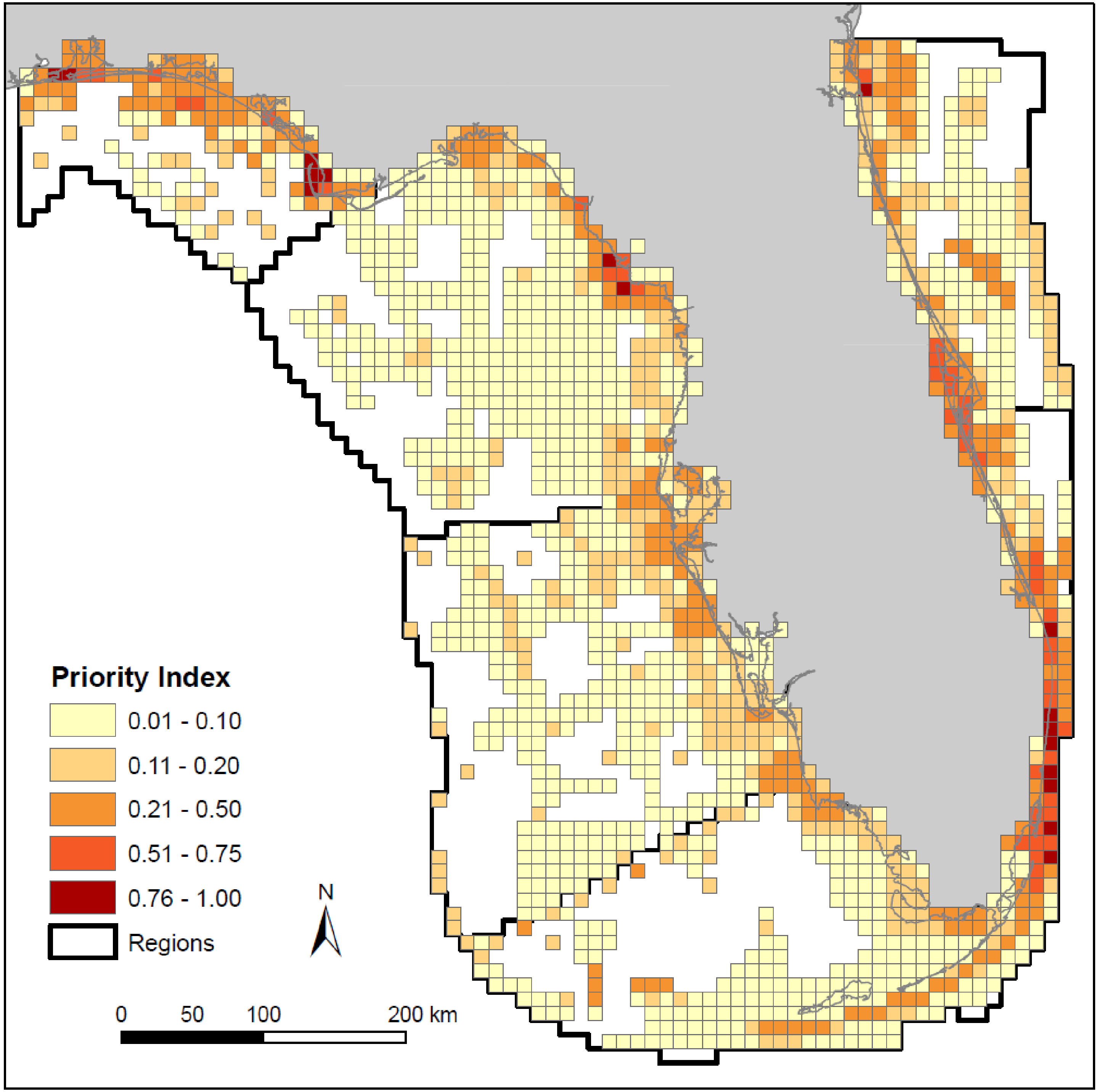
- Prioritization Tool - Collect stakeholder input
  - Web based GIS
- Prioritize needs by allocating coins
  1. Priority location
  2. Degree of priority (# of coins/cell)
  3. Reason it is a priority (Mapping Need)
  4. What is the priority (Map Products)
- Regional workshops
  - 2018 & 2019



Results

Normalized Priority Index

- 35% of cells in study area did not receive any coins
- Nearshore concentrations



Priority Mapping Need

- General knowledge gap
- Habitat mapping and coastal geomorphology
- Resource management
- Fishing and fisheries
- Recreation
- Navigation/safety/marine infrastructure
- Scientific research and education Cultural/historical resources

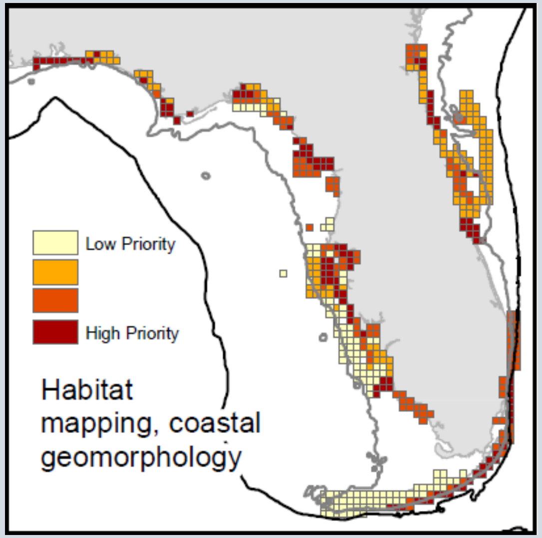
Mapping Product

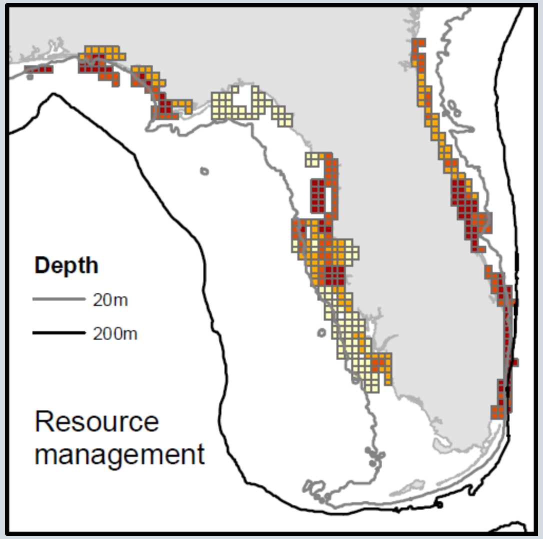
- Bottom type - Side-scan sonar
- Bottom type - Multibeam backscatter
- Sub-bottom geology from a profiler
- Ferrous objects from a magnetometer
- Ground data such as imagery/grabs or in situ spectrometry
- Seafloor color from remotely collected imaging sensor

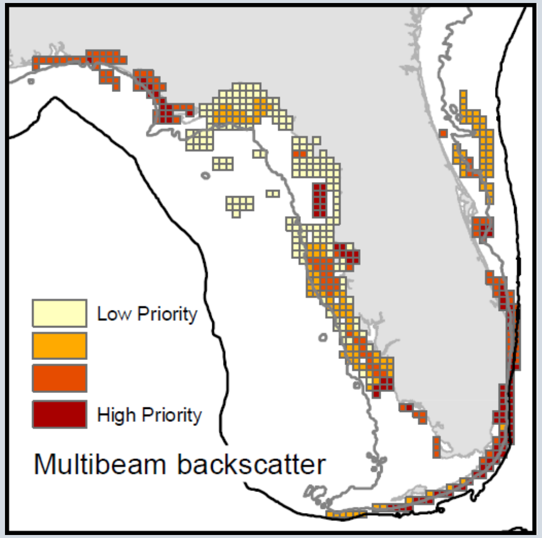
Identified Priorities

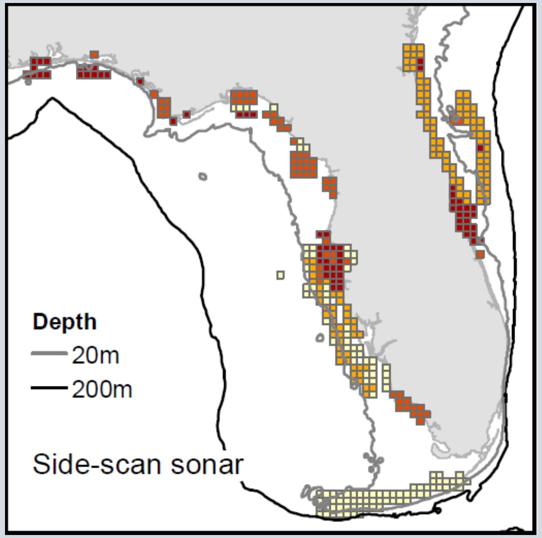
- Priority Mapping Need:
    1. Habitat Mapping & Coastal Geomorphology
    2. Resource Management

- Priority Mapping Products:
    1. Bottom type (MB backscatter)
    2. Bottom type (Side-scan sonar)



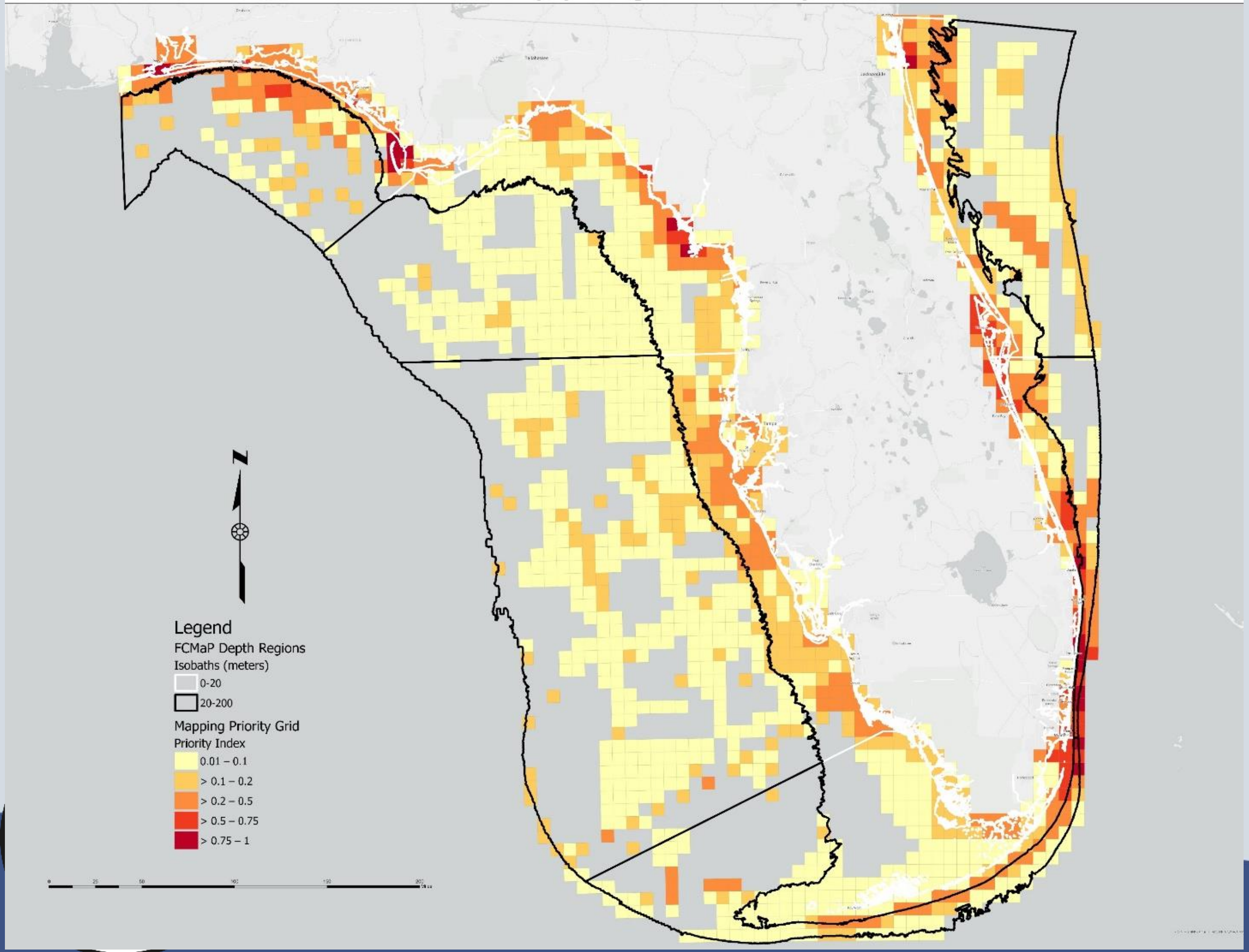




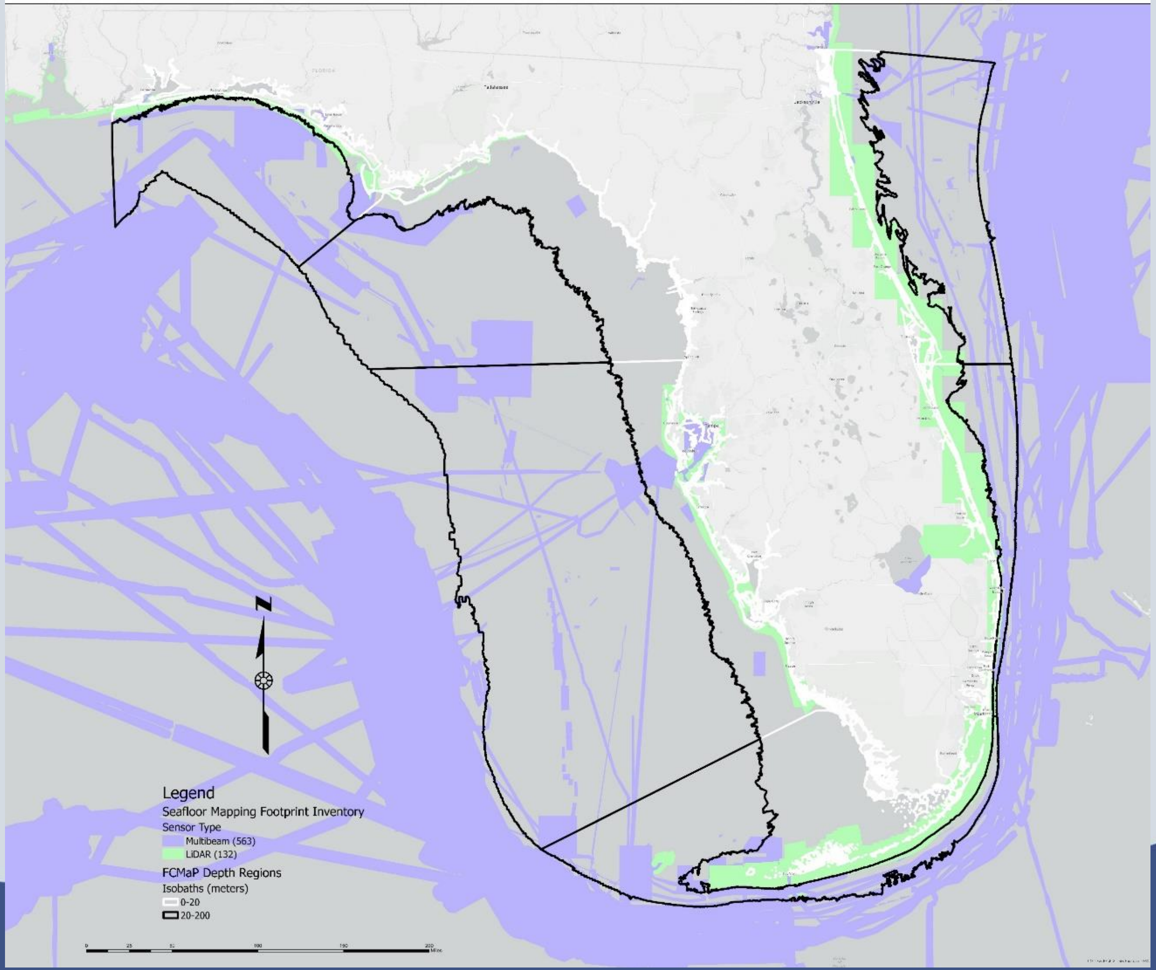


Identified Priorities

FCMaP Mapping Priority Index



FCMaP Full Multibeam and LiDAR Inventory



Discussion: Offshore mapping prioritization

- Does this prioritization hold true for your current needs? What could/should change?
- Are there any existing or planned project footprints we are missing?
- Is the prioritization data useful (in the right format, scale, etc.) for guiding new acquisitions.
- What resolution bathymetry do we need for low relief areas?
- How do we identify aeras of interest without high resolution data?
  - Fisheries research/mgmt, resource mgmt
- Planning – how can we best coordinate?
  - NOAA SeaSketch?
- Is FCMaP hub/inventory meeting your needs for Data Discovery?
- How do we fill in the rest of the offshore gaps? -Drones? Funding?
- Why is it important? Building a case for funding offshore mapping
  - Fisheries research, resource management (wind farms, aquaculture, etc., target sampling efforts (species biodiversity, fisheries), ecosystem modeling...

Breakout Discussion Groups

- Gulf Coast – stay in 3rd floor conference room
- East Coast – 1st floor auditorium

Virtual attendees – Cover both East and Gulf Coast


Aquaculture
Environment
Tourism
Research
Energy
Sand Resources
2017 BEACH
RENOURISHMENT
PROJECT
Public Meeting
Fisheries
Safety

Break

Florida Coastal Mapping Program Summit 2022

Breakout Group Discussions

Offshore Mapping Prioritization Discussion Questions

- Does this prioritization hold true for your current needs? What could/should change?
- Are there any existing or planned project footprints we are missing?
- Is the prioritization data useful (in the right format, scale, etc.) for guiding new acquisitions.
- What resolution bathymetry do we need for low relief areas?
- How do we identify aeras of interest without high resolution data?
- Fisheries research/mgmt, resource mgmt
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Breakout Group Report Outs

Day 1 Wrap Up

Jenna Tourje-Maldonado, Kearns & West

Florida Coastal Mapping Program Summit 2022

December 1, 2022

Florida Coastal Mapping Program Summit Report 2022

Thank you sponsors!

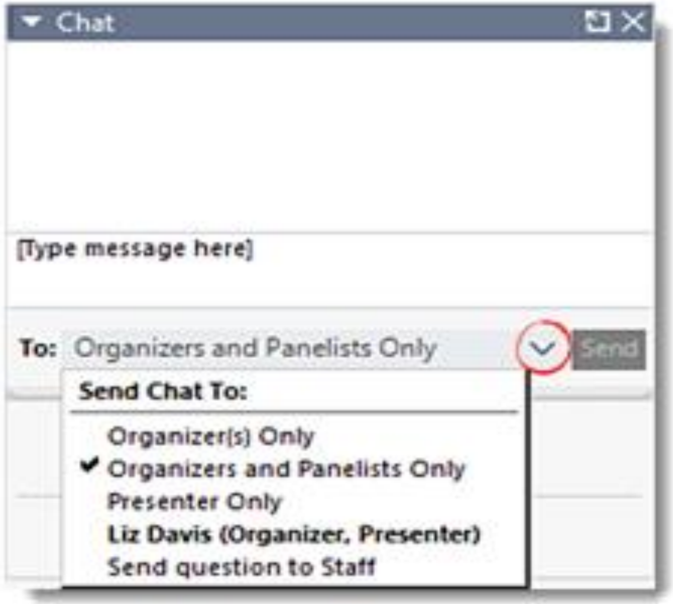
Hybrid and In-Person Integration

- The facilitator will note virtual attendee questions and comments
- The facilitator will provide the opportunity for virtual attendees to ask questions and unmute when they raise their hand
- Virtual presenters will present via GoToWebinar
- In-person and virtual attendees will be able to communicate back and forth through the OWL system and GoToWebinar
- Both in-person and virtual attendees will be able to respond to the polls

GoTo Webinar Logistics

Interaction: We encourage you to engage with your fellow attendees, the speakers, and the organizers

- Please utilize the chat box and keep your microphone muted and your camera off unless prompted otherwise by an organizer.
- Please use the **"chat box"** function in your menu on the right to send messages to "organizers" for technical questions, or "panelists and organizers" to chat with all virtual attendees or choose a particular attendee to chat privately with.
- Use the "raise hand" function and an organizer will be with you shortly.
- We will only be opening up questions after each talk, but please feel free to submit them during the presentations and the organizer will address them out loud during discussion times.
- Feel free to type in follow up questions to any discussion you are a part of!



GoTo Webinar Logistics

Agenda and Handouts: You can find the full agenda in the "handouts" in your GoToWebinar menu pane to the right.

Follow up: Written comments are always welcome, now and later, **chapke@usf.edu**

If you are having trouble with your connection, please email **amber.butler@noaa.gov**

Productive Conversations

- Let’s talk
- “Honor” the agenda
- Participate actively and respectfully
- Raise your hand to speak – facilitator will call on you in order
- Speak clearly into the mic/phone/owl for others to hear you
- Enjoy our time together

Agenda – Day 2

Mapping Activities

1:00 – 1:30 PM	Florida State Mapping Initiative
1:30 – 2:30 PM	Group Discussion: Florida Seafloor Bathymetry
2:30 – 2:45 PM	Networking and Coffee Break
2:45 – 2:55 PM	Hurricane Ian LiDAR
2:55 – 3:45 PM	Group Discussion: Storm Response
3:45 – 4:00 PM	Open Comments and Discussion
4:00 – 4:05 PM	Wrap Up

Agenda – Day 2

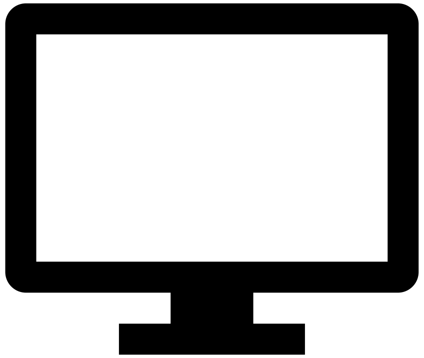
Mapping Activities

9:00 – 9:05 AM	Welcome and Agenda Overview
9:05 – 9:30 AM	Keynote: Crowd Sourced Bathymetry
9:30 – 10:30 AM	CSB Panel Discussion
10:30 – 10:45 AM	Break
10:45 – 12:00 AM	Lightning Talks: Federal and Academic Mapping Updates
12:00 – 1:00 PM	Lunch

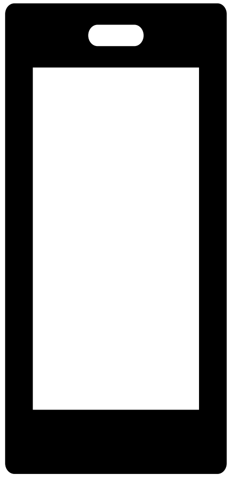
Welcome
Day 2

Introductions

Poll Everywhere Instructions



BY BROWSER
Go to **pollev.com/kwpoll1** on your internet browser.



BY SMART PHONE
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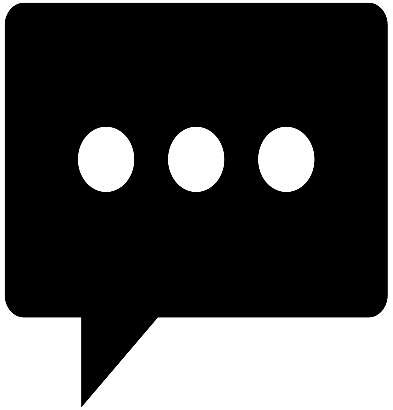


BY TEXT MESSAGE
Text **kwpoll1** to 22-333 on your mobile device.

Use an underscore (“_”) or tilde (“~”) between words to submit them as a single word cloud response

When poll is active, respond at **pollev.com/kwpoll1**

Text **KWPOLL1** to **22333** once to join

What is the most exciting aspect of crowd-sourced bathymetry?

Mapping the gaps

Public engagement

New technology development

Keynote

Jennifer Jencks, NOAA NCEI

Encouraging Innovative Supplementary Data Gathering

The IHO Crowdsourced Bathymetry Initiative

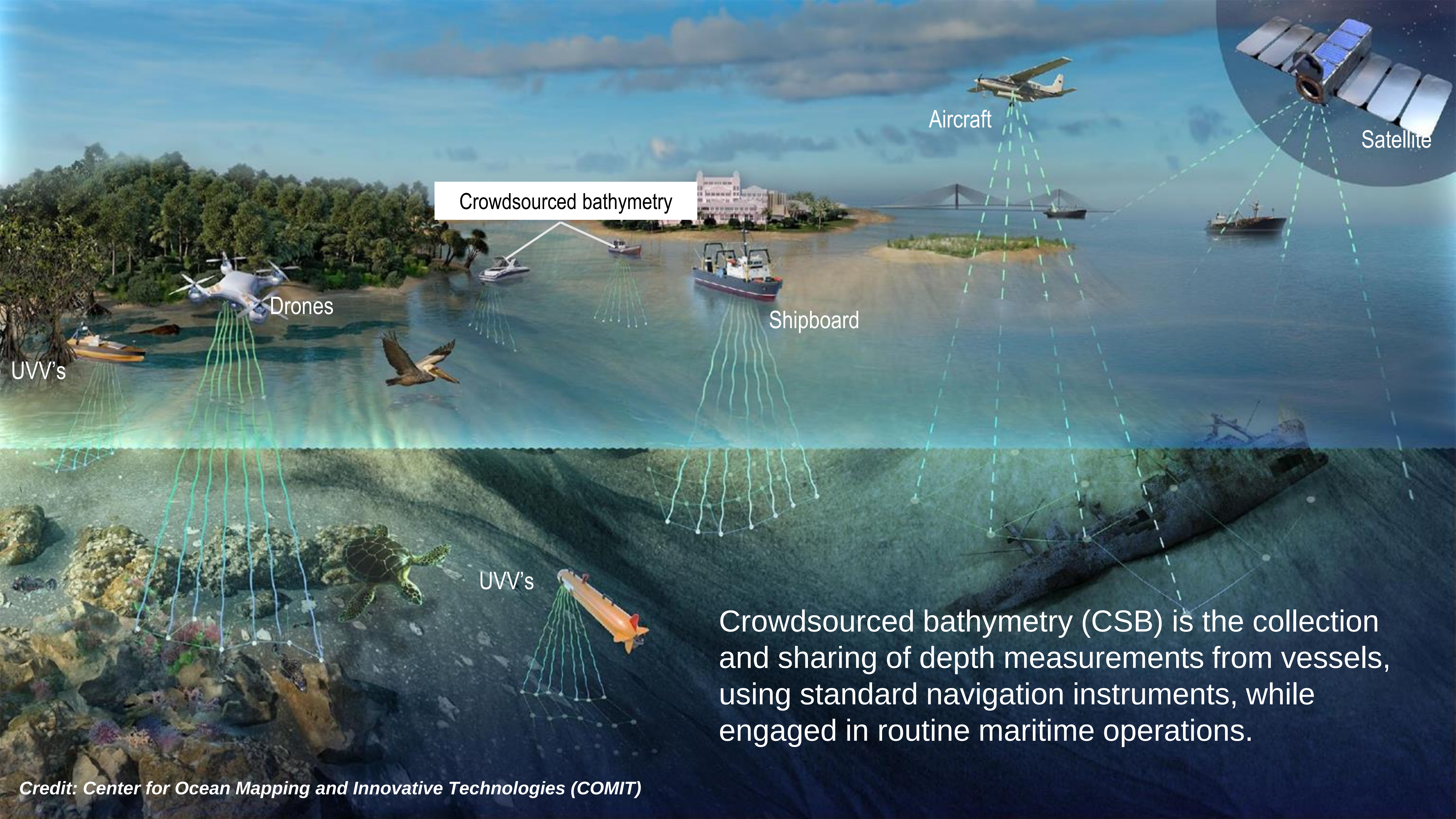
Jennifer Jencks

Director, IHO Data Center for Digital Bathymetry
Chair, IHO CSB Working Group
NOAA's National Centers for Environmental Information

jennifer.jencks@noaa.gov

2022 Florida Coastal Mapping Summit

IHO International Hydrographic Organization


Aircraft
Satellite
Crowdsourced bathymetry
Drones
Shipboard
UVV's
UVV's
Crowdsourced bathymetry (CSB) is the collection and sharing of depth measurements from vessels, using standard navigation instruments, while engaged in routine maritime operations.
Credit: Center for Ocean Mapping and Innovative Technologies (COMIT)

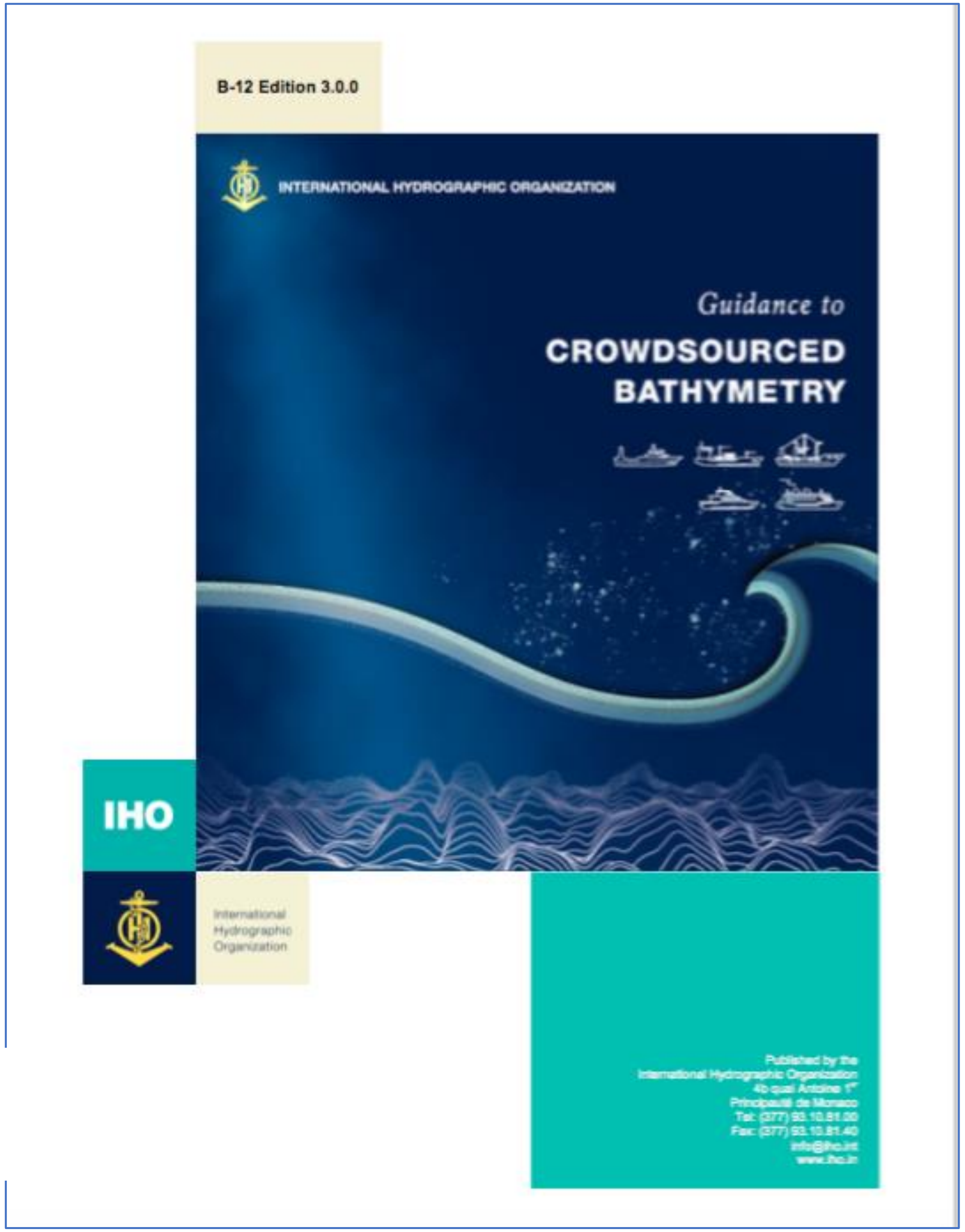
The IHO Crowdsourced Bathymetry Initiative

IHO CSBWG - B12

International
Hydrographic
Organization

A Working Group was formed and tasked to develop ***B-12 IHO Guidance on Crowdsourced Bathymetry*** that states the IHO's policy towards, and best practices for, the collection and contribution of CSB.

Edition 3.0.0 was published in October 2022.



iho.int/uploads/user/pubs/bathy/B_12_CSB-Guidance_Document-Edition_3.0.0_Final.pdf

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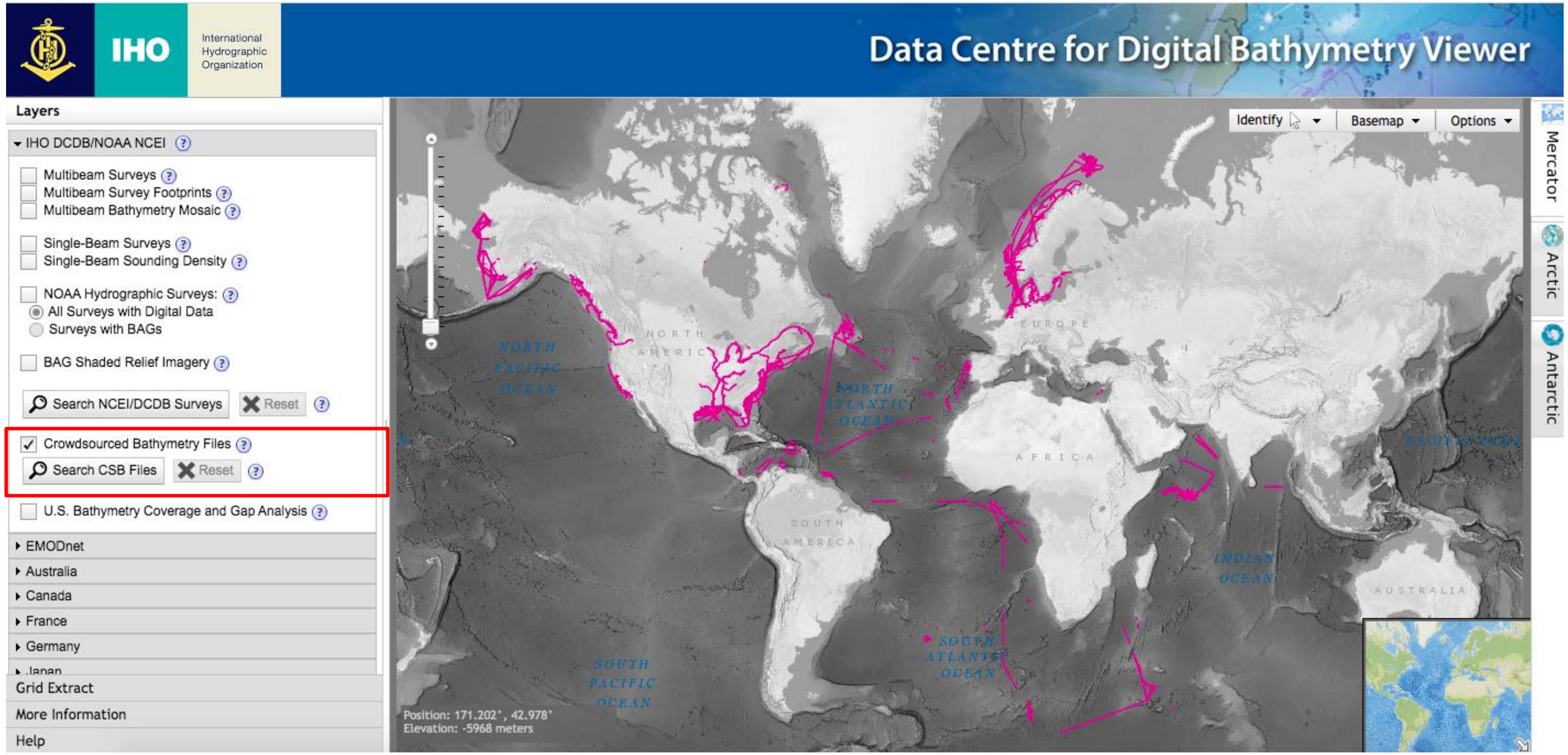
The IHO Crowdsourced Bathymetry Initiative

IHO DCDB

The NOAA-hosted IHO Data Centre for Digital Bathymetry (DCDB) established a data pipeline to allow the public to contribute, discover and download CSB data.



ncei.noaa.gov/maps/iho_dcdb

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Organization

The IHO Crowdsourced Bathymetry Initiative Pilot Project

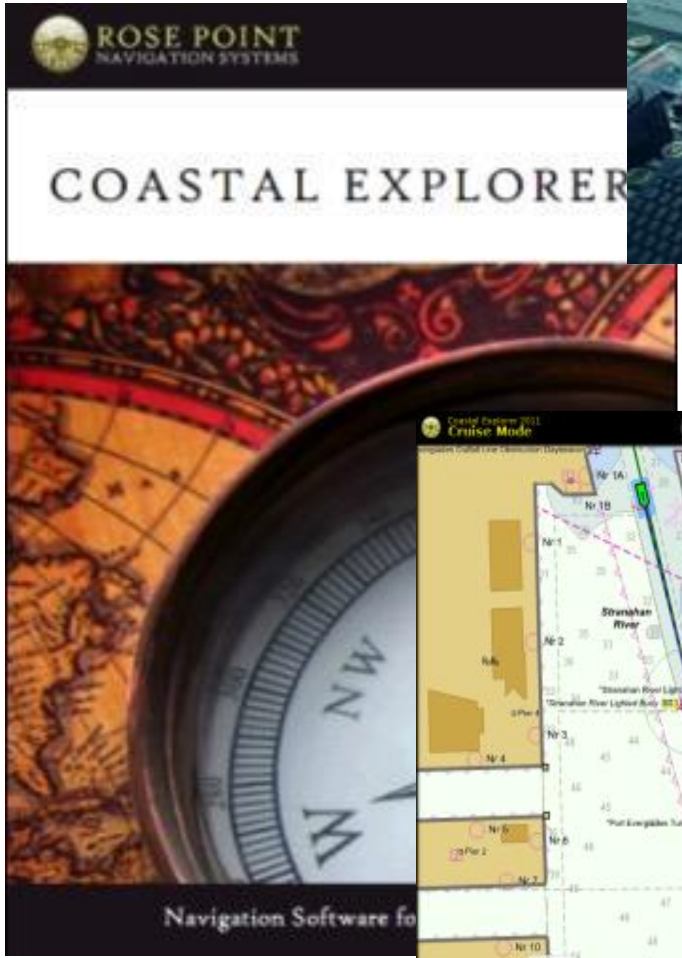
- NOAA (OCS and NCEI/DCDB) teamed up with Rose Point Navigation Systems

- Using their navigational system software (Coastal Explorer), mariners can enable a modified electronic charting system log file to record position, depth and time.

- Mariners can capture metadata about vessel and equipment.

- Whenever the mariner updates the software or chart catalog, the data is sent to Rosepoint who then transmits the data to the DCDB via HTTPS post.

www.pcmaritime.com



www.rosepointnav.com

noaacoastsurvey.wordpress.com/2016/06/14/beta-test-csb/

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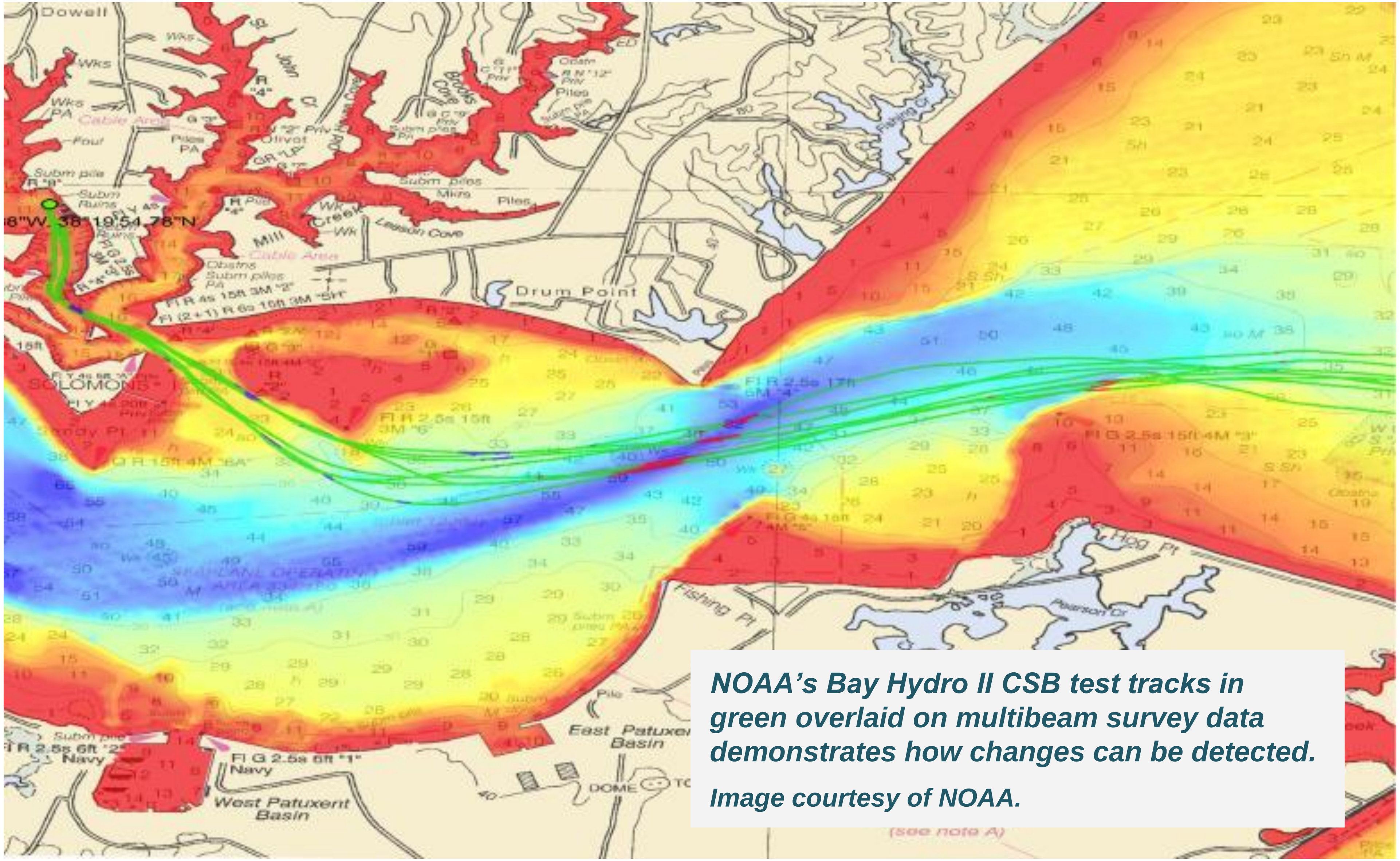
The IHO Crowdsourced Bathymetry Initiative Pilot Project



NOAA's Bay Hydro II CSB test tracks in green overlaid on multibeam survey data demonstrates how changes can be detected.

Image courtesy of NOAA.

The IHO Crowdsourced Bathymetry Initiative

CSB Data Pipeline

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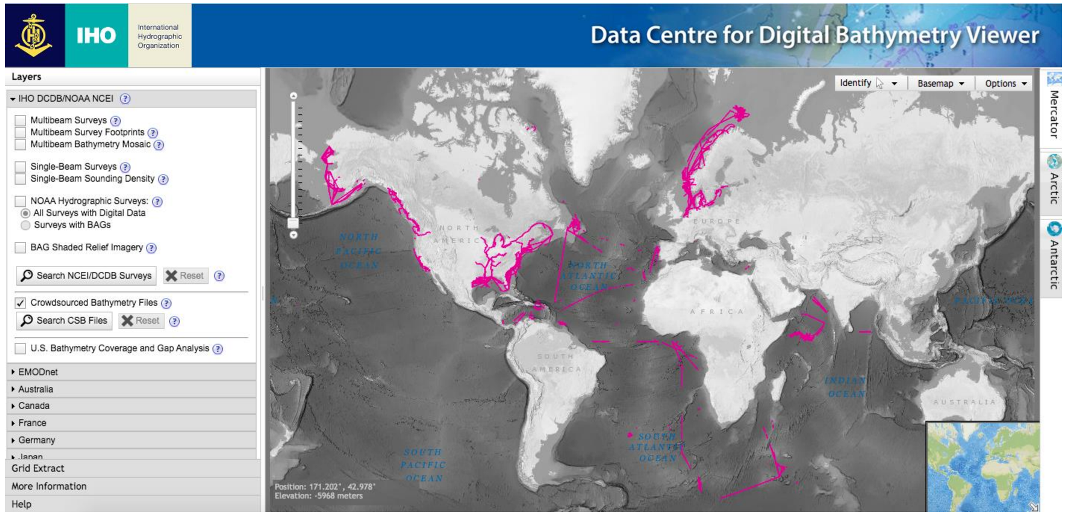
Data discovery and access via map viewer.

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    }
}
```


CSB data log file (with JSON metadata string)


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lat,lon,depth,time
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47.666517,-122.098527,14.63,20161017T234839Z
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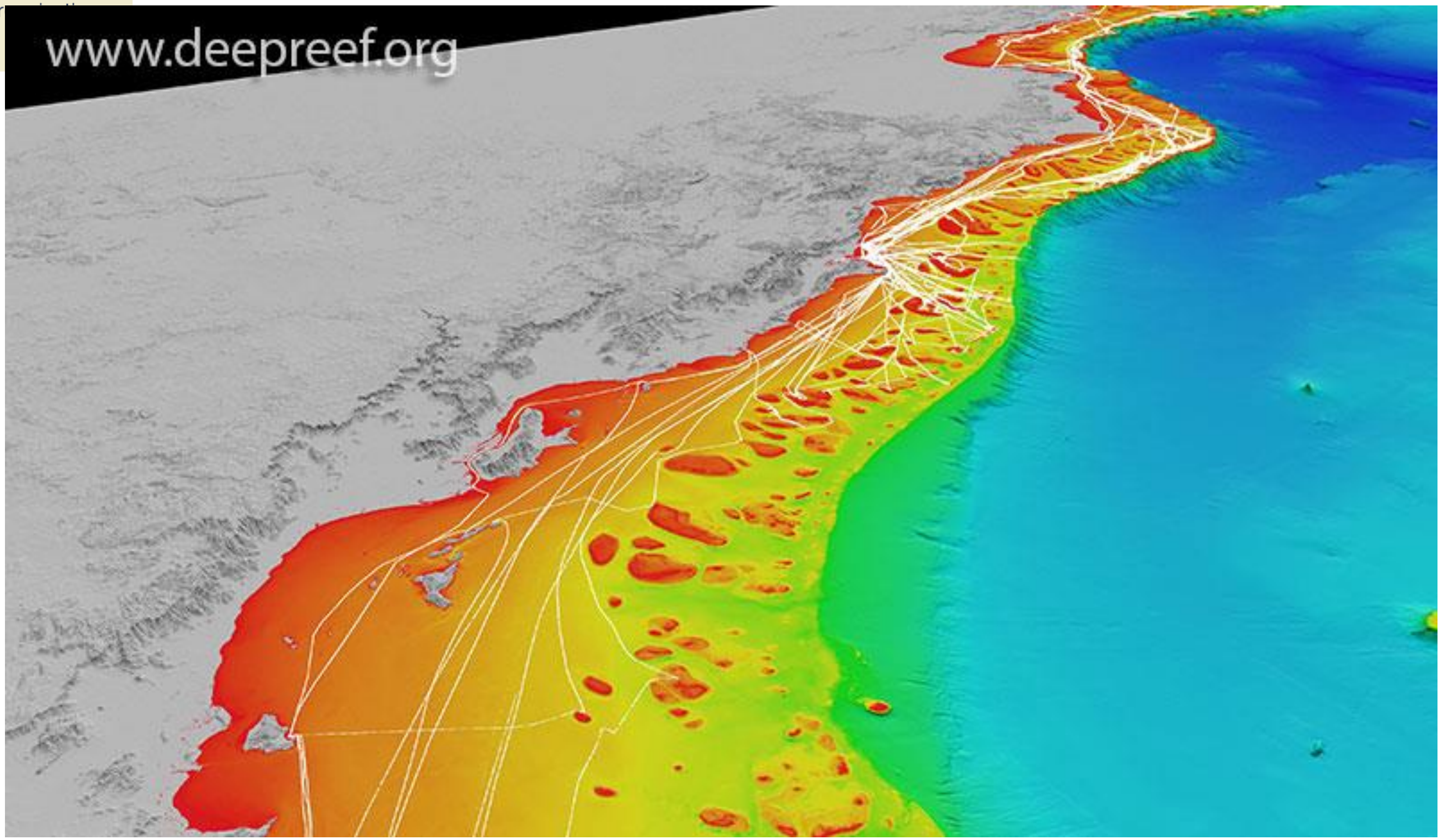
Data and identifying token are submitted to DCDB via HTTPS post

Frequent update of viewer

IHO

International Hydrographic Organization

Value



3D view of northern Great Barrier Reef showing all vessel tracks as of December 2019.
Credit: Robin Beaman

- Data with scientific, commercial & research value at little to no cost to the public sector
- Fill gaps where data is scarce (eg: Arctic, SIDS)
- Useful along shallow, complex coastlines
- Identify uncharted features
- Assist in verifying charted information
- Confirm whether charts are appropriate for the latest traffic patterns.

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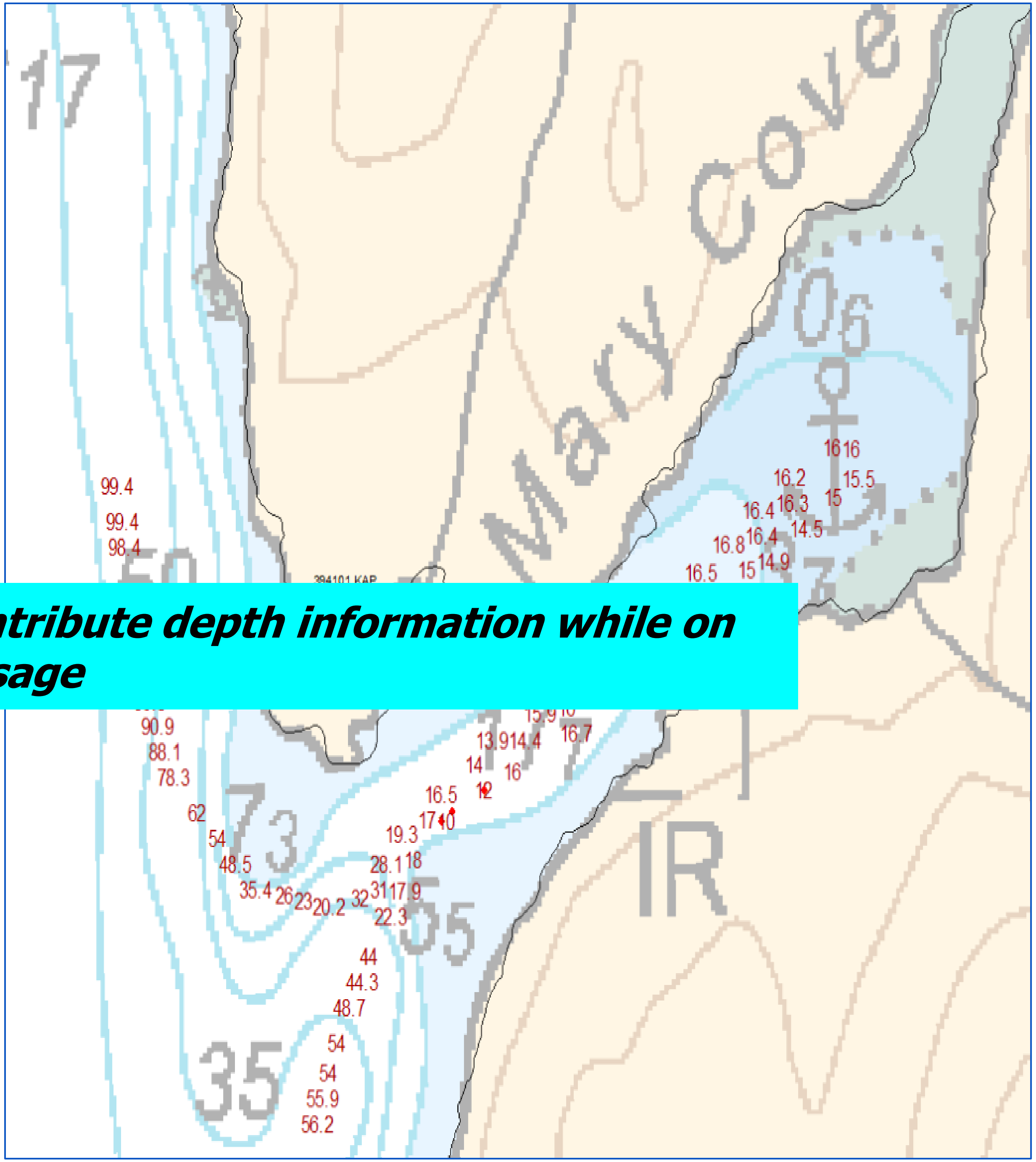
Value

- The Canadian Hydrographic Service has used CSB to update several Inside Passage charts along coastal routes.

- A systematic comparison of charted depths < 10 m y... data de... areas that were surveyed with single beam.

- CSB helped prioritize survey areas for the following survey season

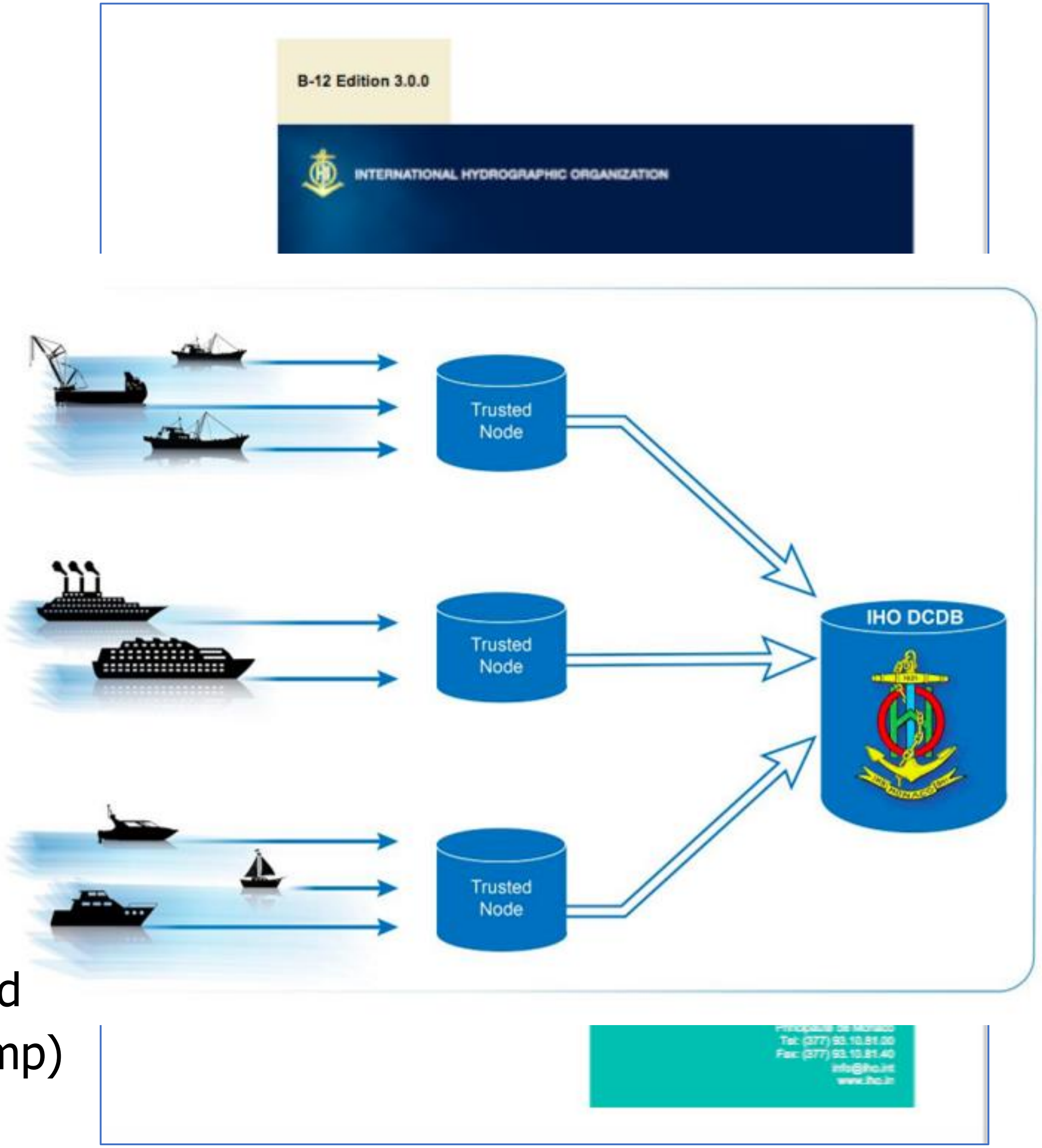
- CSB has initiated the publication of Notices to Mariners.



...but only if vessels collect and contribute depth information while on passage

How to Collect & Contribute CSB Data

- **B-12 IHO Guidance on Crowdsourced Bathymetry**
    - *iho.int/uploads/user/pubs/bathy/B_12_CSB-Guidance_Document-Edition_3.0.0_Final.pdf*
- The DCDB accepts CSB contributions through a network of "**Trusted Nodes**"
    - Eg: organizations, companies or universities serving as data liaisons between mariners (data collectors) and the DCDB.
    - Trusted Nodes may supply data logging equipment, provide technical support to vessels, download data from data loggers, and be responsible for data transfer directly to the DCDB.
- CSB data must be provided in either CSV or GeoJSON, and capture the minimum required information (XYZ, timestamp)



CSB Trusted Nodes – Software Companies

International
Hydrographic
Organization

Rose Point Navigation System

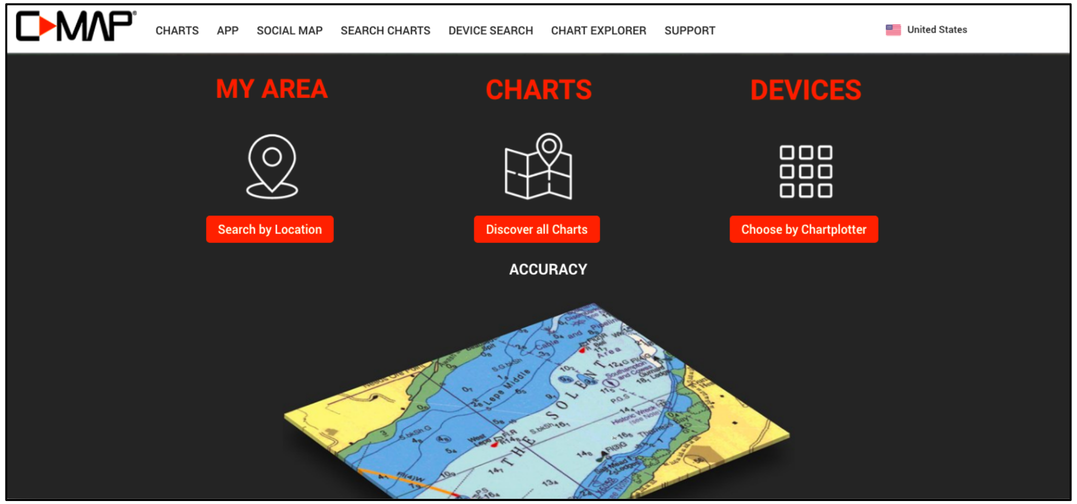
- Mariners can enable their electronic charting system log file to record *position, depth, and time*.
- When a mariner updates their software or chart catalog, data is transmitted to the DCDB

www.pcmaritime.com

www.rosepointnav.com

Navico C-MAP

- Finalized testing of new bathymetric feed b/w DCDB & navigation software company.
- Data contributions to begin soon.

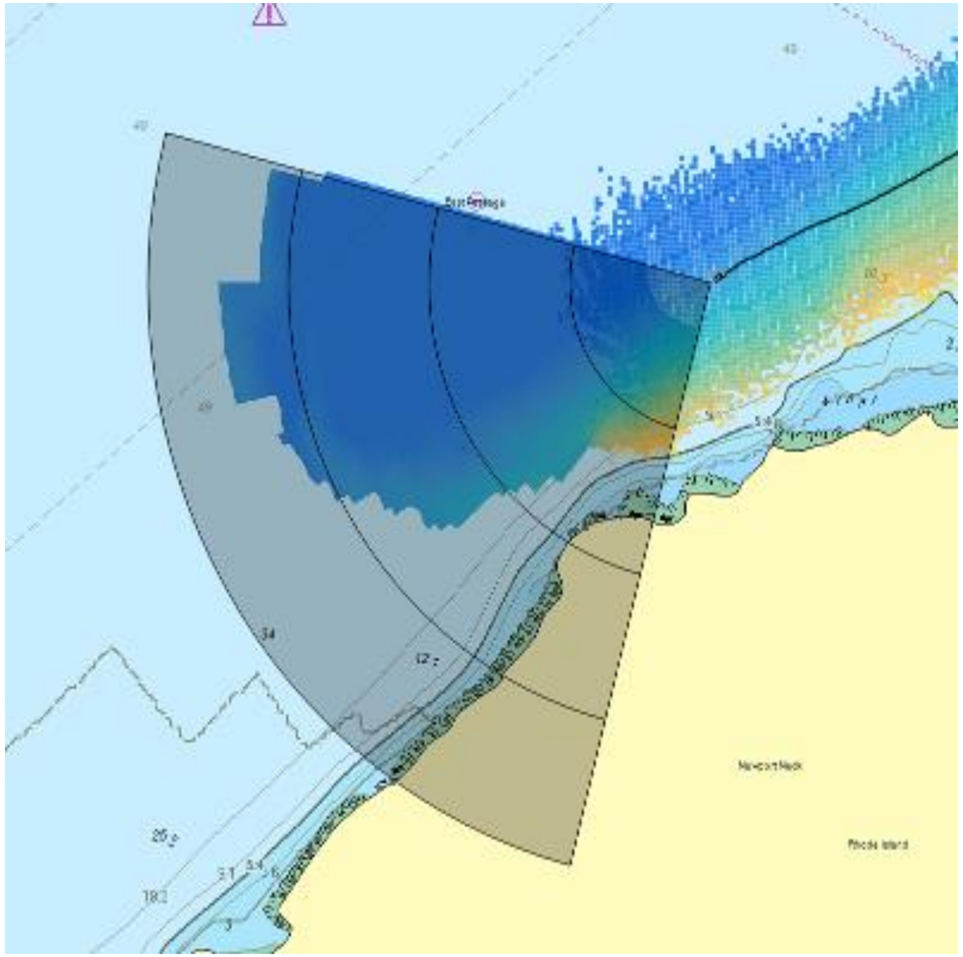


CSB Trusted Nodes – Hardware Companies

International Hydrographic Organization

FarSounder Inc.

- Designs and manufactures 3D Forward Looking Sonar (3D-FLS) for navigation and obstacle avoidance.
- Customers are given the option to participate in CSB collection and contribution



CSB Trusted Nodes – Cruise Line Industry

Voyage Data Recorder

Macgregor Germany / Carnival Cruise Line

- Macgregor Germany supplies Carnival Cruise Lines with VDR solutions.
- Voyage Data Recorders (VDR) are a mandated device for effectively all ships on international voyages.
- By default, this device is logging depth sounding data for IMO mandated shipborne single beam devices.
- A bathymetric feed was established between MacGregor and the DCDB

MACGREGOR

Carnival

CSB Trusted Nodes – <u>Marine Contractors</u>

International
Hydrographic
Organization

Petroleum Geo-Services (PGS)

- Implemented a data feed from PGS vessels to the DCDB

M2Ocean

- Finalizing metadata content and testing data submissions with data collected by Hydroballs (small autonomous bathymetric buoys).
- Data contributions to begin this winter

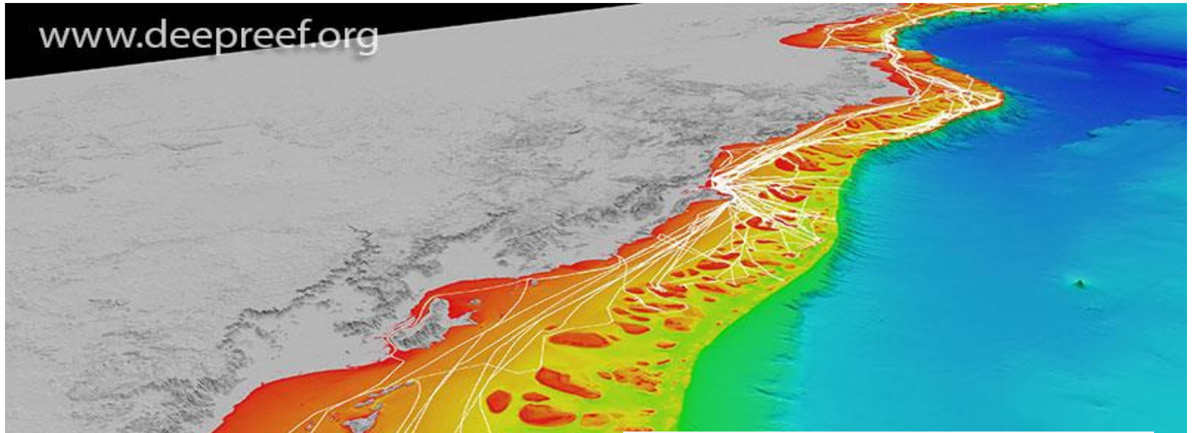
CSB Trusted Nodes – Academia/Research

International Hydrographic Organization

James Cook University

- Distributed inexpensive data loggers to ~10 volunteer vessels using their own echo sounder and GPS sensors along the Great Barrier Reef
- Data is at the DCDB

SmartLog USB data logger



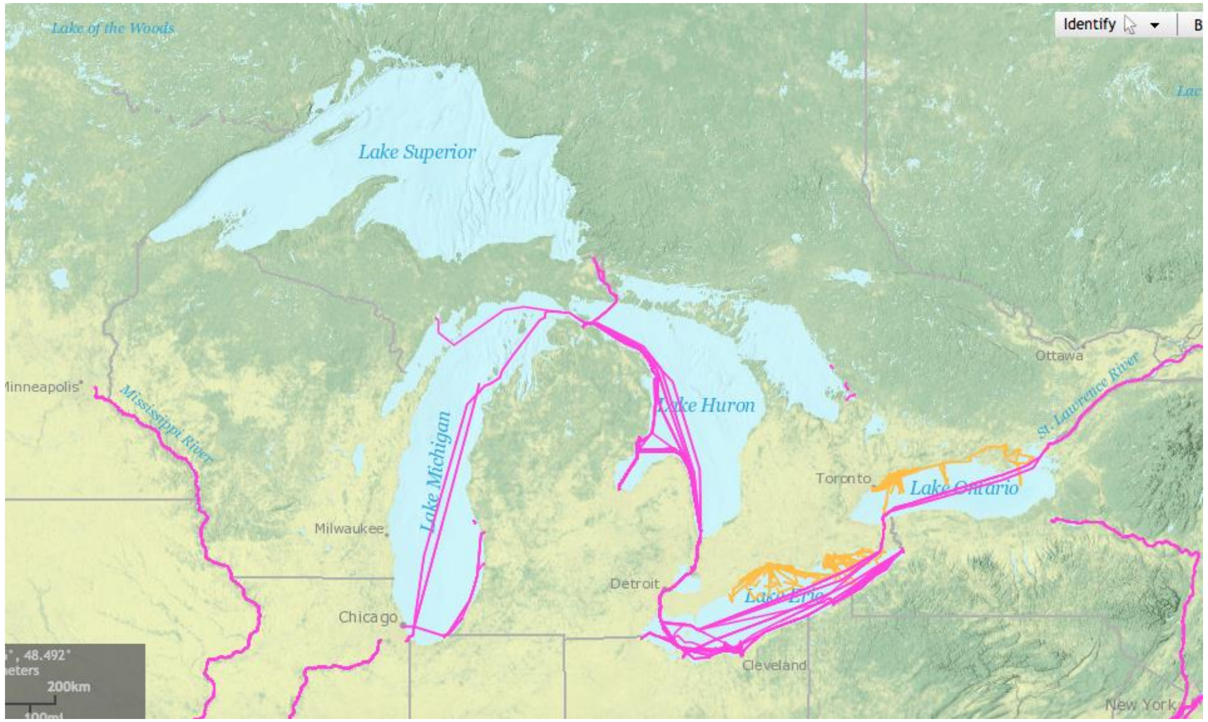
3D view of northern Great Barrier Reef showing all vessel tracks as of December 2019

CSB Trusted Nodes – Non Profit

International Hydrographic Organization

GLOS / OFM

- Data collected by Great Lakes Observing System using the Orange Force Marine Mussel data logger.



CSB Trusted Nodes – Seabed 2030 Project

International Hydrographic Organization

Objective:

1. Facilitate field trials that will accelerate CSB activity
2. Collect data in data scarce areas
3. Grow excitement about the CSB initiative!

In return, a potential program must guarantee the provision of staff to:

1. Hand out data loggers to the community
2. Assist local mariners in set up
3. *Provide a copy of these data to Seabed 2030 for inclusion into the DCDB and the GEBCO grid*

Support includes provision of data loggers (NMEA0183 and NMEA2000) and installation support (where needed).

CSB Trusted Nodes – Seabed 2030-funded CSB Programs

Greenland Institute of Natural Resources

- Phase 1: aim to engage approximately 50 vessels of various sizes- 30 data loggers deployed so far.

The Institute For Maritime Technology & The South African Navy HO

- 100 data loggers deployed to SANHO/IMT.
- Planning of trials: identification of stakeholders, establish relationships, feasibility studies, regular communication via various channels.

"Sea Lab 1", IMT – trial deployment (Credit: CDR Christoff Theunissen)

Bureau of Marine Transportation - Palau

- 100 data loggers received (NMEA0183 and NMEA2000)
- Coordinating with S & W Pacific Seabed 2030 Data Center
- Currently receiving support from U.S. Navy for logger installation and setup.

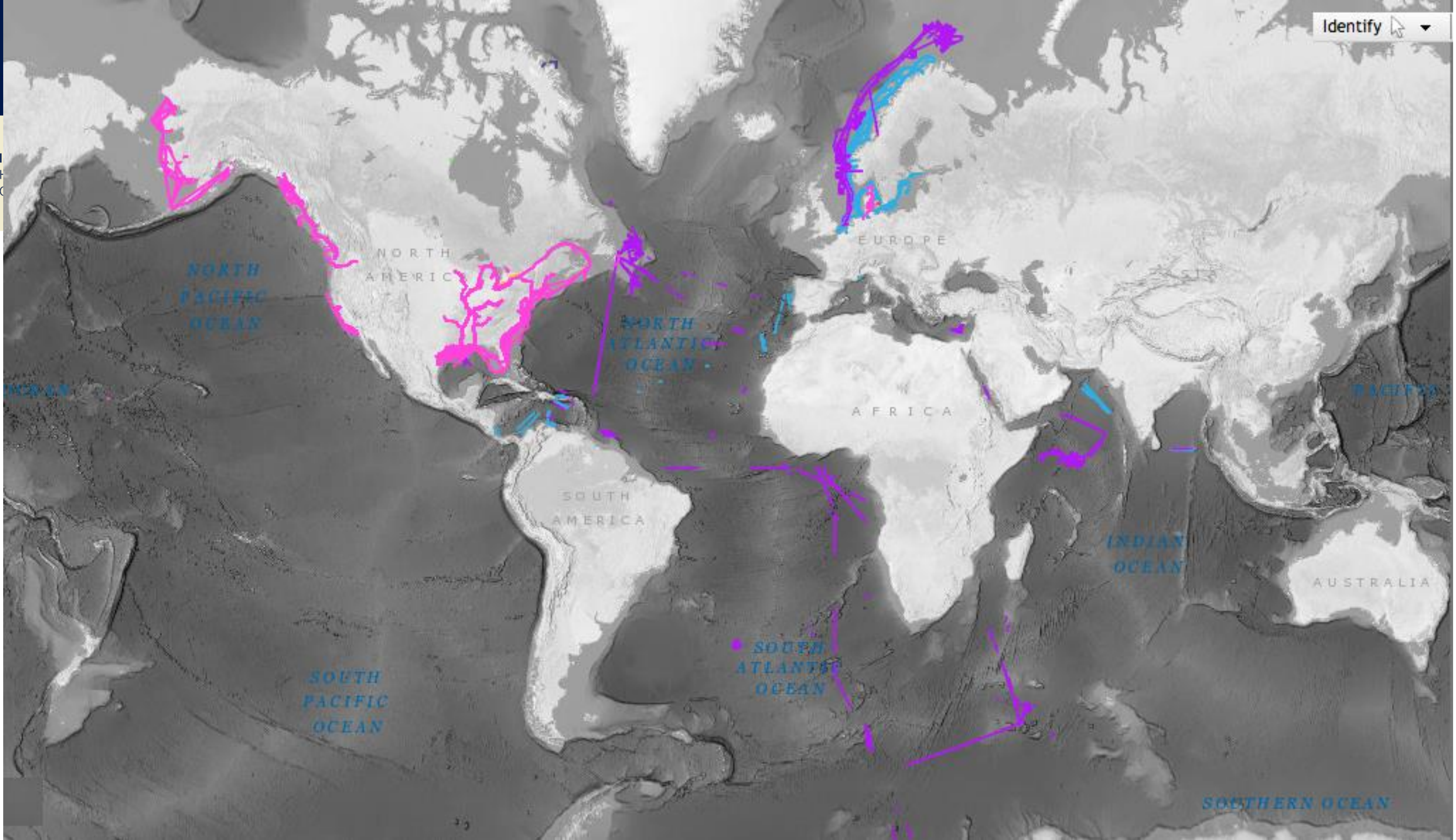
IHO

International
Hydrographic
Organization

CSB Trusted Nodes – Seabed 2030-funded CSB Programs

National Institute of Water and Atmospheric Research (NIWA):

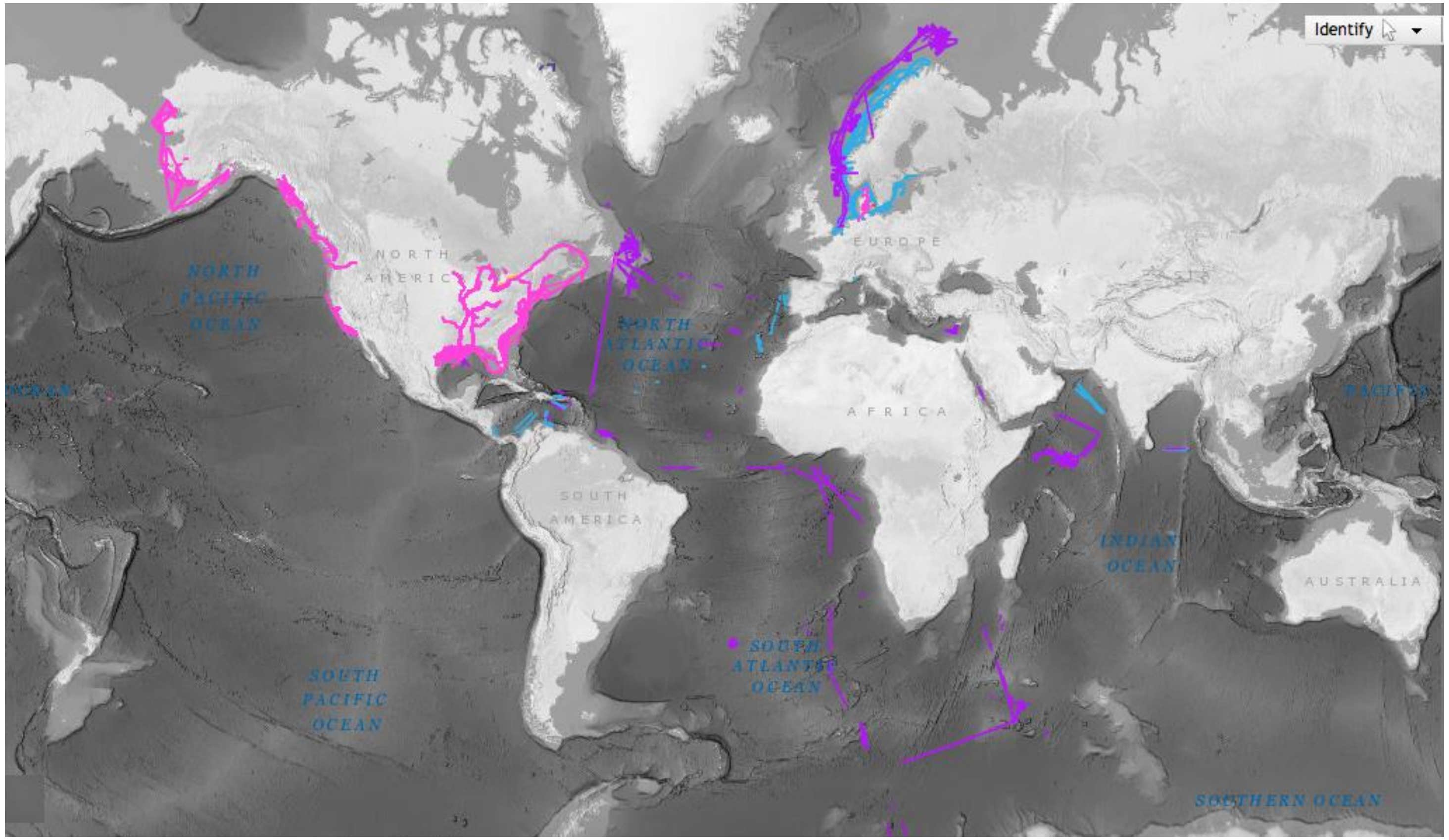
- **MY Dapple:** Data loggers installed on main vessel and all work boats since October 2021.
- **NIWA Workboats:** Logging from data loggers and installed echo sounders.
- **Department of Conservation:** Data loggers en-route to be installed.
- **New Zealand Coastguard**: Discussions currently underway


Identify
NORTH PACIFIC OCEAN
NORTH AMERICA
NORTH ATLANTIC OCEAN
EUROPE
AFRICA
SOUTH AMERICA
INDIAN OCEAN
AUSTRALIA
SOUTH ATLANTIC OCEAN
SOUTH PACIFIC OCEAN
SOUTHERN OCEAN

The Need to Scale / Overcoming Obstacles

International
Hydrographic
Organization

1. Technology
2. National Policy
3. Public Perception



Technology - Collect & Contribute

What's the
minimum-**cost**,
minimal-**functionality**,
data collection **SYSTEM** for CSB?

Brian R. Calder (brc@ccom.unh.edu)
Center for Coastal and Ocean Mapping & NOAA-UNH Joint Hydrographic Center

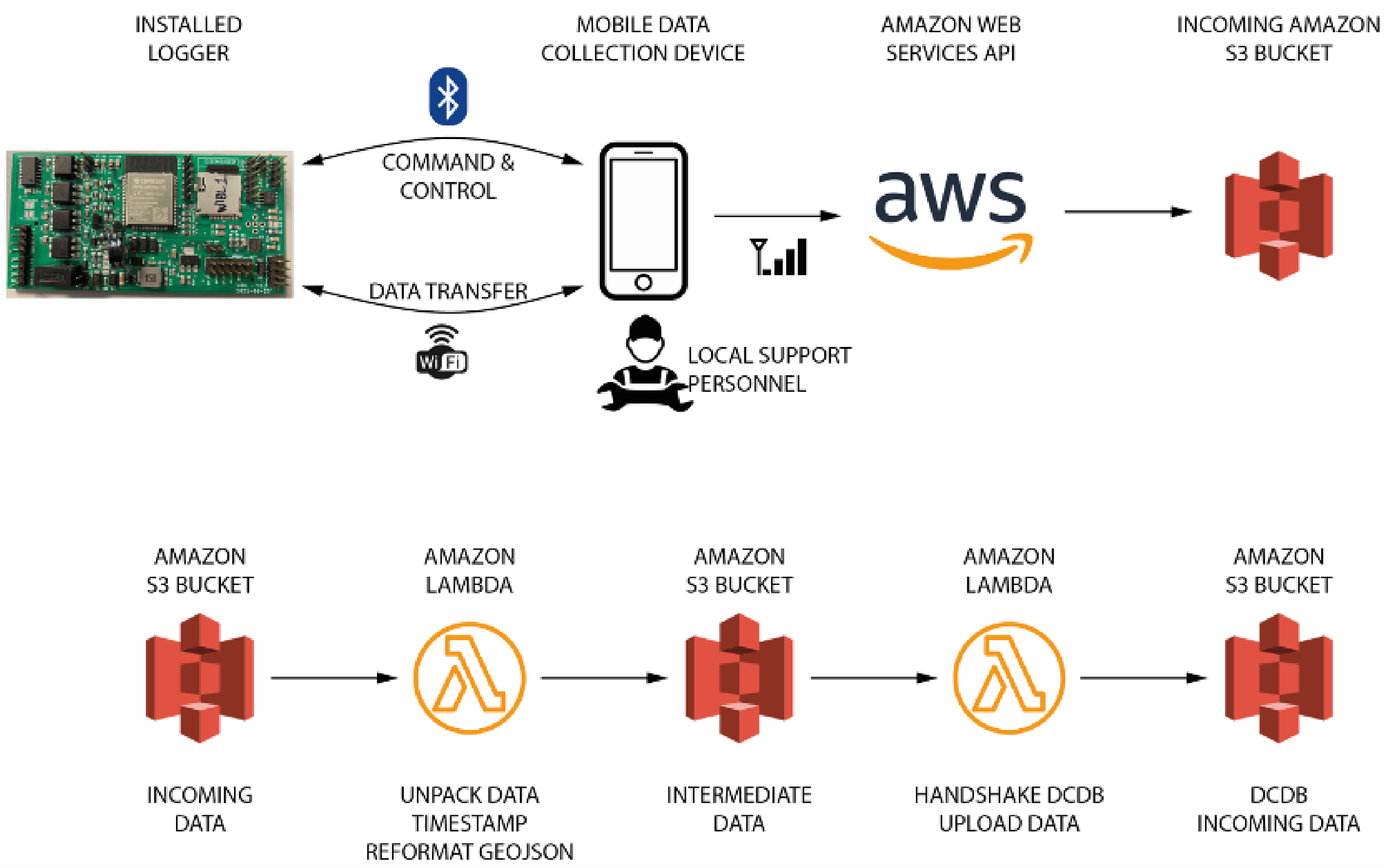
IHO

International

Technology

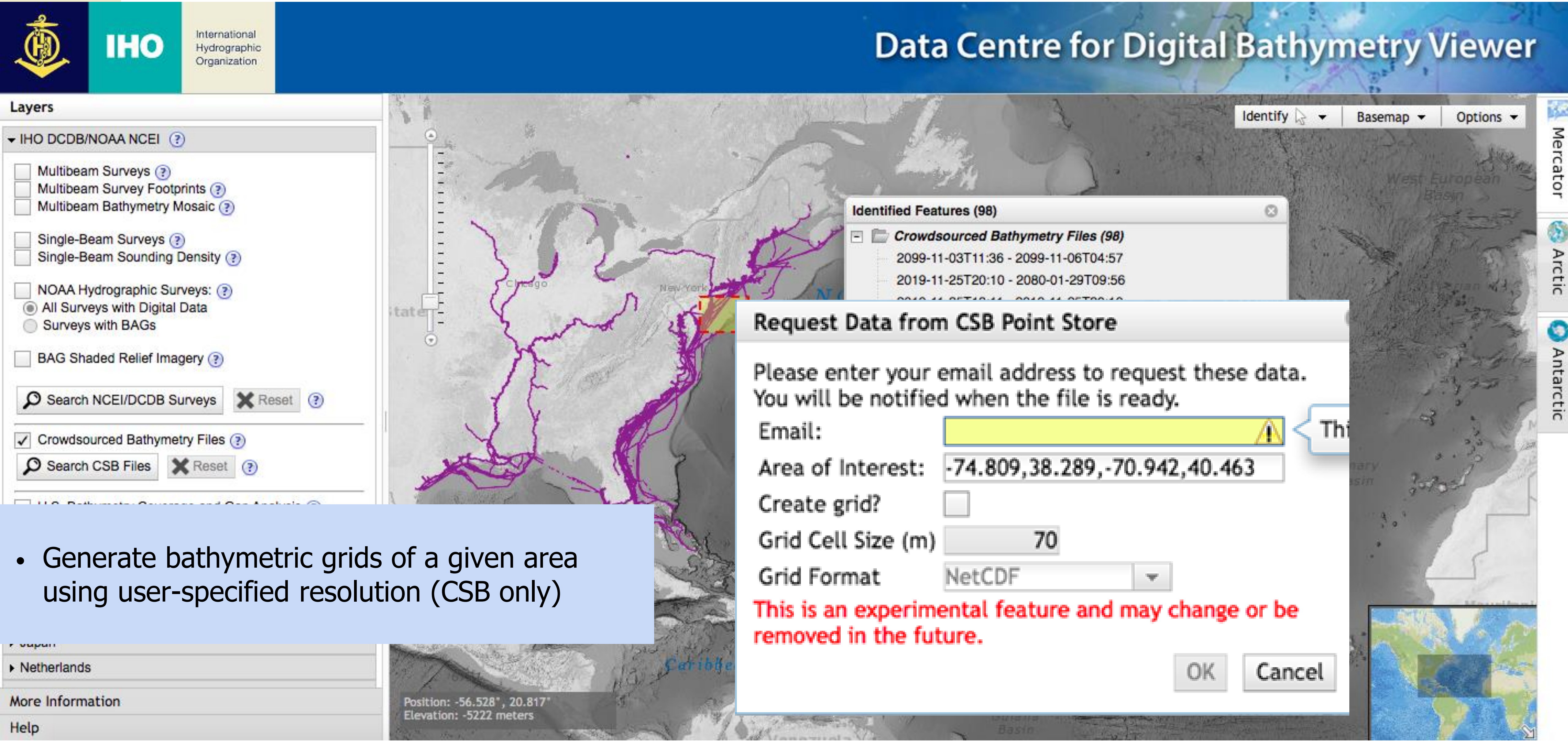
There is no central authority to limit the rate at which this could scale.

- **Wireless Inexpensive Bathymetry Logger (WIBL):** Inexpensive, open source/hardware data logger for bathymetry
- Full-spectrum solution from hardware to cloud
- CONOP for technician-supported local data collection
- Scales through federation of local collection efforts
- Can deliver data directly to DCDB without collector action
- Extensible cloud segment for individual customization
- Working with partners for hosted hardware/software implementations



Brian R. Calder (brc@ccom.unh.edu)
Center for Coastal and Ocean Mapping & NOAA-UNH Joint Hydrographic Center

Technology

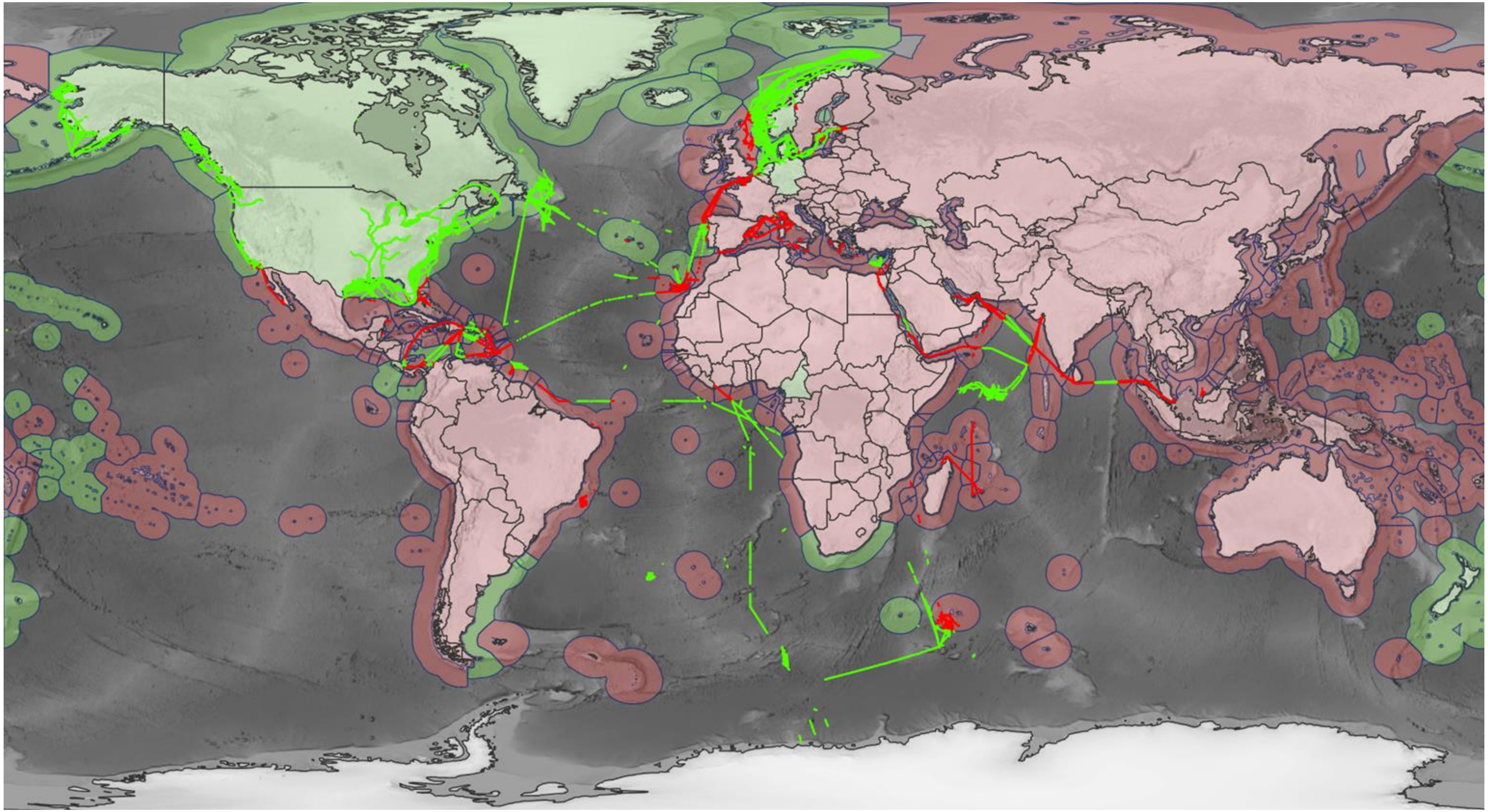


- Generate bathymetric grids of a given area using user-specified resolution (CSB only)

IHO

International Hydrographic Organization

National Policy



Map for illustrative purposes only. (Credit: Marine Regions)

IHO

International Hydrographic Organization

Public Perception

“Our job is to survey for the oil & gas industry, not to participate in citizen science” **- Geophysical Surveying Co.**

“I have no interest in sharing the location of my favorite fishing hole” **- Local Fisherman**

“My route is planned and repetitive. How useful would my data even be?” **- Cruise Line Co.**

“Not sure I’m a fan of my whereabouts being tracked.” **- Superyacht owner**

“We don’t have extra funds to support any start up costs.” **- Academic Institute**

“Looks like participation would hurt my business model.” **- Navigational Software Co.**

Public Perception

IHO

International
Hydrographic
Organization

- Superyacht
- Marine Contractors
- Fisheries
- Cruise Ships
- Software/hardware industry
- Hydrographic Offices
- Academic/Scientific Research

© Pixabay

CITIZEN SOURCED DATA

HELP REVEAL THE DEEP AND SHARE YOUR DATA

CROWDSOURCED DEPTH INFORMATION

Commercially owned ships can participate in increasing our knowledge of the ocean by sharing depth measurements from navigation instruments while out at sea. Known as Crowdsourced Bathymetry (CSB), this information can help identify uncharted features such as seamounts and canyons, verify charted information, and help fill the gaps where no data exists.

CRUISE SHIPS

Many expedition cruise ships explore the world's oceans, often in areas where data is sparse, non-existent, or of poor quality. These are exactly the places where contributions to global seafloor mapping efforts can have the greatest impact.

To minimise effort on the part of the ship's crew, data collection and contribution of data can occur by using either built-in navigation software systems that are participating in the CSB initiative, or through a small hardware data logger that can be interfaced to the ship's NMEA data bus. Routinely measured parameters such as under keel depth and position, can then be stored, uploaded and contributed to local and global mapping initiatives. These contributions can also benefit navigational safety, detect unknown hazards, and aid other mariners and ocean scientists.

By contributing data, cruise ships can help avoid accidents, environmental damage and make the oceans a safer place for all. Additionally, participation in this global effort can be included in the cruise line's marketing materials highlighting the various ways they contribute to scientific endeavors.

© ID23 © Ibrahim Boran

DR. MATHIAS JONAS
IHO SECRETARY-GENERAL

"Getting to know the ocean is the greatest mapping adventure of our times. Many underwater mountain ranges, volcanoes, canyons have yet to be discovered and named."

© George Desipris

BECOMING A 'TRUSTED NODE'

The IHO's Data Centre for Digital Bathymetry (DCDB) accepts CSB data contributions through organizations, companies or universities that serve as data aggregators and / or liaisons between mariners (data collectors) and the DCDB. These "trusted nodes" help the CSB effort in a variety of ways ranging from supplying data logging equipment or software, providing technical support to vessels, downloading data from data loggers, aggregating collected data and facilitating data transfer. The IHO DCDB will help identify the best-suited "trusted node" type for you.

Contributed data should include depth, position and time stamp. While additional information is encouraged, data does not need to include vessel name, IMO number or anything else with the vessel identification prior to uploading to the IHO DCDB database. By contributing data to the IHO DCDB, the provider will not be held liable for the data submitted.

© Alexander Svir

FIND OUT MORE

Further information about collecting or contributing data can be found at the IHO DCDB website (ngdc.noaa.gov/iho/) or by contacting representatives of the IHO Crowdsourced Bathymetry Working Group at bathydata@iho.int

Visit seabed2030.org to learn more about the Nippon Foundation-GEBCO Seabed 2030 project, which aims to bring together all available bathymetric data to produce the definitive map of the world ocean floor by 2030.

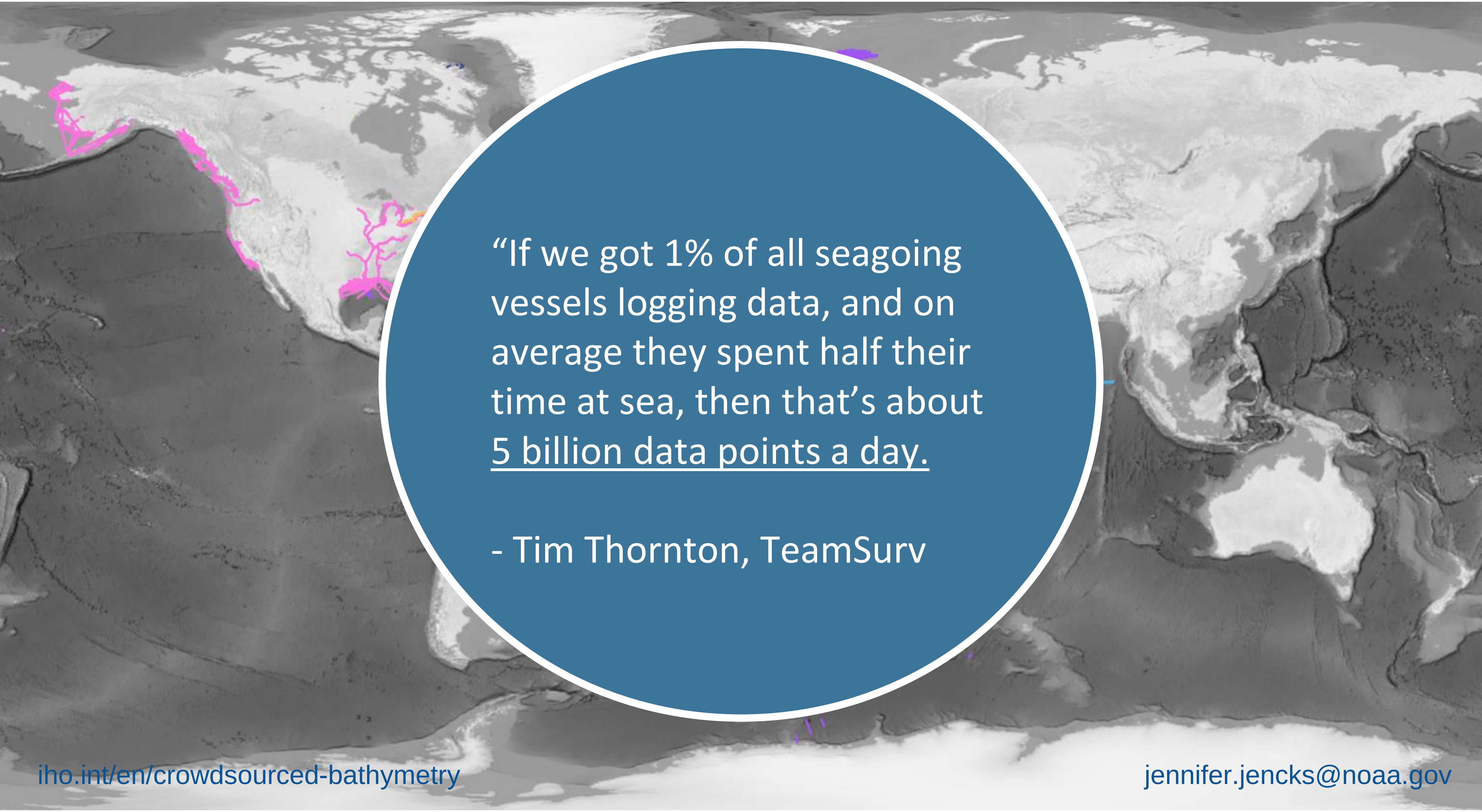
NOAA's Bay Hydro II crowdsourced bathymetry test tracks in green overlaid on multibeam survey data demonstrates how changes can be detected.

3D view of northern Great Barrier Reef showing all vessel tracks as of December 2019.

Image courtesy of NOAA © Rob Beaman

iho.int/en/bathymetric-publications

iho.int/en/communication-material



"If we got 1% of all seagoing vessels logging data, and on average they spent half their time at sea, then that's about <u>5 billion data points a day.</u>

- Tim Thornton, TeamSurv

iho.int/en/crowdsourced-bathymetry

jennifer.jencks@noaa.gov

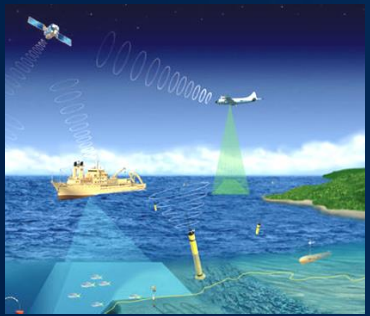
CSB Panel Discussion

Break

Florida Coastal Mapping Program Summit 2022

Lightning Talks: Federal and Academic Mapping Updates

NOAA
Office of Coast Survey
Florida Coastal Mapping Program



Paul Turner – IOCM

December 07, 2021

NOAA's Office of Coast Survey
Florida Based Hydrographic Survey Operations - 2022

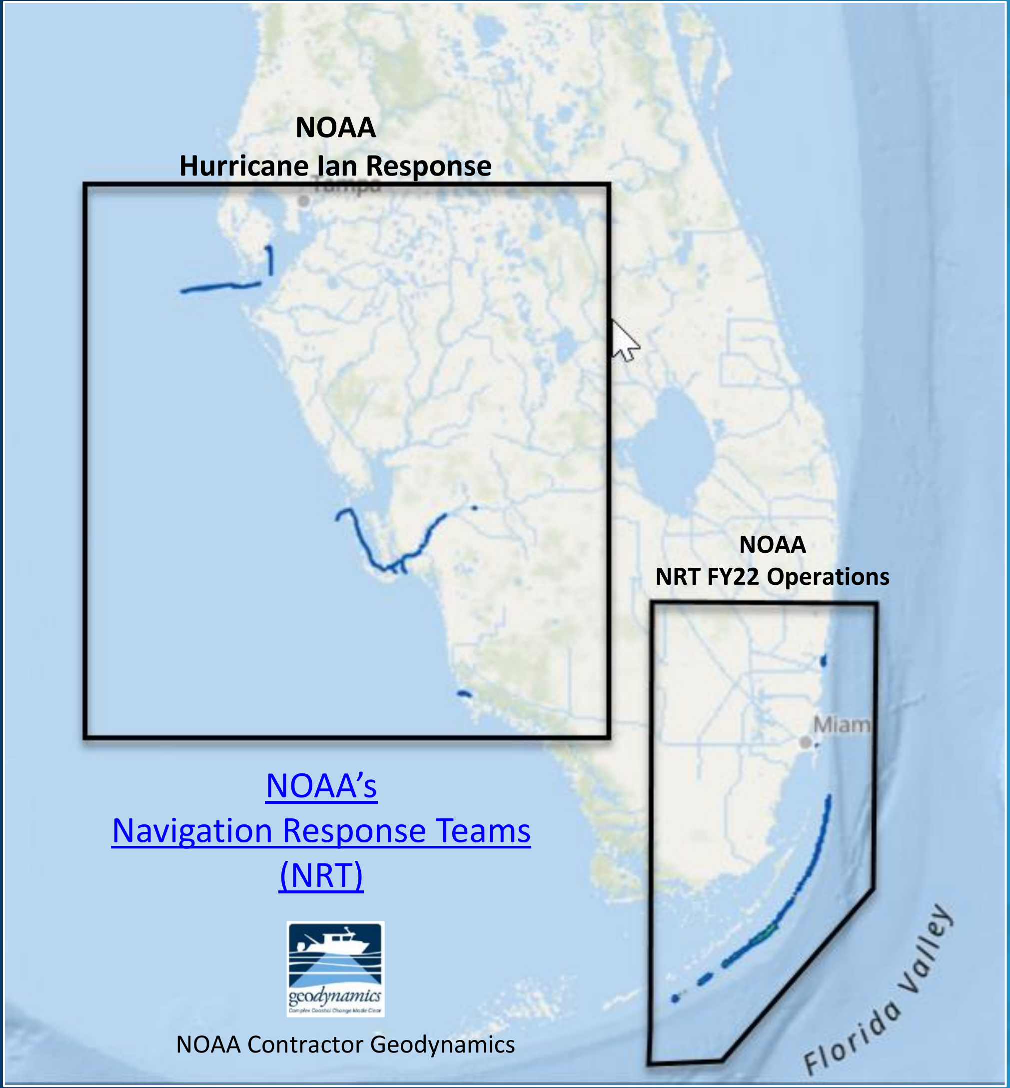
All projects provided updated bathymetry and feature data

Data products include MB bathy and seafloor backscatter

All OCS survey data are provided to and archived with NOAA's National Centers for Environmental Information (NCEI) in Boulder, CO: https://www.ngdc.noaa.gov/

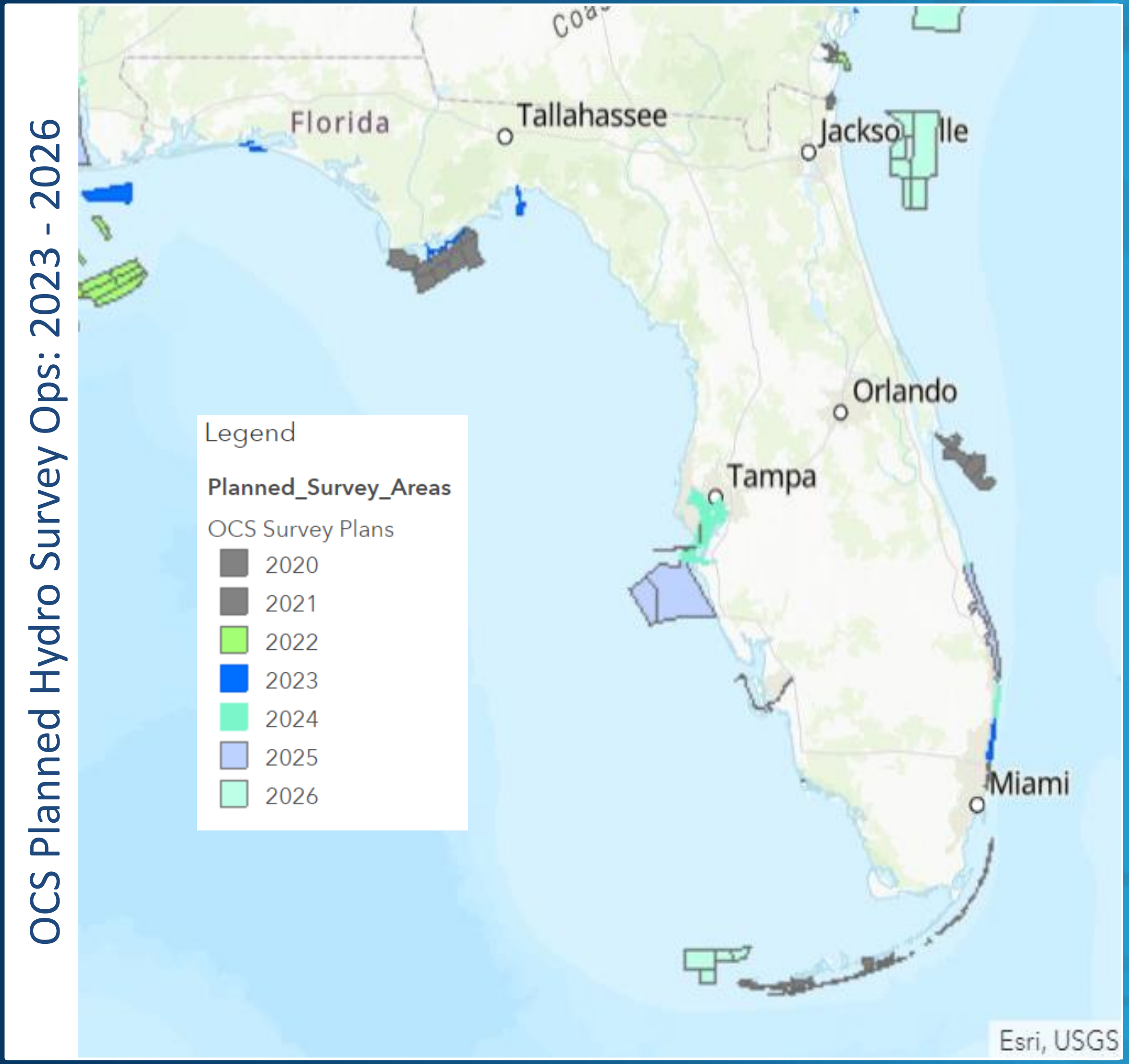
IWG-OCM GIS Priorities Available on U.S. FedMap Coordination Site

Mapping Data Sharing & Contribution link



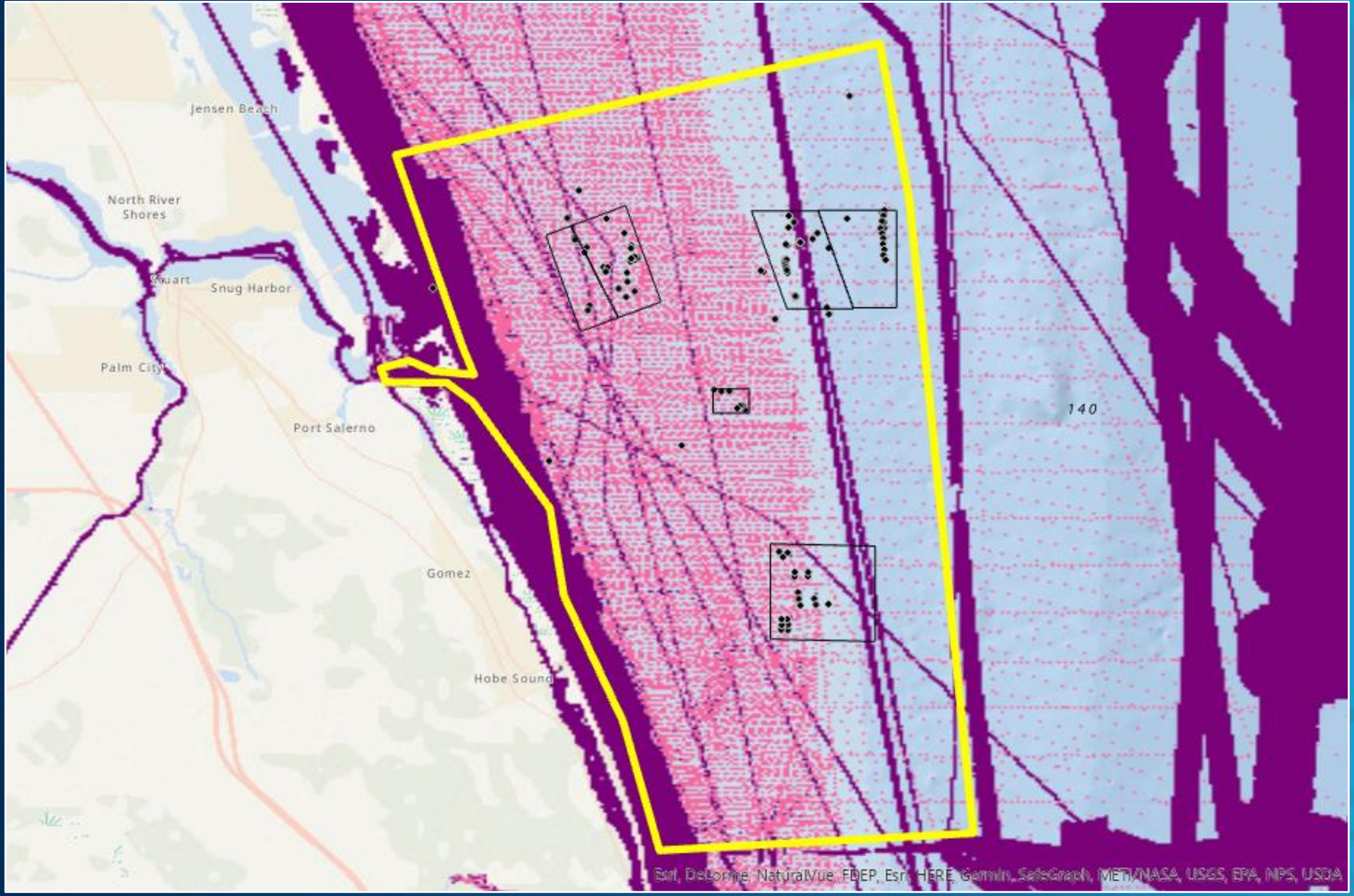
NOAA's Office of Coast Survey
Planned - Florida Based Hydrographic Survey Operations

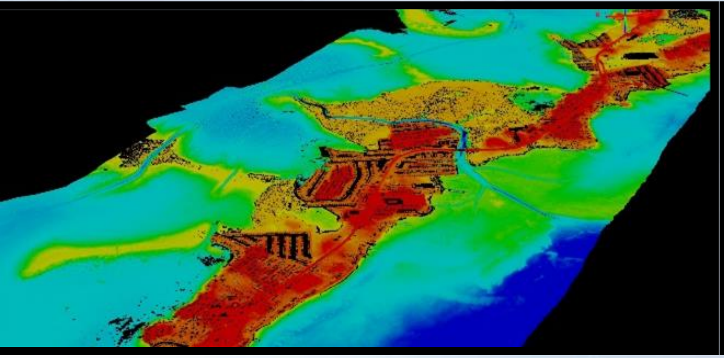
- NOAA's OCS Mapping & Surveying Projects for FY22 and Planned Outyears FY23-FY26
- Operations conducted by combination of NOAA Hydro Ships, contract firms on the NOAA Hydro Survey Services contract, and OCS NRT's
- Primary data products include MBES bathymetry with backscatter or SSS in support of NOAA nautical charts and products

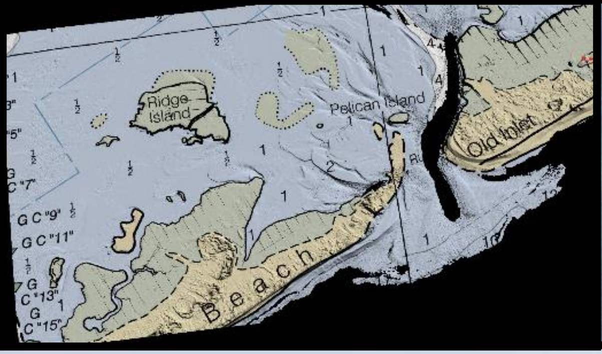


NOAA's Office of Coast Survey
Potential – Martin Co. Florida Mapping Partnership

- Potential mapping partnership with Martin County, FL Artificial Reef Mapping Program
- Office of Coast Survey and Martin County, FL areas of interest
- Update area w/ new MBES bathy and backscatter data, verify reef locations & extents, document condition of reef materials and settlement, update existing nautical charts & related products







NGS Coastal Mapping Program

Shoreline, Imagery, and Nearshore Bathymetry

Mike Aslaksen
Chief, Remote Sensing Division
NOAA's National Geodetic Survey

National Oceanic and Atmospheric Administration

National Geodetic Survey

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

RSD Primary Programs:

Aeronautical Survey Program

Coastal Mapping Program

Emergency Response

National Oceanic and Atmospheric Administration

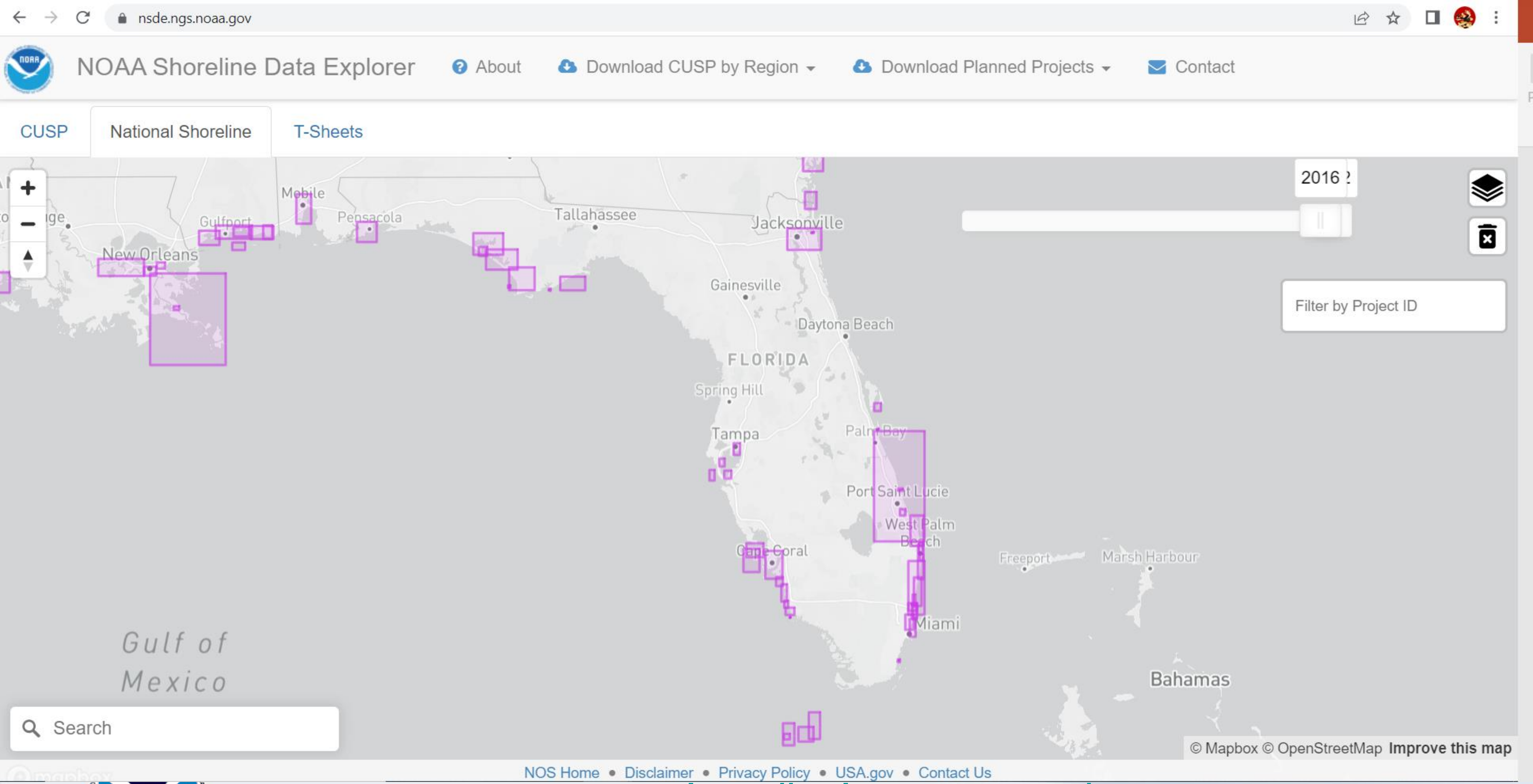
The RSD Coastal Mapping Program

- **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

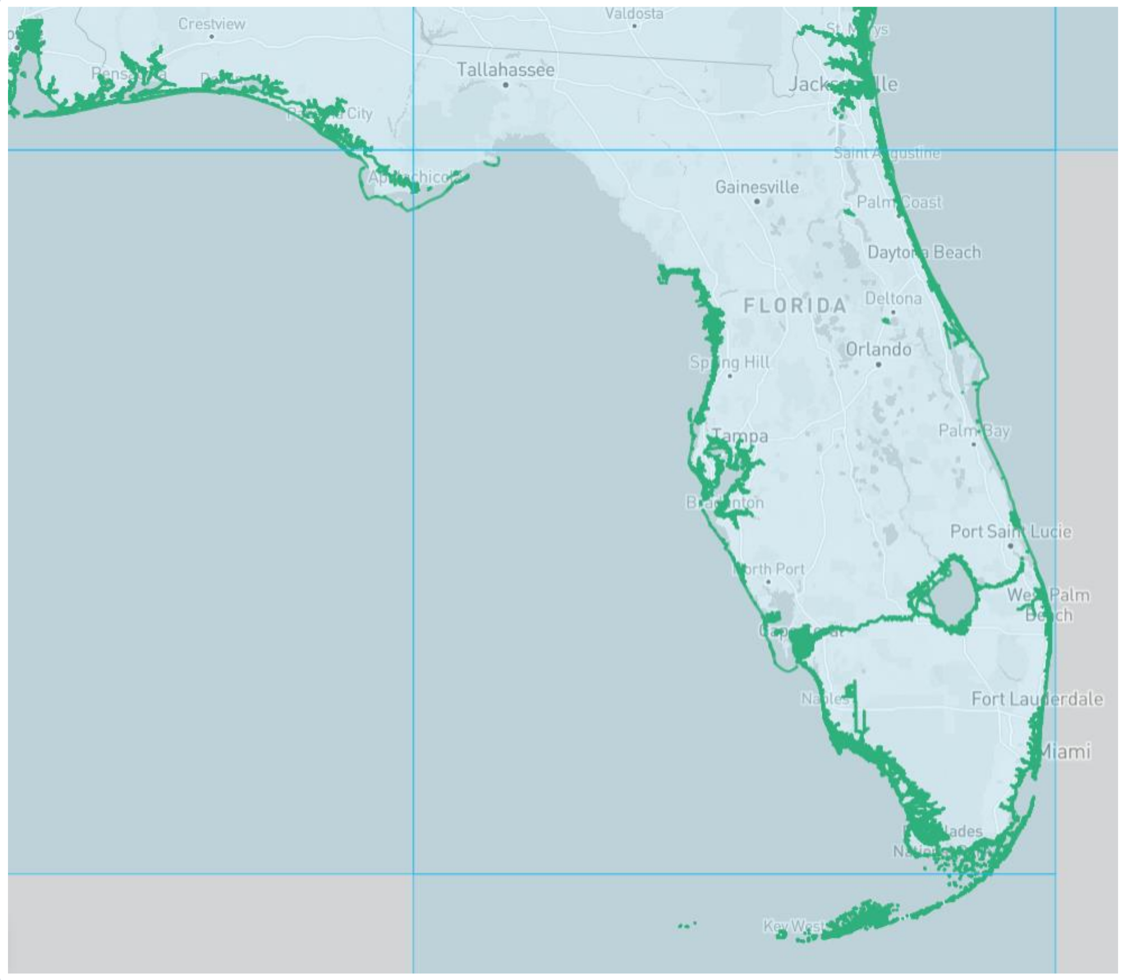
- **Sources:**
  - **Lidar**
  - **Digital Cameras**
  - **High Resolution Satellites**
  - **UAS**

National Oceanic and Atmospheric Administration



National Oceanic and Atmospheric Administration https://nsde.ngs.noaa.gov/

Continually Updated Shoreline Product (CUSP)



https://nsde.ngs.noaa.gov/

National Oceanic and Atmospheric Administration

Coast and Shoreline Change Analysis Program (CSCAP), Florida Ports

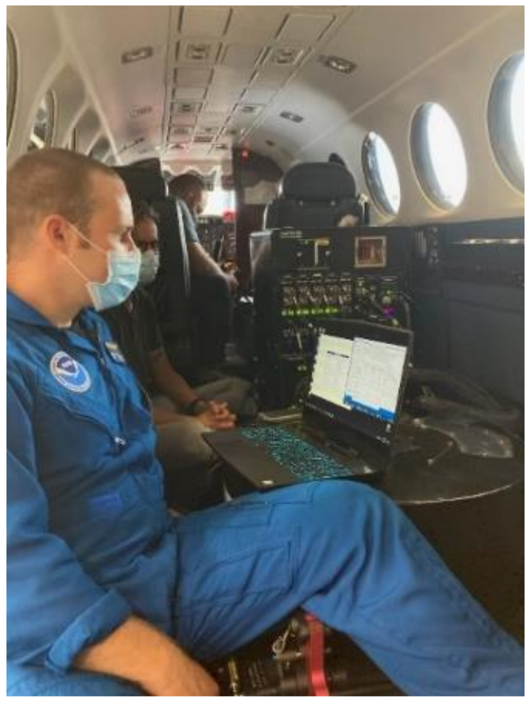
- Fernandina
- Jacksonville/Mayport
- Port Canaveral
- Port Everglades
- Palm Beach
- Miami
- Key West
- Port Manatee
- Tampa
- Weedon Island/St. Petersburg
- Panama City
- Pensacola

National Oceanic and Atmospheric Administration

New Camera System

Digital Sensor System (DSS) V6
(King Air)

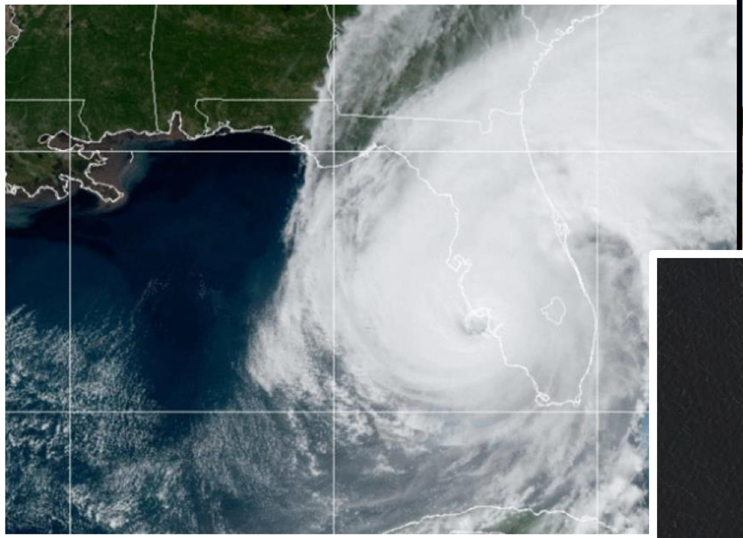
- 150MP RGB camera (x2)
- 100MP NIR camera (x2)
- Nadir and Oblique orientations

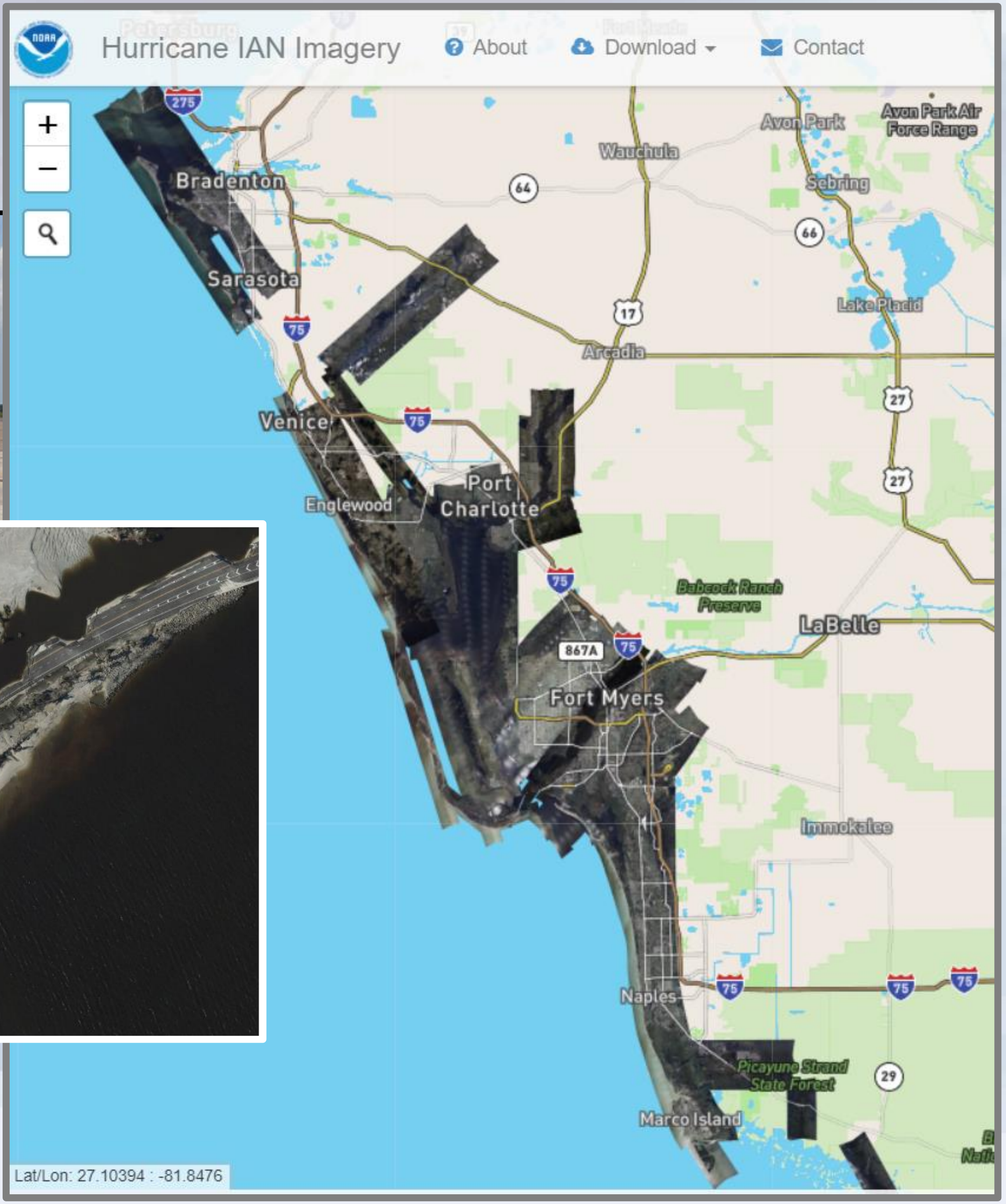


National Oceanic and Atmospheric Administration

Emergency Response

https://storms.ngs.noaa.gov/



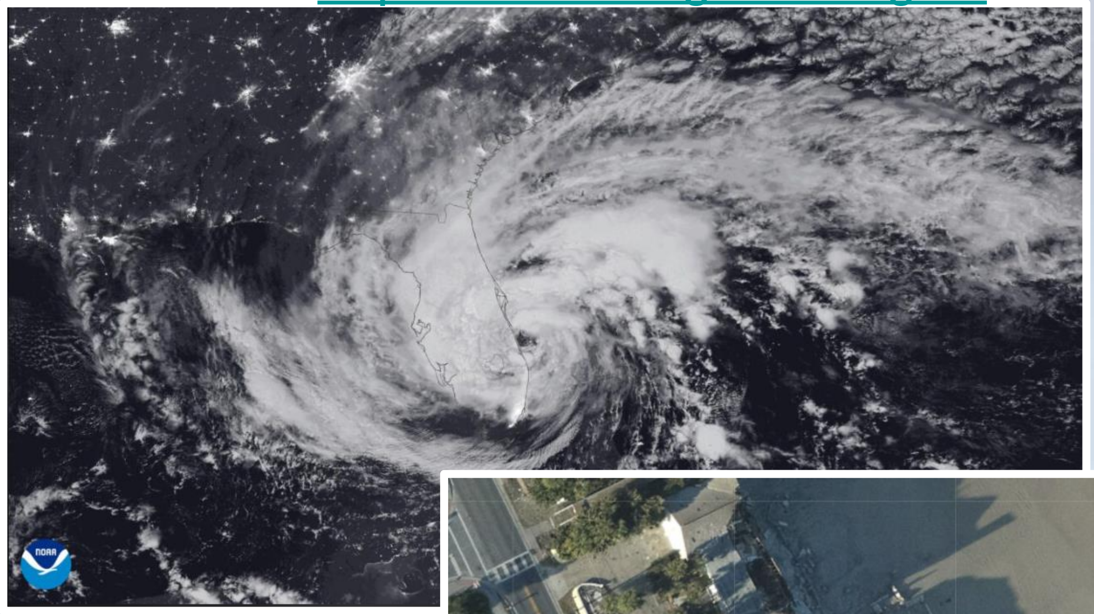


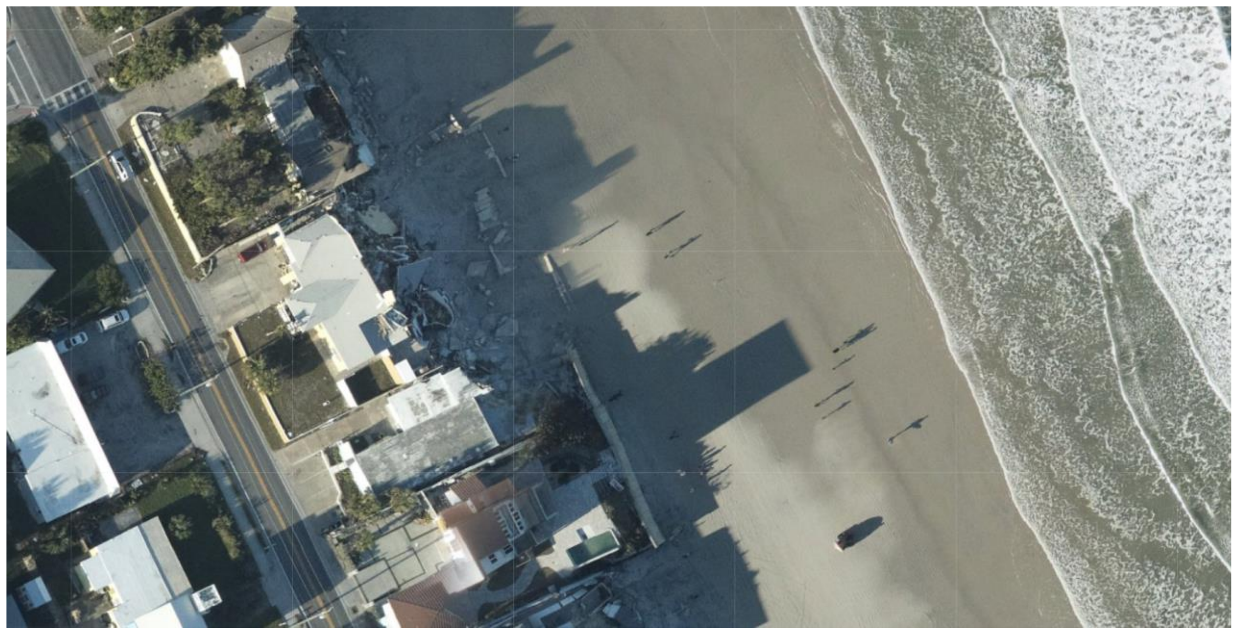
7949 Images
10,178 km2
27.8 flight hours

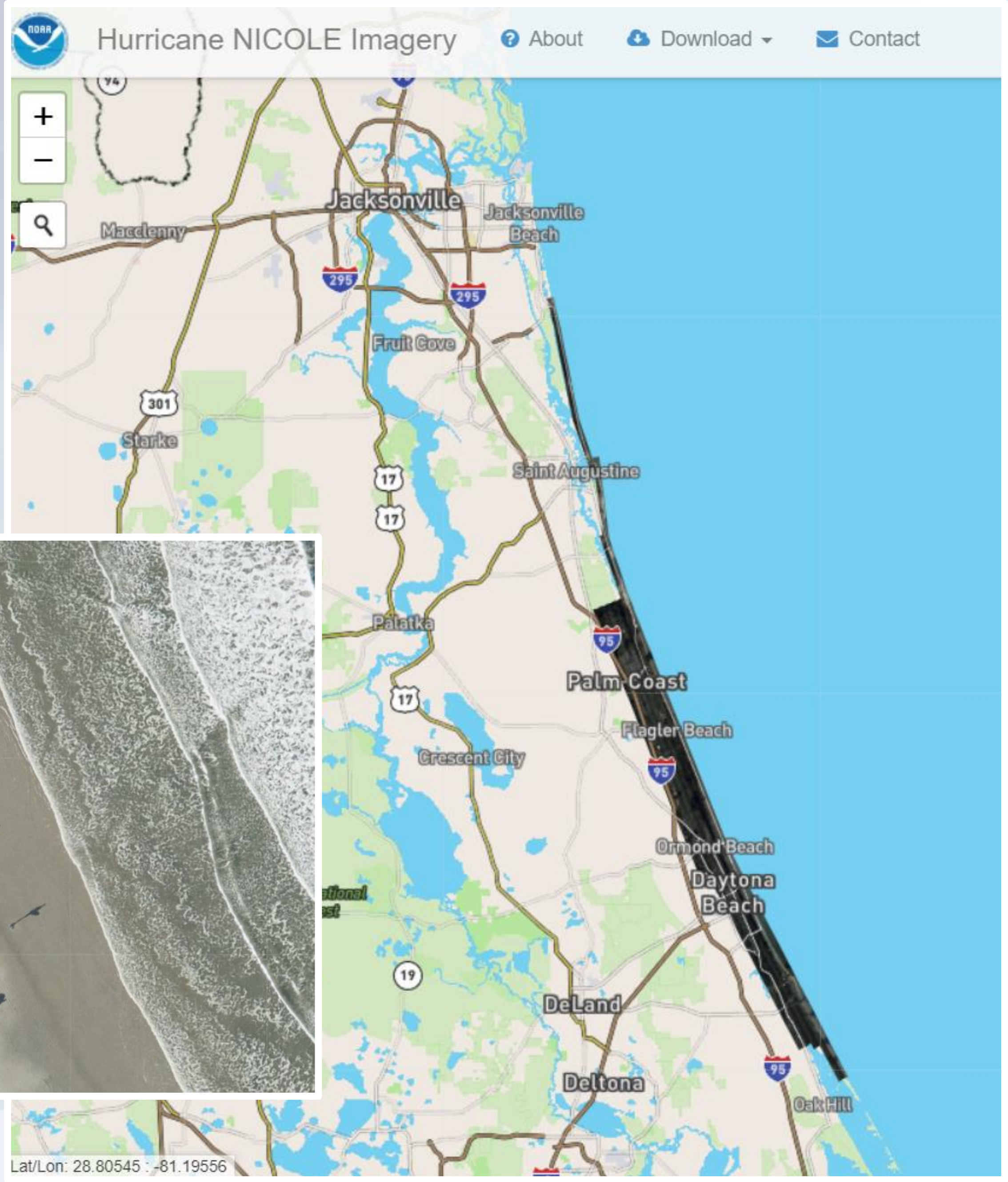
National Oceanic and Atmospheric Administration

Emergency Response

https://storms.ngs.noaa.gov/





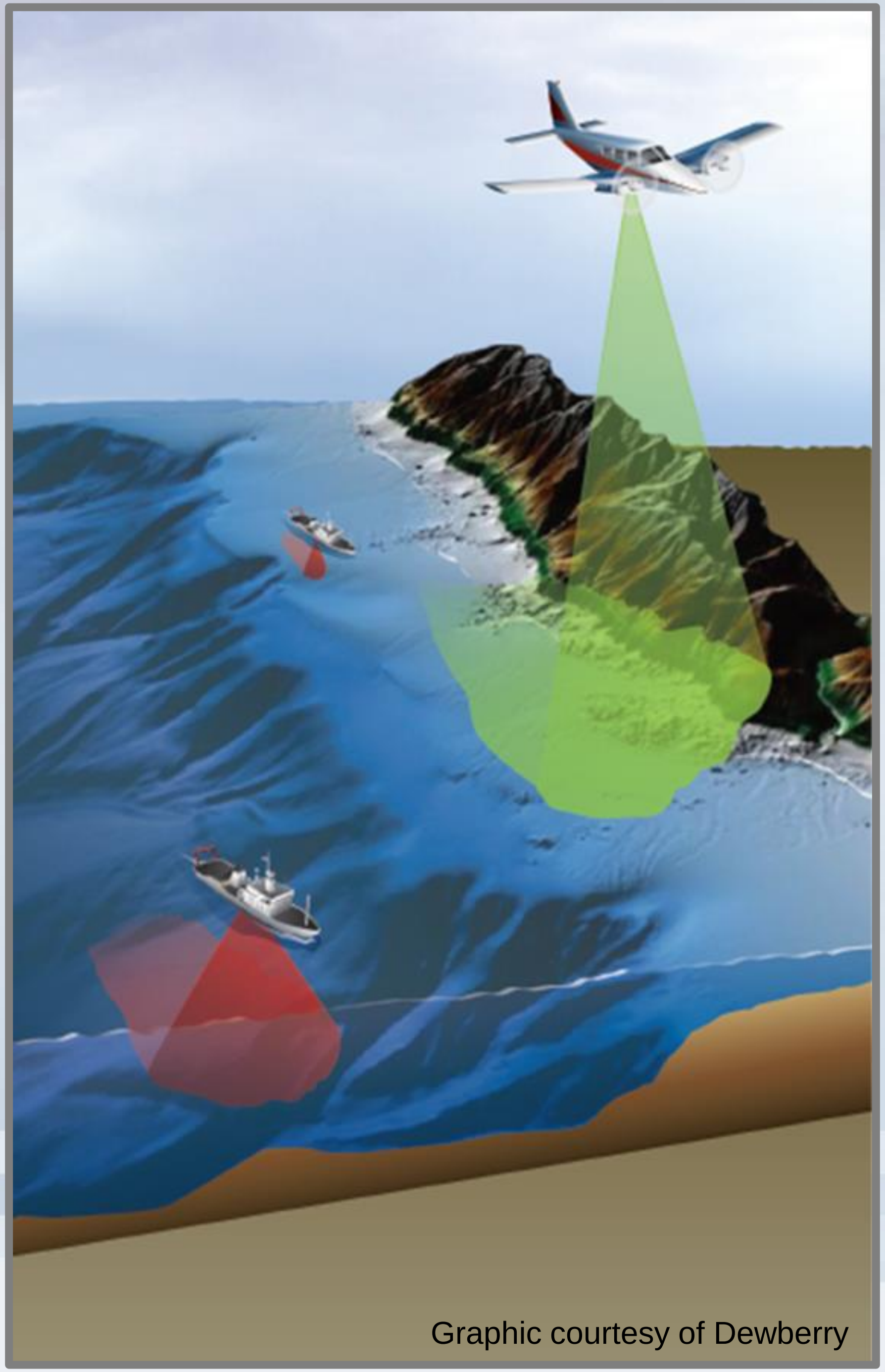


6866 images
2961 km2
17.9 flight hours

National Oceanic and Atmospheric Administration

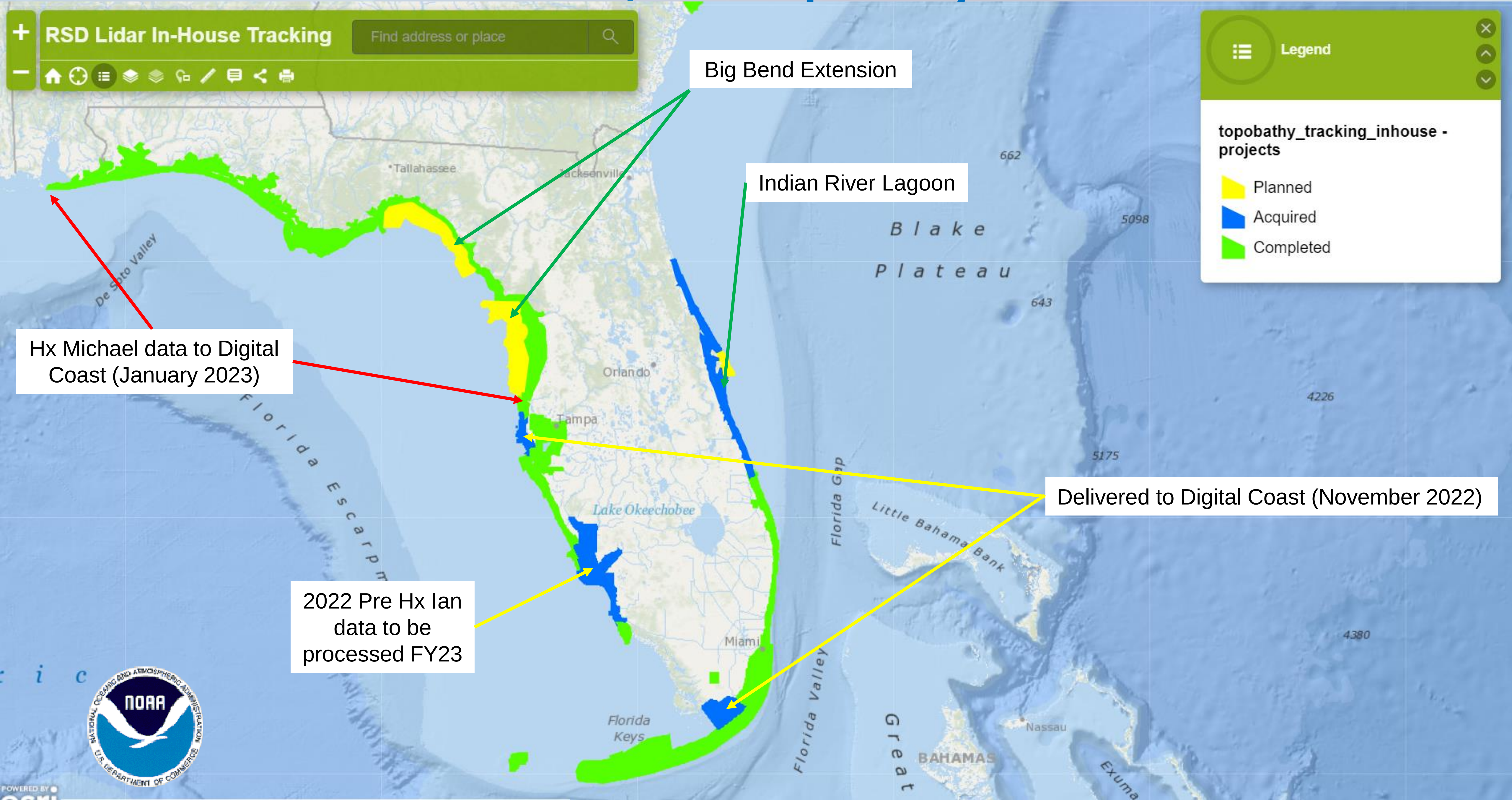
Support of Hydrographic Surveys

- 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



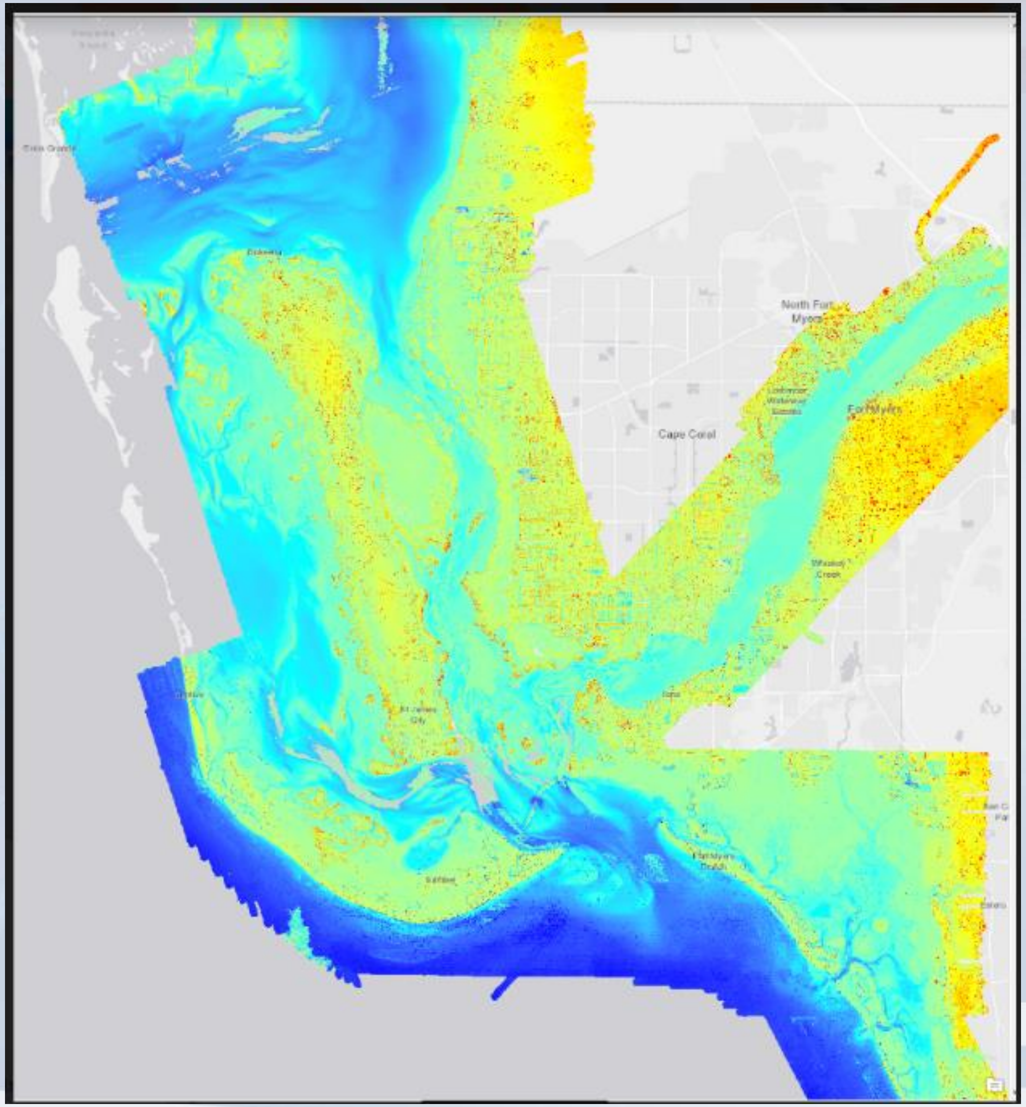
Graphic courtesy of Dewberry

NGS/RSD Topobathy

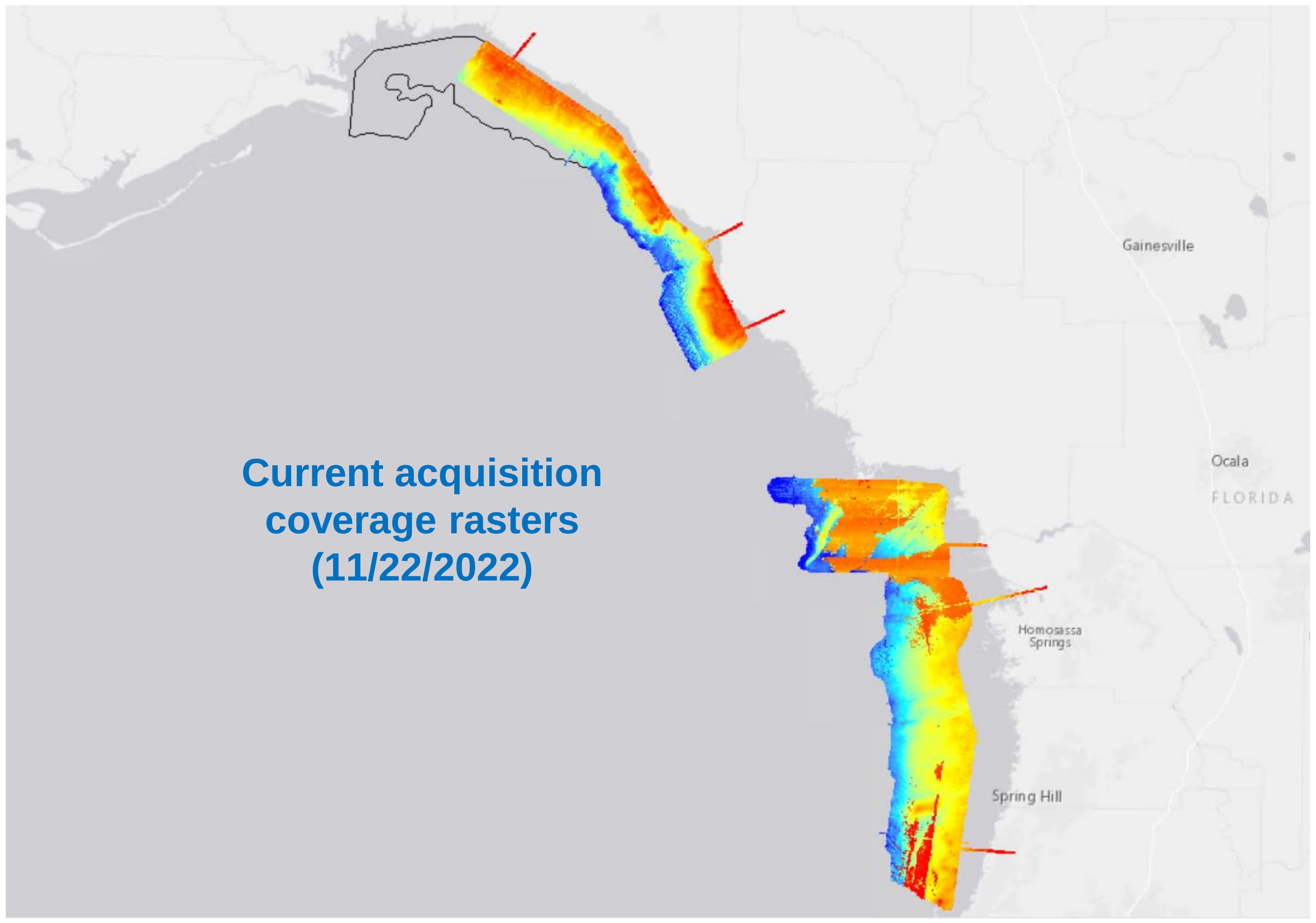


NGS/RSD 2022 Acquired Pre-Hx Ian Data

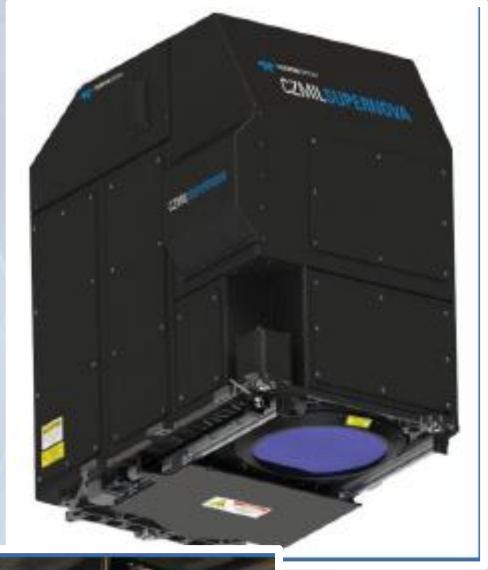
Processed FY23



FL2205 (Big Bend)



Lidar



Teledyne Optech Coastal Zone Mapping and Imaging Lidar (CZMIL)

•Powerful topographic/hydrographic mapping

•Capable of modeling ~3.5 x Secchi depth

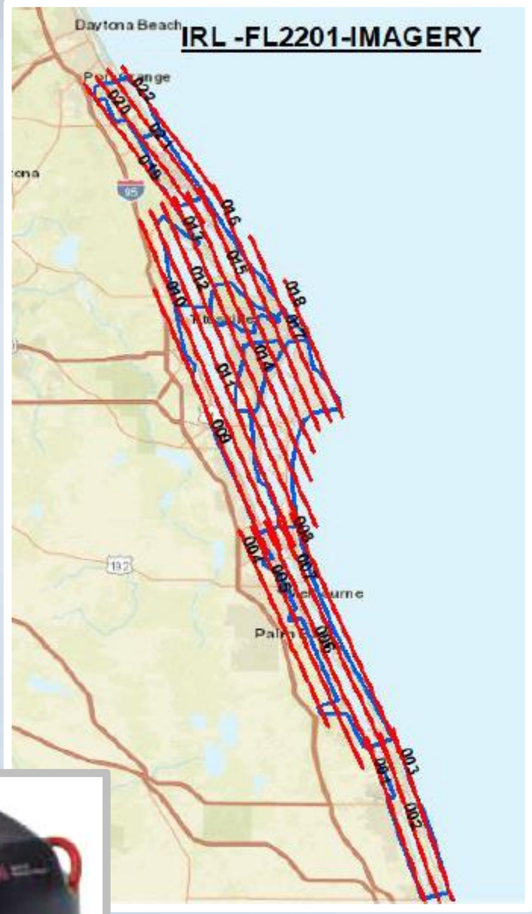
Deliverables:

- Point clouds
- 1 meter DEMs
- normalized intensity
- TPU

Imagery

4-band imagery using a Leica ADS100 aerial mapping camera

- Stereo coverage: 30% sidelap, 60% endlap
- Orthoimagery: 25cm GSD
- Acquisition within +/- 3 hours around low tide



National Oceanic and Atmospheric Administration

FL2201 (Indian River Lagoon):
Project Overview

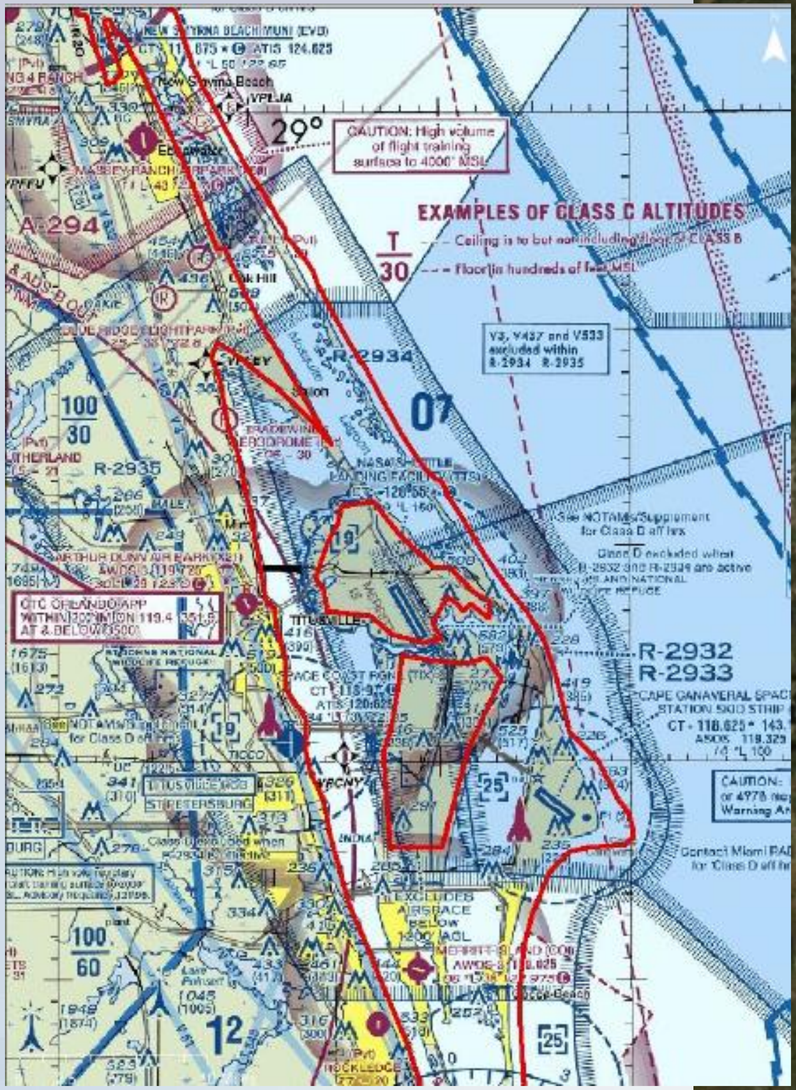
- Project Area: ~616 square miles
- 1,663 linear shoreline miles

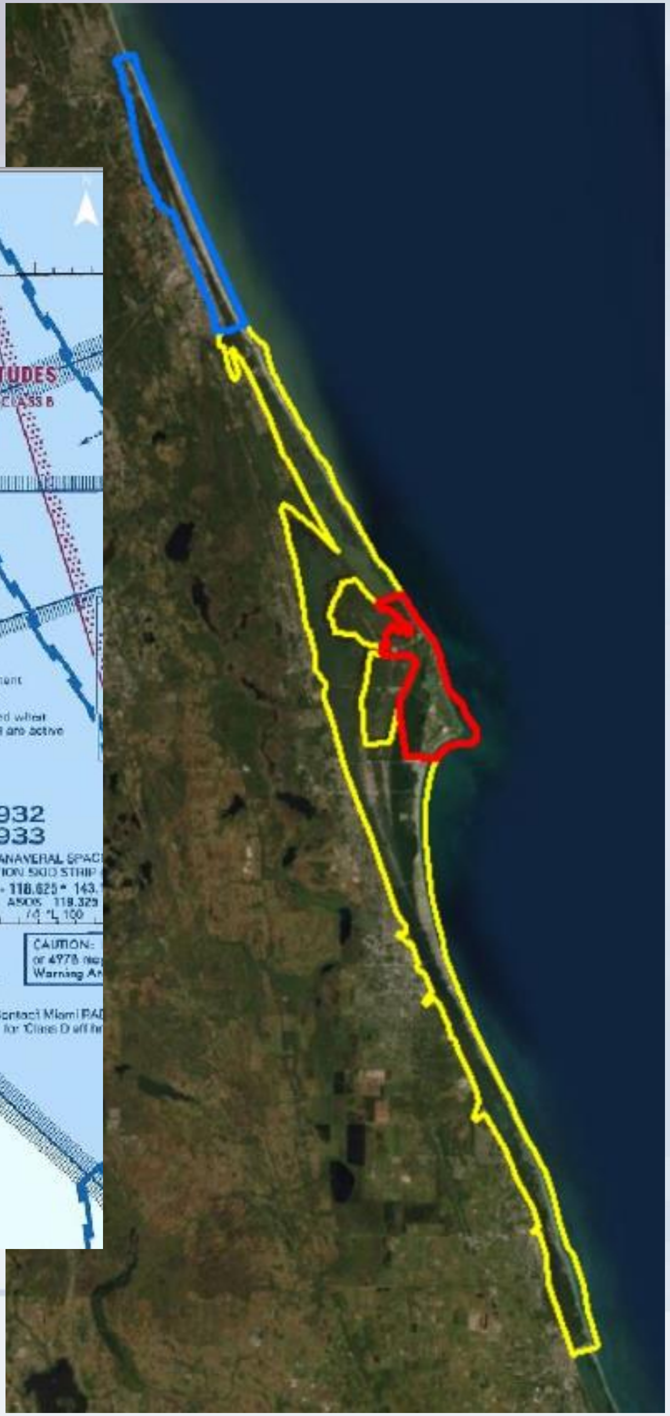
Yellow: initial area

Red: Restricted Area

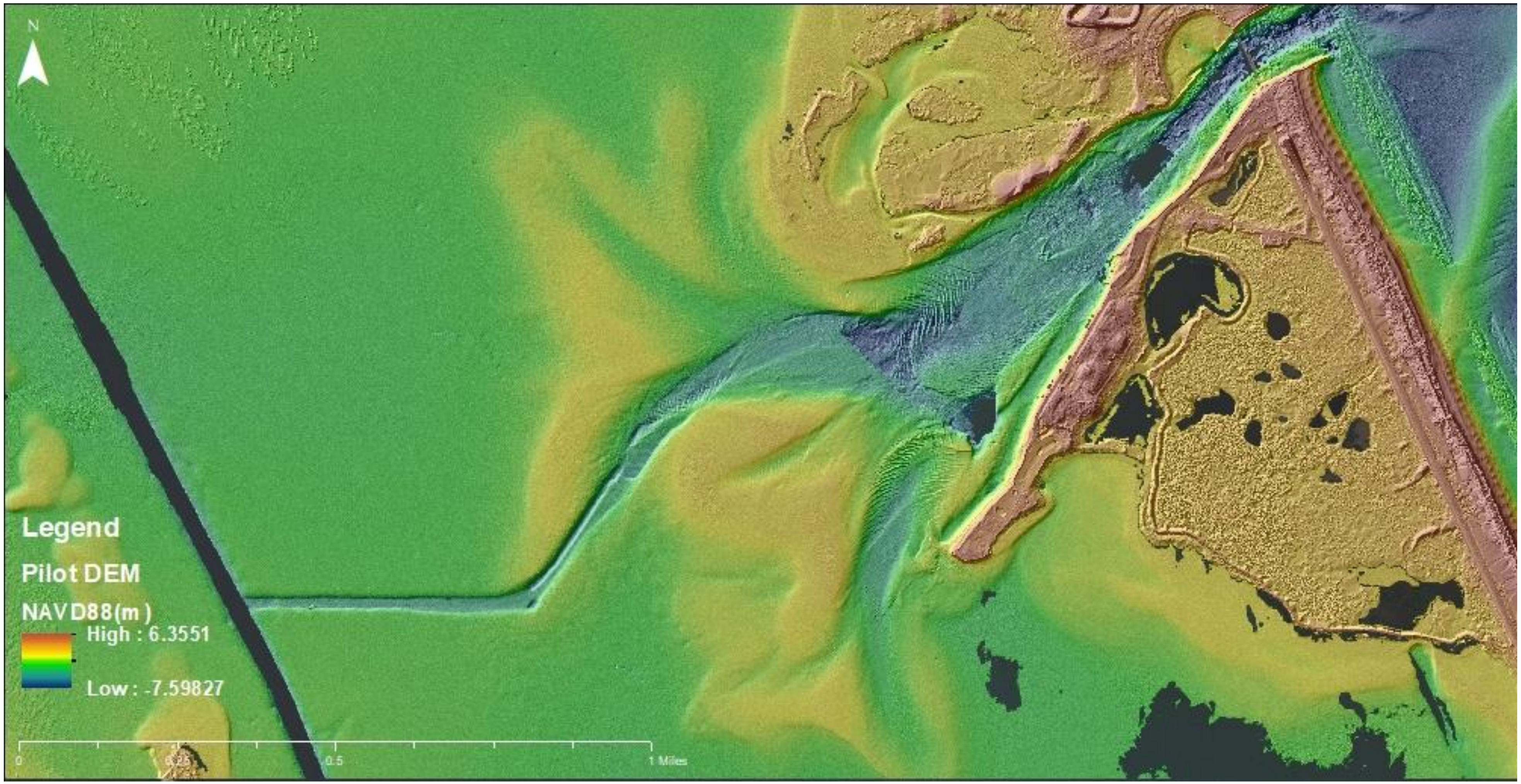
Blue: swap for Restricted Area

- NOAA is monitoring water clarity for possible acquisition in Restricted Area





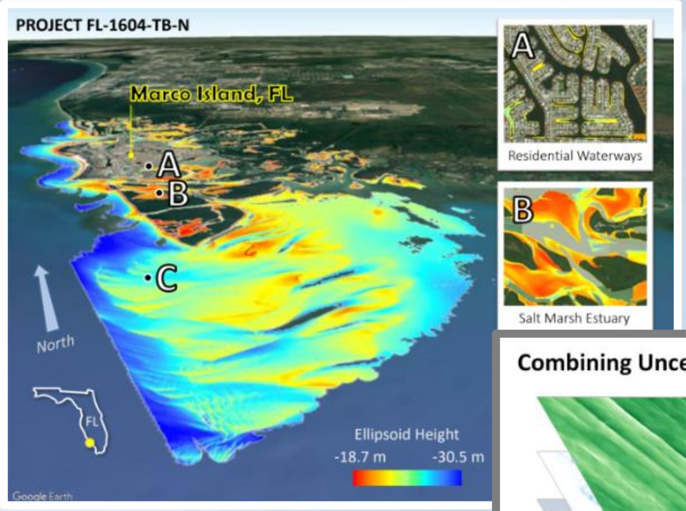
Initial Quick Look of Topobathy Lidar

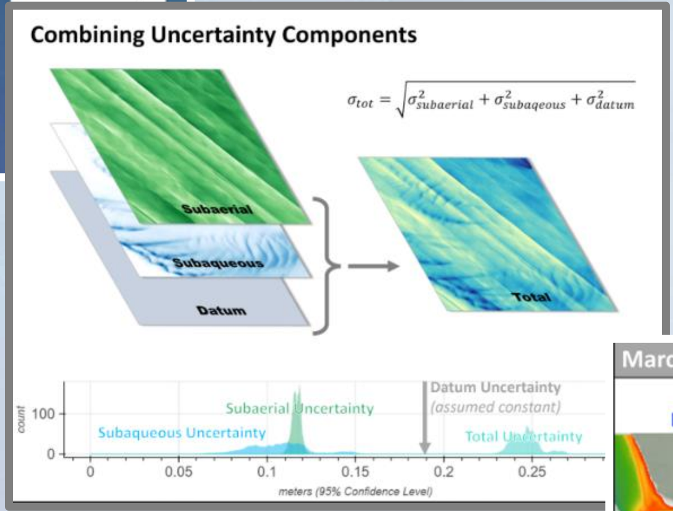


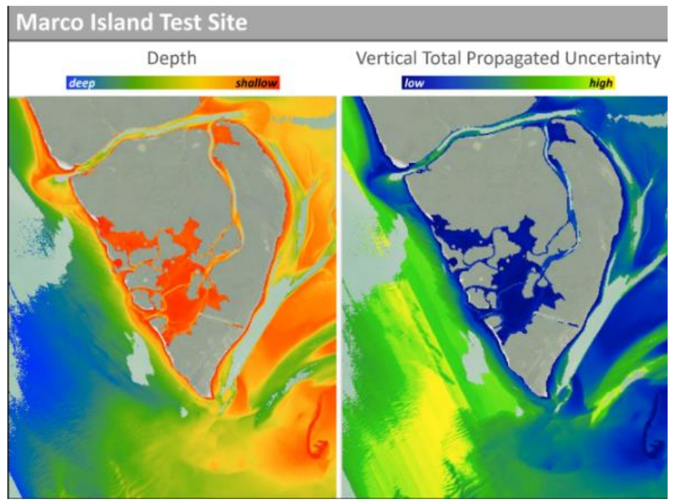
Indian River Lagoon: Sebastian Inlet
(Courtesy of Dewberry)

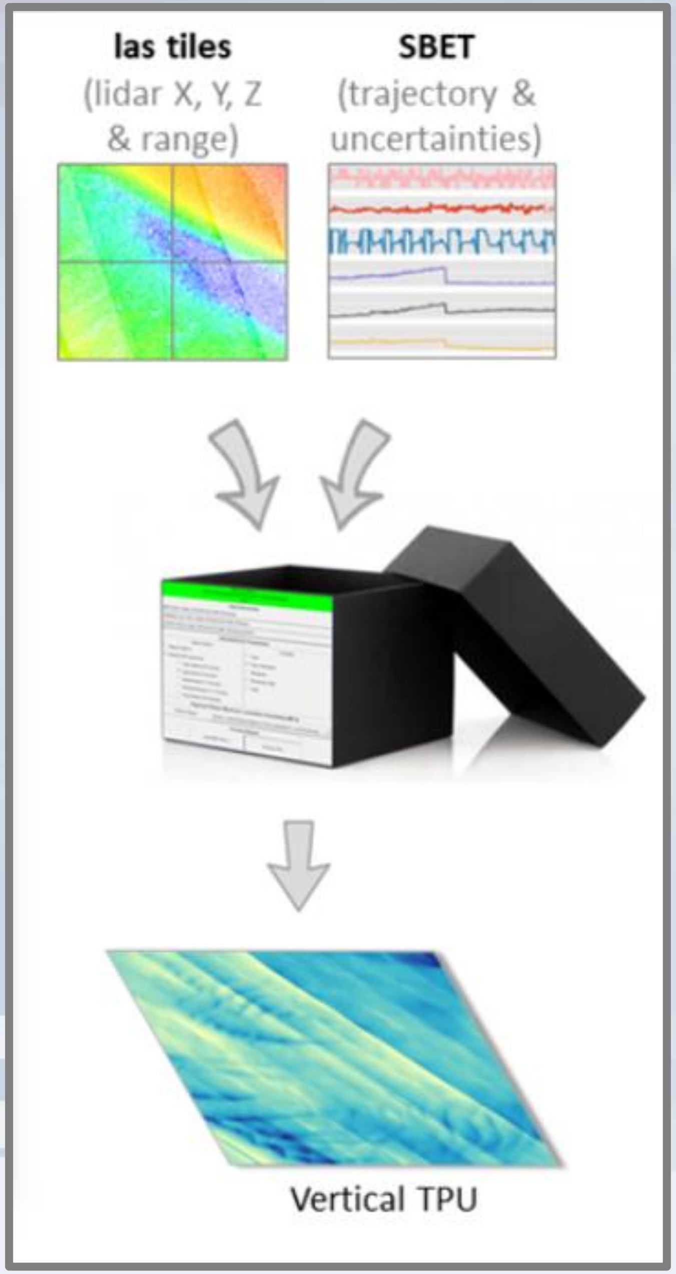
National Oceanic and Atmospheric Administration

Total Propagated Uncertainty (TPU)







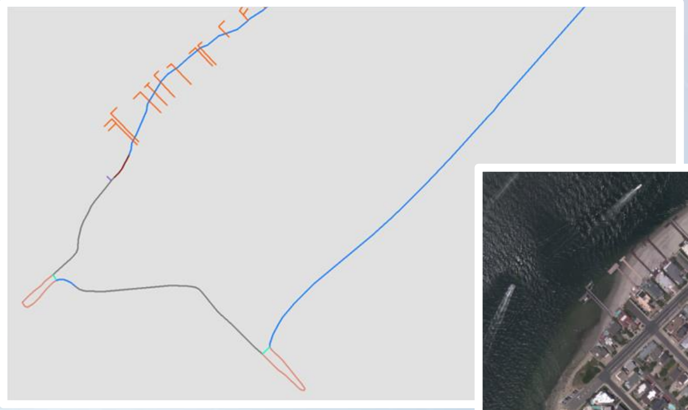


OSU Oregon State UNIVERSITY

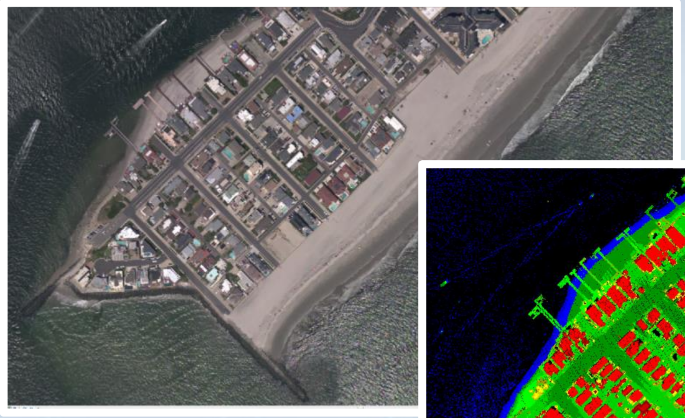
CCOM JHC Center for Coastal & Ocean Mapping Joint Hydrographic Center University of New Hampshire

NOAA National Oceanic and Atmospheric Administration U.S. Department of Commerce

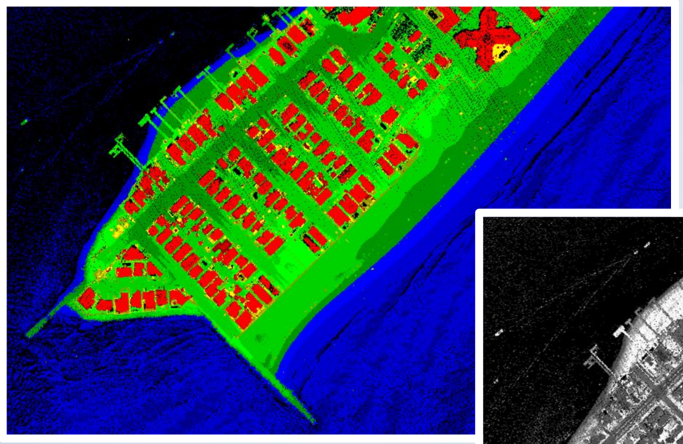
IOCM Products/Deliverables



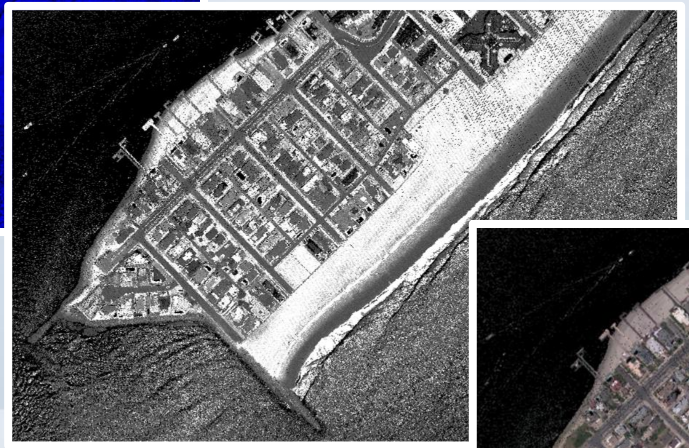
Shoreline



Ortho Mosaic Imagery



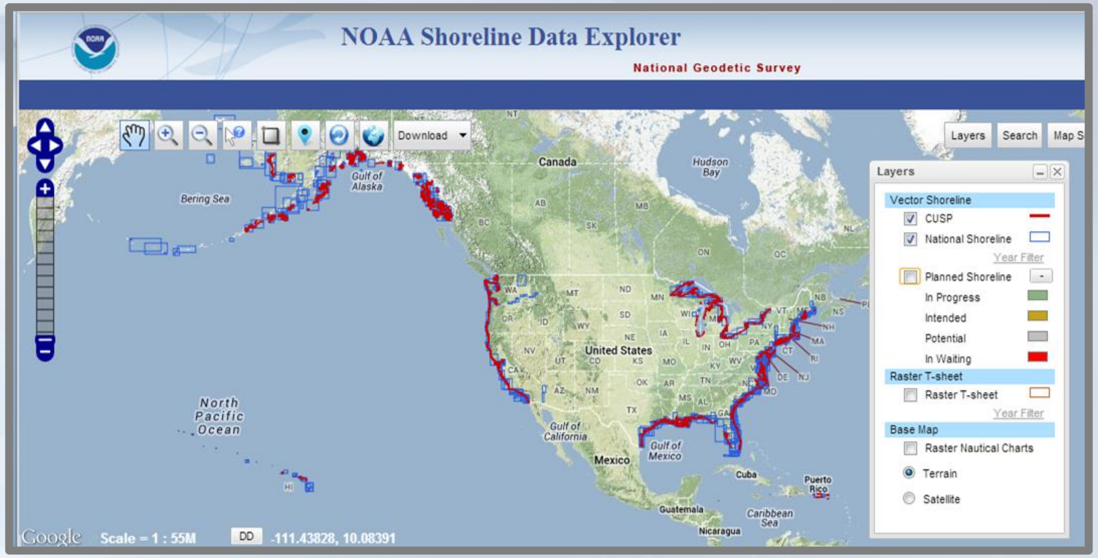
Lidar Point Clouds\
DEMs (elevation)



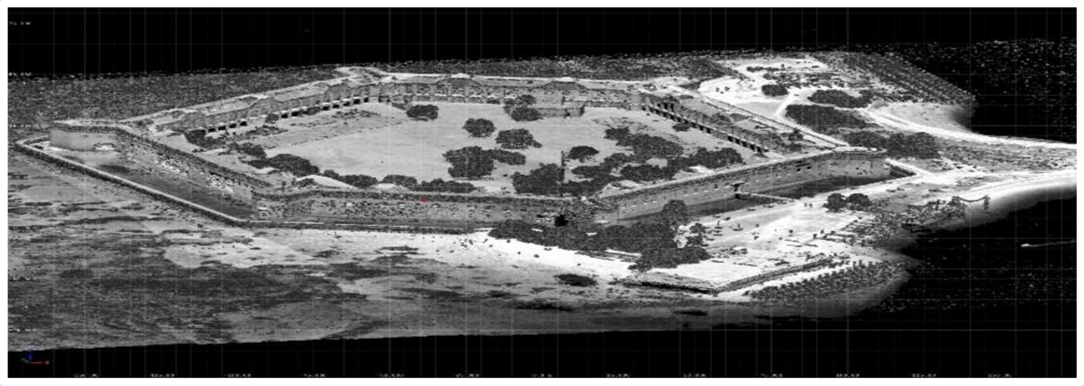
Normalized
Intensity

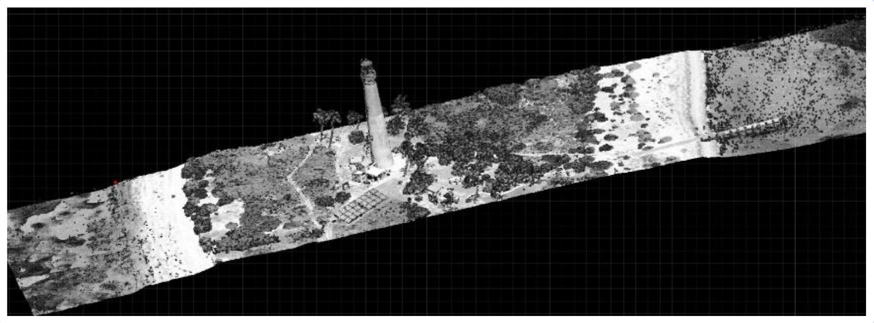
Total Propagated
Uncertainty (TPU)

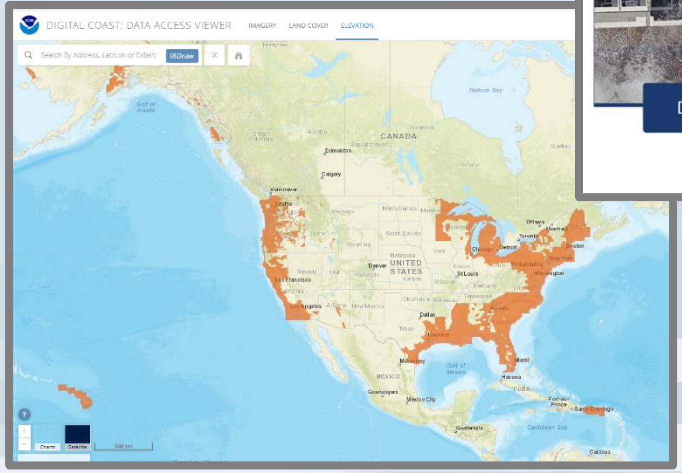
Distribution of Data

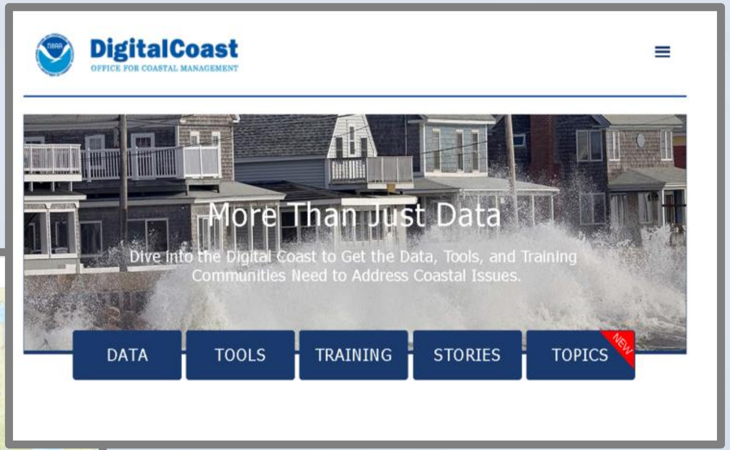


Shoreline (**http://www.ngs.noaa.gov/NSDE/**)









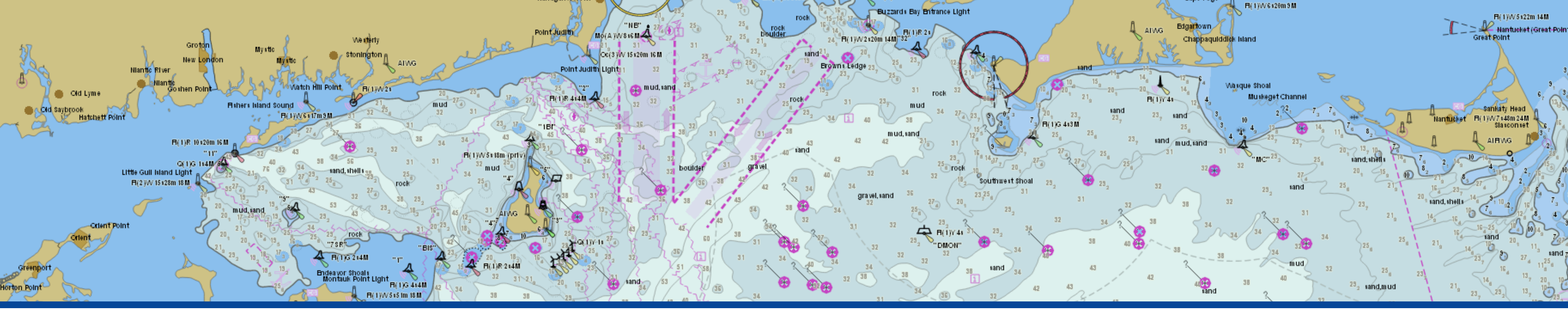
Lidar and Imagery:

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

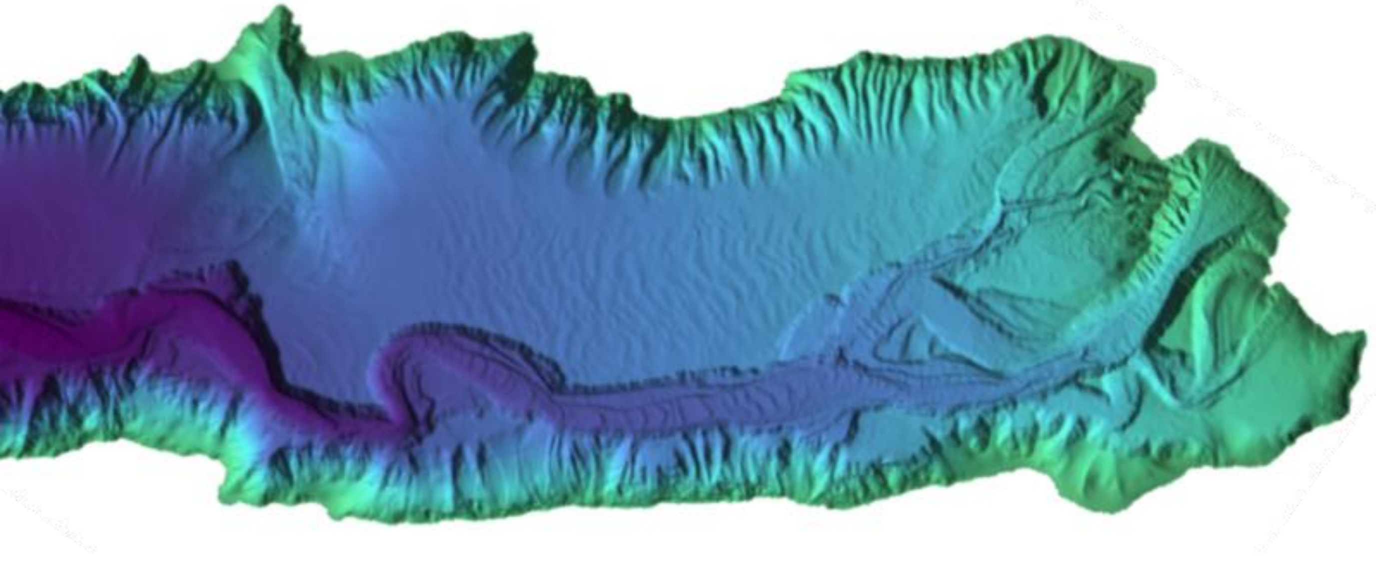
National Oceanic and Atmospheric Administration

Questions?

Mike Aslaksen
Chief, Remote Sensing Division
NOAA National Geodetic Survey
Mike.aslaksen@noaa.gov



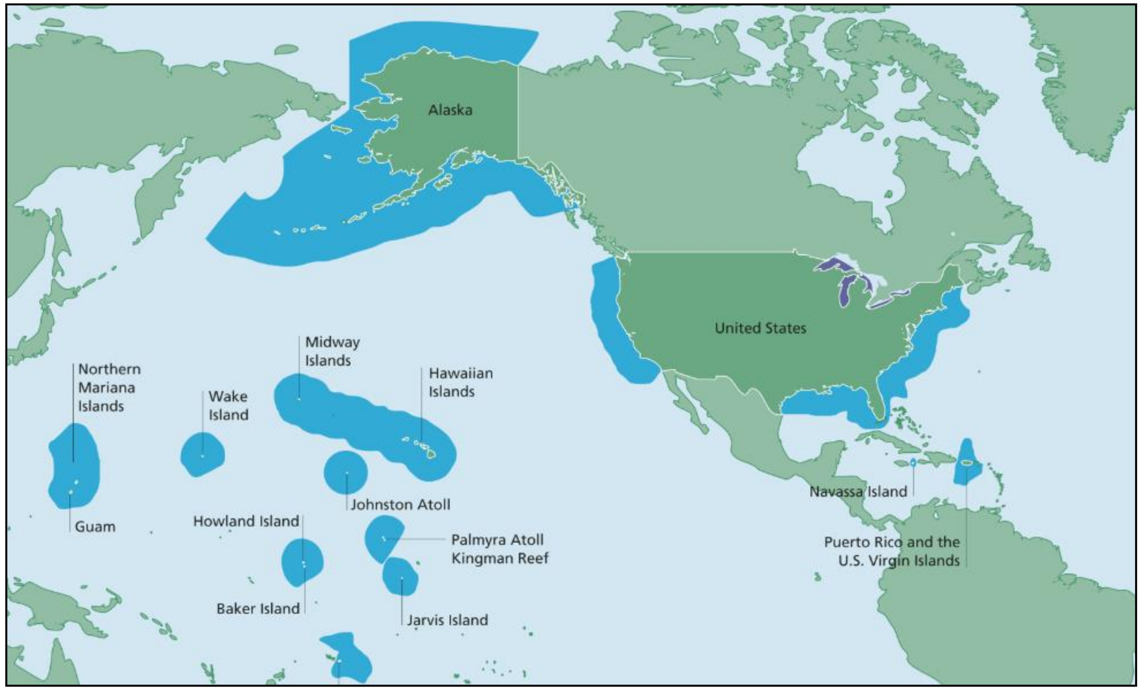
The National Bathymetric Source

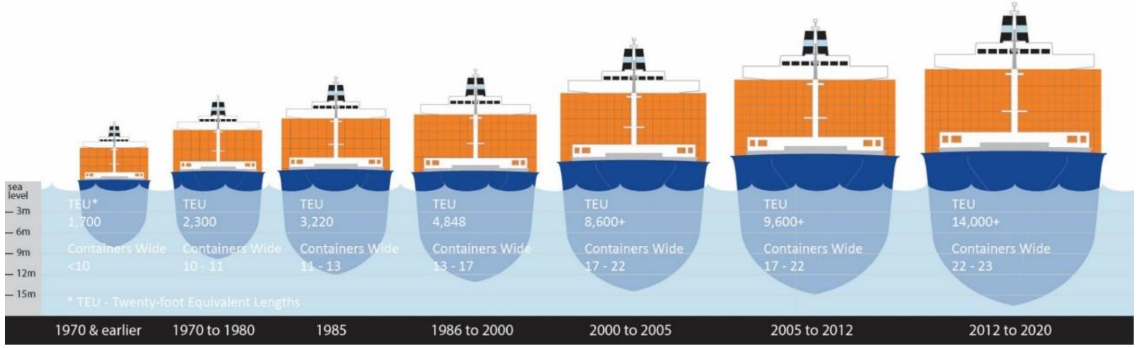


NOAA Coast Survey
Florida Coastal Mapping Program
2022 Annual Summit
December 1, 2022

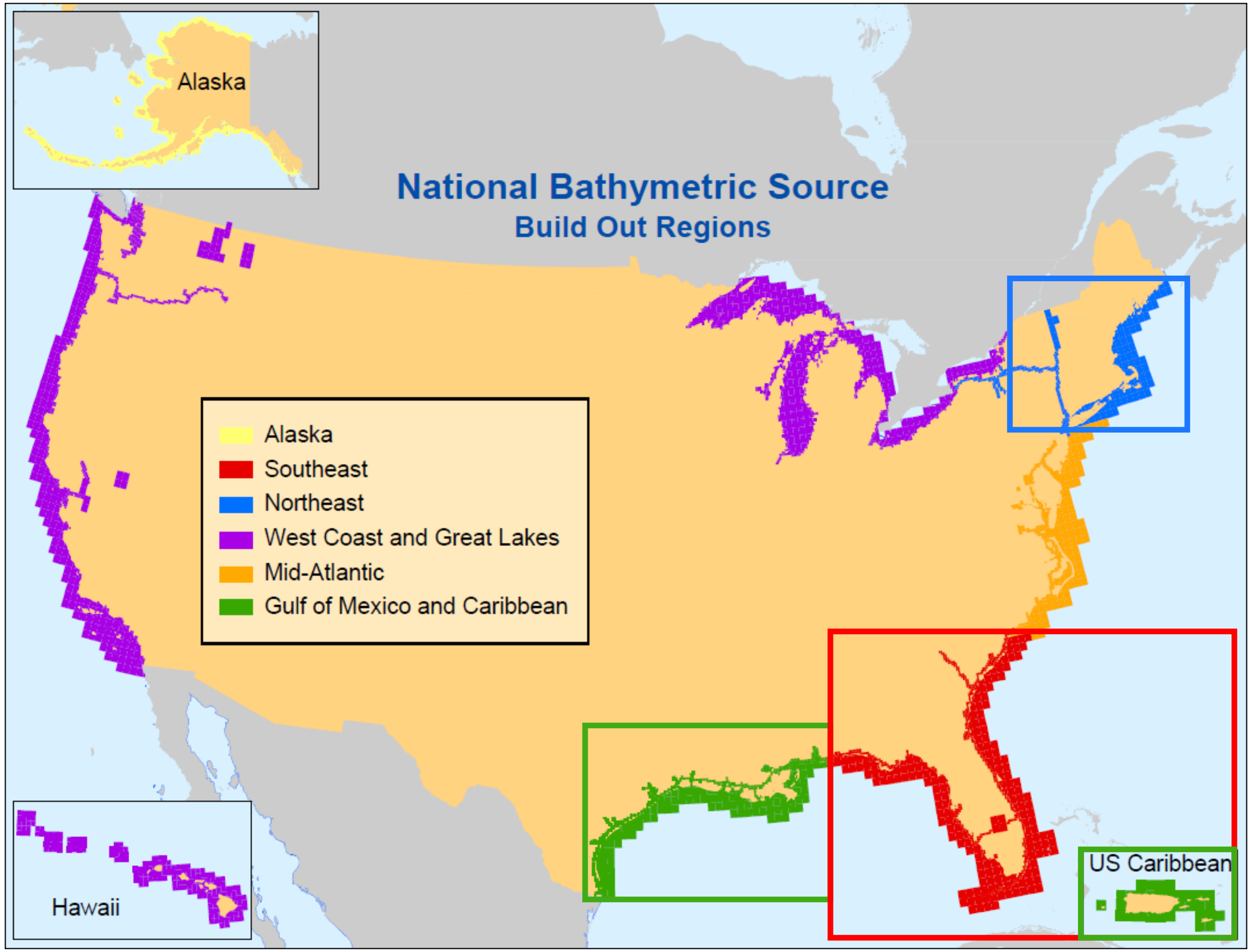
Office of Coast Survey
National Oceanic and Atmospheric Administration

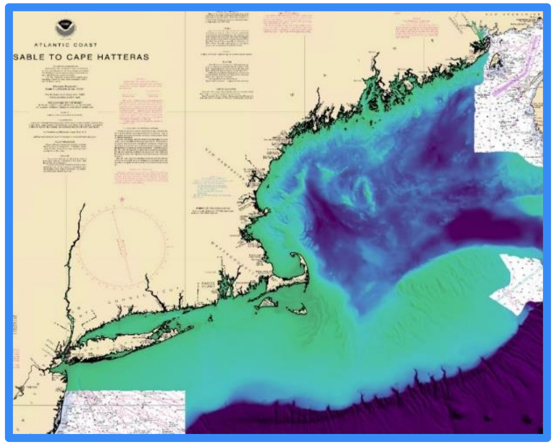
NOAA Coast Survey

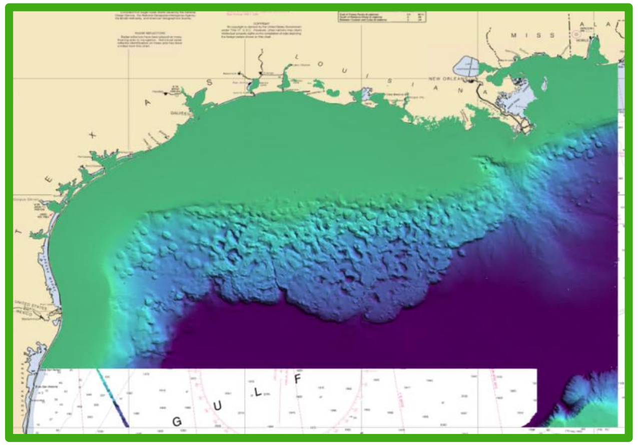


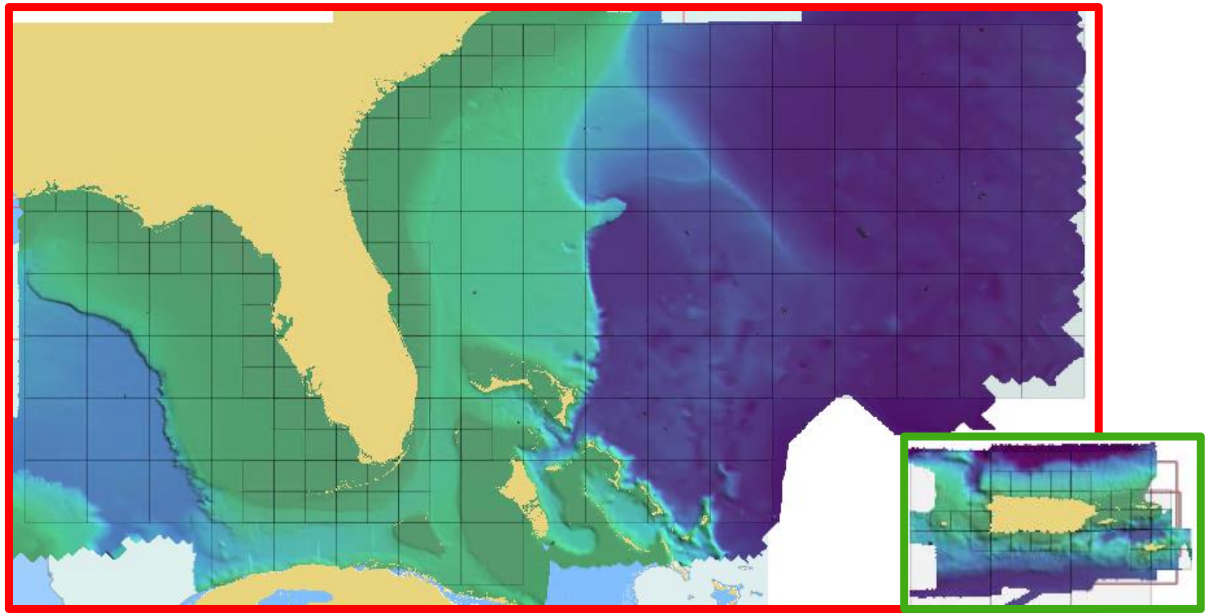


National Bathymetry Build Out and Maintenance

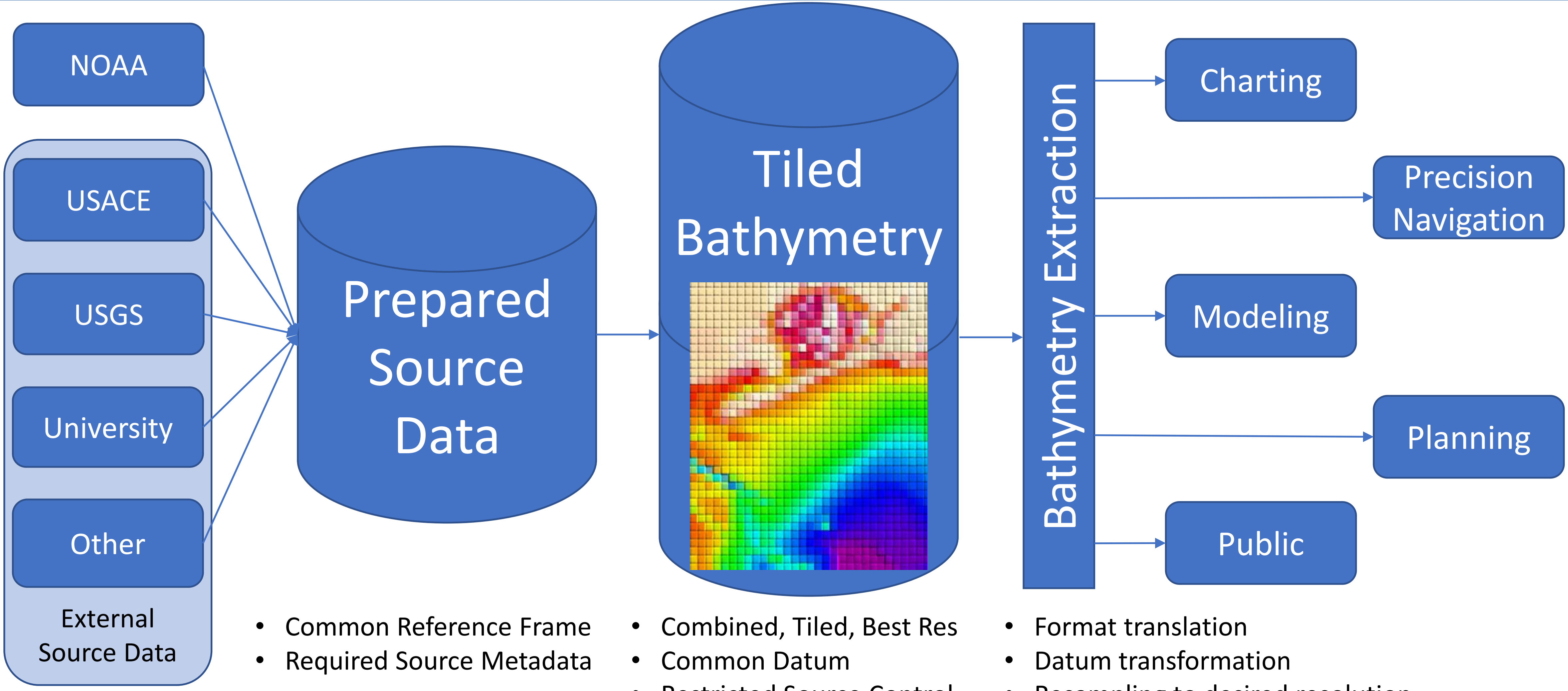








National Bathymetry Workflow



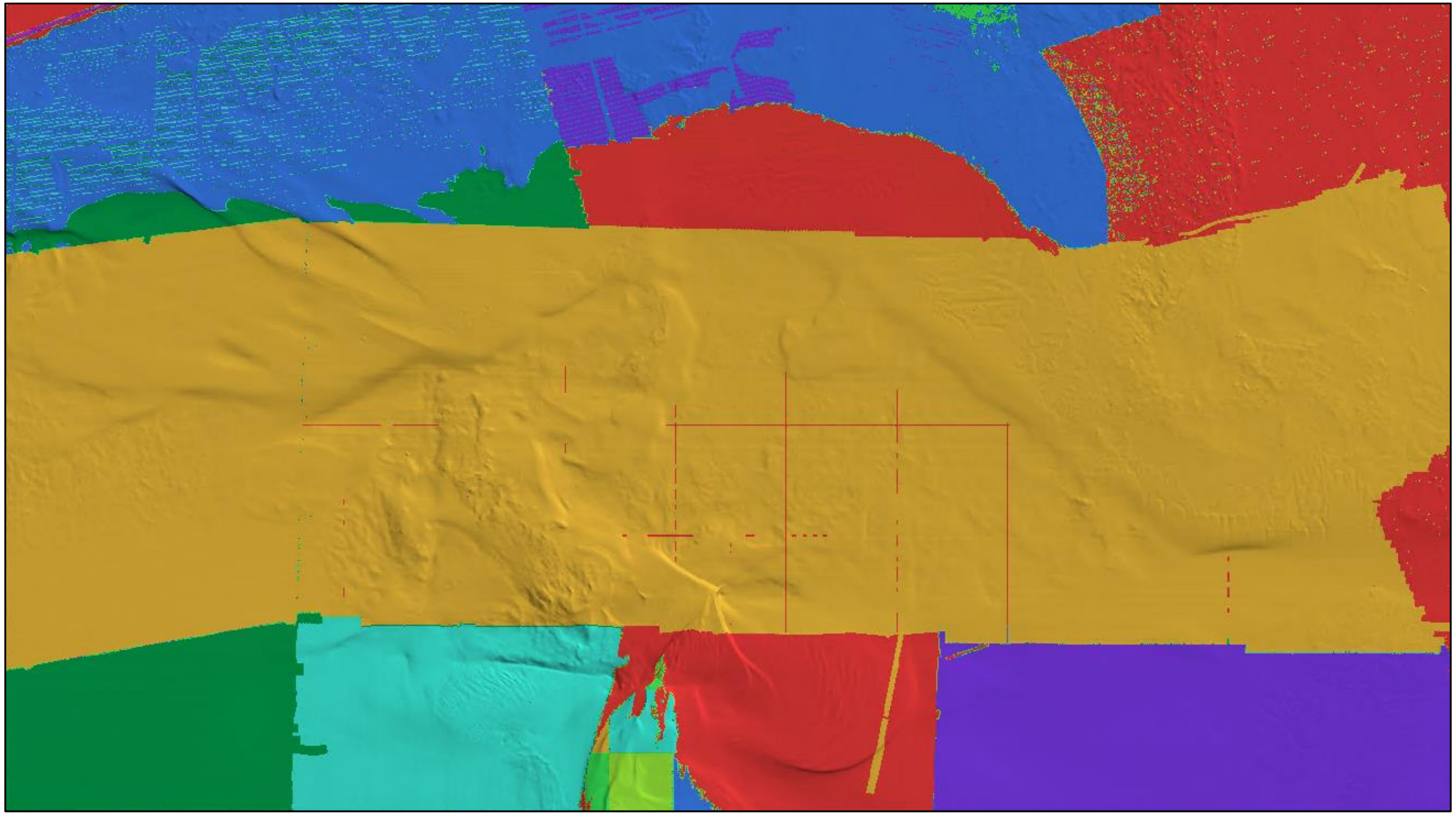
- Common Reference Frame
- Required Source Metadata

- Combined, Tiled, Best Res
- Common Datum
- Restricted Source Control

- Format translation
- Datum transformation
- Resampling to desired resolution

National Bathymetry Metrics

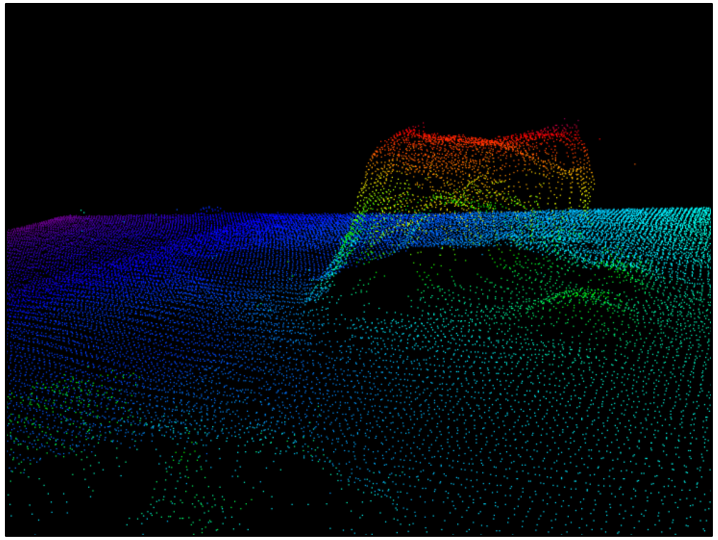
- Depth
  - Datum
  - Units
- Quality
  - Coverage
  - Uncertainty
  - Feature Detection
- Origin
  - Source information
  - License

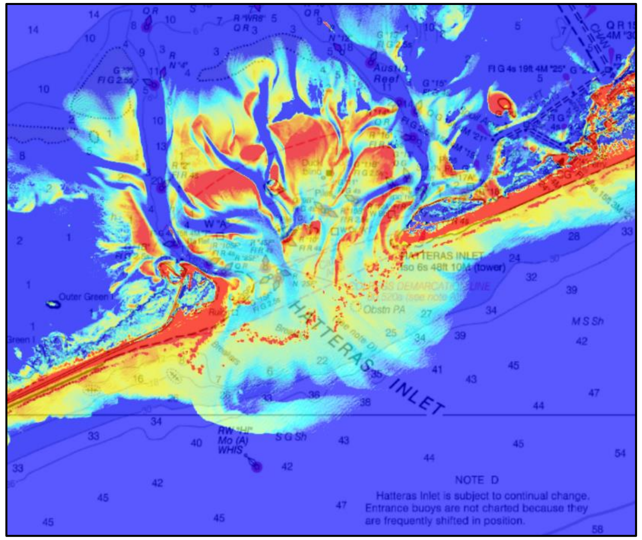


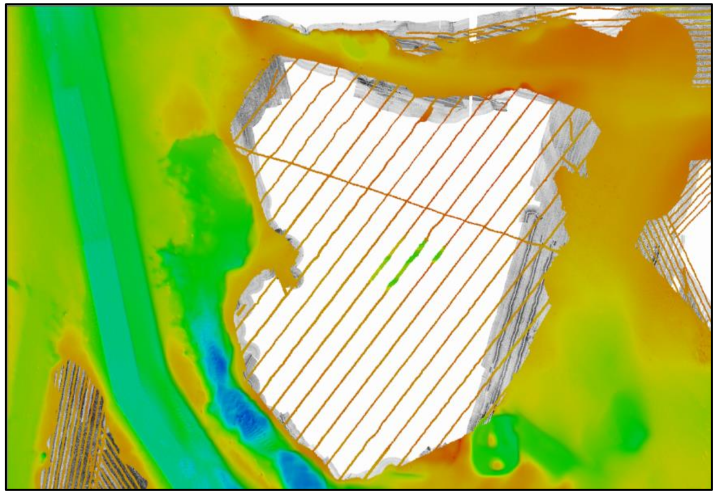
National Bathymetry Metrics

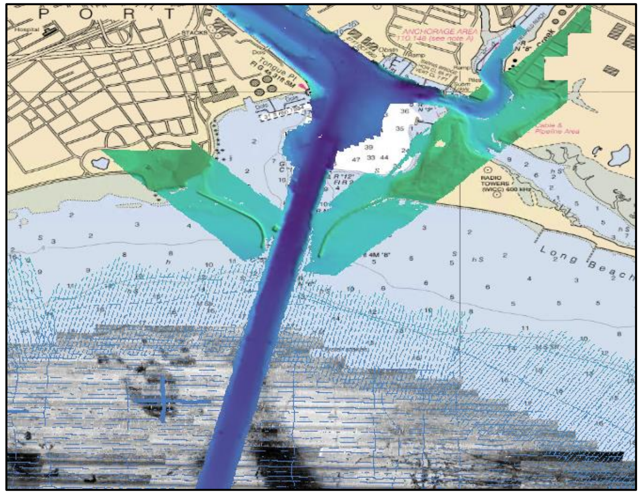
Quality of Bathymetry

- Vertical Uncertainty
- Horizontal Uncertainty
- Survey Date Range
- Full Coverage Achieved
  - Bathymetry Coverage
- Features Detected
  - Least Depth Measured
  - Size of Features Detected

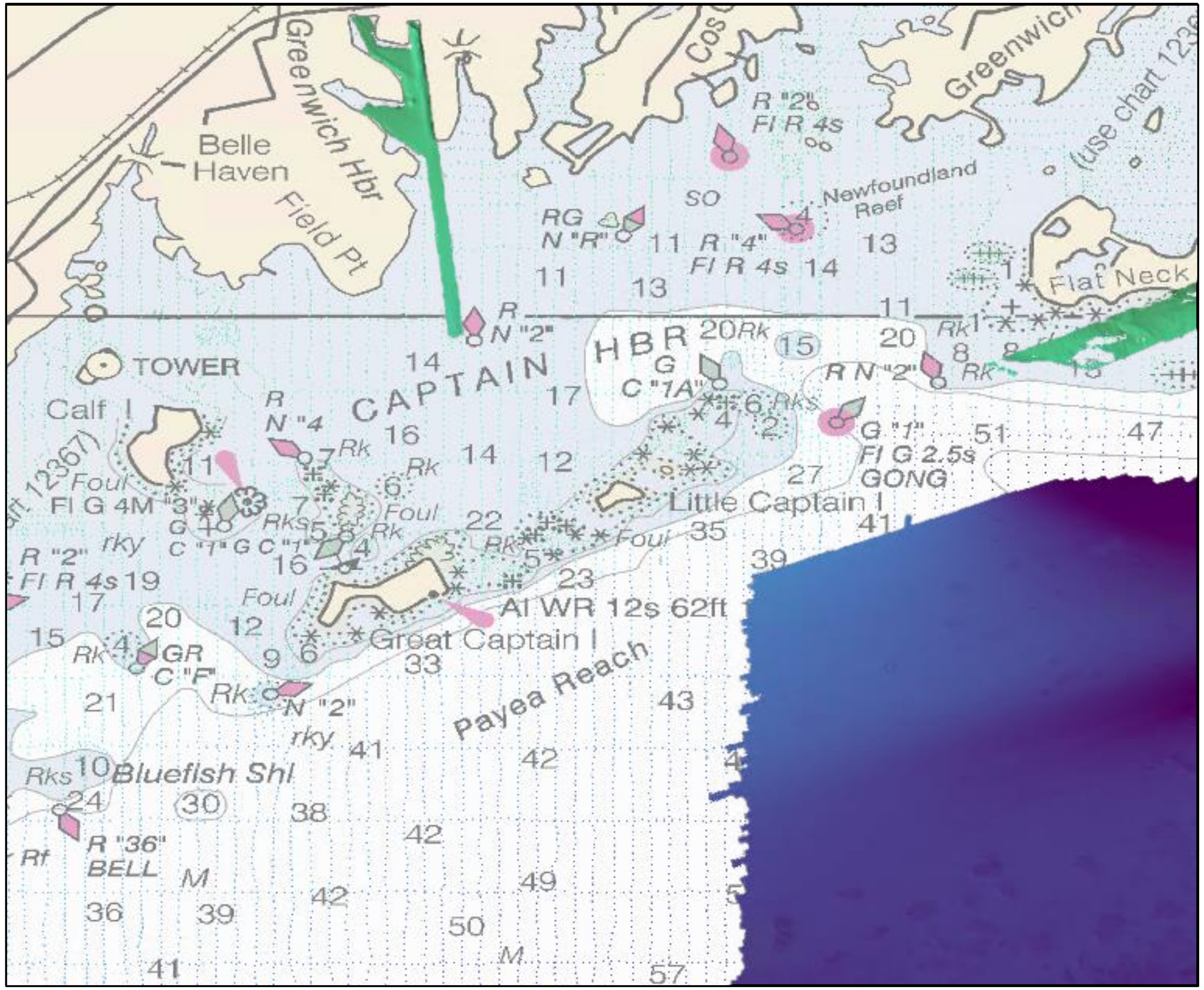


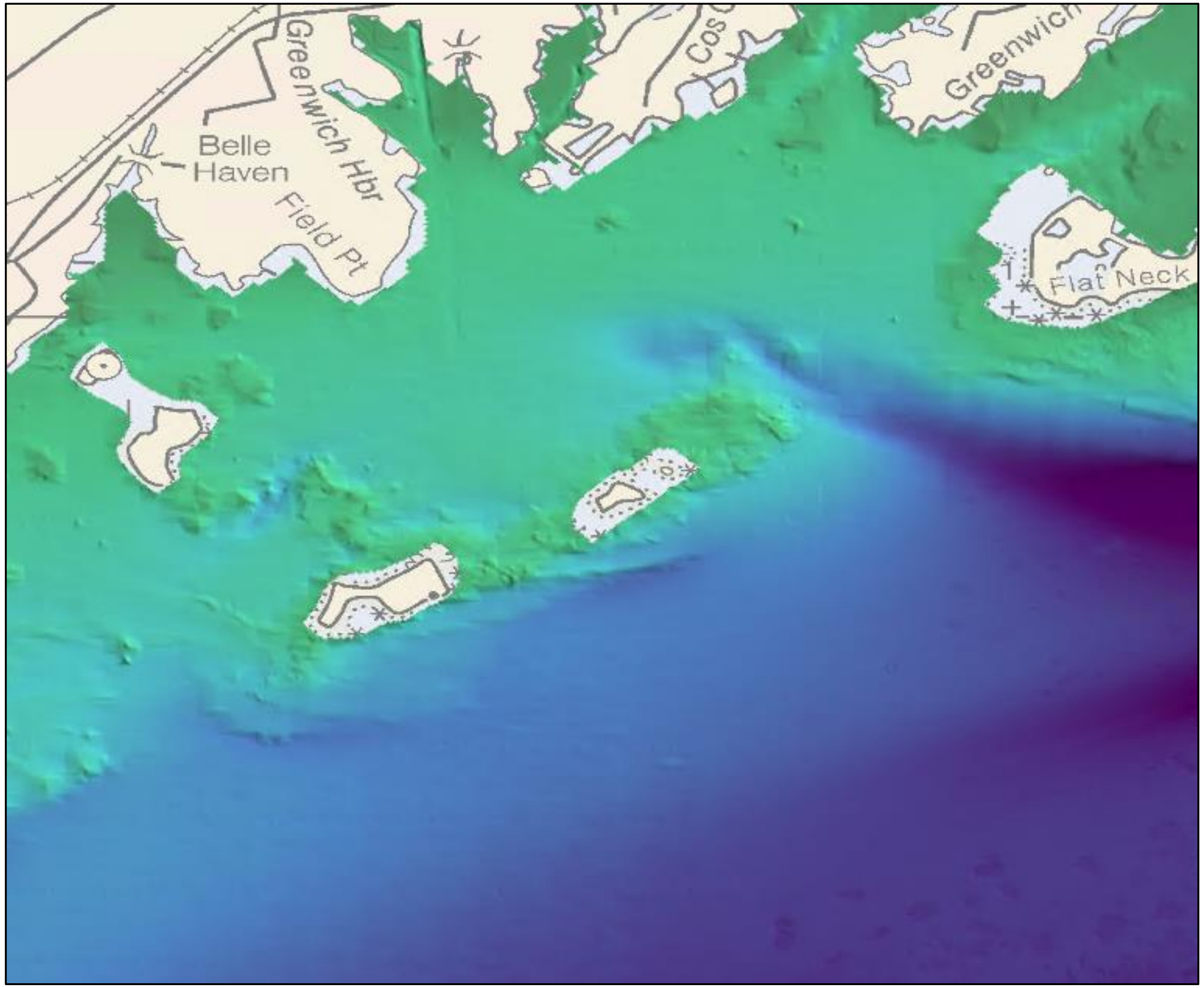


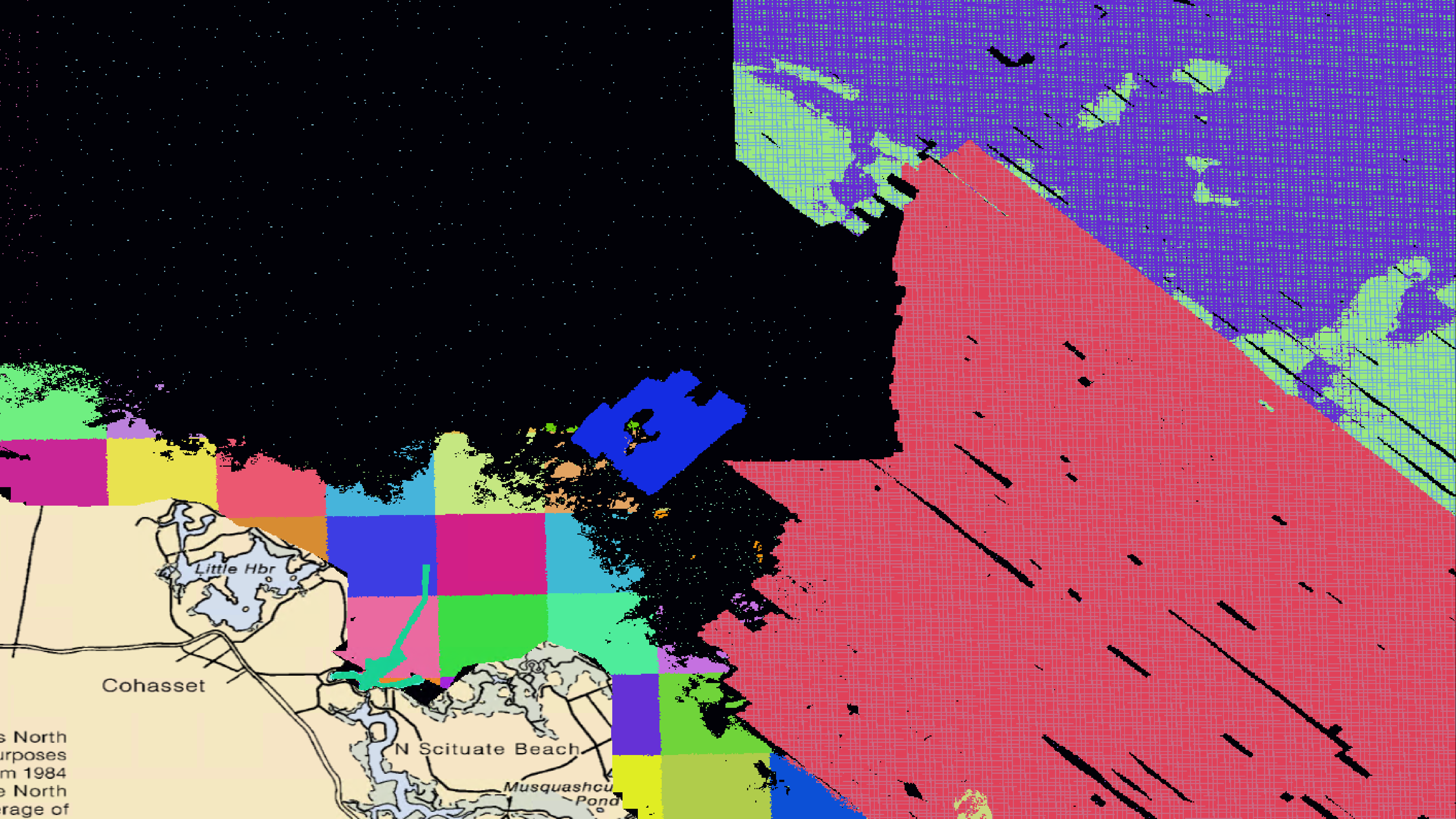




National Bathymetry Metrics



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National Bathymetry Metrics

- Survey ID ▪ Source Institution ▪ Survey Start Date ▪ Survey End Date ▪ License/URL
- Vertical Uncertainty Fixed and Variable ▪ Horizontal Uncertainty Fixed and Variable
- Features Detected, Least Depth, and Size ▪ Coverage and Bathymetric Coverage

License_Name	License_URL	Source_Survey_ID	Source_Institution	survey_date_start	survey_date_end
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cc0-1.0	https://creativecommons.org/publicdomain/zero/1.0/legalcode	W00040_MB_10m_MLLW_2of2	DOC/NOAA/NOS/OCS -- Office of Coast Survey	1994-11-13	2003-10-04
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cc0-1.0	https://creativecommons.org/publicdomain/zero/1.0/legalcode	2018_NCMP_MA_19TCG5970_BareEarth_1mGrid	DOD/USACE/JALBTCX -- Joint Airborne Lidar Bathymetry Technical Center of Expertise	2018-05-09	2018-08-27
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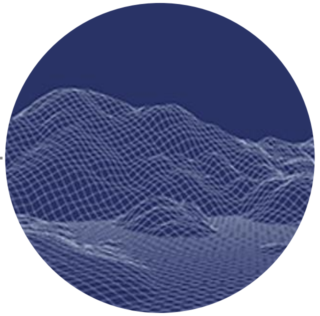
National Bathymetry Products



Navigation

- ENC and S-102

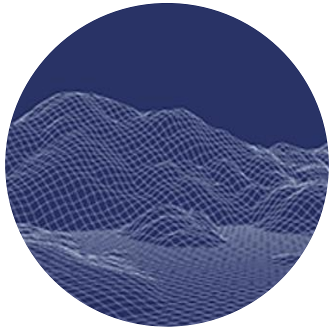
Internal

- Project Planning

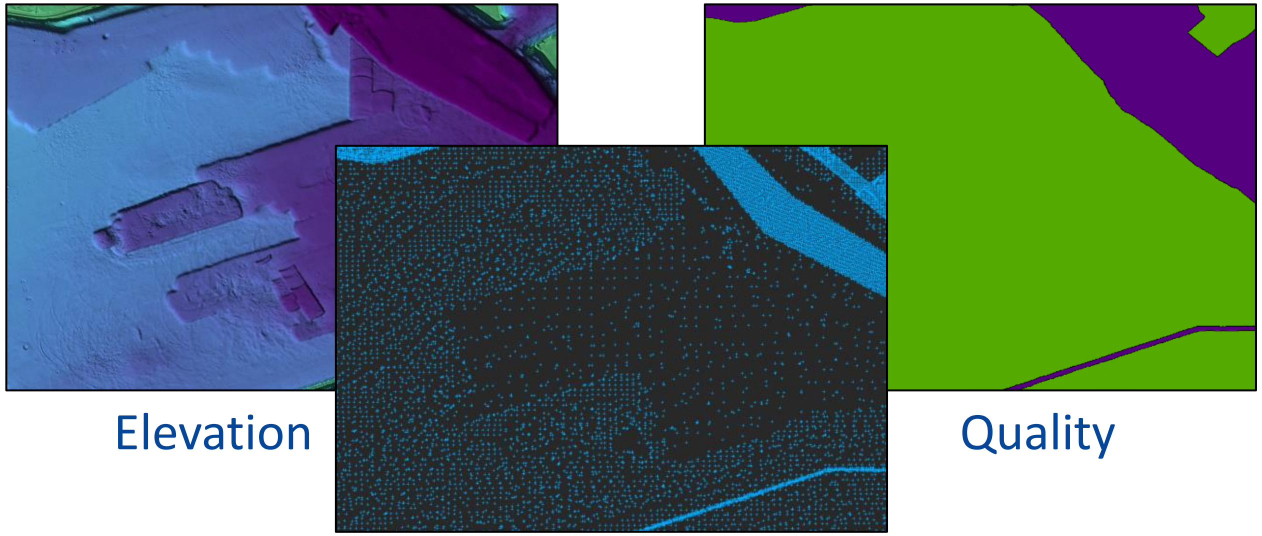
Public

- BlueTopo™

Navigation Products



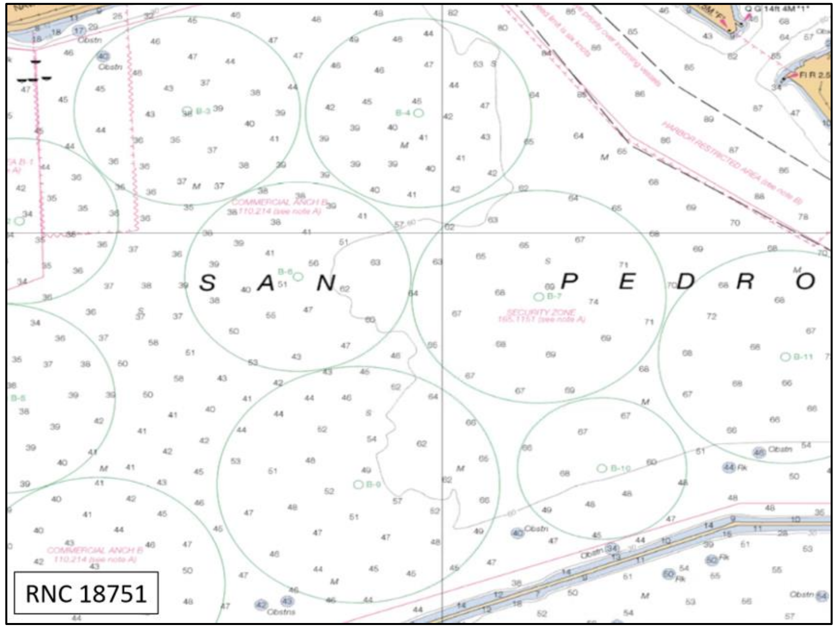
- Vertical Datum is Chart (e.g. Mean Lower Low Water, Hudson River)
- ENC products via NOAA Coast Survey webpage
- S-102 products via Precision Marine Navigation Gateway



Elevation

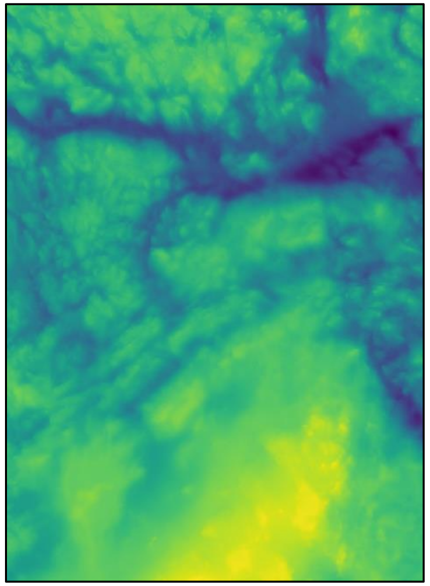
Quality

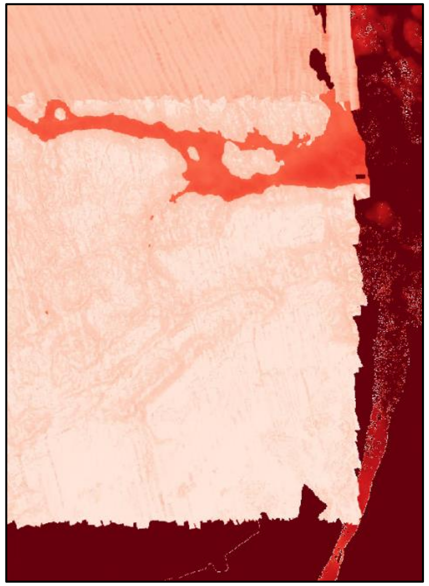
Attributed Soundings



Internal Products: Project Planning

- Vertical Datum is Chart (e.g. Mean Lower Low Water, Hudson River)
- Three layer GeoTIFF with Raster Attribute Table


Elevation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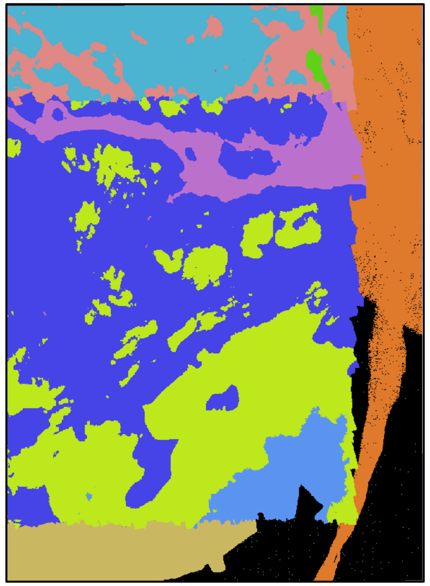
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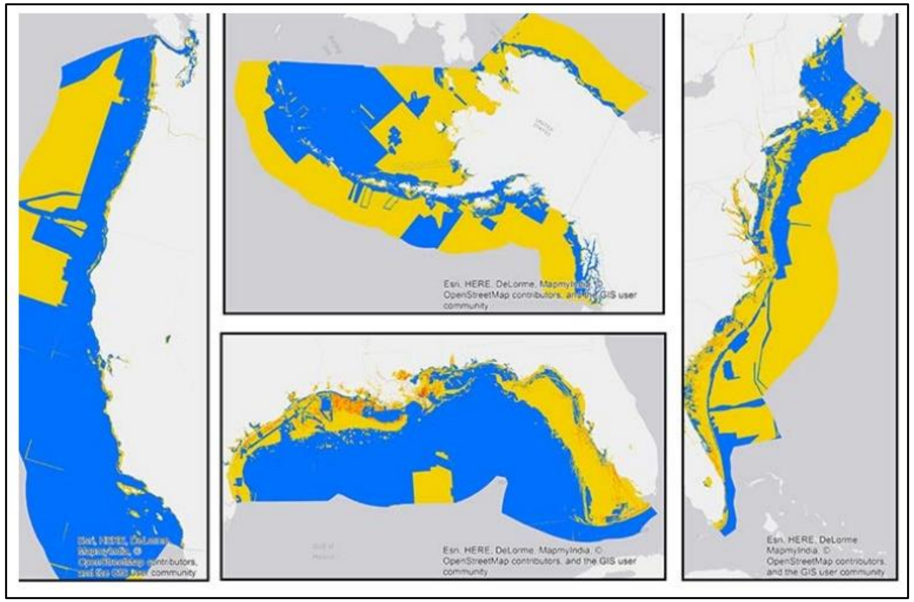
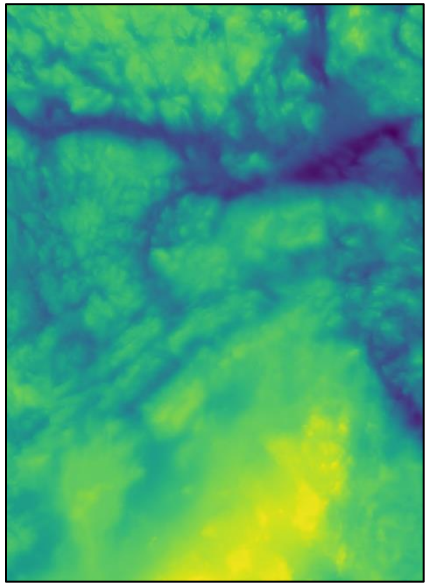


Public Products: BlueTopo™

- Not for Navigation
- Vertical Datum is NAVD88
- Three layer GeoTIFF with Raster Attribute Table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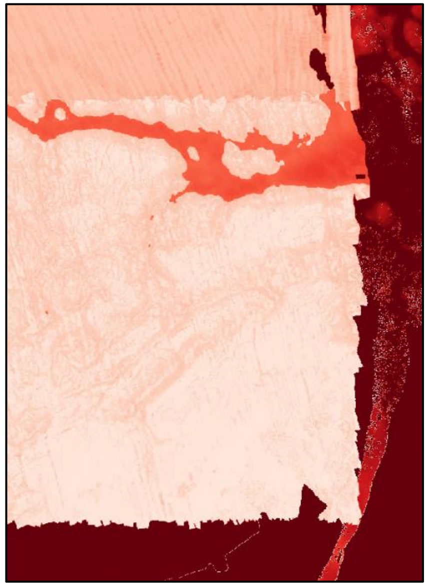
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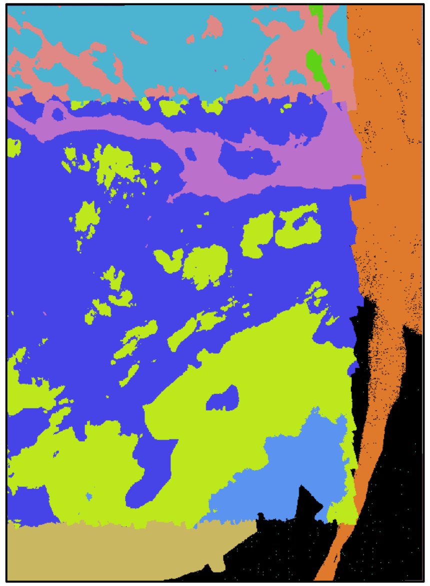
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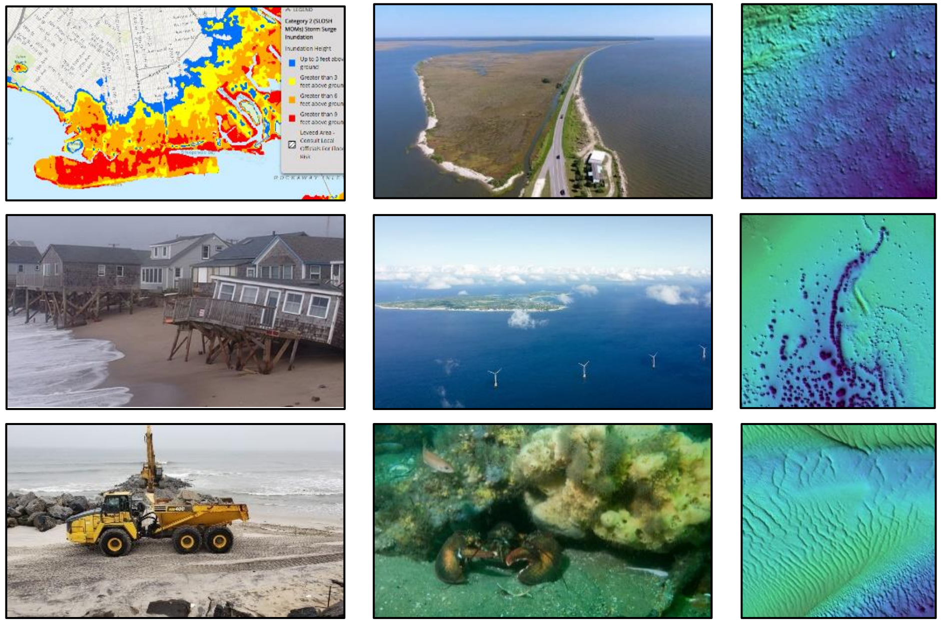

BlueTopo™ Webpage and AWS Bucket

Office of Coast Survey
National Oceanic and Atmospheric Administration
U.S. Department of Commerce

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Home > Data > BlueTopo™

BLUETOPO
A curated collection of high resolution seafloor models

What is BlueTopo™?

BlueTopo is a compilation of the nation's best available bathymetric data. In the same way that topographic map details the height of land, BlueTopo details the depth of lake beds and seafloor beneath navigationally significant U.S. waters. Created as part of the Office of Coast Survey nautical charting mission and its National Bathymetric Source project, BlueTopo is curated bathymetric source data to provide a definitive nationwide model of the seafloor and the Great Lakes.

NOAA's Office of Coast Survey is the nation's nautical charting authority in U.S. waters. Nautical charts are maps that provide professional mariners and recreational boaters with the information they need to navigate safely, such as water depths, locations of hazards, and other features.

BlueTopo bathymetry displayed on the left and the associated BlueTopo contributing sources displayed on the right.

Historically, depth information on nautical charts has been drawn from many different, often sparse, bathymetric sources that can be difficult to access and update. The National Bathymetric Source project is part of a new Office of Coast Survey workflow to modernize the charting process and to provide a critical bathymetry resource to several customers, including the public. For example, NBS supports Precision Navigation by providing seamless, high-resolution bathymetric data to better equip mariners in making critical navigation decisions. BlueTopo is the public "not for navigation"

BlueTopo™ Information

The National Bathymetric Source

Description

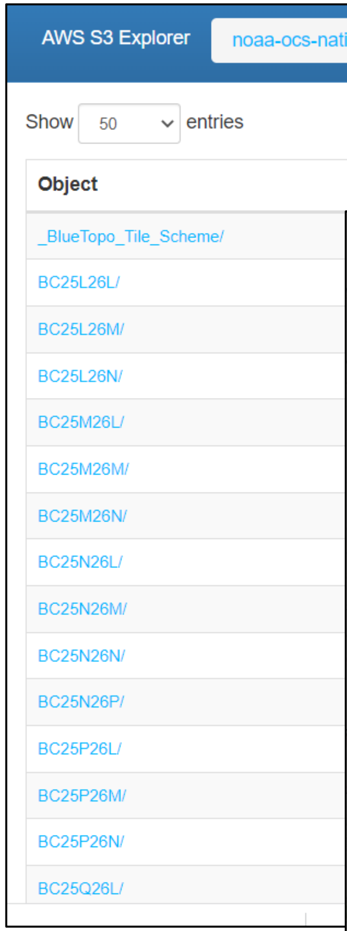
Specifications

Frequently Asked Questions (FAQs)

Related Links

Link to Data

Script Examples



AWS S3 Explorer | noaa-ocs-nationalbathymetry-pds / BlueTopo

Show 50 entries

Object	Last Modified
_BlueTopo_Tile_Scheme/	
BC25L26L/	
BC25L26M/	
BC25L26N/	
BC25M26L/	
BC25M26M/	
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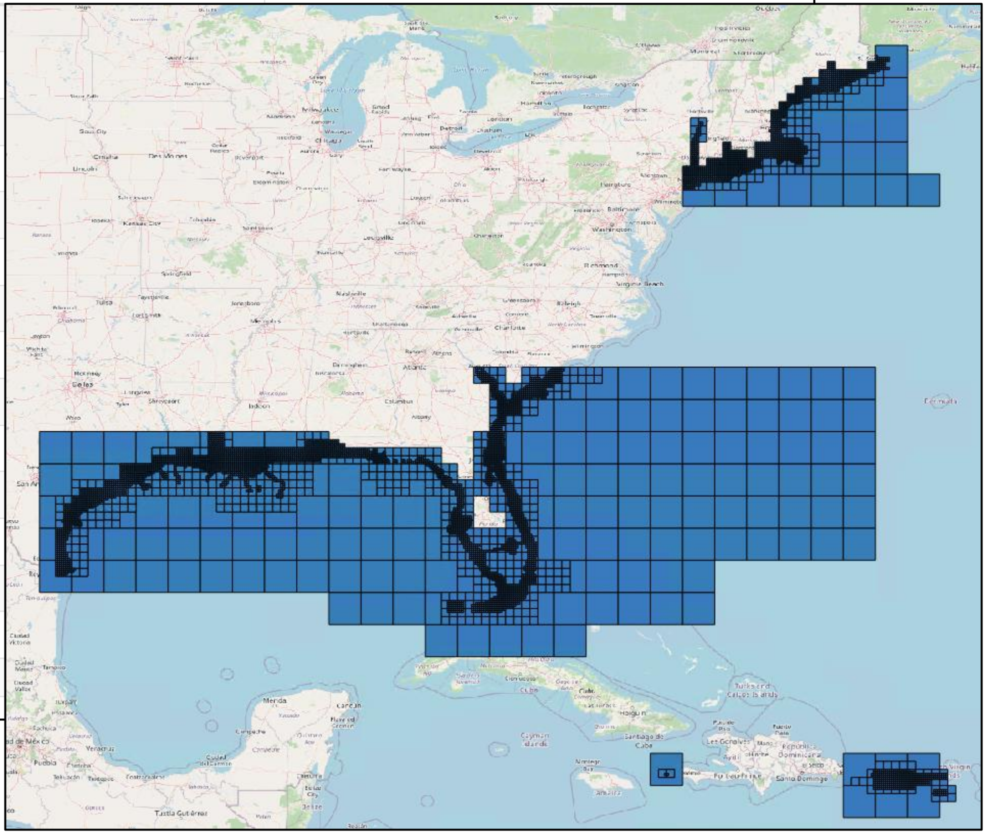
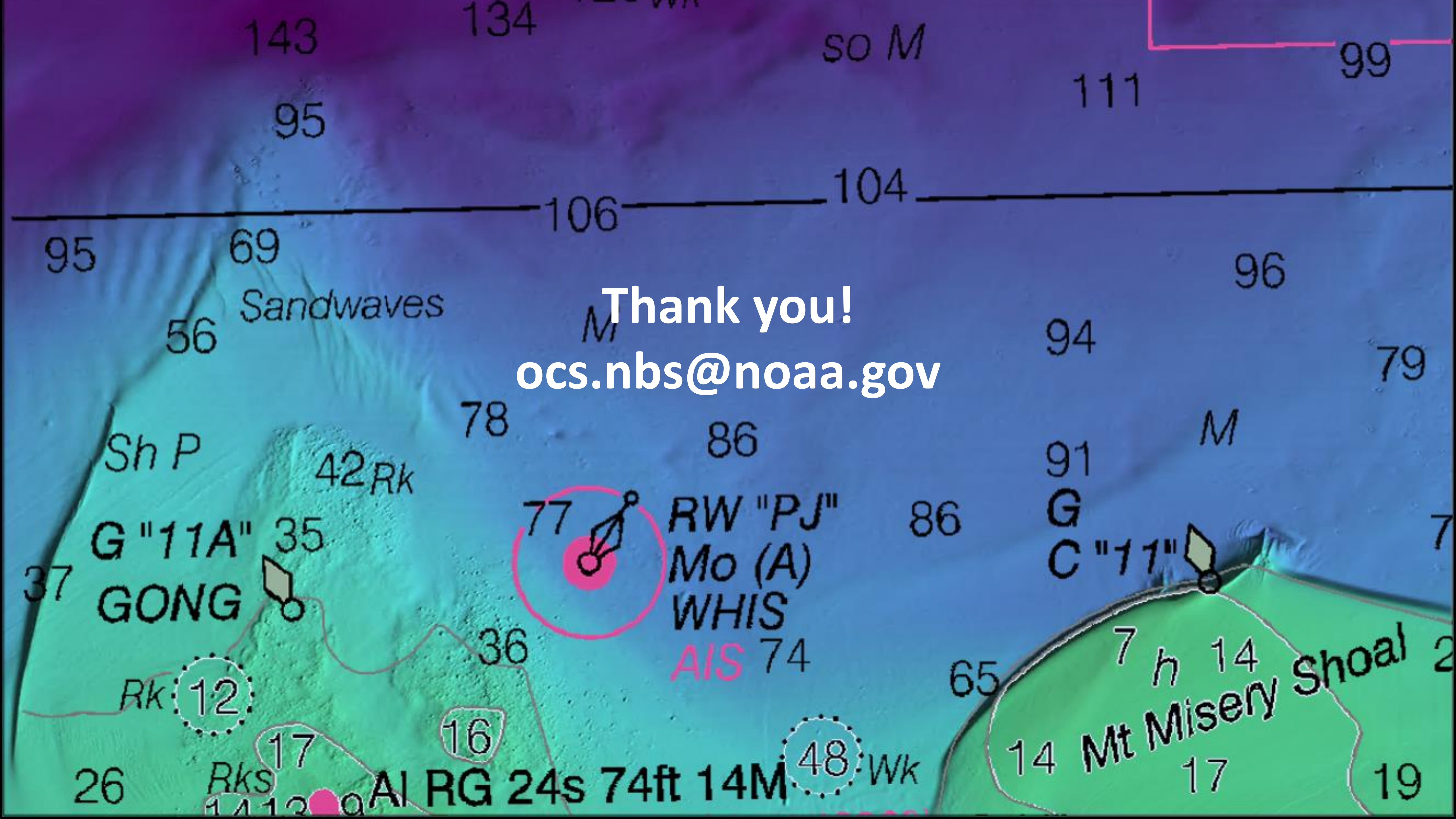


Thank you!

ocs.nbs@noaa.gov



NCCOS | NATIONAL CENTERS FOR COASTAL OCEAN SCIENCE

South Florida Coral Reefs Mapping and Digital Atlas Update

Chris Taylor – chris.taylor@noaa.gov

with

Matthew Johnson – NMFS SEFSC

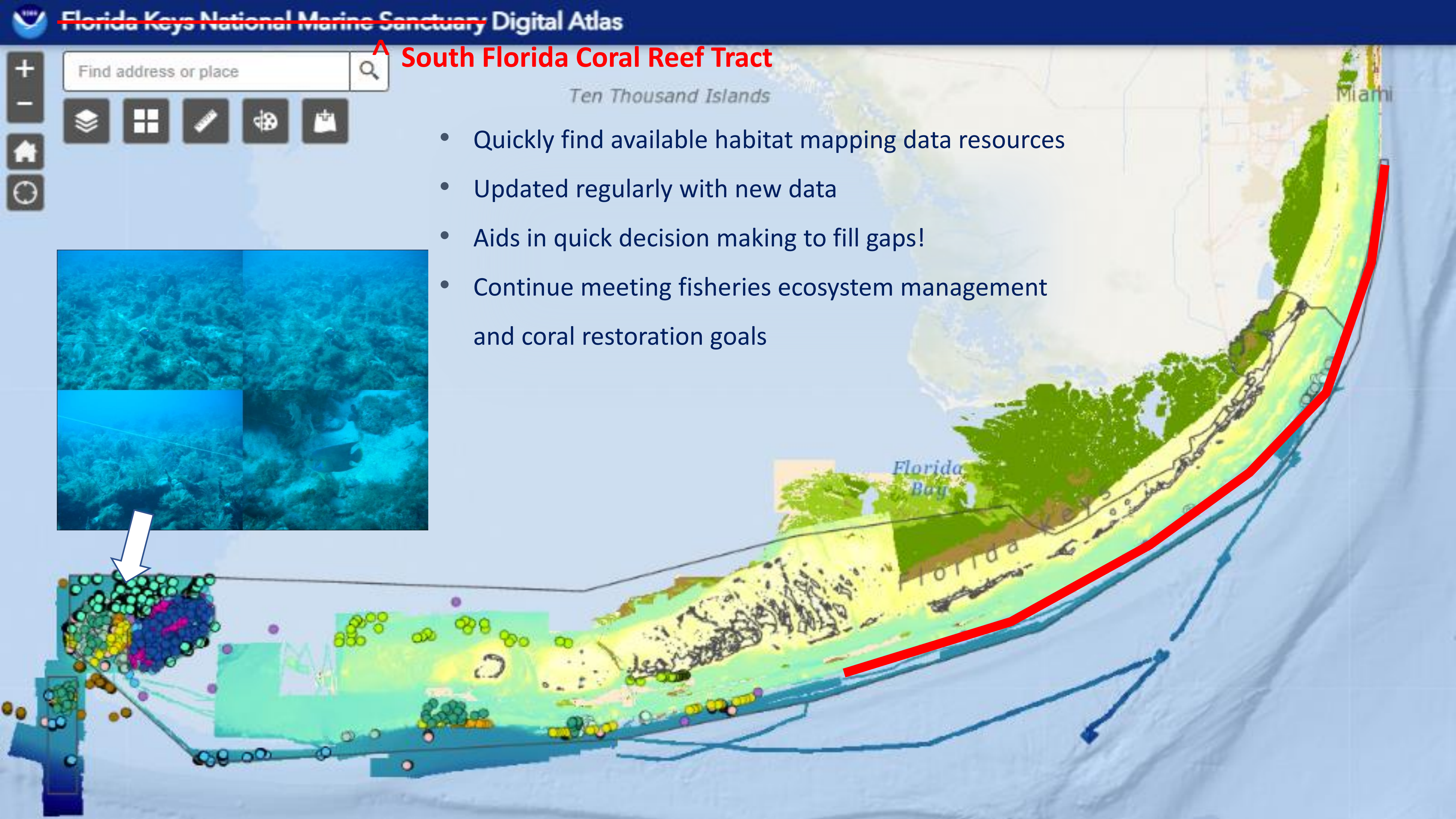
James Kirkpatrick – OCS NRT-FB

NOAA FISHERIES

Office of Coast Survey
The Nation's Chartmaker

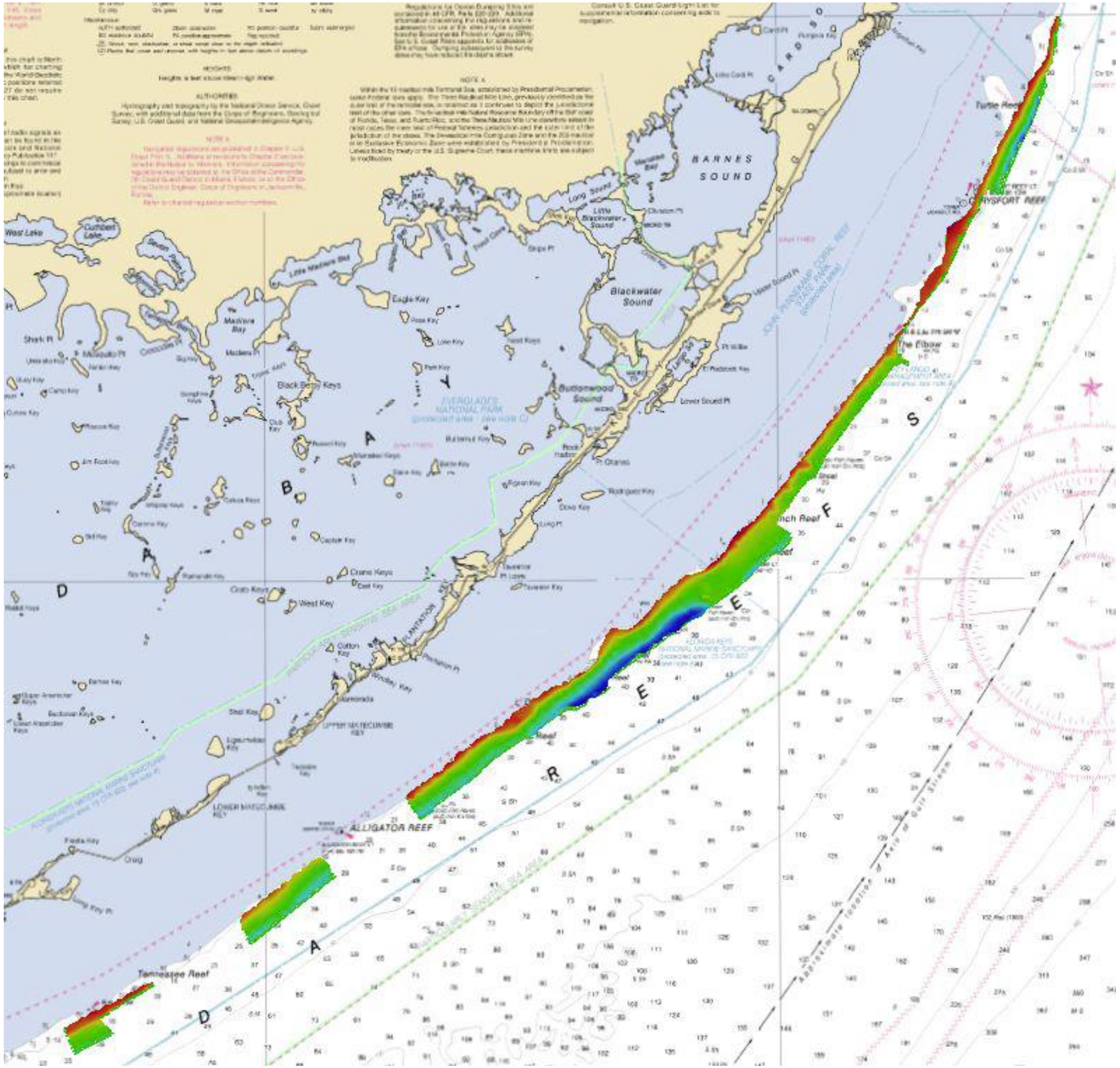
NOAA CORAL REEF CONSERVATION PROGRAM

SCIENCE SERVING COASTAL COMMUNITIES


~~Florida Keys National Marine Sanctuary~~ Digital Atlas
^ South Florida Coral Reef Tract
Find address or place
Ten Thousand Islands
Miami
• Quickly find available habitat mapping data resources
• Updated regularly with new data
• Aids in quick decision making to fill gaps!
• Continue meeting fisheries ecosystem management and coral restoration goals
Florida Bay
Florida Keys

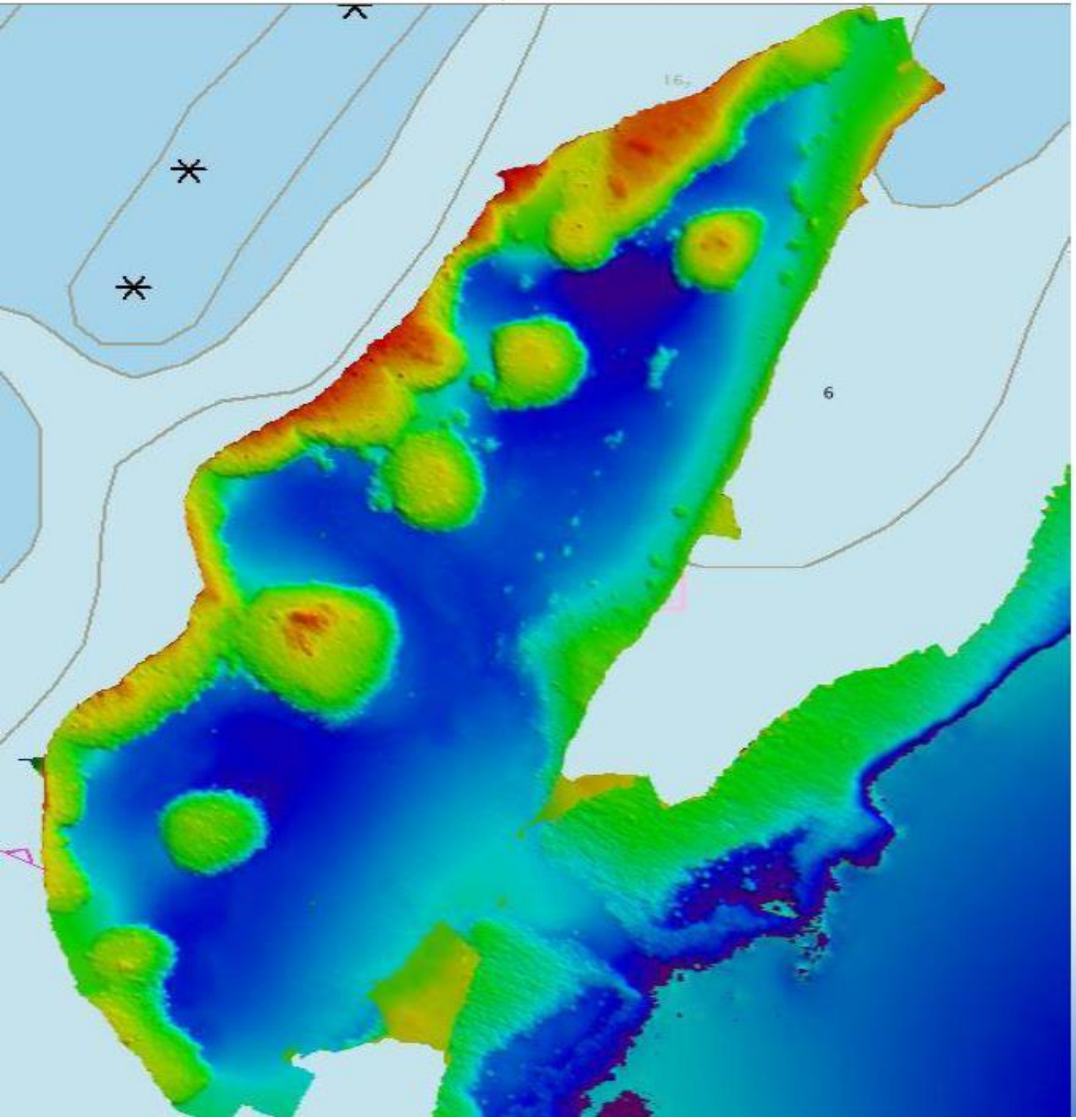
NOAA NRT-FB

- New coverage from Tennessee Reef to Turtle Reef, LiDAR to ~60m
- 27 survey days, 663 linear nautical miles, 31 square nautical miles
- 50cm or finer resolution over majority of survey area
- Backscatter intensity COMING SOON!

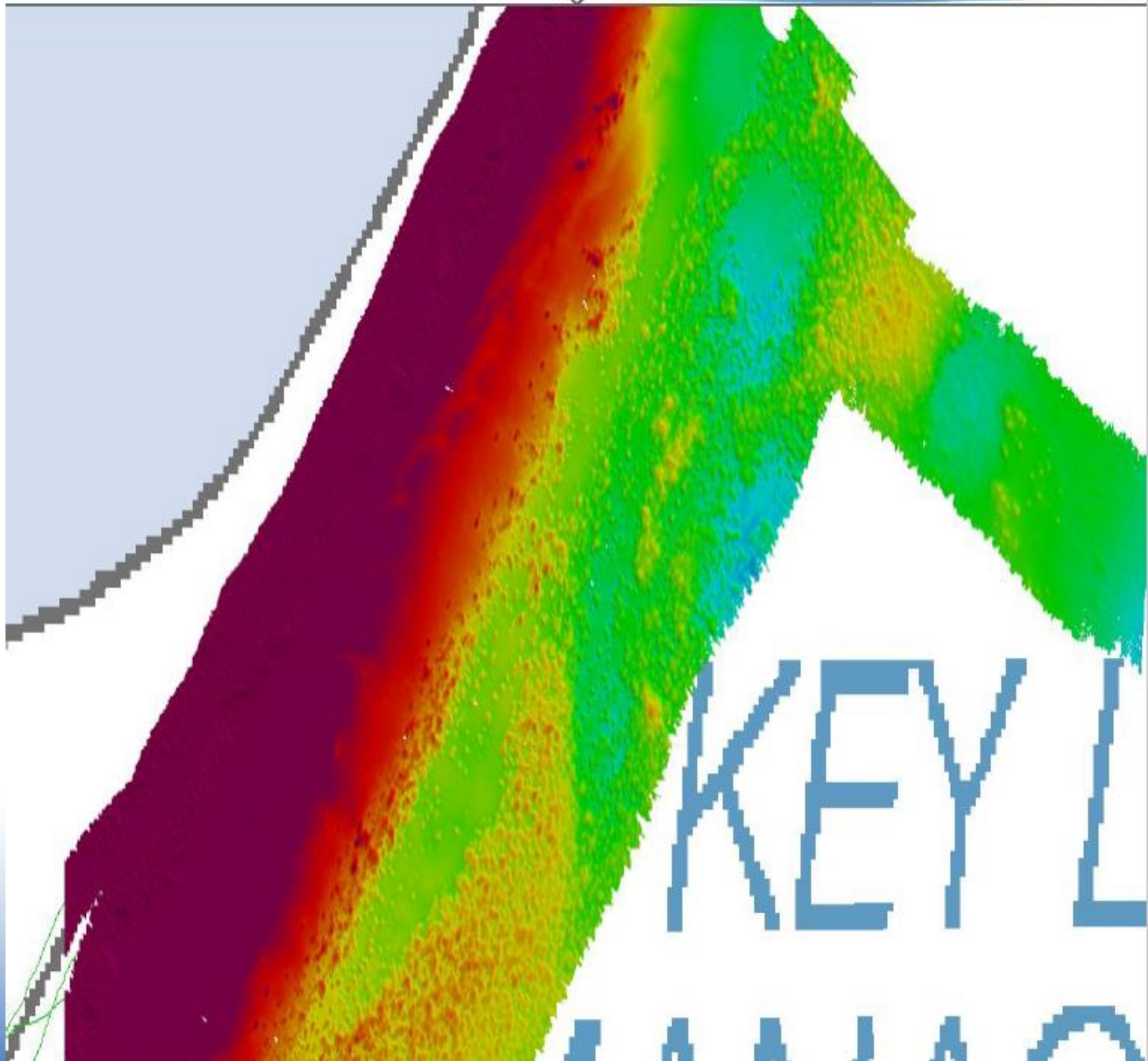


NOAA Coast Survey

Carysfort Reef

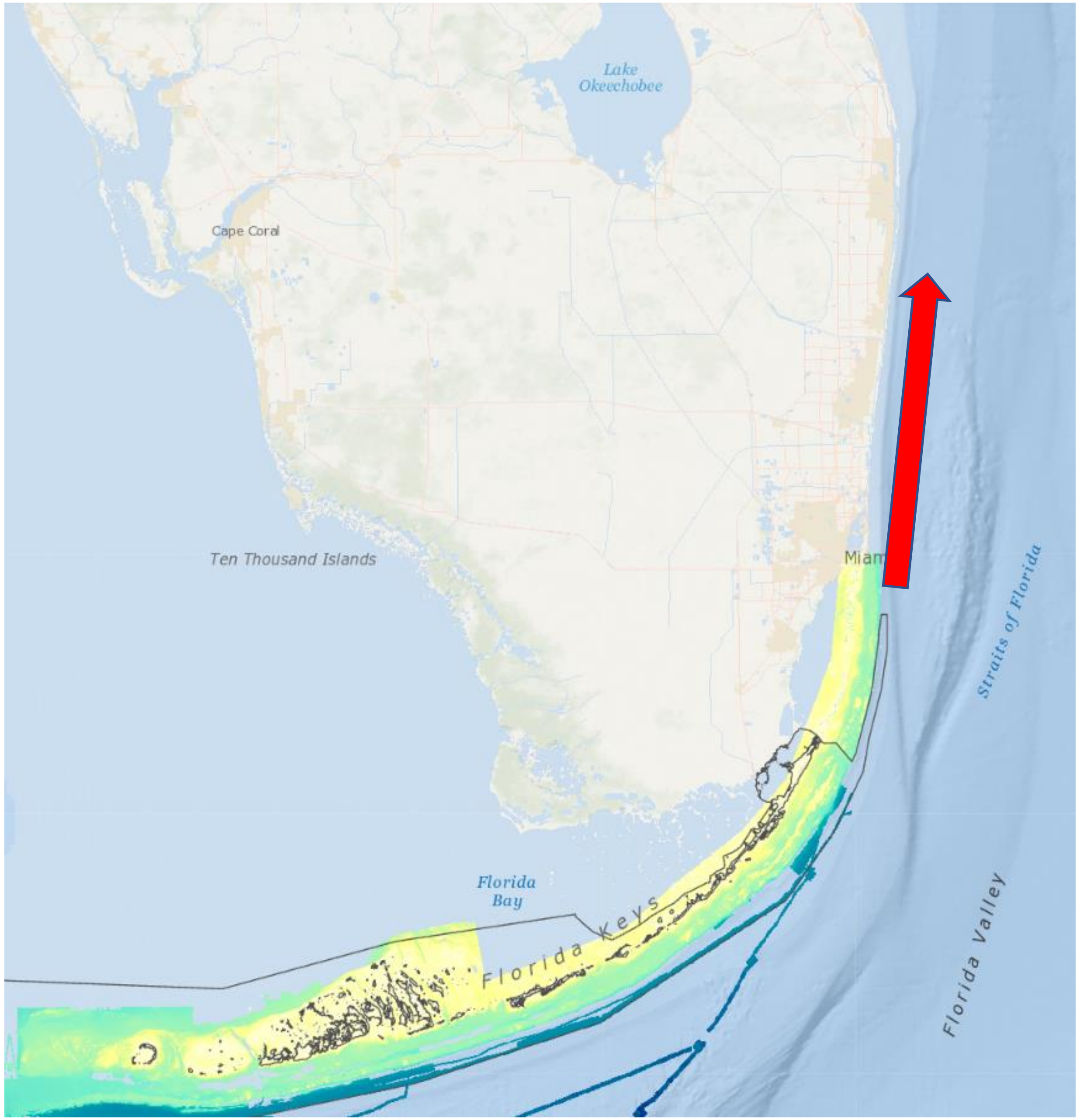


Deep Habitat near “The Elbow”



Looking Forward - 2023

- Continue mapping outer reef north of Keys and Biscayne National Park
- Integrate new AUV for ground-truthing habitats
- Update Digital Atlas



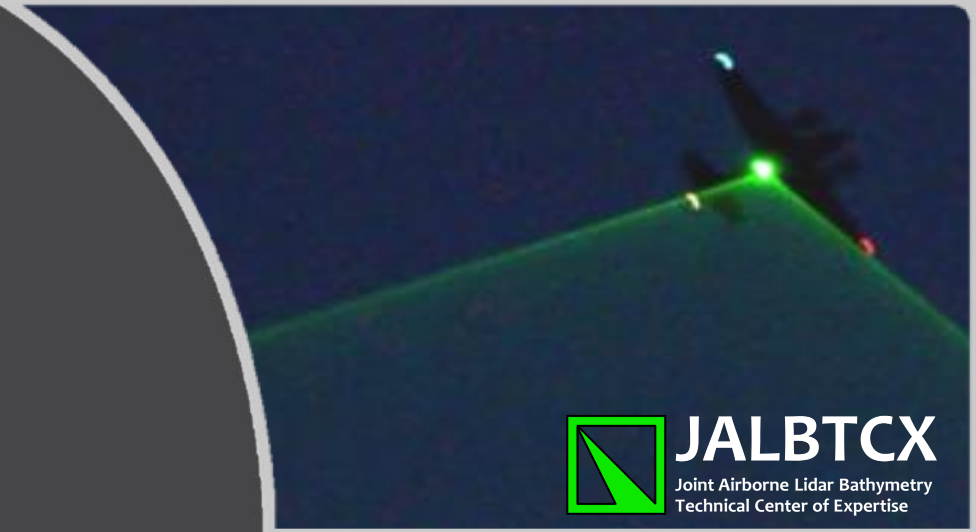
South Florida Coral Reefs Mapping and Digital Atlas Update

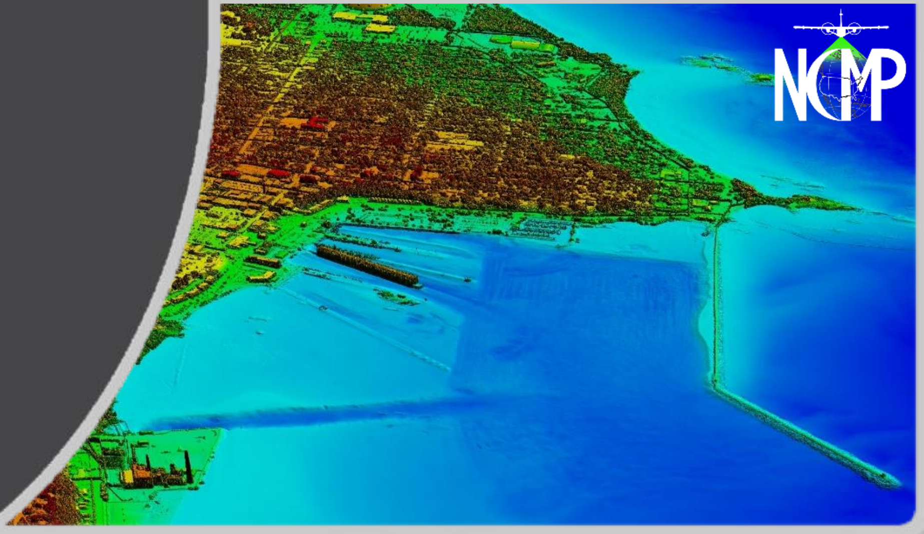
Chris Taylor – chris.taylor@noaa.gov

Marine Spatial Ecology, Habitat Mapping Team

U.S.ARMY

US Army Corps of Engineers Topobathy Mapping





Jennifer M. Wozencraft

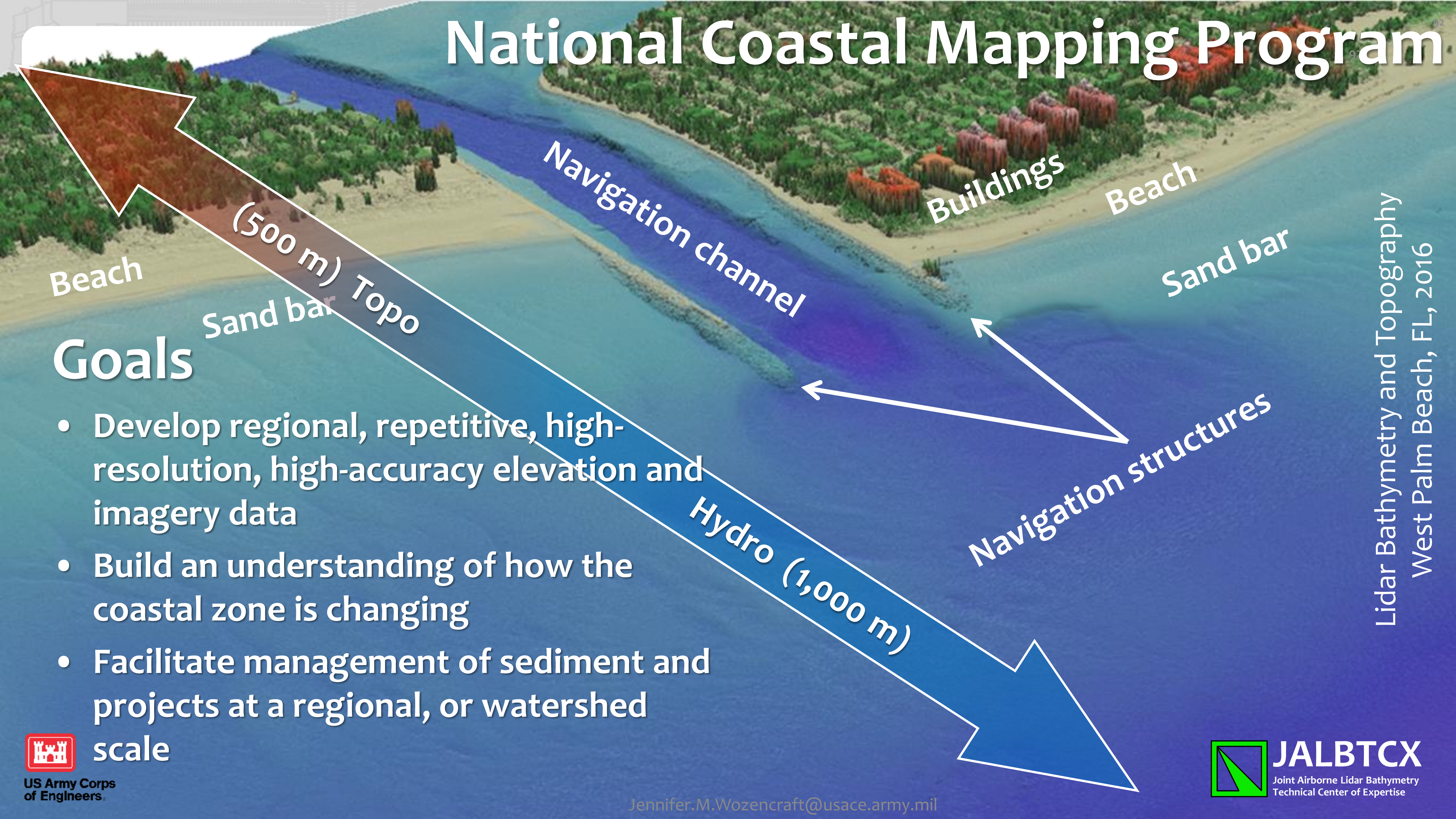
- US Army Corps of Engineers National Coastal Mapping Program Manager
- Joint Airborne Lidar Bathymetry Technical Center of Expertise Director
- Coastal and Hydraulics Laboratory, US Army Engineer Research and Development Center

Florida Coastal Mapping Program Summit
1 December 2022

US Army Corps of Engineers

ERDC
ENGINEER RESEARCH & DEVELOPMENT CENTER

National Coastal Mapping Program



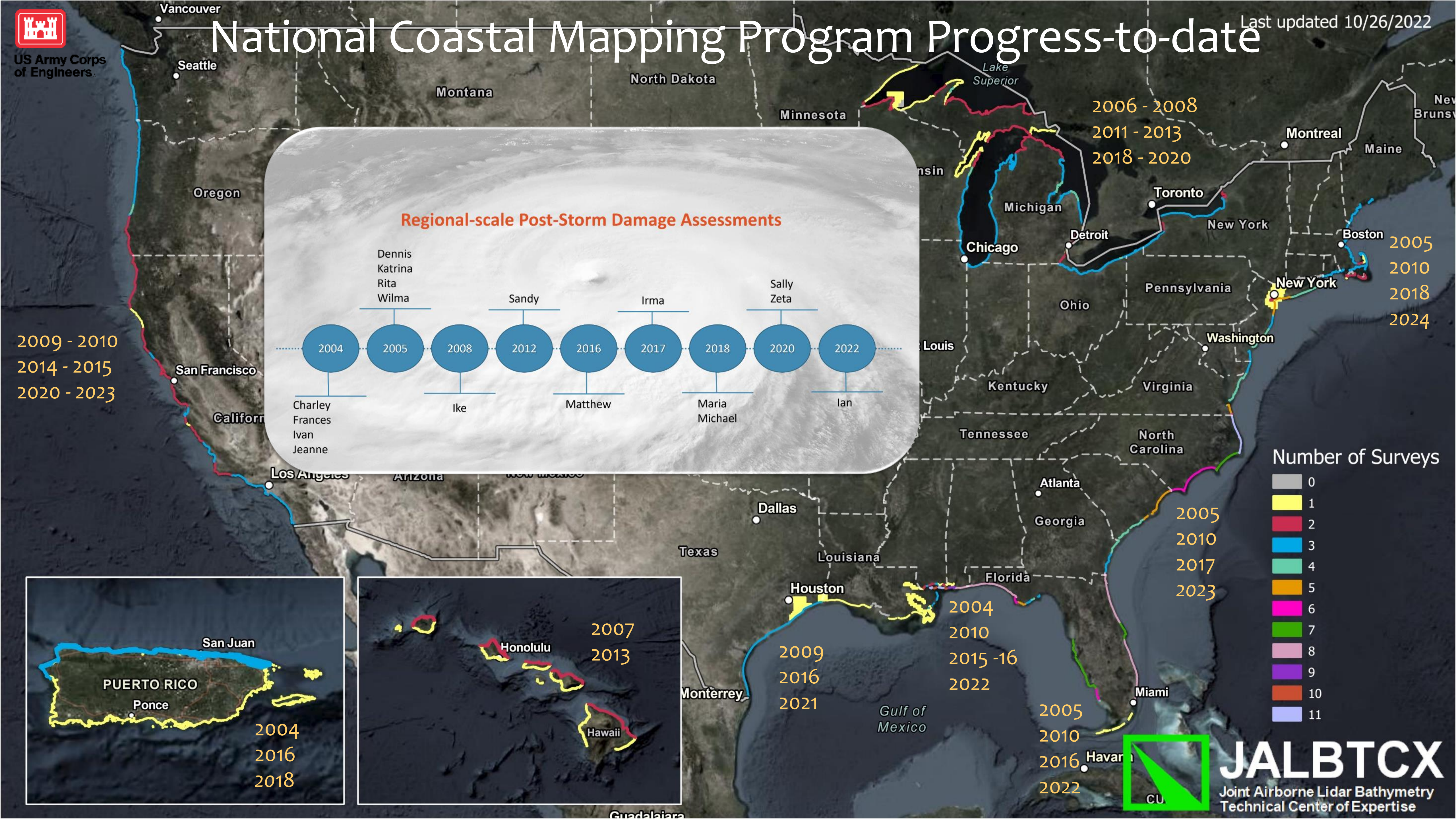
Goals

- Develop regional, repetitive, high-resolution, high-accuracy elevation and imagery data
- Build an understanding of how the coastal zone is changing
- Facilitate management of sediment and projects at a regional, or watershed scale

US Army Corps of Engineers

JALBTCX
Joint Airborne Lidar Bathymetry Technical Center of Expertise

Jennifer.M.Wozencraft@usace.army.mil


National Coastal Mapping Program Progress-to-date
Last updated 10/26/2022
US Army Corps of Engineers
Regional-scale Post-Storm Damage Assessments
2004
Charley
Frances
Ivan
Jeanne
2005
Dennis
Katrina
Rita
Wilma
2008
Ike
2012
Sandy
2016
Matthew
2017
Irma
2018
Maria
Michael
2020
Sally
Zeta
2022
Ian
2009 - 2010
2014 - 2015
2020 - 2023
2006 - 2008
2011 - 2013
2018 - 2020
2005
2010
2018
2024
2005
2010
2017
2023
2004
2010
2015 -16
2022
2009
2016
2021
2005
2010
2016
2022
2004
2016
2018
2007
2013
PUERTO RICO
San Juan
Ponce
Honolulu
Hawaii
Number of Surveys
0
1
2
3
4
5
6
7
8
9
10
11
JALBTCX
Joint Airborne Lidar Bathymetry Technical Center of Expertise
Vancouver
Seattle
Montana
North Dakota
Minnesota
Lake Superior
Oregon
San Francisco
Los Angeles
Michigan
Chicago
Detroit
Toronto
Montreal
Maine
New York
Boston
Pennsylvania
Ohio
Washington
Kentucky
Virginia
Tennessee
North Carolina
Atlanta
Georgia
Dallas
Texas
Louisiana
Houston
Florida
Miami
Gulf of Mexico
Monterrey

National Coastal Mapping Program Products

St. Pete Beach, Florida, 2015
bathymetry and topography

JALBTCX Image Service: 1-meter topographic/bathymetric lidar surface models
https://arcgis.usacegis.com/arcgis/rest/services/JALBTCX/JALBTCX_Products_1mGrid/ImageServer

St. Pete Beach, Florida, 2015
“bare earth” for coastal flood models

JALBTCX Image Service: 1-meter topographic/bathymetric lidar elevation models
https://arcgis.usacegis.com/arcgis/rest/services/JALBTCX/JALBTCX_Products_BareEarth_1mGrid/ImageServer

St. Andrews Inlet
Panama City, Florida, 2020
5 cm resolution imagery

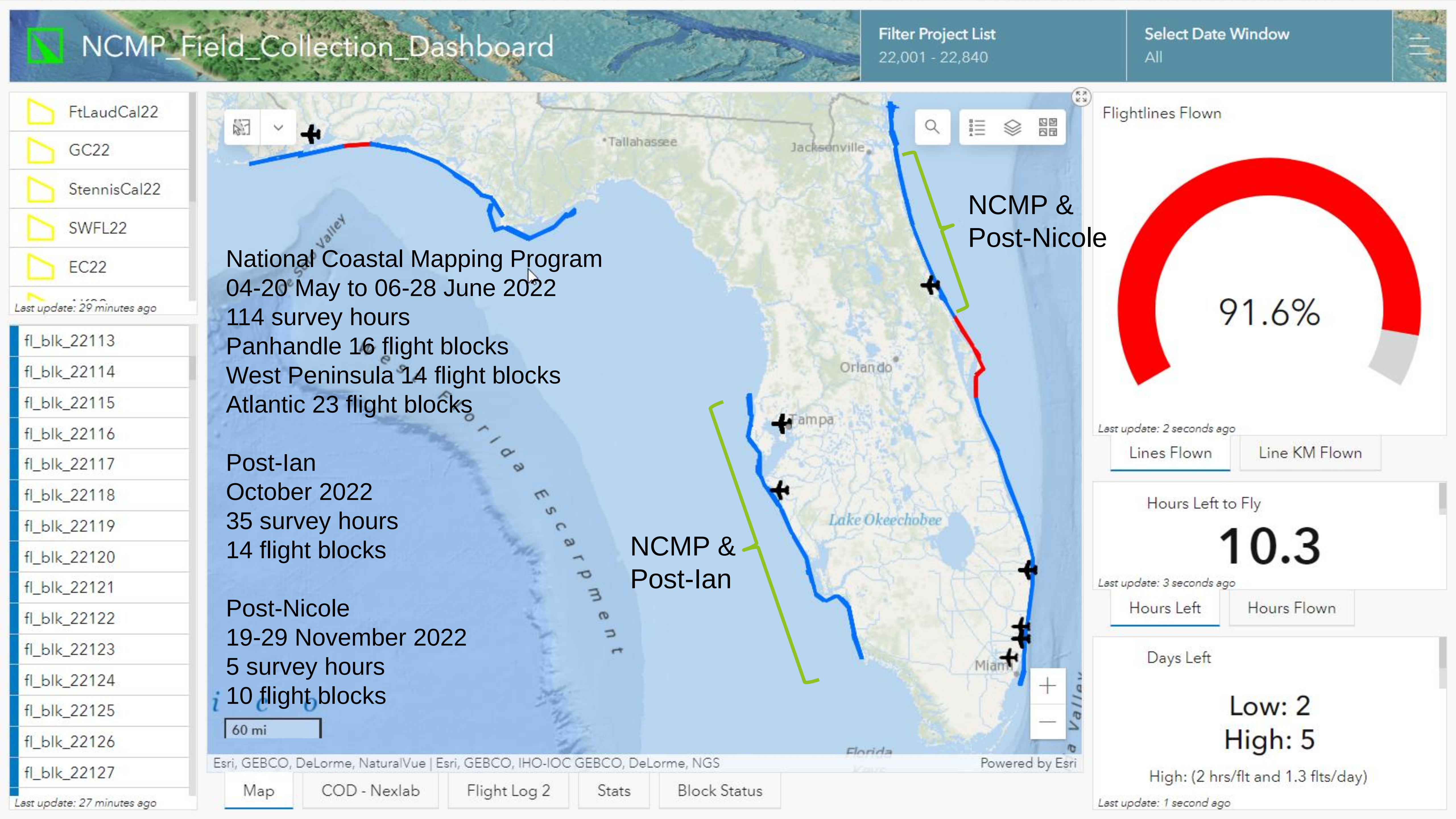
JALBTCX Image Service: 5-20 cm air photo mosaics
https://arcgis.usacegis.com/arcgis/rest/services/JALBTCX/JALBTCX_Products_RGB/ImageServer

JALBTCX Public Group at ArcGIS Online
https://arcg.is/qe0Sz
JALBTCX Products and Tools
https://tinyurl.com/jalbtcx

DIGITAL COAST https://coast.noaa.gov/dataviewer/

NCMP

Jennifer.M.Wozencraft@usace.army.mil


NCMP_Field_Collection_Dashboard
Filter Project List
22,001 - 22,840
Select Date Window
All
FtLaudCal22
GC22
StennisCal22
SWFL22
EC22
Last update: 29 minutes ago
fl_blk_22113
fl_blk_22114
fl_blk_22115
fl_blk_22116
fl_blk_22117
fl_blk_22118
fl_blk_22119
fl_blk_22120
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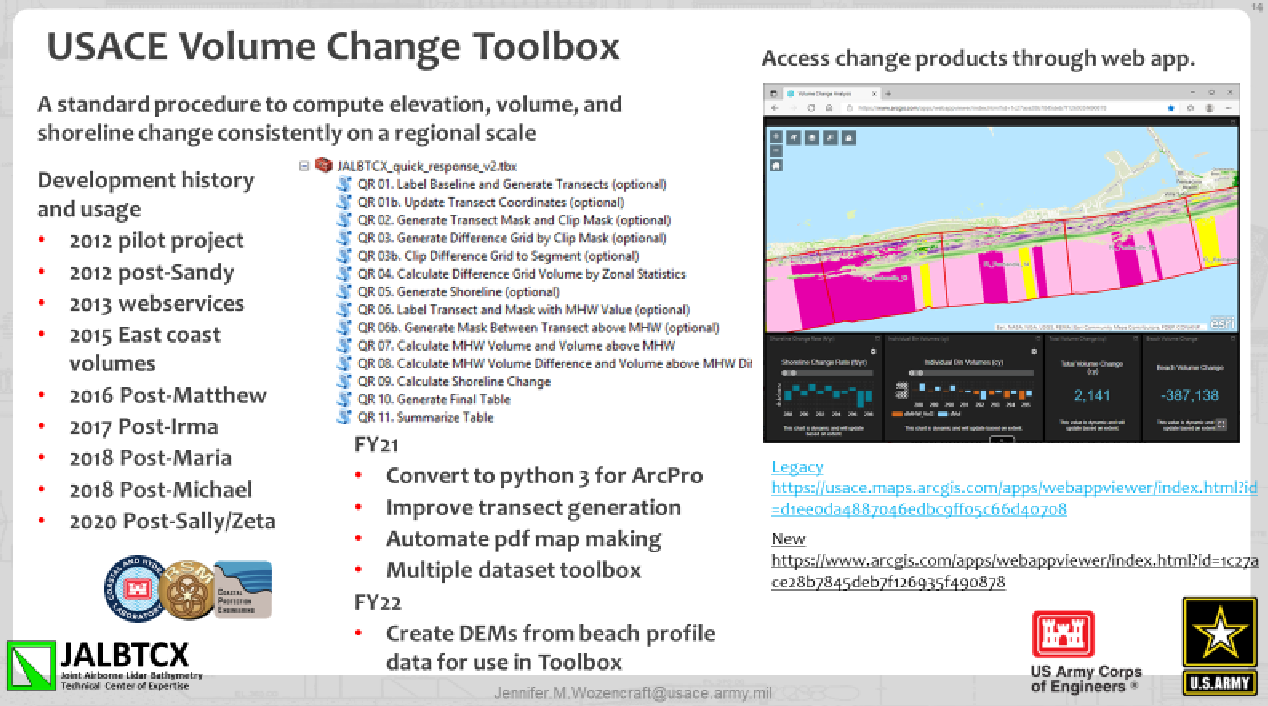
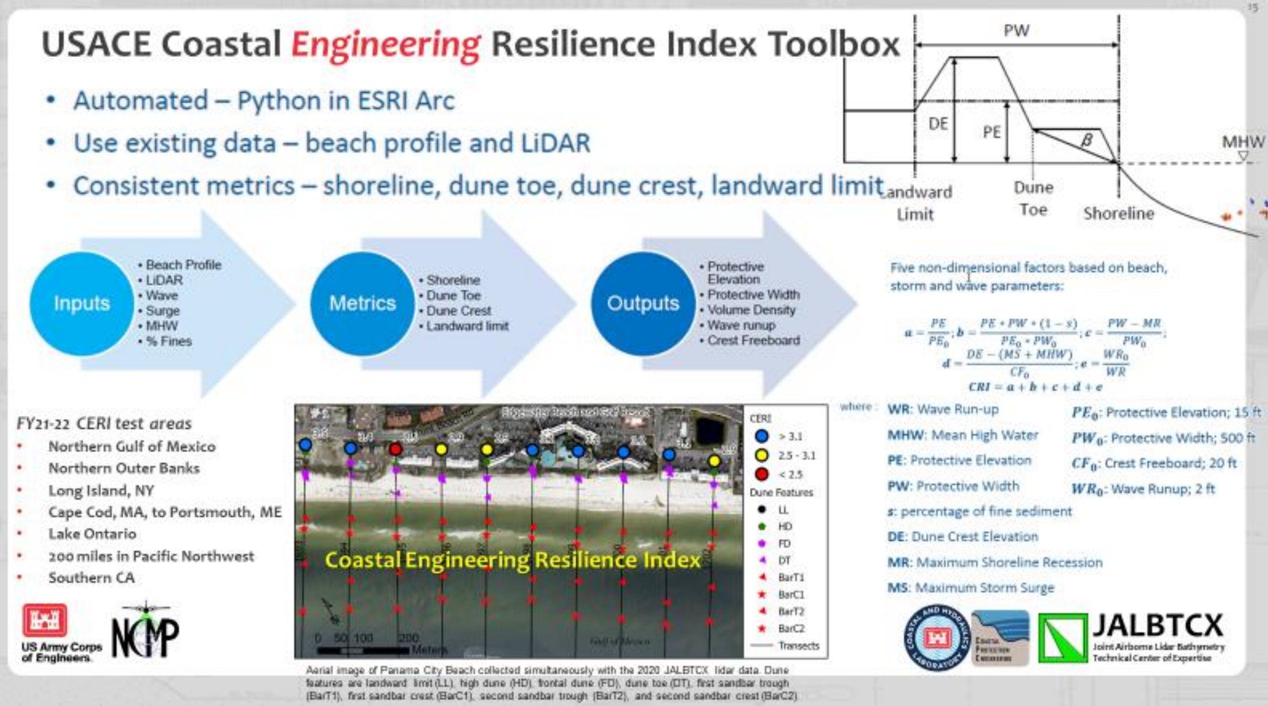
fl_blk_22124
fl_blk_22125
fl_blk_22126
fl_blk_22127
Last update: 27 minutes ago
Tallahassee
Jacksonville
Orlando
Tampa
Lake Okeechobee
Miami
Florida Escarpment
National Coastal Mapping Program
04-20 May to 06-28 June 2022
114 survey hours
Panhandle 16 flight blocks
West Peninsula 14 flight blocks
Atlantic 23 flight blocks
Post-Ian
October 2022
35 survey hours
14 flight blocks
Post-Nicole
19-29 November 2022
5 survey hours
10 flight blocks
NCMP & Post-Nicole
NCMP & Post-Ian
60 mi
Esri, GEBCO, DeLorme, NaturalVue | Esri, GEBCO, IHO-IOC GEBCO, DeLorme, NGS
Powered by Esri
Map
COD - Nexlab
Flight Log 2
Stats
Block Status
Flightlines Flown
91.6%
Last update: 2 seconds ago
Lines Flown
Line KM Flown
Hours Left to Fly
10.3
Last update: 3 seconds ago
Hours Left
Hours Flown
Days Left
Low: 2
High: 5
High: (2 hrs/flt and 1.3 flts/day)
Last update: 1 second ago

What's next?

- Loads of data processing
  - Post-Nicole
  - Post-Ian full coverage
  - National Coastal Mapping Program data, focusing on Ian and Nicole impact areas first
- Volume change analysis to quantify sand lost to beaches
- Expand Coastal Engineering Resilience Index analysis to Peninsula
- In collaboration with USACE Mobile District, perform multi-temporal change and resilience index analysis along the Panhandle





Jennifer.M.Wozencraft@usace.army.mil

Questions?

Jennifer.M.Wozencraft@usace.army.mil

JALBTCX (arcgis.com)

National Coastal Mapping Program Team

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Lauren Dunkin
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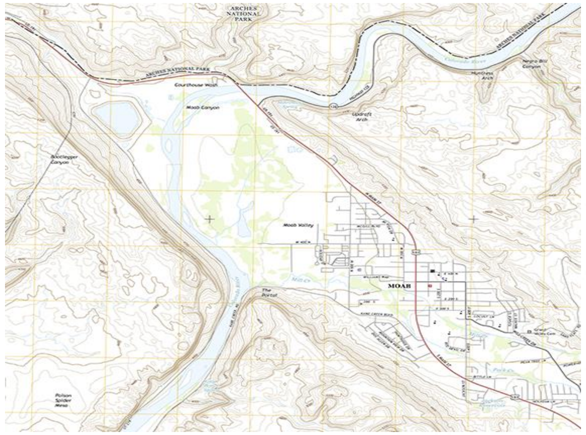
Scott Spurgeon
Ashley Elkins
Justin Shawler
Alexsandra Ostojic

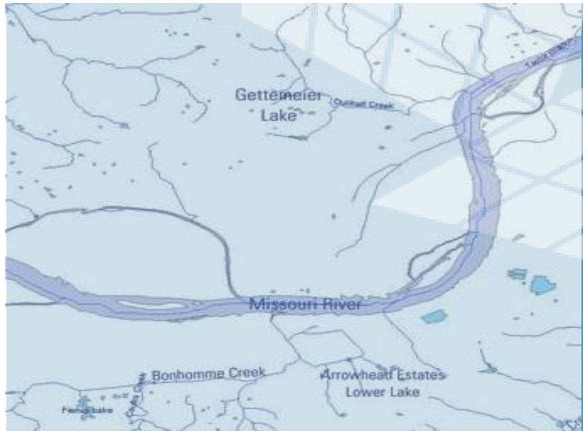
USACE ERDC
Environmental Laboratory

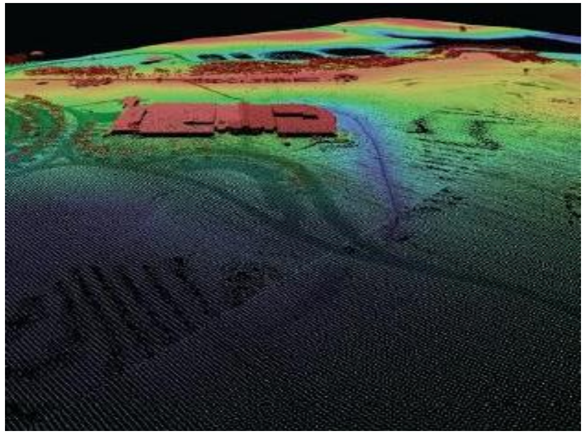
Molly Reif
Sam Jackson
Glenn Suir
Christina Saltus

Time-lapse of a night flight, Long Island, NY, September 2017

USGS National Geospatial Program: *Florida 3DEP Updates*







Note Presentation Slides Not Available

USGS science for a changing world

The National Map
Your Source for Topographic Information

FCMaP Annual Summit
1 December 2022

Xan Fredericks, GISP
afredericks@usgs.gov

Summary of U.S. Geological Survey Florida Coastal Mapping Activities in 2022

James Flocks, USGS SPCMSC

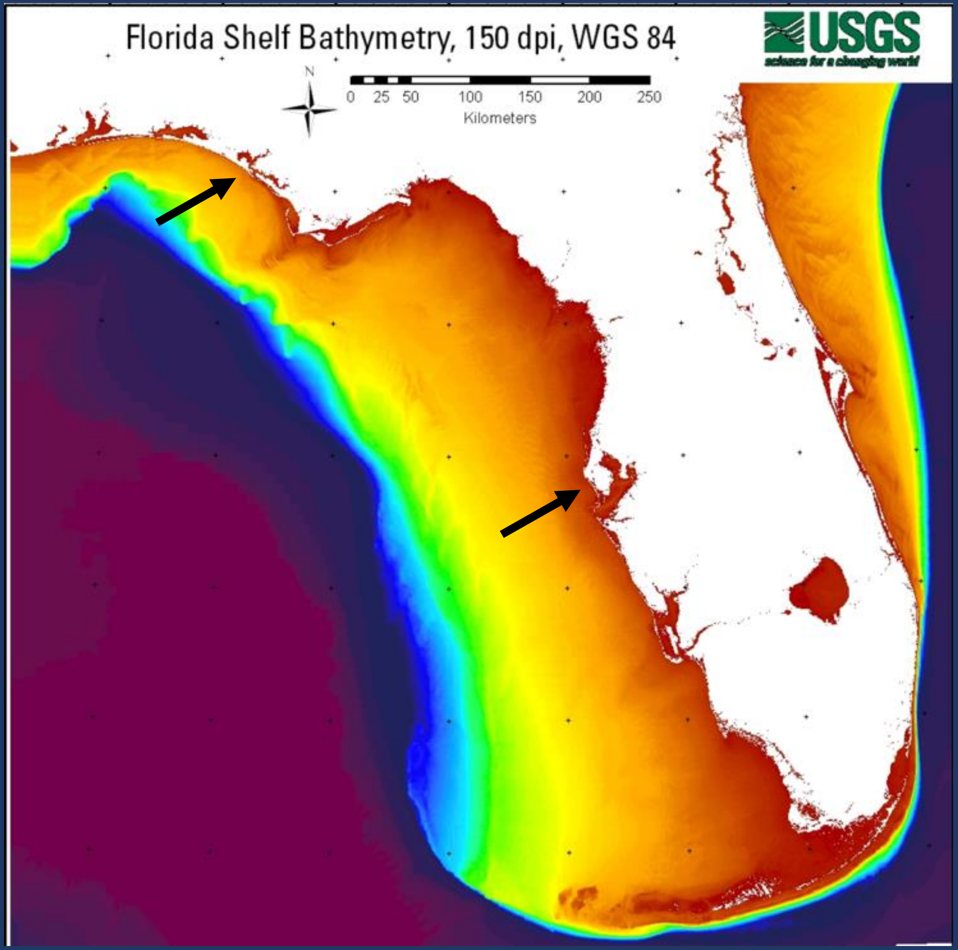
USGS Mapping Activities In 2022 include:

- 3 Data Collections Underway
- 2 Published Data Collections
- 2 Relevant Publications

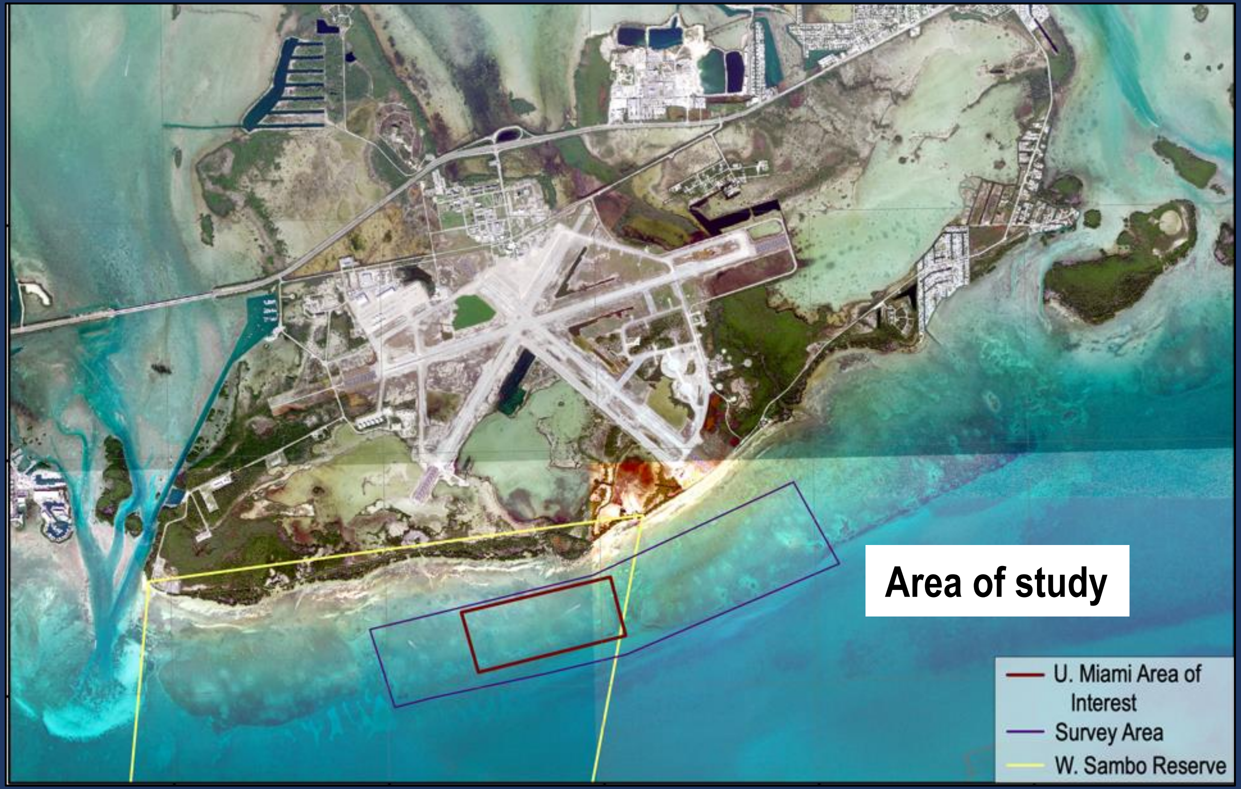
Santa Rosa Island Topobathymetric lidar and multibeam bathymetry, 2019

Current Data Collection:
Multibeam Bathymetry, Single Beam Bathymetry

Survey Type	Survey Dates	Location	Data Availability
MBES & SBES	January 2022	Madeira Beach, FL	Currently in Processing, Expected by February 2023
MBES	June 2022	East Bay and Saint Andrew Bay, Panama City, FL	Currently in Processing, Expected by Spring 2023



Current Data Collection:
Multibeam Bathymetry, Chirp subbottom, and bottom imagery



St. Petersburg Coastal and Marine Science Center Contact:

Emily Wei
Research Geologist
ewei@usgs.gov

Published Data Sets (2022): Imagery and SfM-derived bathymetry

USGS
science for a changing world

Coastal/Marine Hazards and Resources / Data System / Data Releases / Data Release 10.5066/P9WSF09G

Overlapping seabed images and location data acquired using the SQUID-5 system at Looe Key, Florida, in July 2021, with structure-from-motion derived point cloud, digital elevation model and orthomosaic of submerged topography

By Gerry A. Hatcher, Christine J. Kranenburg, Jonathan A. Warrick, Stephen T. Bosse, David G. Zawada, Kimberly K. Yates, and Selena A. Johnson

https://doi.org/10.5066/P9WSF09G

Dates

Published: Oct. 5, 2022

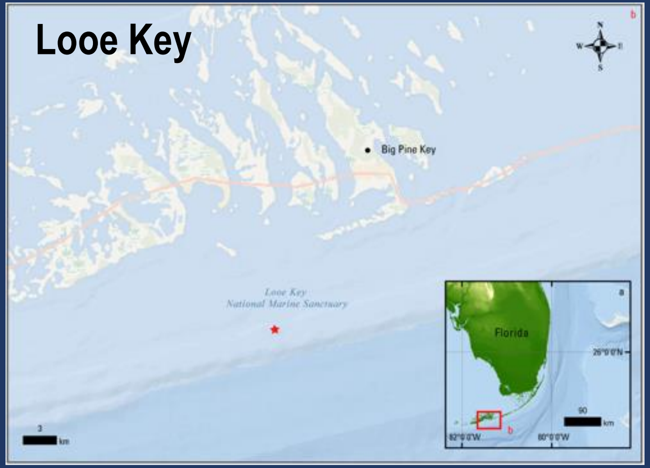
Summary

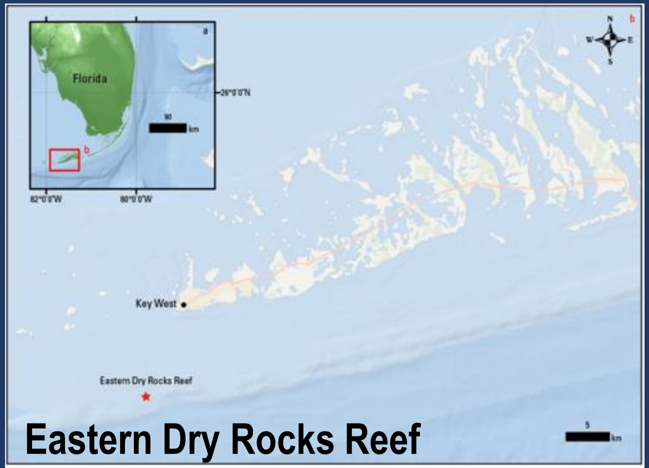
Underwater images were collected using a towed-surface vehicle with multiple downward-looking underwater cameras developed by the U.S. Geological Survey (USGS). The system is named the Structure-from-Motion (SfM) Quantitative Underwater Imaging Device with Five Cameras (SQUID-5). The raw images and associated navigation data were collected at Looe Key, a coral reef located within the Florida Keys National Marine Sanctuary approximately eleven kilometers south of Ramrod Key, Florida. SQUID-5 was towed through the survey area using the 25' R/V Sallenger USGS support vessel during the data collection from July 15-July 19, 2021. The images and position data acquired by the SQUID-5 system were then processed using SfM photogrammetry techniques to generate the point cloud, digital elevation model, and full-color orthomosaic data products presented here. The goal of this work was to generate very high (millimeter scale) resolution maps and precisely co-registered, full-color, orthomosaic imagery of the seabed at Looe Key with accurate geospatial location to support ongoing USGS research, including seafloor elevation and stability modeling, and small-scale hydrodynamic flow modeling at millimeter scales over short time frames (event-driven and storms). These data will also enable other researchers and stakeholders to co-register and validate their imagery and ecological data in the area.

St. Petersburg Coastal and Marine Science Center Contact:

David Zawada
Research Oceanographer
dzawada@usgs.gov

Published Data Sets (2022): Imagery and SfM-derived bathymetry

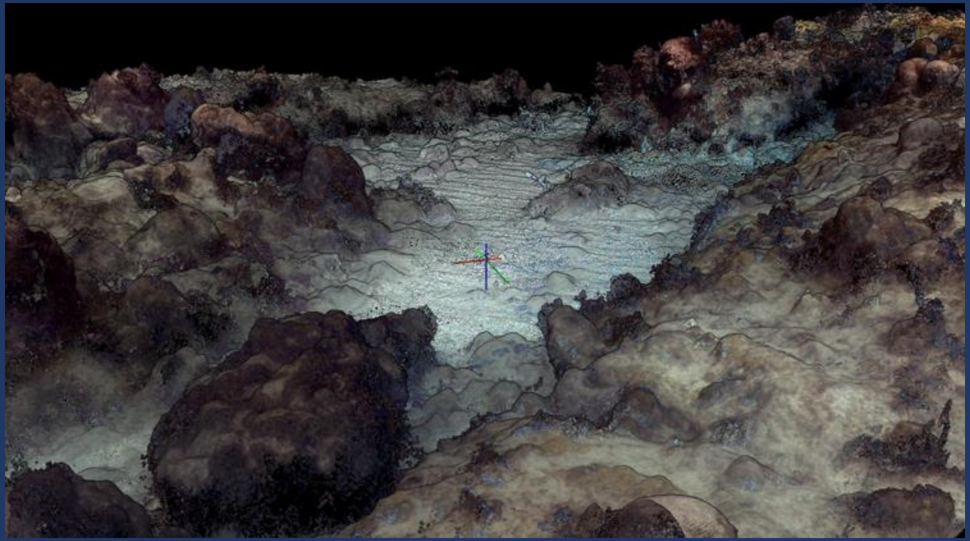




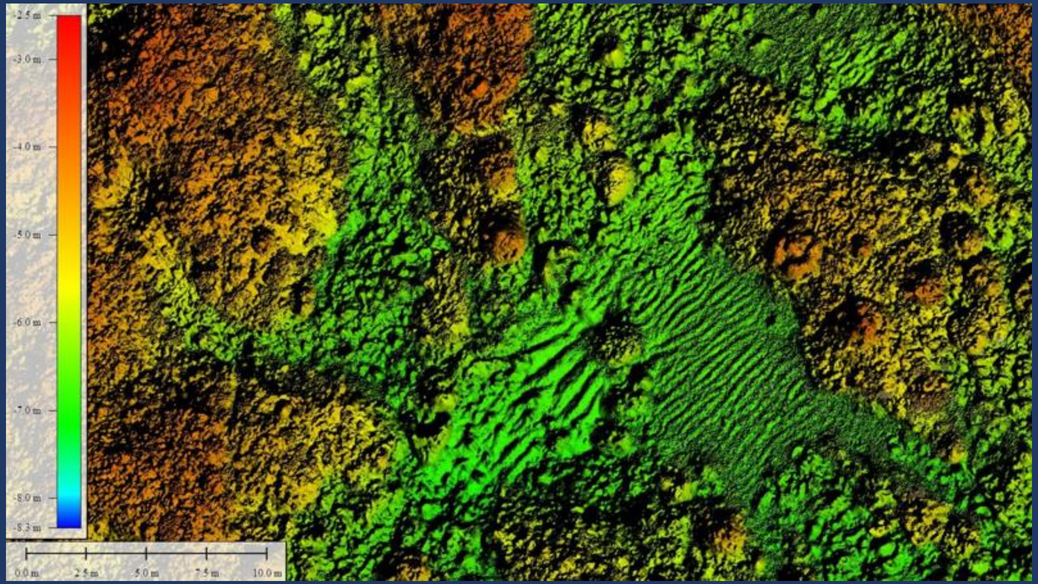
Looe Key, FL 2021:
https://cmgds.marine.usgs.gov/data-releases/datarelease/10.5066-P93RIIG9/

Eastern Dry Rocks reef, FL 2021:
https://cmgds.marine.usgs.gov/data-releases/datarelease/10.5066-P9WSF09G/

Point cloud dataset using structure from motion photogrammetry techniques



Bathymetric digital elevation model derived from point cloud data



Published Data Sets (2022):
Seamless Topographic and Bathymetric cross-shore profiles and associated morphologic characteristics for sandy coastlines

Data Release

Atlantic and Gulf Coast Sandy Coastline Topo-Bathy Profile and Characteristic Database

By Rangley C. Mickey and Davina L. Passeri

U.S. Geological Survey, St. Petersburg, Florida

Summary

Seamless topographic-bathymetric (topo-bathy) profiles and their derived morphologic characteristics were developed for sandy coastlines along the Atlantic and Gulf coasts of the United States. The topo-bathy profiles are published as a database in the Hierarchical Data Format version 5 (HDF5) which contain cross-shore distance coordinates, Universe Transverse Mercator (UTM) coordinate system Easting and Northing coordinates, and various morphologic characteristics. As such, the rocky coasts of Maine, the coral reefs in southern Florida and the Keys, and the marsh coasts in the Mississippi Delta and the Florida Big Bend region are not included in this dataset. A total of 3,897 topo-bathy profiles are included in the HDF5 database file. For further information regarding generation of these seamless topo-bathy profiles refer to Mickey and Passeri, 2022.

Mickey, R.C., Passeri, D.L., 2022, A database of topo-bathy cross-shore profiles and characteristics for U.S. Atlantic and Gulf of Mexico sandy coastlines: Data, v. 7, no. 7, article 92, https://doi.org/10.3390/data7070092.

Data

File Name and Description	Metadata (XML format)	Metadata (text format)	Download File
Profile_Database.zip Database of topo-bathy profiles and their associated morphologic characteristics (.hdf5)	Profile_Database_Metadata.xml	Profile_Database_Metadata.txt	Profile_Database.zip (88 MB)

Figure 1. Coverage area for the topo-bathy profiles and their morphologic characteristics across the Atlantic and Gulf coastlines.

Suggested Citation

Mickey, R.C. and Passeri, D.L., 2022, Atlantic and Gulf coast sandy coastline topo-bathy profile and characteristic database: U.S. Geological Survey data release, https://doi.org/10.5066/P9838KPW.

https://coastal.er.usgs.gov/data-release/doi-P9838KPW/

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Rangley Mickey
Oceanographer
St. Petersburg Coastal and Marine Science Center
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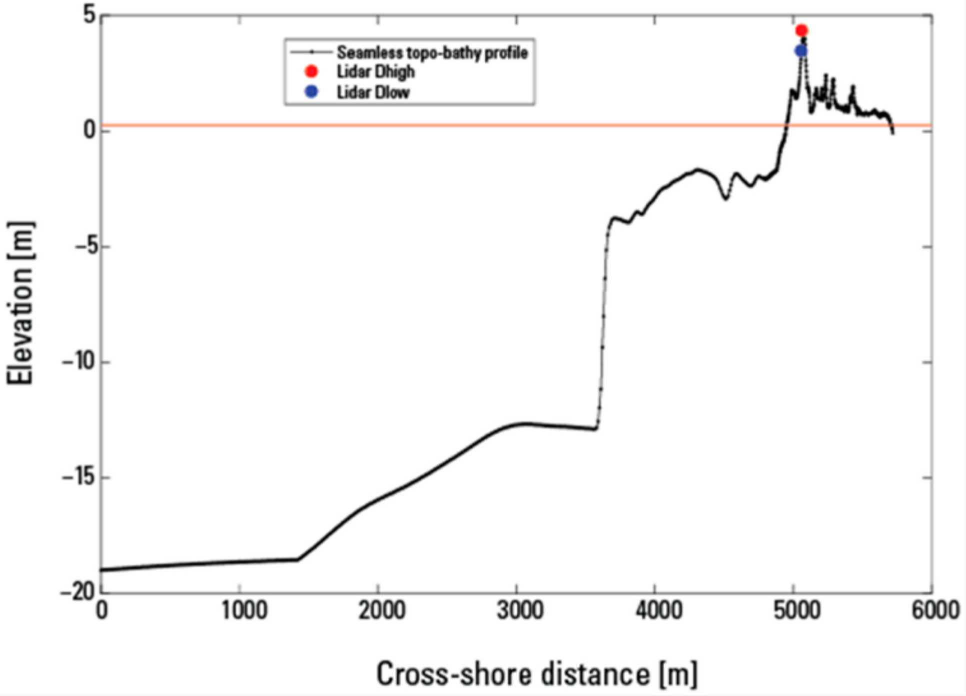
Phone: 727-502-8115

Figure 3. Example of merged lidar topographic and CUDEM bathymetric profile (black dotted line) extracted at the position of a TWL model shoreline point. The red circle indicates the lidar derived foredune crest elevation/location (Dhigh), the blue circle indicates the foredune toe elevation/location (Dlow), and the horizontal red line indicates the shoreline elevation; note offshore is to the left.



From: Mickey, R., and Passeri, D., 2011 (https://doi.org/10.3390/data7070092)

Relevant Publications (2022):

Relative sea-level change in South Florida during the past ~5000 years

Global and Planetary Change 216 (2022) 103902

Contents lists available at ScienceDirect

Global and Planetary Change

journal homepage: www.elsevier.com/locate/gloplacha

ELSEVIER

Relative sea-level change in South Florida during the past ~5000 years

Nicole S. Khan [a,b,*], Erica Ashe [c], Ryan P. Moyer [d], Andrew C. Kemp [e], Simon E. Engelhart [f], Matthew J. Brain [f], Lauren T. Toth [b], Amanda Chappel [d,g], Margaret Christie [h], Robert E. Kopp [c,i], Benjamin P. Horton [j,k]

[a] Department of Earth Sciences and the Swire Institute of Marine Science, The University of Hong Kong, Hong Kong
[b] U.S. Geological Survey, St Petersburg Coastal and Marine Science Center, St Petersburg, FL, USA
[c] Department of Earth and Planetary Sciences, Rutgers University, Piscataway, NJ, USA
[d] Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission, St Petersburg, FL, USA
[e] Department of Earth and Climate Sciences, Tufts University, Medford, MA, USA
[f] Department of Geography, Durham University, Durham, UK
[g] Department of Environmental Engineering Science, University of Florida, Gainesville, FL, USA
[h] Department of Environmental Studies, McDaniel College, Westminster, MD, USA
[i] Rutgers Institute of Earth, Ocean, and Atmospheric Sciences, Rutgers University, Piscataway, NJ, USA
[j] Earth Observatory of Singapore, Nanyang Technological University, Singapore
[k] Asian School of the Environment, Nanyang Technological University, Singapore

ARTICLE INFO

Editor: Dr. Fabienne Marret-Davies

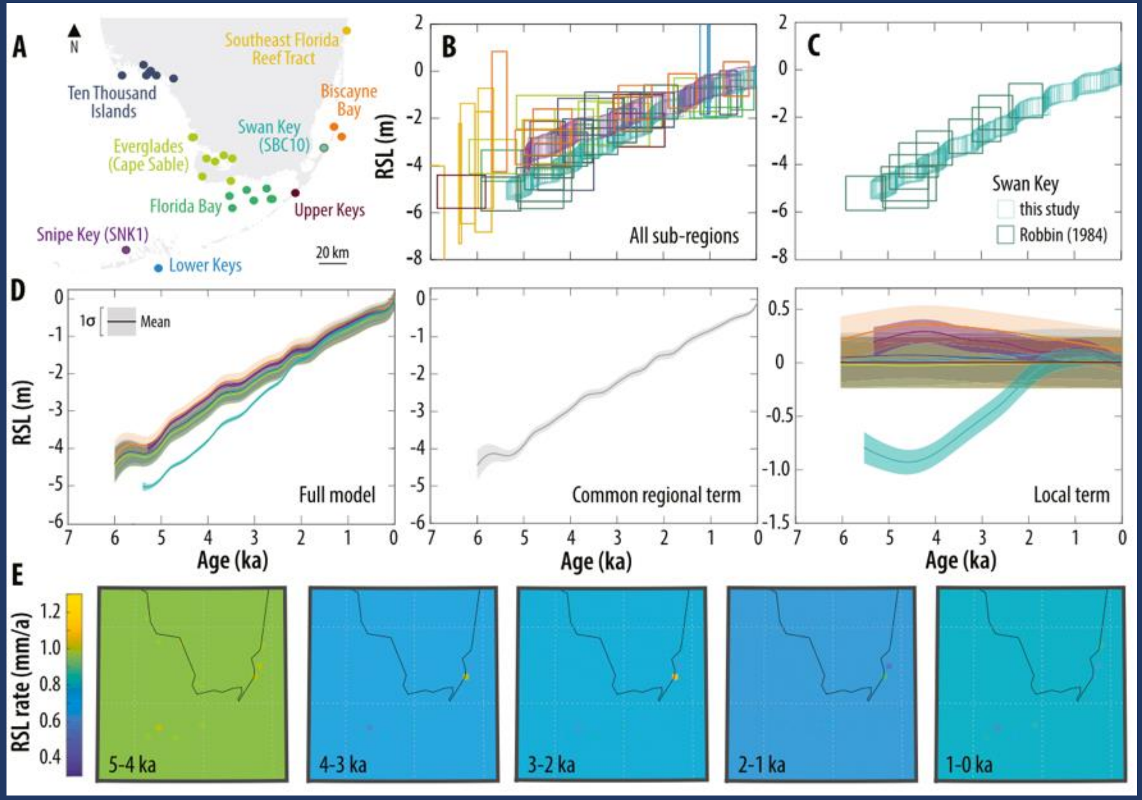
Keywords:
Sea level
Holocene
Mangrove
Proxy reconstruction
Reproducibility

ABSTRACT

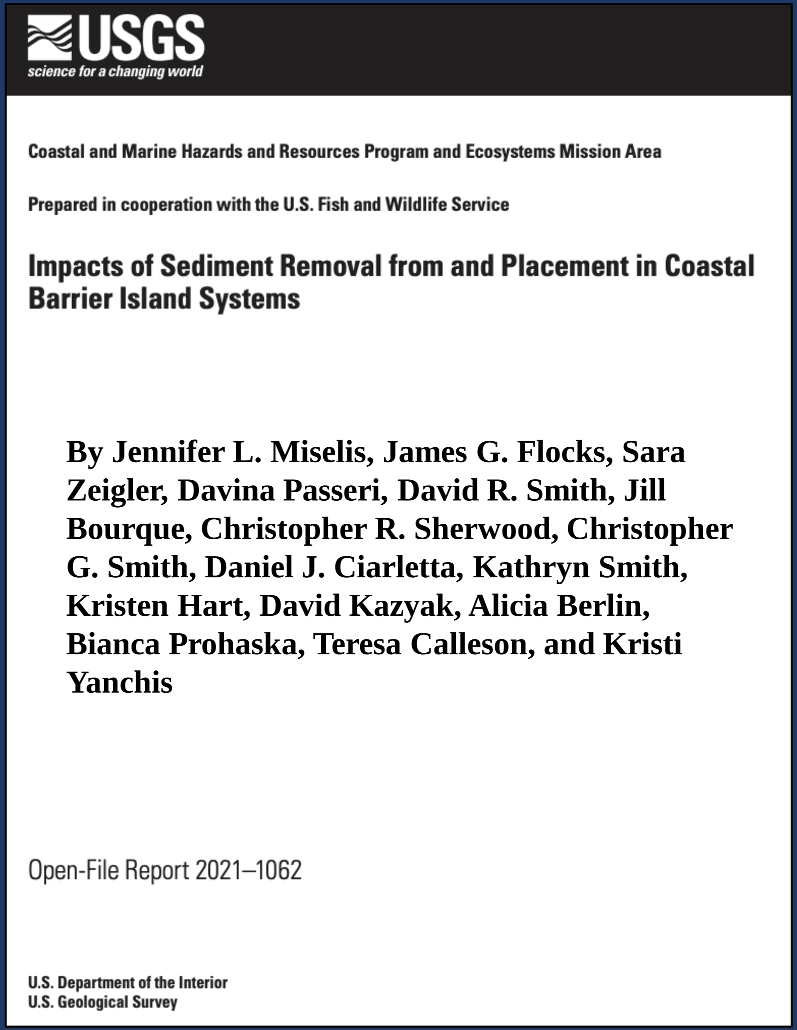
A paucity of detailed relative sea-level (RSL) reconstructions from low latitudes hinders efforts to understand the global, regional, and local processes that cause RSL change. We reconstruct RSL change during the past ~5 ka using cores of mangrove peat at two sites (Snipe Key and Swan Key) in the Florida Keys. Remote sensing and field surveys established the relationship between peat-forming mangroves and tidal elevation in South Florida. Core chronologies are developed from age-depth models applied to 72 radiocarbon dates (39 mangrove wood macrofossils and 33 fine-fraction bulk peat). RSL rose 3.7 m at Snipe Key and 5.0 m at Swan Key in the past 5 ka, with both sites recording the fastest century-scale rate of RSL rise since ~1900 CE (~2.1 mm/a). We demonstrate that it is feasible to produce near-continuous reconstructions of RSL from mangrove peat in regions with a microtidal regime and accommodation space created by millennial-scale RSL rise. Decomposition of RSL trends from a network of reconstructions across South Florida using a spatio-temporal model suggests that Snipe Key was representative of regional RSL trends, but Swan Key was influenced by an additional local-scale process acting over at least the past five millennia. Geotechnical analysis of modern and buried mangrove peat indicates that sediment compaction is not the local-scale process responsible for the exaggerated RSL rise at Swan Key. The substantial difference in RSL between two nearby sites highlights the critical need for within-region replication of RSL reconstructions to avoid misattribution of sea-level trends, which could also have implications for geophysical modeling studies using RSL data for model tuning and validation.

First near-continuous records of Relative Sea Level Rise (RSL) from mangrove peat archives for the past 5,000 years

https://doi.org/10.1016/j.gloplacha.2022.103902



Relevant Publications (2022):
Impacts of Sediment Removal from and Placement in Coastal Barrier Island Systems


USGS
science for a changing world

Coastal and Marine Hazards and Resources Program and Ecosystems Mission Area

Prepared in cooperation with the U.S. Fish and Wildlife Service

Impacts of Sediment Removal from and Placement in Coastal Barrier Island Systems

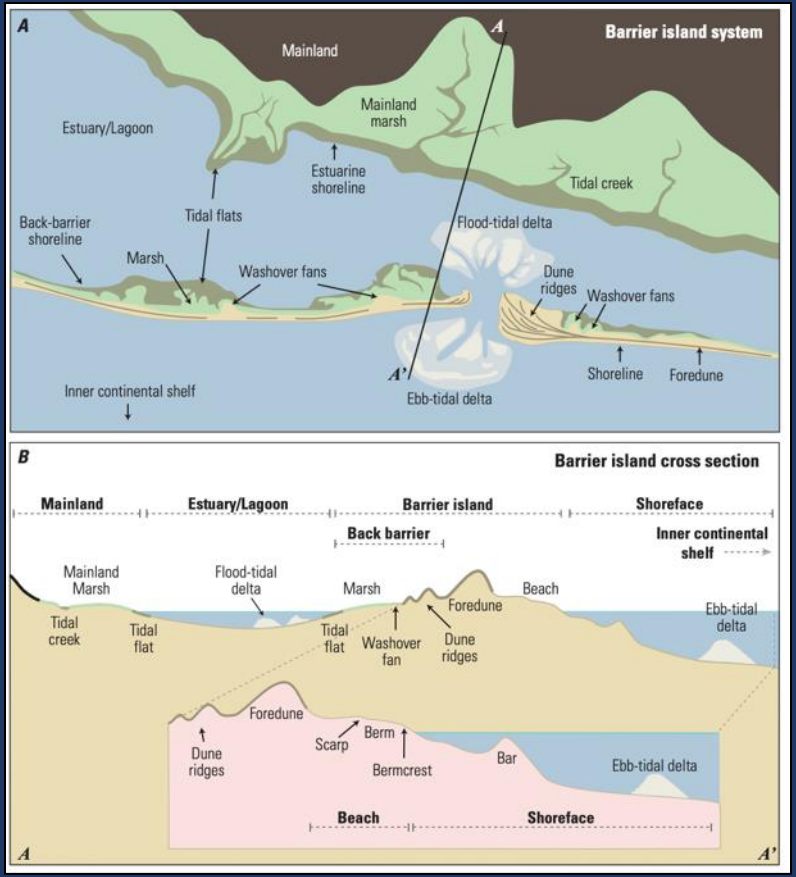
By Jennifer L. Miselis, James G. Flocks, Sara Zeigler, Davina Passeri, David R. Smith, Jill Bourque, Christopher R. Sherwood, Christopher G. Smith, Daniel J. Ciarletta, Kathryn Smith, Kristen Hart, David Kazyak, Alicia Berlin, Bianca Prohaska, Teresa Calleson, and Kristi Yanchis

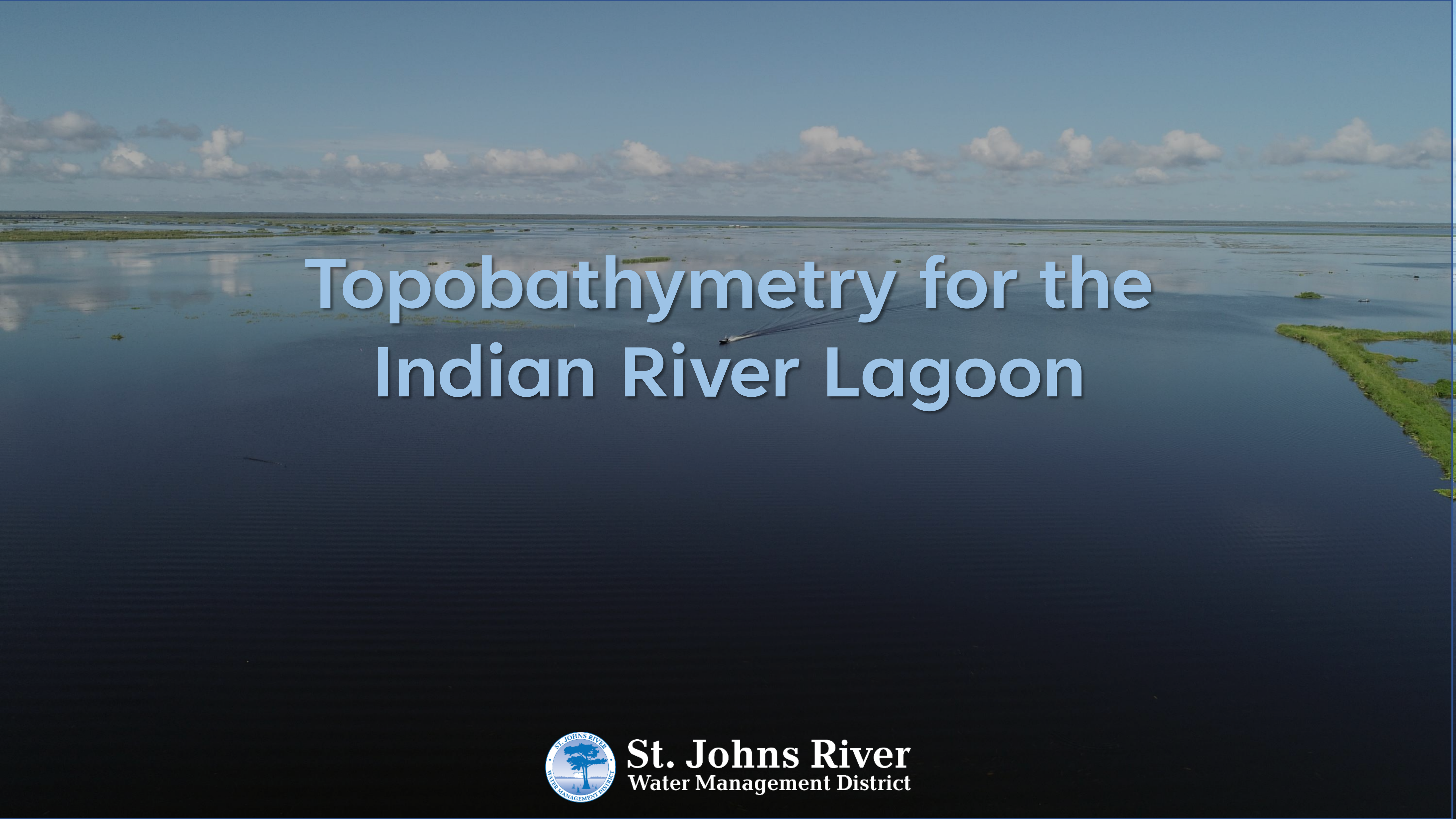
Open-File Report 2021–1062

U.S. Department of the Interior
U.S. Geological Survey

Identifies consensus findings and research gaps relevant to sediment removal and placement impacts

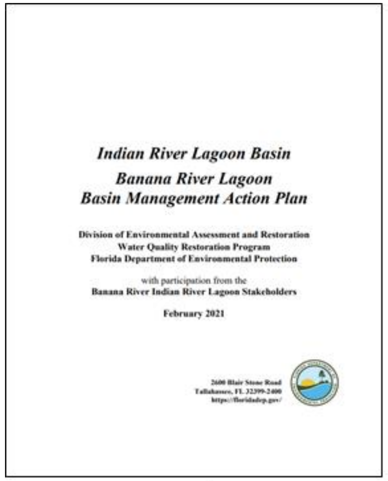
https://doi.org/10.3133/ofr20211062




Topobathymetry for the
Indian River Lagoon
St. Johns River
Water Management District

Status and use of bathymetry

- Current bathymetry based on data from the late 1990s
- Bathymetry plus seagrass used as a measure of successful management
- Bathymetry also used to address flooding, storm surge, and other elements of resilience



Indian River Lagoon Basin

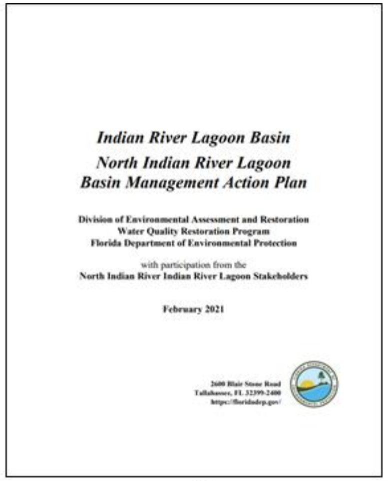
Banana River Lagoon
Basin Management Action Plan

Division of Environmental Assessment and Restoration
Water Quality Restoration Program
Florida Department of Environmental Protection

with participation from the
Banana River Indian River Lagoon Stakeholders

February 2021

2600 Blair Stone Road
Tallahassee, FL 32399-2400
https://floridadep.gov/



Indian River Lagoon Basin

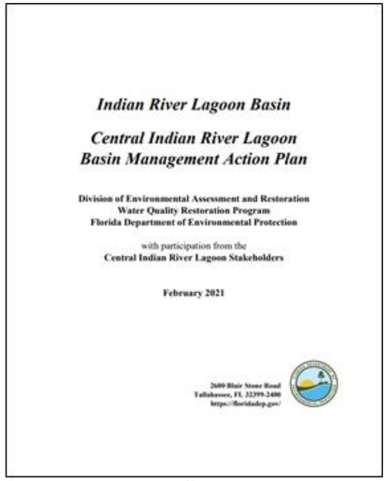
North Indian River Lagoon
Basin Management Action Plan

Division of Environmental Assessment and Restoration
Water Quality Restoration Program
Florida Department of Environmental Protection

with participation from the
North Indian River Indian River Lagoon Stakeholders

February 2021

2600 Blair Stone Road
Tallahassee, FL 32399-2400
https://floridadep.gov/



Indian River Lagoon Basin

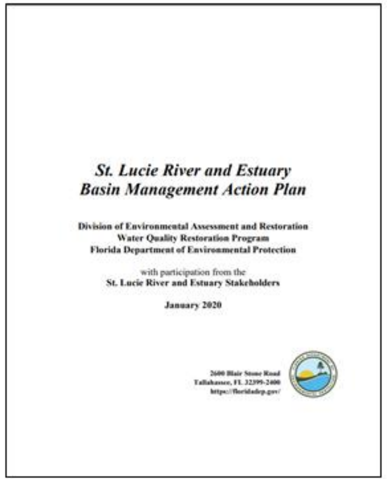
Central Indian River Lagoon
Basin Management Action Plan

Division of Environmental Assessment and Restoration
Water Quality Restoration Program
Florida Department of Environmental Protection

with participation from the
Central Indian River Lagoon Stakeholders

February 2021

2600 Blair Stone Road
Tallahassee, FL 32399-2400
https://floridadep.gov/



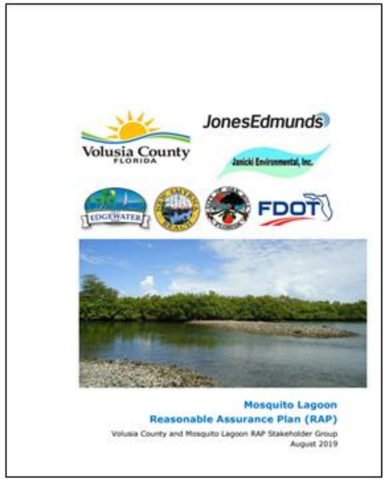
St. Lucie River and Estuary
Basin Management Action Plan

Division of Environmental Assessment and Restoration
Water Quality Restoration Program
Florida Department of Environmental Protection

with participation from the
St. Lucie River and Estuary Stakeholders

January 2020

2600 Blair Stone Road
Tallahassee, FL 32399-2400
https://floridadep.gov/



Mosquito Lagoon
Reasonable Assurance Plan (RAP)
Volusia County and Mosquito Lagoon RAP Stakeholder Group
August 2019

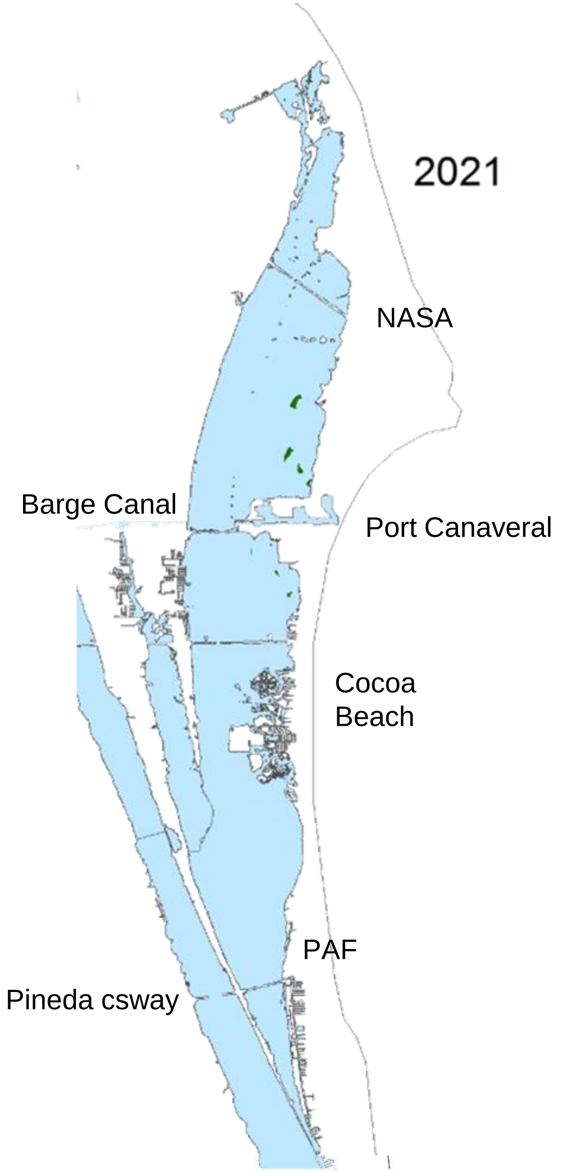
St. Johns River
Water Management District

Issues surrounding bathymetry

- Seagrass loss began in 2011
- Loss led to unstable sediment
- Shifting sediment may change bathymetry
- Changes can affect management
- Partnership to fund updated bathymetry
  - NOAA
  - DEP
  - SJRWMD
- Contractor is Dewberry

Dewberry

St. Johns River Water Management District



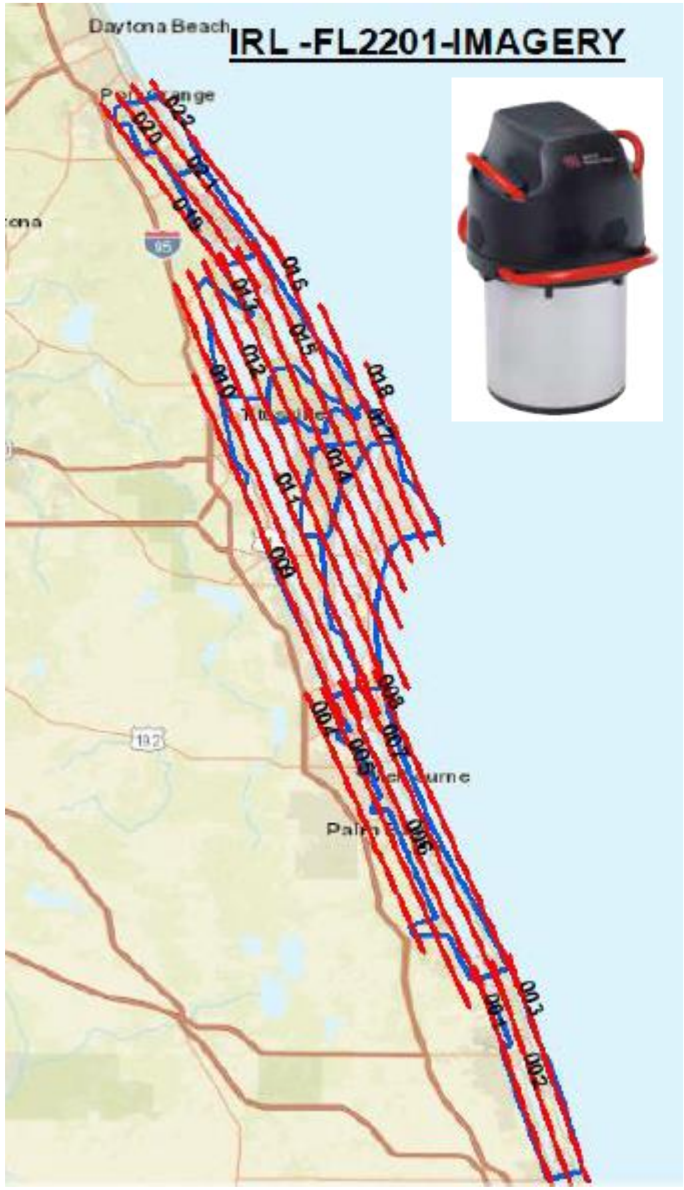
Project overview

- Shoreline = 1,663 miles
- Area = ~616 square miles
  - Yellow = initial survey
  - Red = restricted area
  - Blue = swap for restricted area
- NOAA working on flying restricted area
- Complete in May 2023

St. Johns River
Water Management District

Imagery

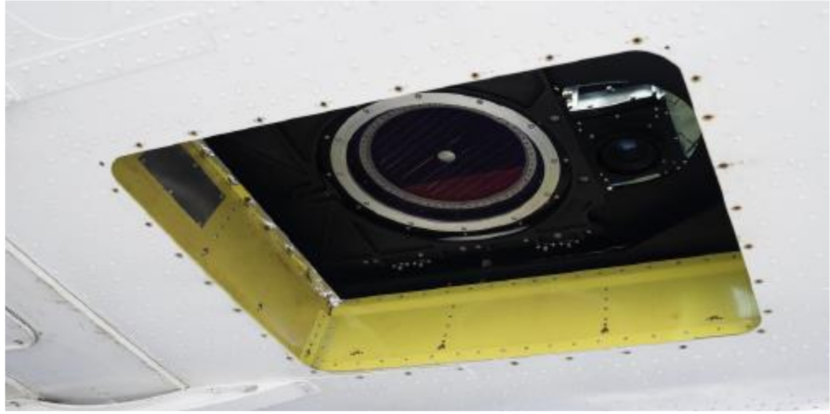
- Leica ADS100 airborne digital sensor
  - 4-band imagery
  - 25-centimeter ground sampling distance
  - Stereo coverage
    - 30% sidelap
    - 60% endlap
- Acquire ± 3 hours around low tide
- Deliver orthoimagery



St. Johns River Water Management District

Lidar

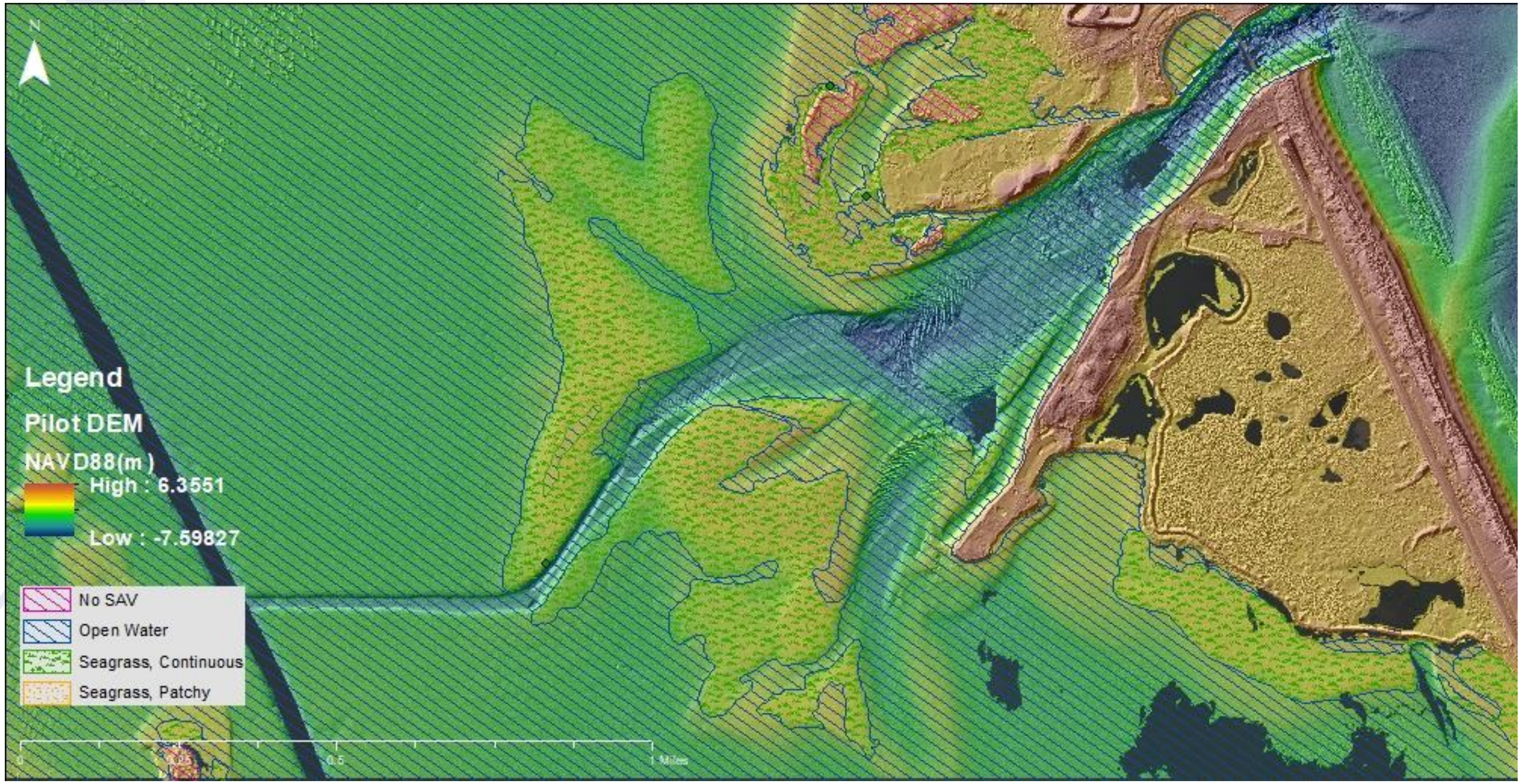
- Teledyne Optech Coastal Zone Mapping and Imaging Lidar (CZMIL)
  - Powerful topographic/bathymetric mapping
  - Capable of modeling ~3.5× Secchi depth
- Deliverables
  - Point clouds
  - Normalized intensity
  - 1-meter digital elevation models
  - Total propagated uncertainty



St. Johns River Water Management District

Progress

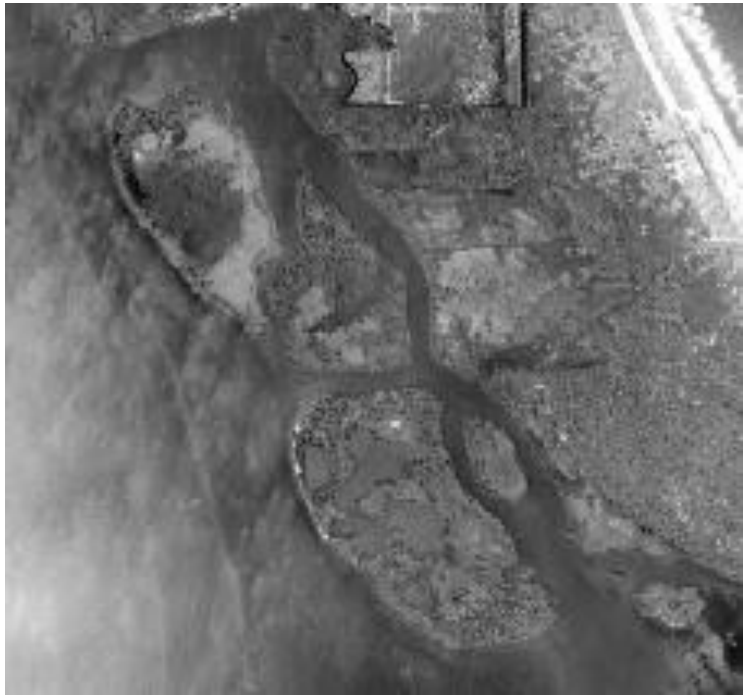
- Complete
  - Pre-acquisition tasks
  - Post-acquisition tasks
  - Stereo imagery and ground surveys
  - Imagery pilot processing
  - Lidar pilot processing
- Coming
  - Pilot shorelines from imagery
  - Lidar deliverables
  - Shoreline and reports



St. Johns River
Water Management District

Topography

- Modeling
  - Flooding
  - Storm surge
  - Wetland migration
- Estimating extent of restoration
  - Mullet Creek Islands ditched
  - Control breeding of mosquitos
  - Recontour to restore salt marsh
  - Maintain control of mosquitos



1951

1958

St. Johns River Water Management District


Thank you
St. Johns River
Water Management District

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NOAA
U.S. DEPARTMENT OF COMMERCE

UNIVERSITY OF SOUTH FLORIDA
College of MARINE SCIENCE

COMIT

Tampa Bay Bathymetry Experiment (TBBEx)

CENTER FOR OCEAN MAPPING
AND INNOVATIVE TECHNOLOGIES

About Us

WHAT WE ARE DOING (priority themes)

Uncrewed Systems

Improving the efficiency of seafloor mapping efforts via advanced technology and processing algorithms.

Geodetic Observations

Developing tools for high precision measurements of the seafloor in coastal zones.

Applied Hydrography

Increasing capacity to rapidly respond to coastal impacts and changes.

High Resolution Modeling

Resolving complexity of spatial and temporal scales for hydrodynamic modeling in nearshore environments.

Professional Development

Capacity building through training modules, certificate programs, graduate coursework, and seminars.

Community Outreach

Community engagement via user-ready content and products for the general public and elementary to high school-aged students.

[TBBEx]

Background

TBBEx is an ongoing effort to pursue solutions to multiple challenges associated with mapping and modeling in shallow, coastal environments.

Stakeholders in these environments are diverse, but there are numerous shared goals and needs. Better information* is a common thread.

The aims of TBBEx are aligned with the goals that COMIT is currently best positioned to address. These are likely to evolve over time.

** Better information is more [accessible, accurate, contextualized, intuitive, precise, timely] information.*

Slide credit: Matt Hommeyer

[TBBEx]

Goals

1. Get better at data collection

More observations, of higher quality, with less environmental impact…
…but can't cost more or take longer.

2. Get better at data processing

Better is code for "faster" is code for "more automated"
(+) reproducible, quantitative
(-) time, judgement

3. Get better at data delivery

Give the user what they need, when they need it.
User may not know what they need or when they need it…until they need it.

Slide credit: Matt Hommeyer

[TBBEx]

Data Collection

Make more observations, of higher quality, with less environmental impact

Innovative technology

Innovative approaches

Slide credit: Matt Hommeyer

[TBBEx]

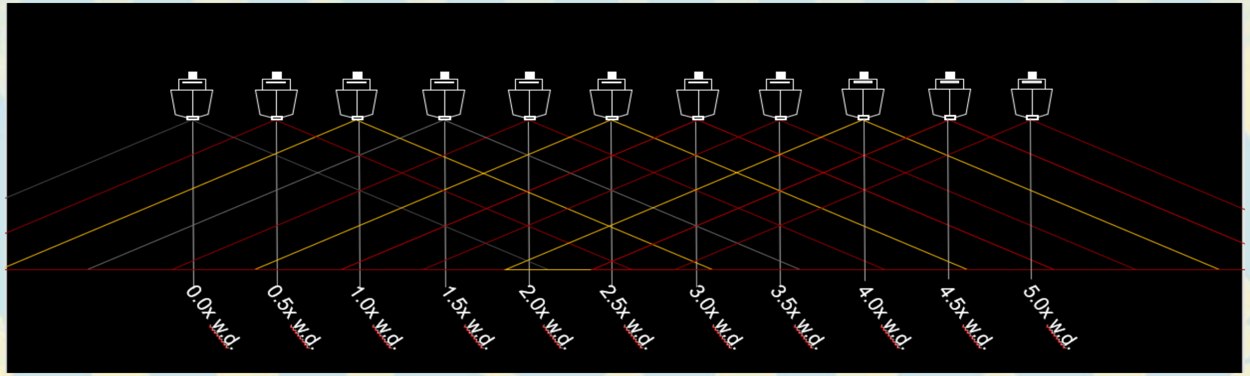
Data Processing

Improve methods for making imperfect data "good enough* for government work"

* really, really good

Remove speed bumps in workflow from ping to chart
Very near future: ping to phone(?)

Evaluation of TU Delft sound speed inversion algorithm



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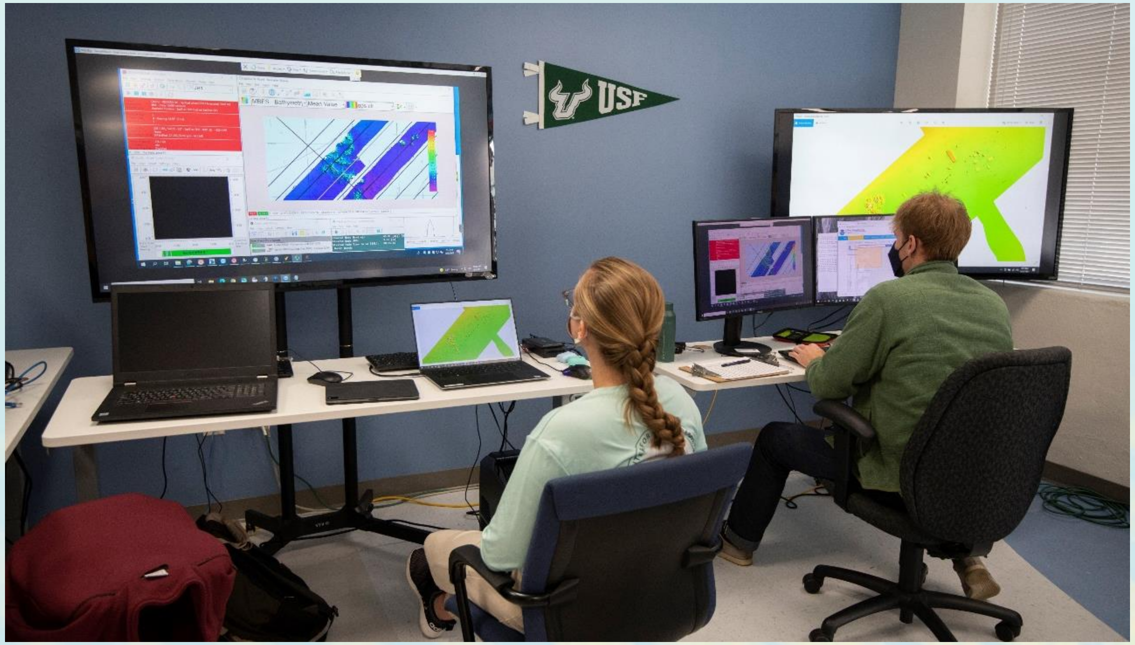
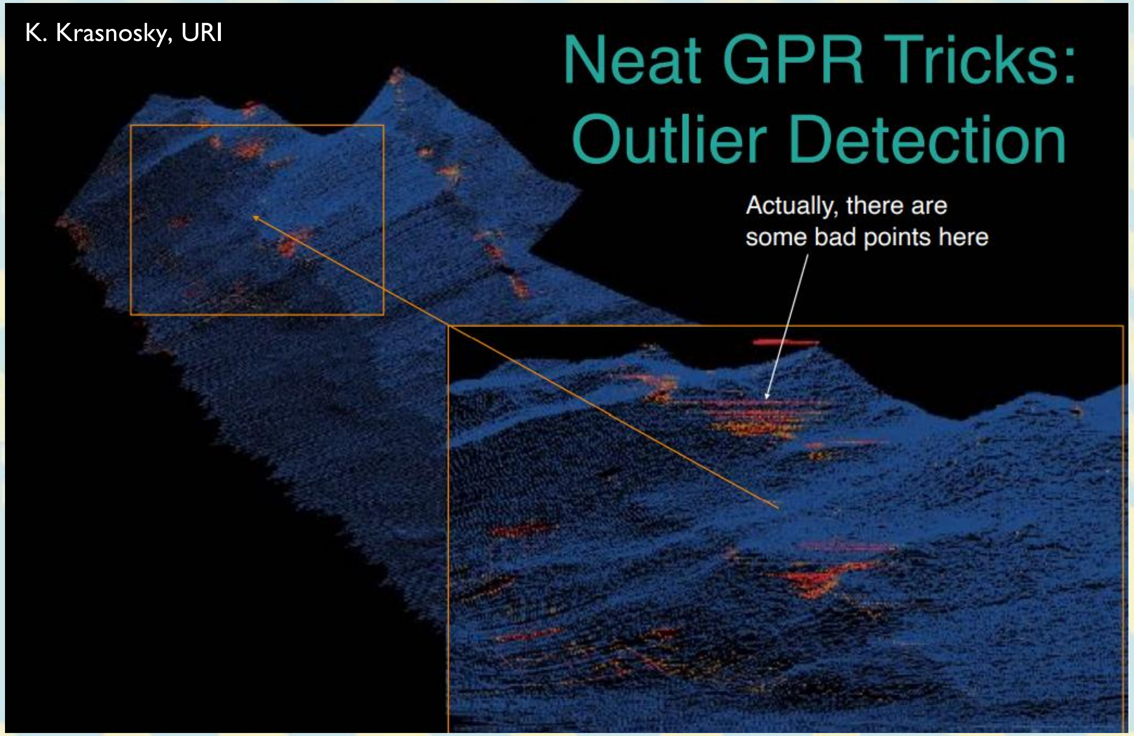




Data Delivery

Provide end users with the information they need, when they need it

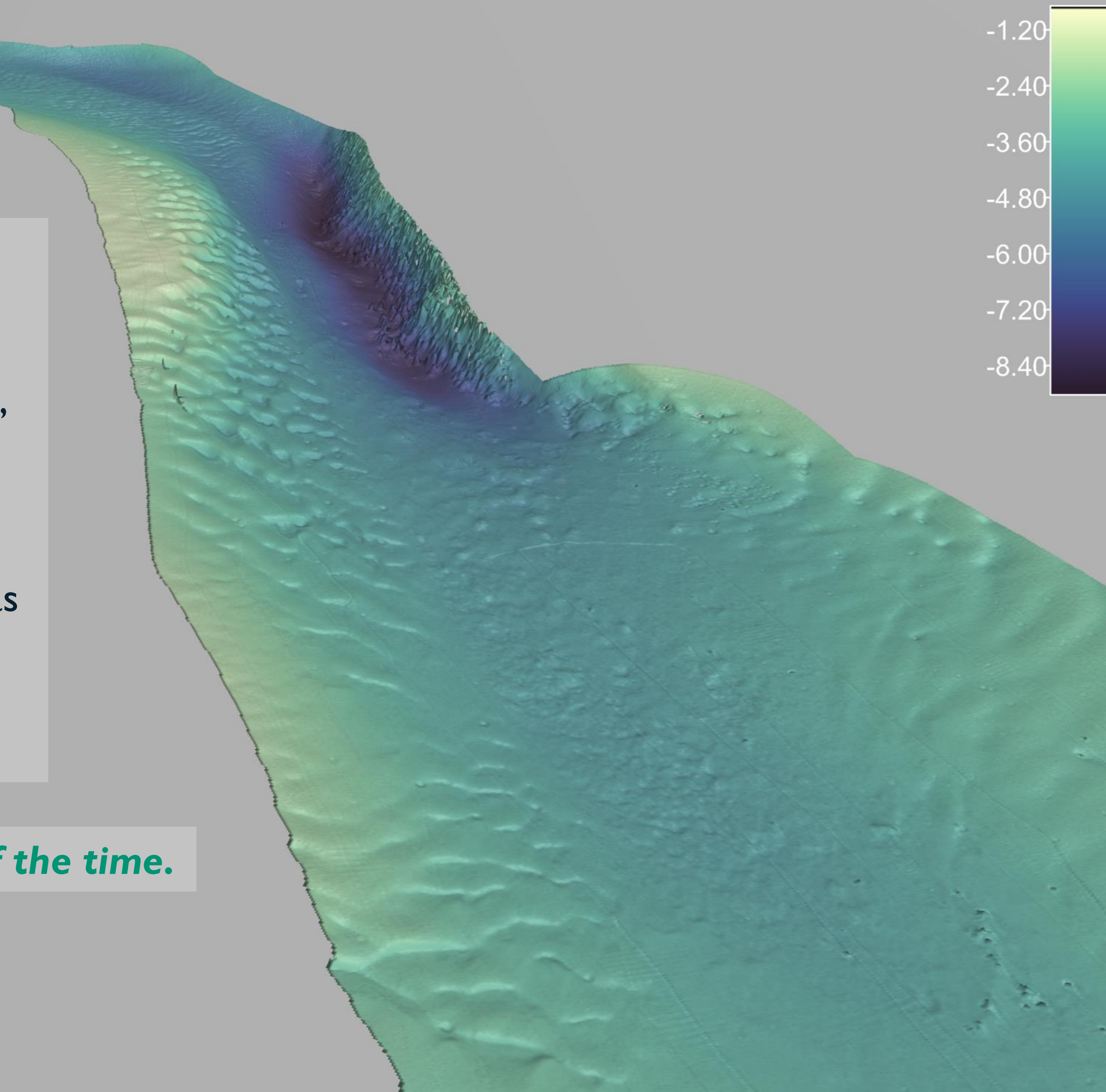
Hydrodynamic modeling and forecasting of tides, currents, and sediment transport

Support digital twin development around port facilities, buffer zones, and other key coastal areas

Deliver all of this in an intuitive way:
more Google Maps, less Google Glass

More eyes and ears in the ocean, more of the time.

Slide credit: Matt Hommeyer



Map the Gaps

BIG BEND MAPPING EFFORT

Grant No. NA19-NOS0220048

2019 - 2022

CENTER FOR OCEAN MAPPING AND INNOVATIVE TECHNOLOGIES
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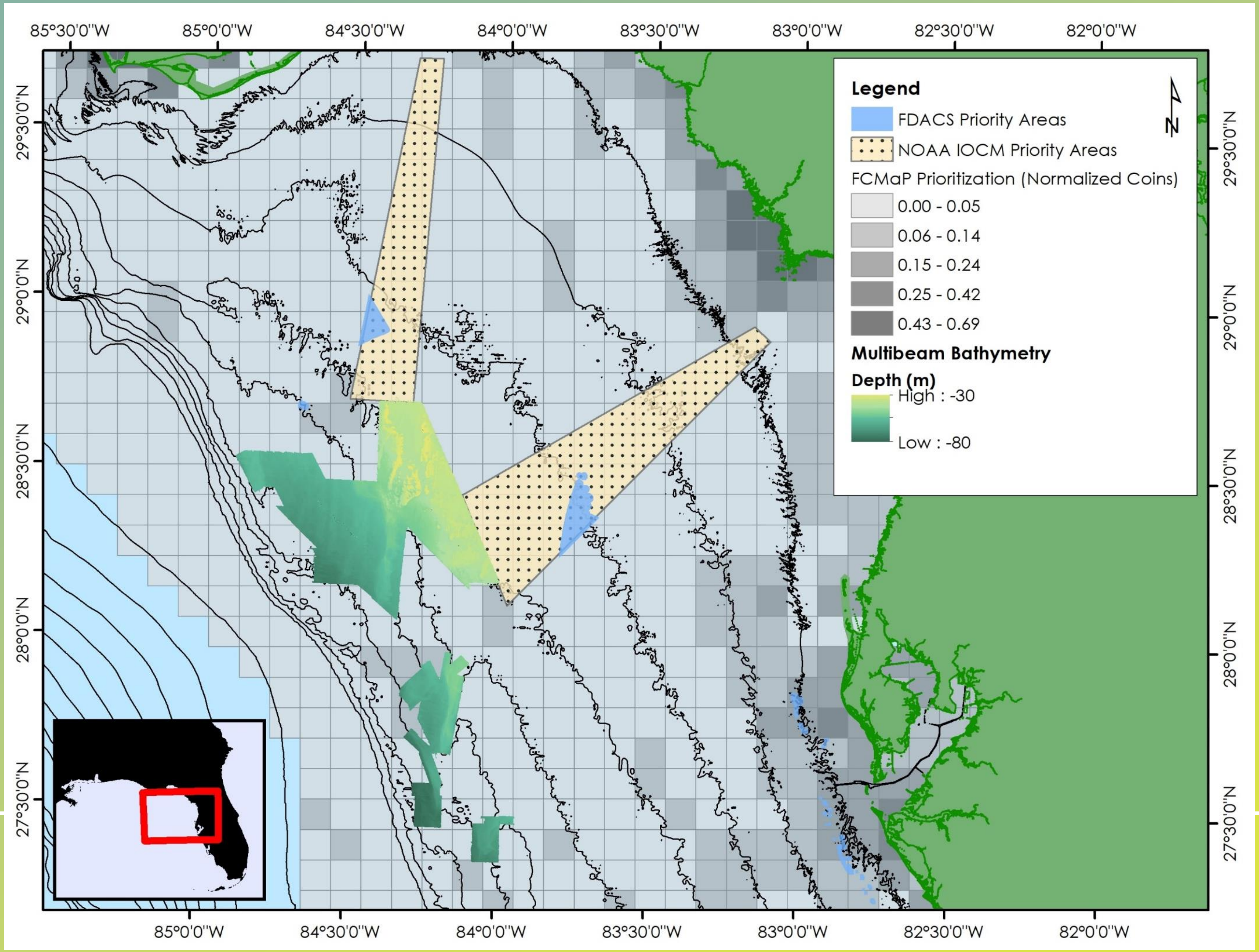
U.S. DEPARTMENT OF COMMERCE

Big Bend

DATA COLLECTION

North/Central WFS Before…

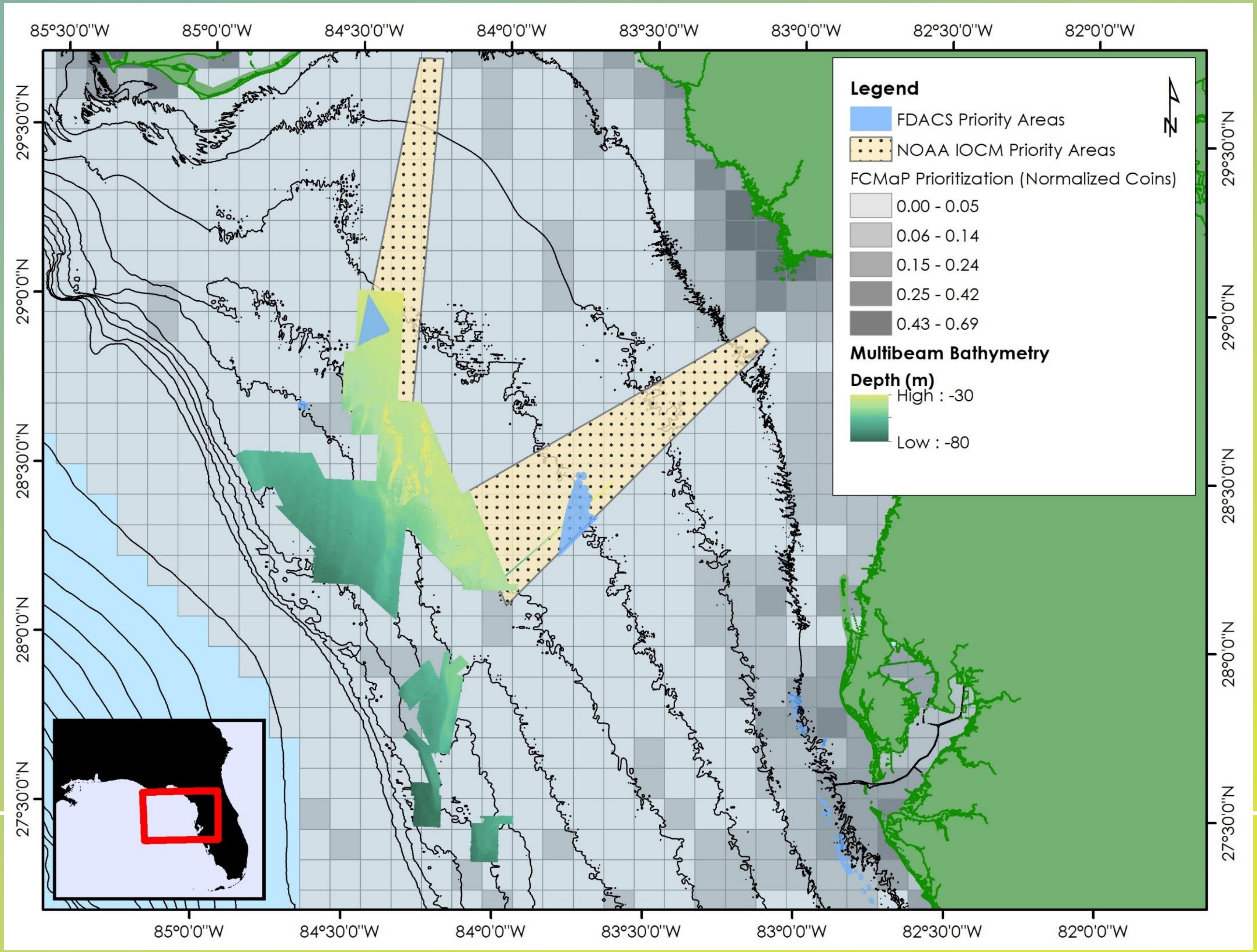


Big Bend

DATA COLLECTION

North/Central WFS Before & After!

Approx. 890 sq-km mapped over 19 days (+ 80 sq-km along perimeters)



Thank You

www.marine.usf.edu/COMIT

@COMITusf

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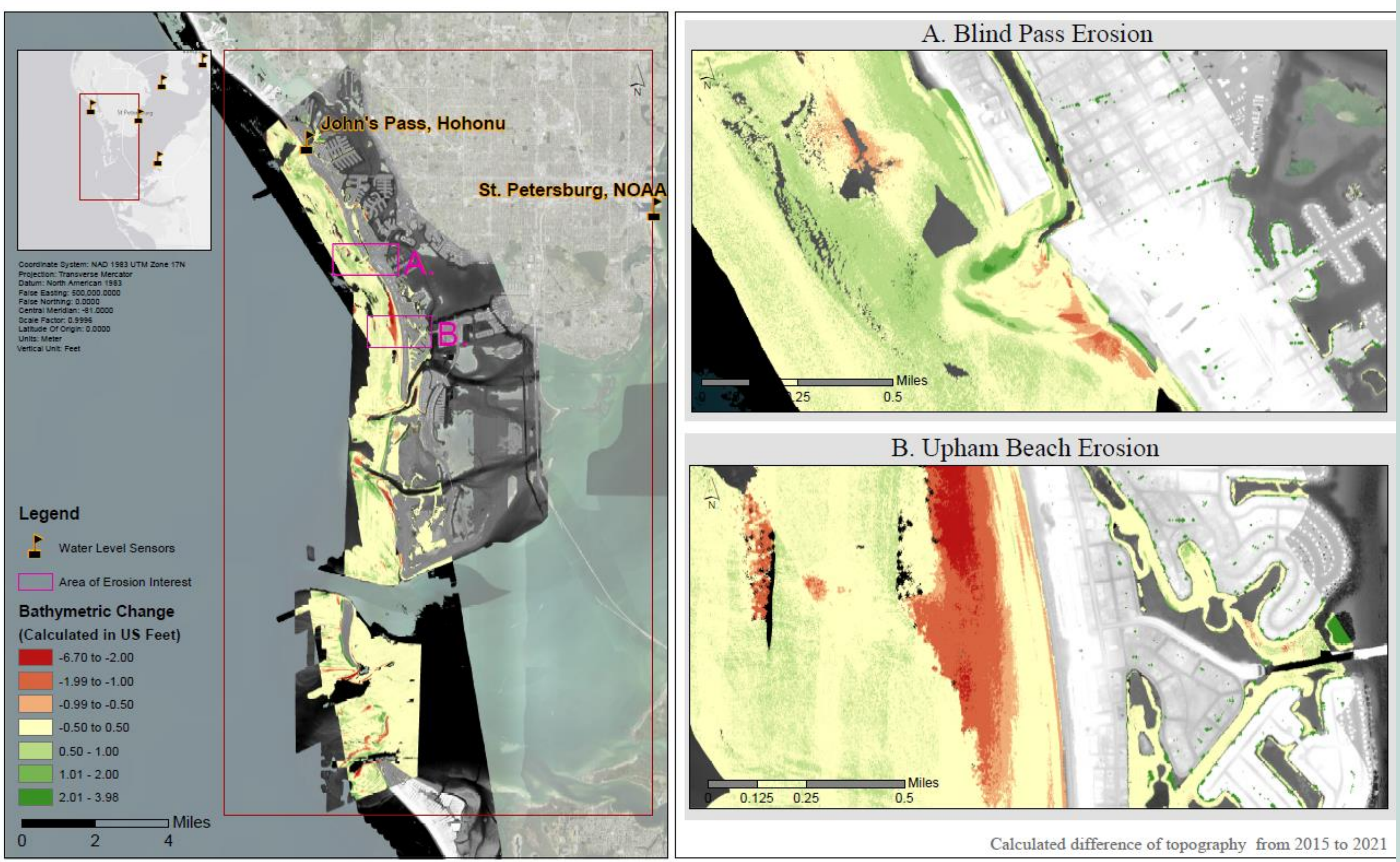
Results (Pt. 1)

Map credit: Cat Dietrick & Sherryl Gilbert



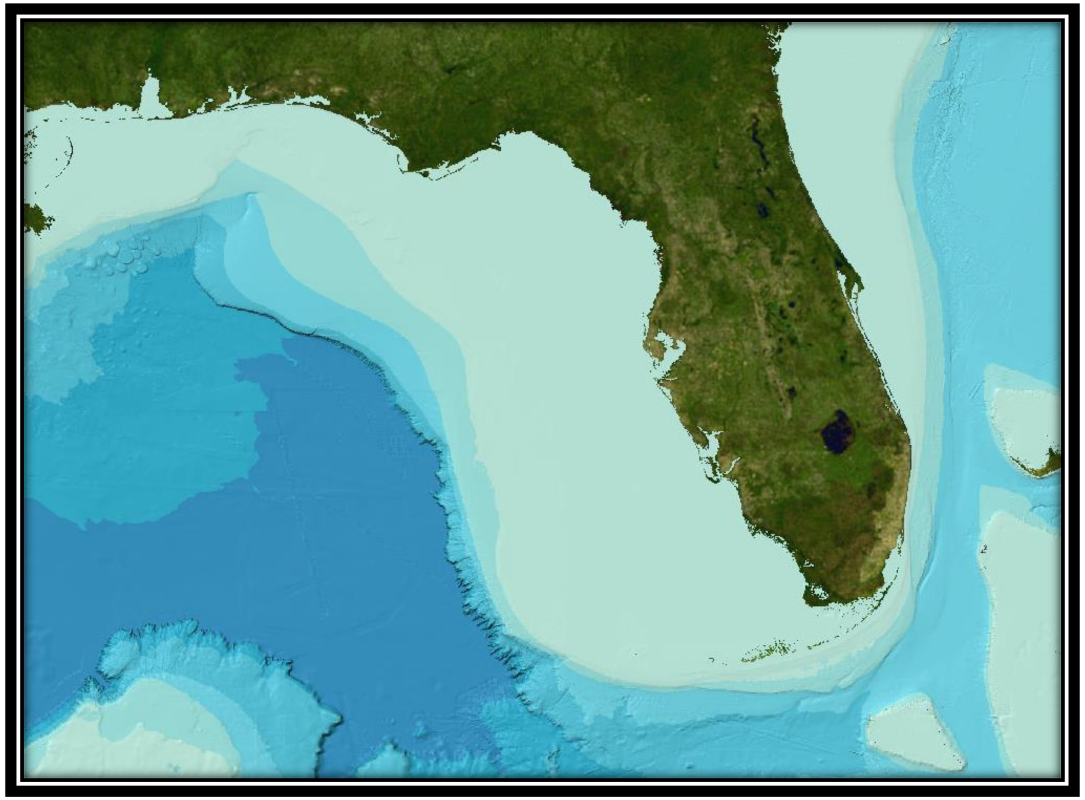
Calculated difference of topography from 2015 to 2021

[TBBEx]

Results (Pt. 1)

Fugro RAMMS System

Facilitating Development of a Standardized Mapping Framework – Stakeholder Survey

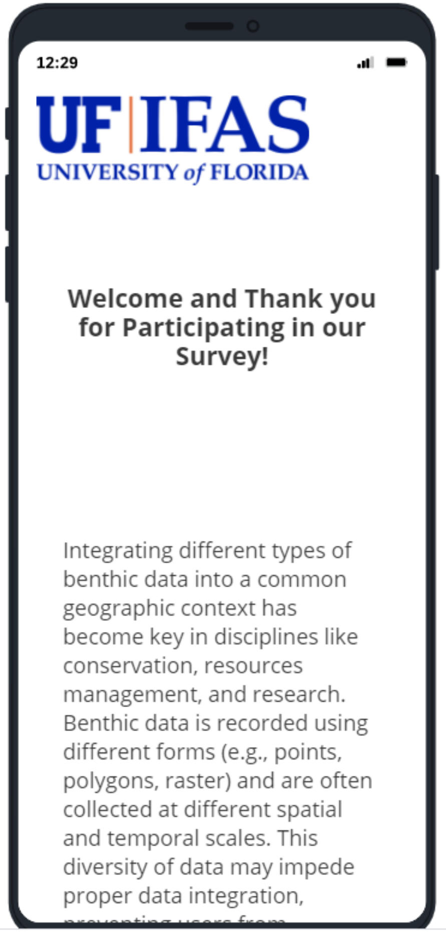


Bradley Ennis, Vincent Lecours, Anna Braswell, Joy Hazell

University of Florida
Standardized Mapping Framework Center of Excellence
School of Forest, Fisheries, and Geomatics Sciences

Survey Request

The objective of the survey is to explore how different stakeholders interact with benthic data in Florida. Information from the survey will be used to identify current practices and community needs.



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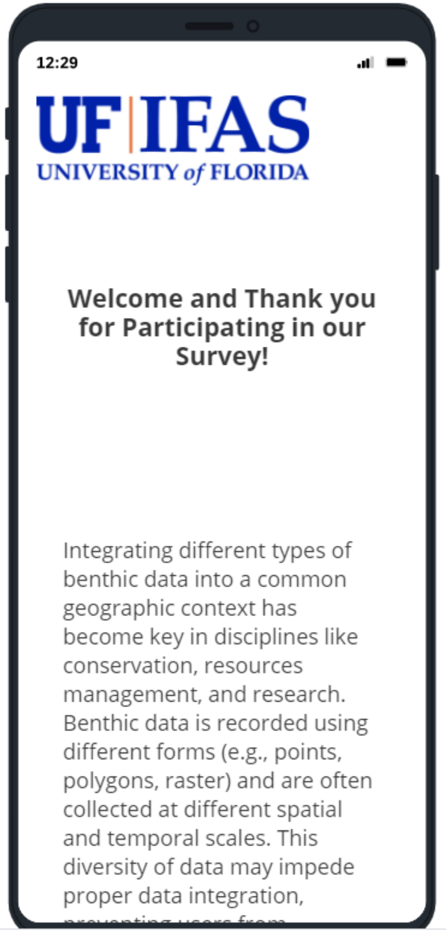
Questions in the survey are focused on data usage, reported metadata standards/frameworks, and tools used by public and private sector.



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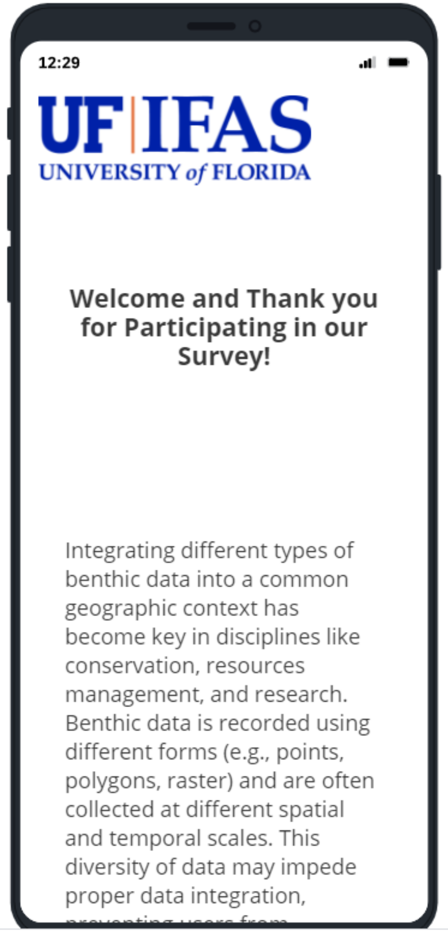
We will use the feedback from the survey to promote recommendations for a standardized framework for benthic data integration and distribution in Florida.

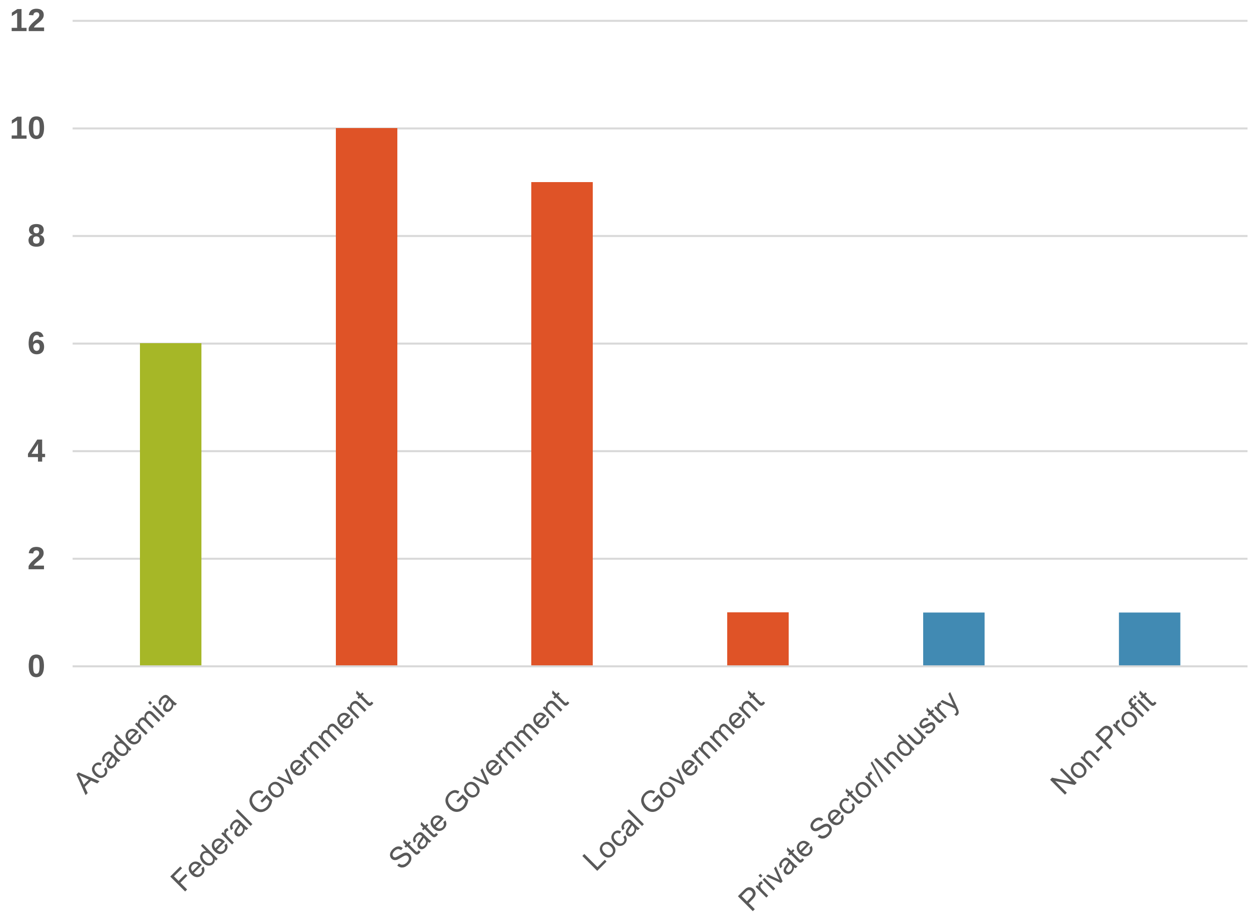


Survey Request

- Survey was created for desktop and mobile devices using Qualtrics
- Survey was distributed in September 2022 through the FCMAP mailing list
- 15 Questions (excluding other fill-in blank responses)

qualtrics® XM

Preliminary Survey Results - Participants



28 Responses

We are looking for 60!

71.4% – Government Agencies

21.4% – Academia

7.1% – Private & Non-profit

Preliminary Survey Results - Participants

Respondents Areas of Expertise	Responses
Habitat Assessment	15
Data Management	12
Marine Ecology	11
Marine Biology	10
Marine Geology (Geomorphology, Marine Sediment, Stratigraphy)	10
Fisheries	4
Biological Oceanography	3
Hydrography	3
Coastal Engineering and Shoreline Management	2
Physical Oceanography	2
Habitat Mapping	1
Water Chemistry	1
Other	3

Preliminary Survey Results - Findings

There is a consensus from stakeholders that there is a lack of adoption of metadata approaches and guidance in handling marine benthic data.

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A variety of data portals and tools are being used to help with distribution of marine data. However, many of these tools are small in context and do not help with distribution workflows.

Preliminary Survey Results - Findings

There is a consensus from stakeholders that there is a lack of adoption of metadata approaches and guidance in handling marine benthic data.

A variety of data portals and tools are being used to help with distribution of marine data. However, many of these tools are small in context and do not help with distribution workflows.

Although stakeholders may vary considerably across different research programs, there is a shared need for data standardization and help with data distribution.

Next Steps Forward

Continue to advertise and keep the survey open. We still need more input from the stakeholders. We are hoping to have at least 60 survey participants.

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Using the results of the survey, we will work with experts to develop or recommend existing best practices for benthic habitat data collection and distribution.

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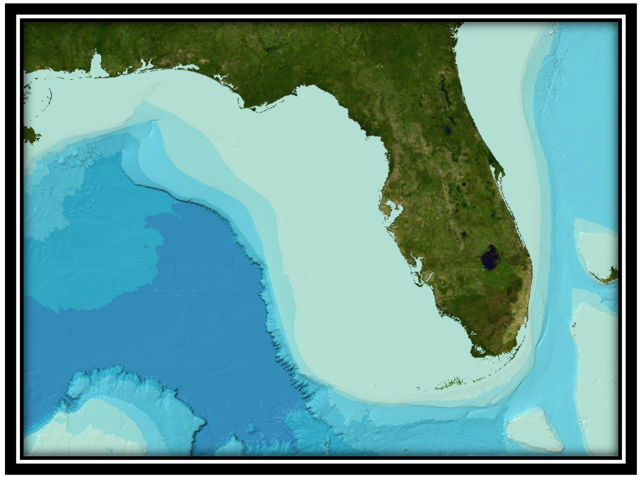
Using the results of the survey, we will work with experts to develop or recommend existing best practices for benthic habitat data collection and distribution.

With help from the research community, data management tools will be created to streamline the data review and management process.

Questions ???

Have you taken the survey yet?

Please scan the QR code or visit https://ufl.qualtrics.com/jfe/form/SV_etzrRfVaSkKF5XM



www.FloridaMarineData.com

SCHOOL OF FOREST, FISHERIES, AND GEOMATICS SCIENCES

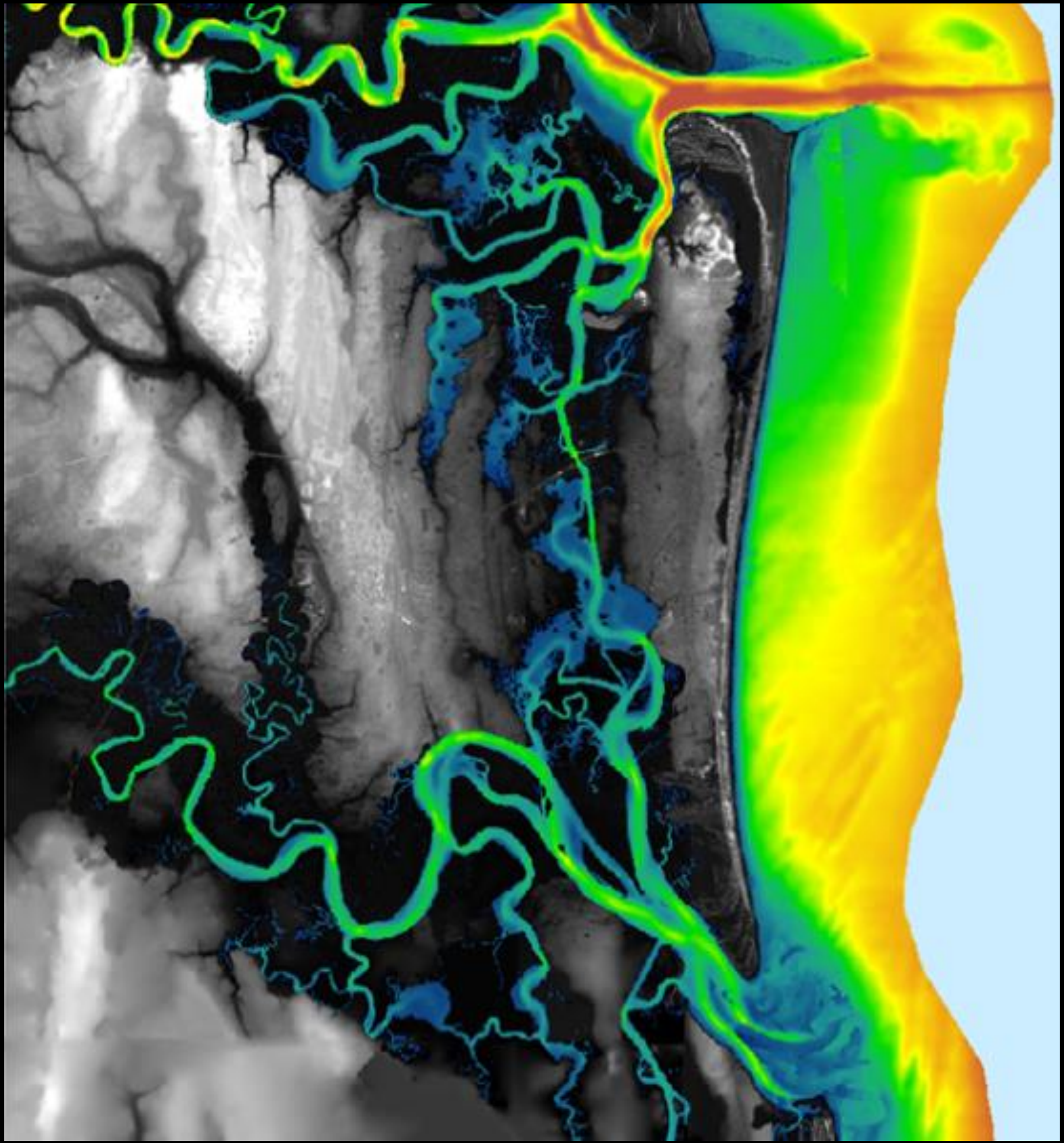
FLORACEP FLORIDA RESTORE ACT CENTERS OF EXCELLENCE PROGRAM

Lunch

Florida Coastal Mapping Program Summit 2022

Florida State Mapping Initiative

Kimberly Jackson, FDEP



Florida
Seafloor Mapping Initiative

Geospatial Data Inventory, Review, and Collection Area Delineation Methodology

Kim Jackson, GISP, GIO

FL Geographic Information Office

December 2022 FCMaP Workshop, virtual

Geospatial Data Coordination

State FGIO and RCP Working Together

PHASE 1

- Inventory
- Review
- Identification
- Data Sharing
- Host Hub Site initiative page

PHASE 2

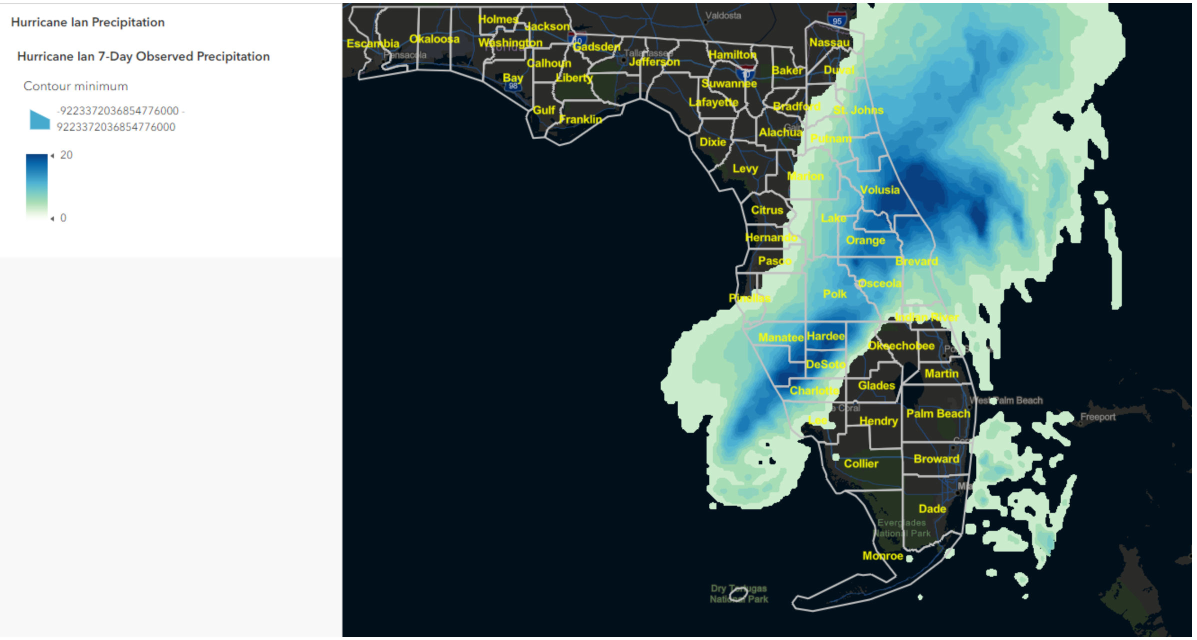
- Technical support
- Status dashboard on Hub Site
- Set Up Azure storage

PHASE 3

- Data storage for process
- Data storage for deliverables
- Coordination with FED repositories
- GIO data hosting
- Outreach / Education
- Develop case for new funding

- **Legislature & Governor's Office**
- **GIO & DEP RCP GIS staff**
- Florida Surveying
- Vendor Community
- Field Staff
- State Agency, Commission, and WMD Partners
- Federal & Military Partners
- Other States – New Jersey and Alaska
- Local Subject Matter Experts (FCMaP, GOMA)
- Azure & ESRI
- NSGIC Coastal Caucus
- TBD…

OVERVIEW


Hurricane Ian Precipitation
Hurricane Ian 7-Day Observed Precipitation
Contour minimum
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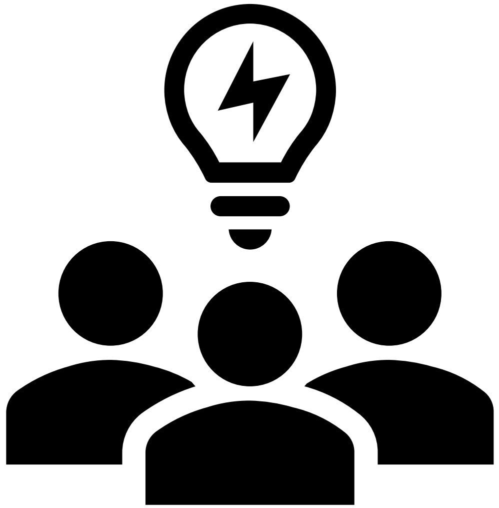
20
0
Escambia
Okaloosa
Holmes
Jackson
Washington
Gadsden
Calhoun
Jefferson
Bay
Liberty
Gulf
Franklin
Hamilton
Nassau
Baker
Suwannee
Lafayette
Bradford
St. Johns
Alachua
Dixie
Levy
Volusia
Citrus
Lake
Orange
Brevard
Polk
Osceola
Manatee
Hardee
Okeechobee
DeSoto
Martin
Charlotte
Glades
Hendry
Palm Beach
Collier
Broward
Dade
Monroe
Freeport


LNG: −81.666725
UTC: 2022−10−02 21:36:07
TO: V−343 (1727.6 m)

OVERVIEW

Professional technical input:

- Ashley Chappell, Stephen White, Paul Turner, NOAA
- Jeff Danielson, USGS CoNED
- Xan Fredericks, USGS
- Rene Baumgartner, FWC
- Lesley Jones, AK GIO
- Angela Witcher, NJ DEP
- Jennifer Wozencraft, US ACOE
- Christina Mohrman, GOMA
- And MANY, MANY MORE!



TECHNICAL INPUT

Identifying Existing Coastal Mapping Data to Integrate into FSMI 2022

1. Literature Review
2. Inventory Accessible Data from geospatial repositories
3. Address Evaluation Factors
4. Verify stakeholder priorities
5. Adjust for timing and cost

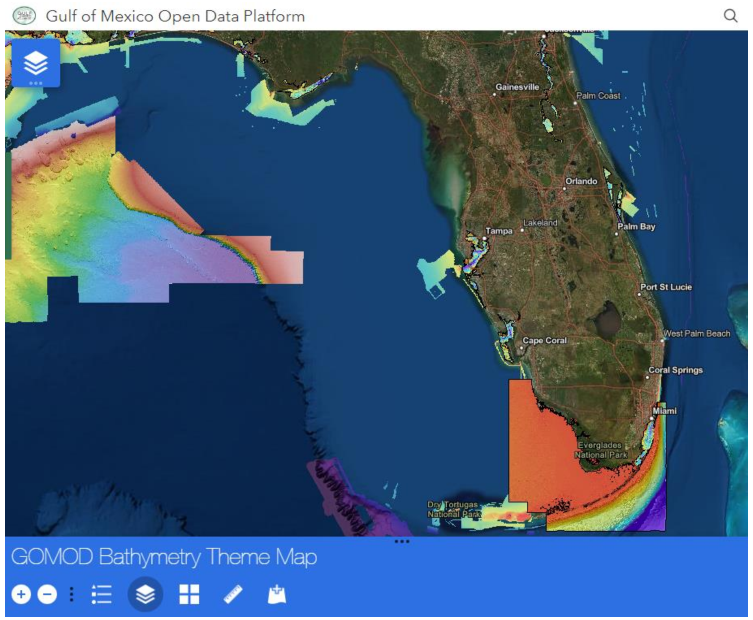
Literature Review

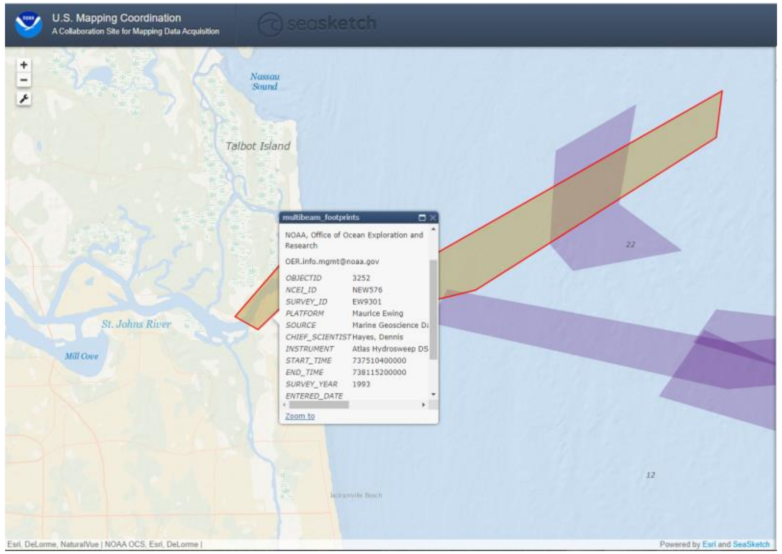
Inventory Accessible Data from geospatial repositories

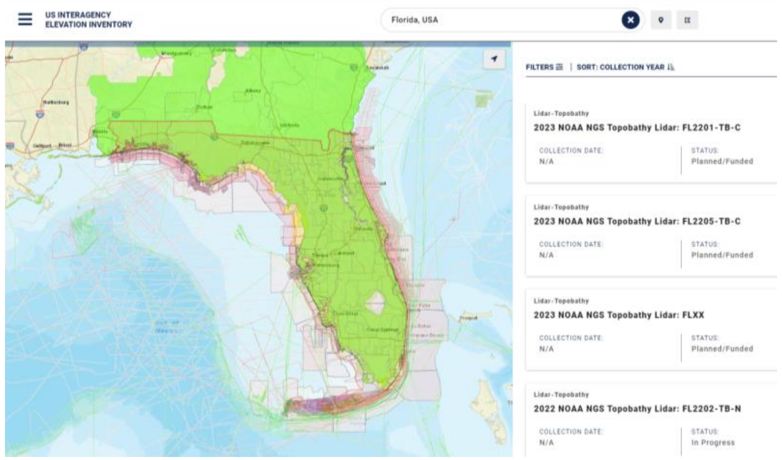
Address Evaluation Factors

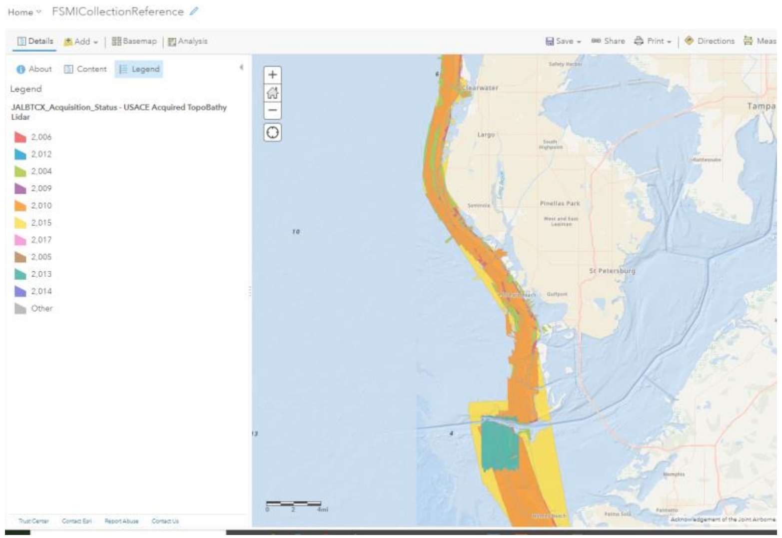
Verify stakeholder priorities

Adjust for timing and cost

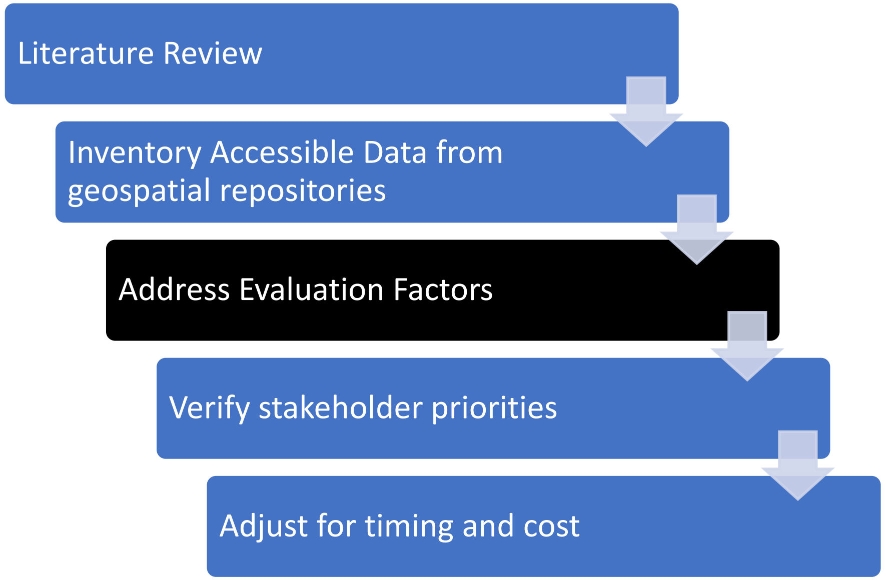








INVENTORY



Factors to evaluate

1. Data age
2. Data quality
3. Minimum mapping unit
4. Data Access
5. Disruptions
6. Completeness
7. Spreadsheet with what we would like versus what we can afford

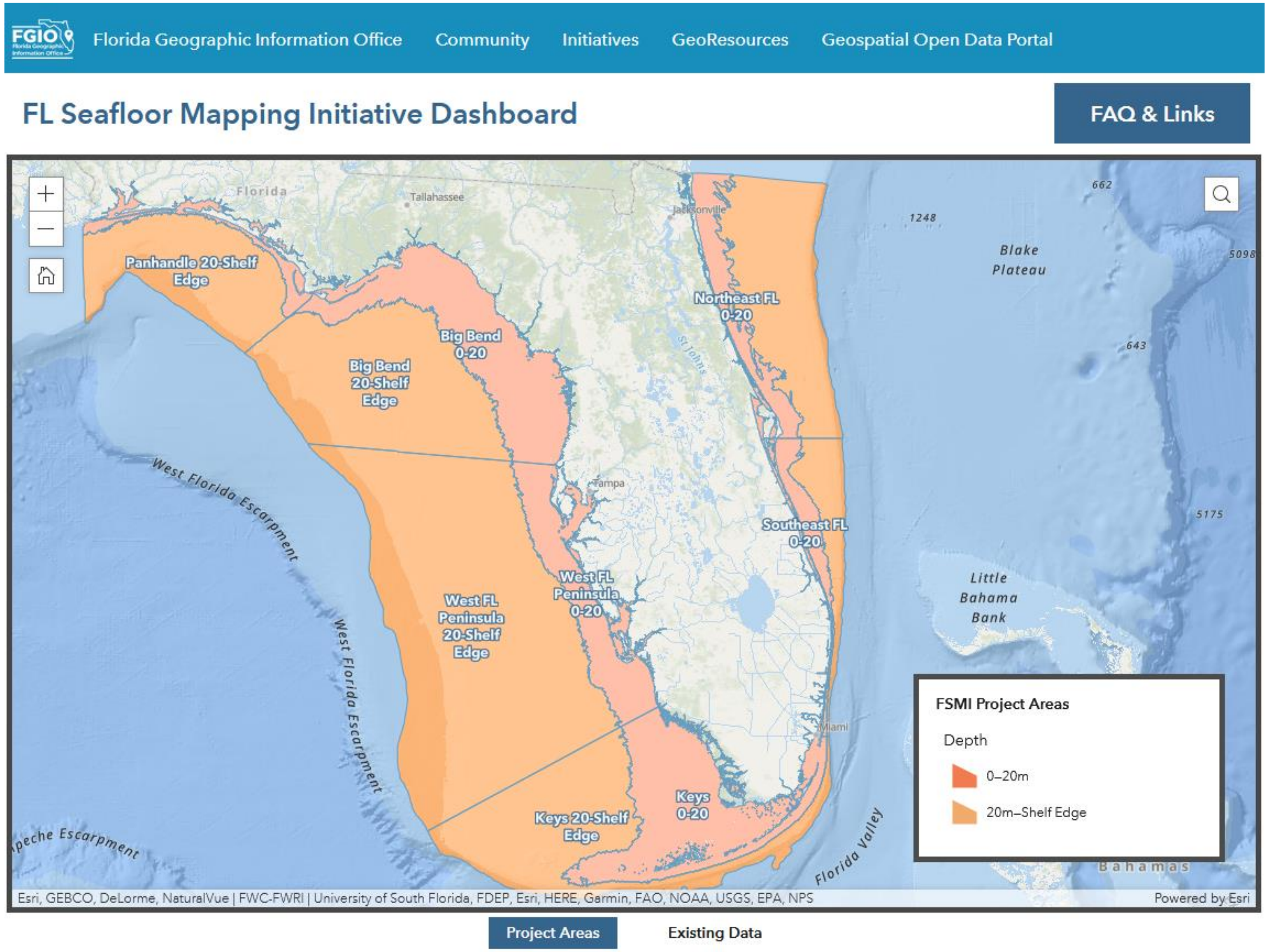
Literature Review

Inventory Accessible Data from geospatial repositories

Address Evaluation Factors

Verify stakeholder priorities

Adjust for timing and cost



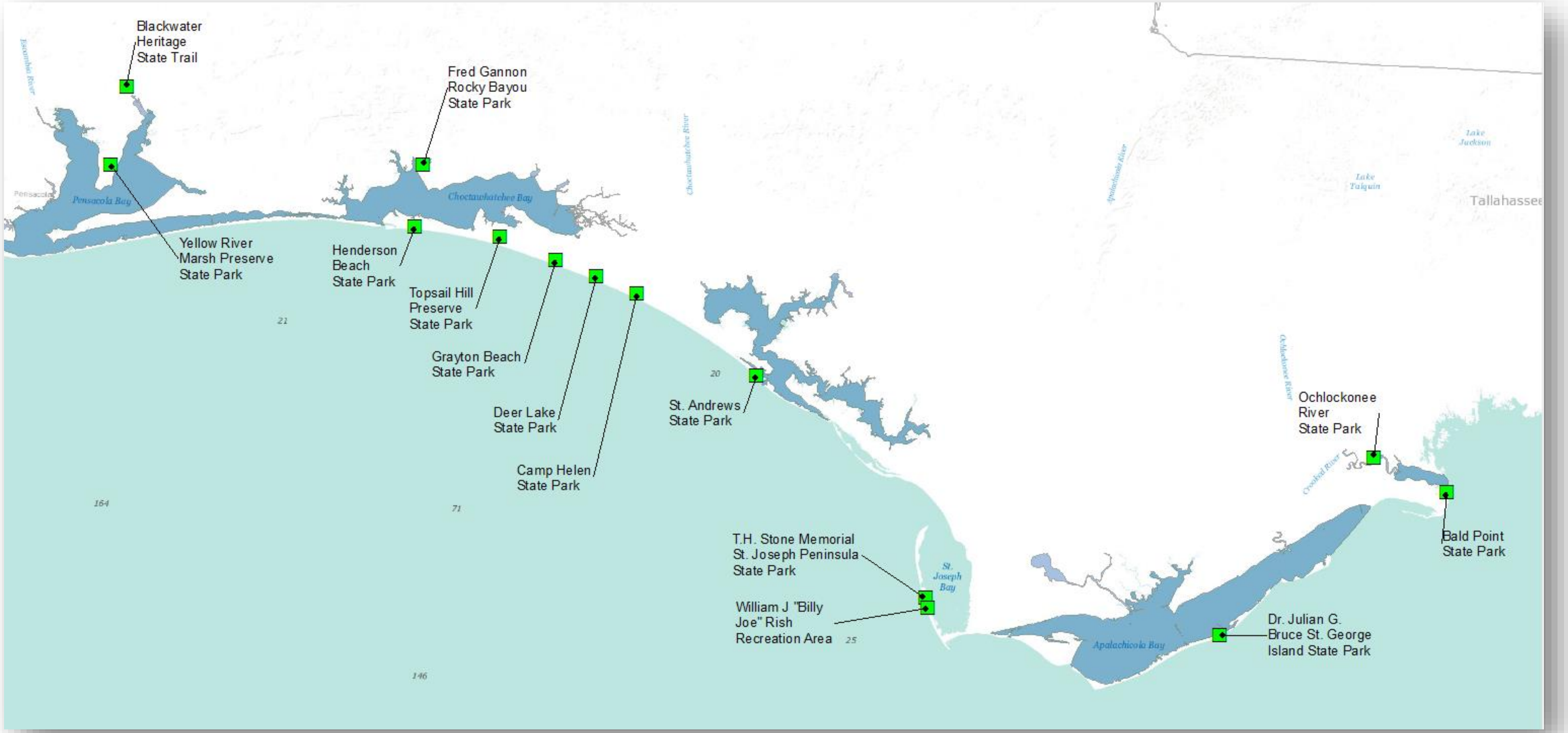
FSMI coastal areas of interest, based on stakeholder needs:

1. River Mouth and Estuaries
2. Near shore – as defined by NOAA 0 – 20 meters in depth
3. Offshore as defined by NOAA 20 – 200 meters in depth

**note #1-2 are the project's priority*

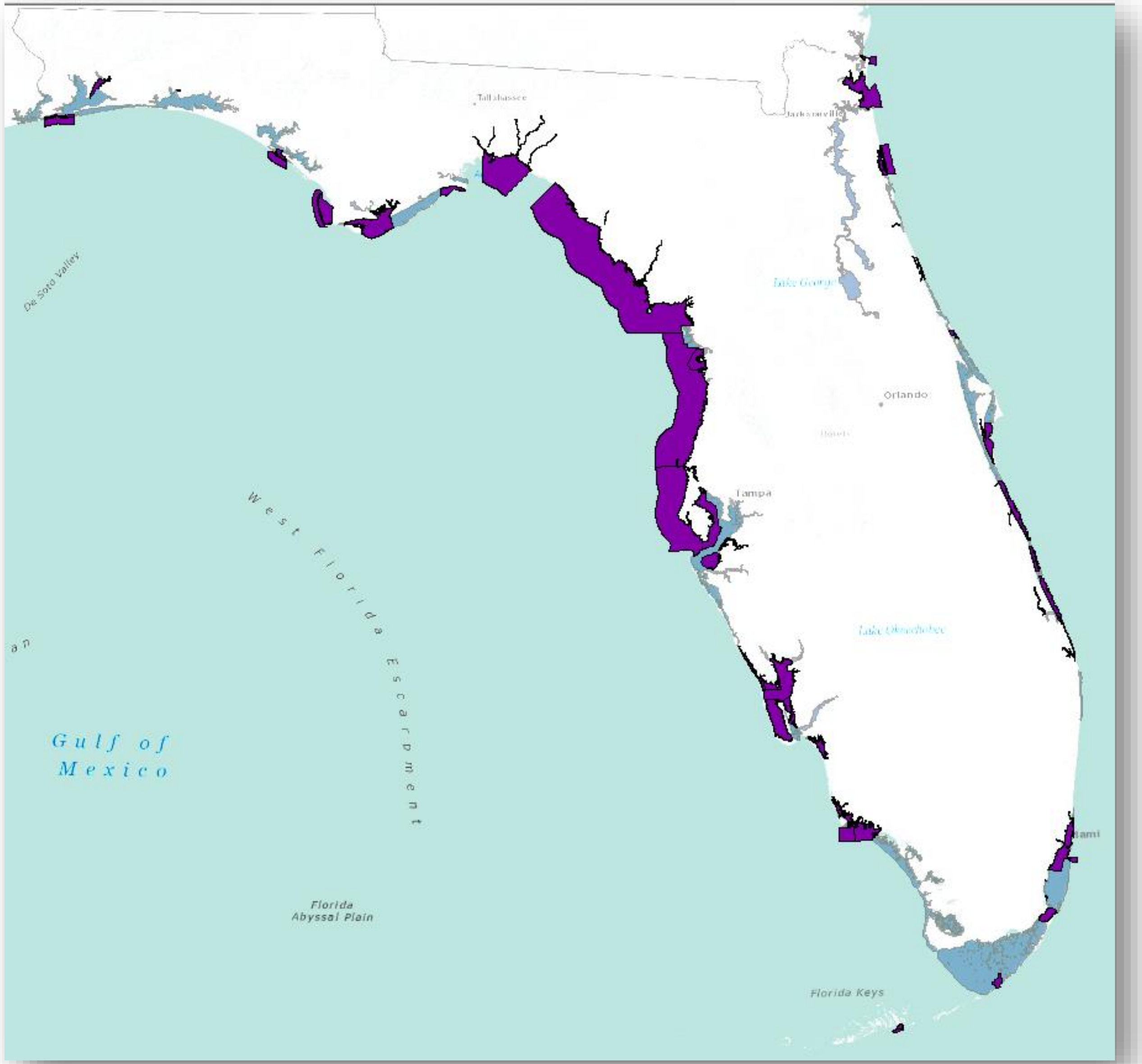
INVENTORY

ESTUARY NAME	SQ KILOMETERS
Suwannee River	9
Withlachoochee Estuary	14
Apalachee Bay	29
Daytona Beach Estuary	30
Worth Lake	31
Lemon Bay	31
Steinhatchee Estuary	33
Nassau Sound	34
Rookery Bay	35
St. Augustine Estuary	38
Estero Bay	39
St. Marys River/Cumberland Sound	64
Caloosahatchee River	67
Wacasassa Estuary	111
Sarasota Bay	124
Perdido Bay	129
South Ten Thousand Islands	226
St. Andrew Bay	252
Choctawhatchee Bay	340
North Ten Thousand Islands	390
Crystal River	406
Pensacola Bay	477
Apalachicola Bay	593
St. Johns River	684
Biscayne Bay	701
Charlotte Harbor	705
Indian River	866
Tampa Bay	902
Florida Bay	1664

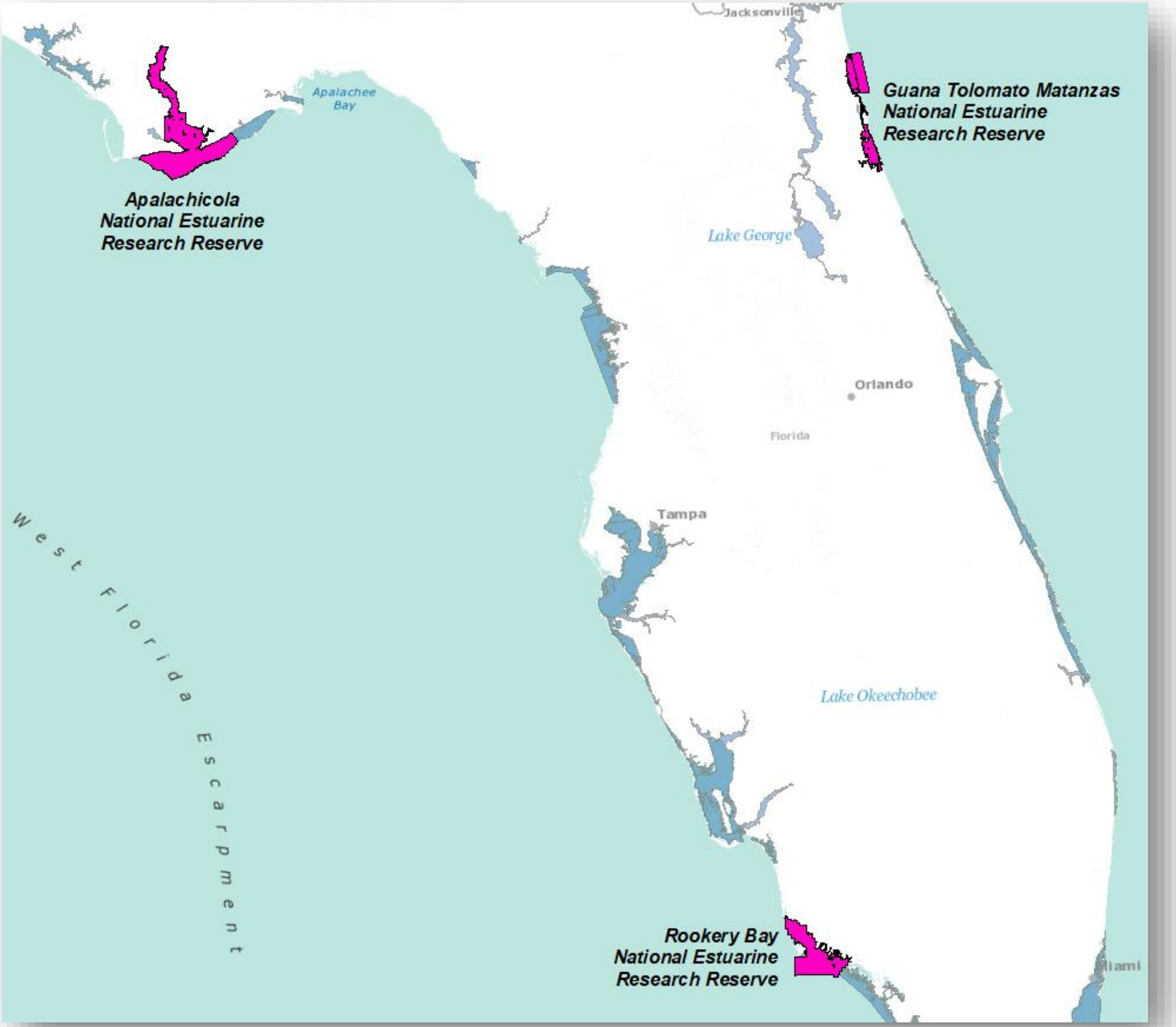


PRIORITY AREAS

LONG_NAME
Alligator Harbor Aquatic Preserve
Apalachicola Bay Aquatic Preserve
Banana River Aquatic Preserve
Big Bend Seagrasses Aquatic Preserve
Biscayne Bay-Cape Florida to Monroe County Line Aquatic Preserve
Biscayne Bay Aquatic Preserve
Boca Ciega Bay Aquatic Preserve
Cape Haze Aquatic Preserve
Cape Romano-Ten Thousand Islands Aquatic Preserve
Cockroach Bay Aquatic Preserve
Coupon Bight Aquatic Preserve
Estero Bay Aquatic Preserve
Fort Clinch State Park Aquatic Preserve
Fort Pickens State Park Aquatic Preserve
Gasparilla Sound-Charlotte Harbor Aquatic Preserve
Guana River Marsh Aquatic Preserve
Indian River-Malabar to Vero Beach Aquatic Preserve
Indian River-Vero Beach to Ft. Pierce Aquatic Preserve
Jensen Beach to Jupiter Inlet Aquatic Preserve
Lake Jackson Aquatic Preserve
Lemon Bay Aquatic Preserve
Lignumvitae Key Aquatic Preserve
Loxahatchee River-Lake Worth Creek Aquatic Preserve
Matlacha Pass Aquatic Preserve
Mosquito Lagoon Aquatic Preserve
Nassau River-St. Johns River Marshes Aquatic Preserve
Nature Coast Aquatic Preserve
North Fork St. Lucie Aquatic Preserve
Oklawaha River Aquatic Preserve
Pellicer Creek Aquatic Preserve
Pine Island Sound Aquatic Preserve
Pinellas County Aquatic Preserve
Rainbow Springs Aquatic Preserve
Rocky Bayou State Park Aquatic Preserve
Rookery Bay Aquatic Preserve
St. Andrews State Park Aquatic Preserve
St. Joseph Bay Aquatic Preserve
St. Martins Marsh Aquatic Preserve
Terra Ceia Aquatic Preserve
Tomoka Marsh Aquatic Preserve
Wekiva River Aquatic Preserve
Yellow River Marsh Aquatic Preserve

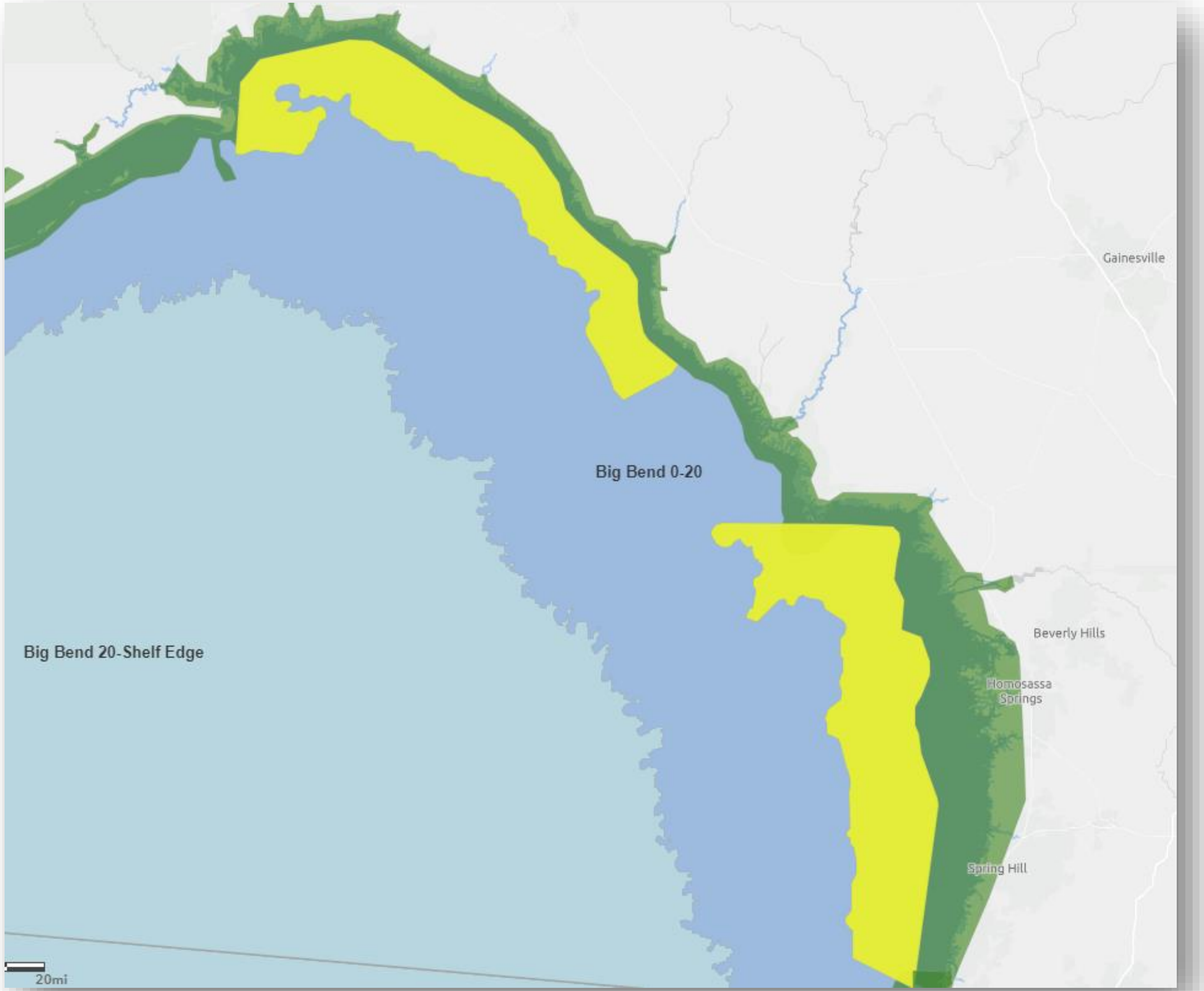


PRIORITY AREAS

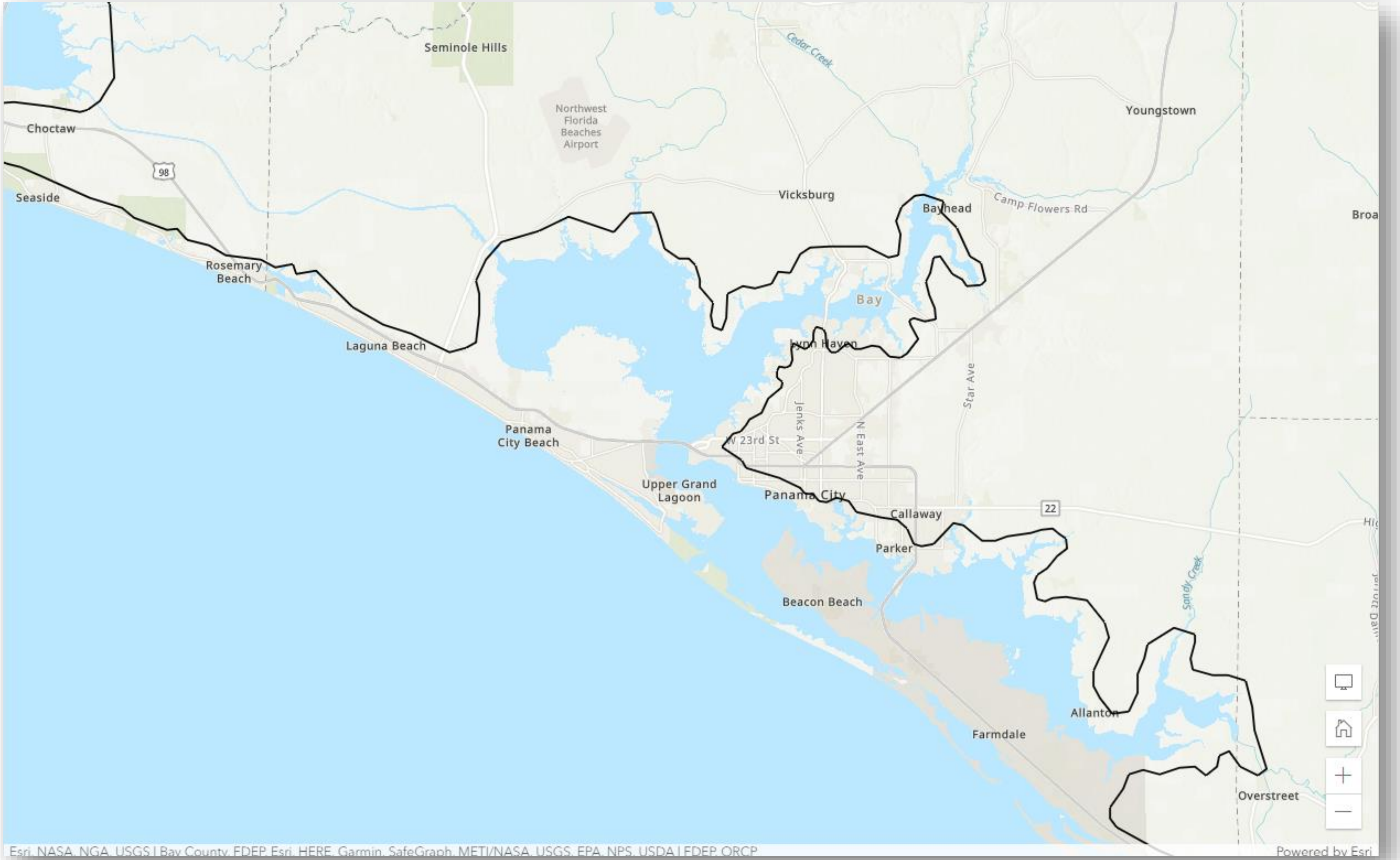


PRIORITY AREAS

- Literature Review
- Inventory Accessible Data from geospatial repositories
- Address Evaluation Factors
- Verify stakeholder priorities
- Adjust for timing and cost



Cost Shares



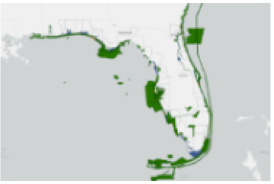
PRIORITY AREAS – Landward Line

FSMI Reference Data

Enter search terms

Grid Title Filter Sign In

Items: 19

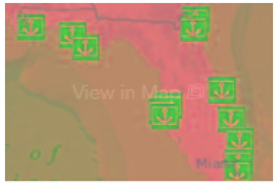


Additional Footprints Non NOAA

Feature Layer

Additional bathymetric data collection project footprints, non-NOAA

View item details

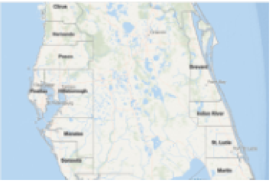


Coastal Deepwater Ports

Feature Layer

Data contained within the layer is intended to be used as a visual representation to locate and identify Deepwater Ports as identified in 2014 Florida Statues, Chapter 403.021(9)(b). This layer was created only for Department staff and other related...

View item details

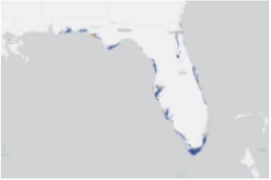


FL Coastal Counties

Feature Layer

Florida coastal counties for use as reference with the FL Seafloor Mapping Initiative Reference Data web app.

View item details

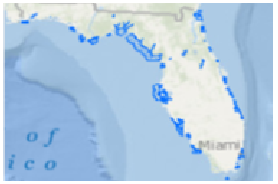


FL Estuaries

Feature Layer

General, broad regions of estuaries around the state of Florida exported from the National Hydrography Dataset (NHD).

View item details

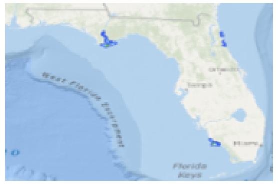


Florida Aquatic Preserves

Feature Layer

This coverage has been generated to provide a graphic depiction of the Aquatic Preserve boundaries and replace previous unofficial maps. These boundaries are only approximate and should not be used for enforcement or permitting purposes. Please see t...

View item details

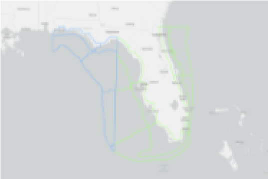


Florida National Estuarine Resarch Reserves (NERR) Boundaries

Feature Layer

This data is a subset of the Marine Protected Areas displaying only the boundaries of the National Estuarine Resarch Reserves present in the State of Florida.

View item details

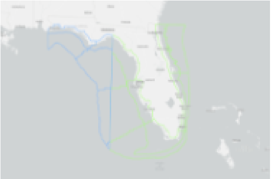


FSMI Region Outline UTM 16

Feature Layer

Statewide region outline for the Florida Seafloor Mapping Initiative. Covers the project area on the UTM 16 N zone, and extents all the way to the continental shelf. Indented for planning purposes.

View item details

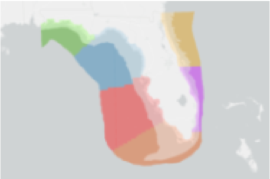


FSMI Region Outline UTM 17

Feature Layer

Statewide region outline for the Florida Seafloor Mapping Initiative. Covers the project area on the UTM 17 N zone, and extents all the way to the continental shelf. Indented for planning purposes.

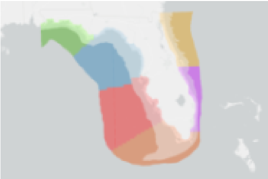
View item details



FSMI Tiling Scheme - UTM 16

Feature Layer

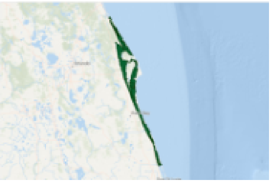
Statewide tiling scheme for the Florida Seafloor Mapping Initiative. Covers the project



FSMI Tiling Scheme - UTM 17

Feature Layer

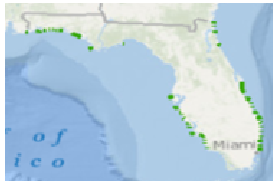
Statewide tiling scheme for the Florida Seafloor Mapping Initiative. Covers the project



IRL Project Footprint

Feature Layer

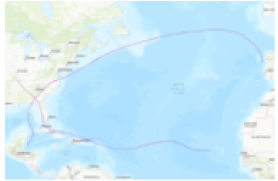
DEAR and SJRWMD area of interest for NOAA cost share data collection. This footprint represents an area of the Indian



Joint Coastal Permitting (JCP) Beach Nourishment Permits

Feature Layer

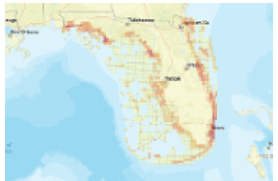
Data contained within the layer is intended to be used as a visual



Major FL Hurricanes Since 2017

Feature Layer

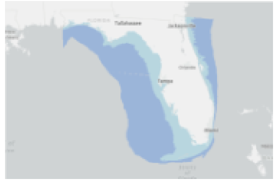
Paths for major hurricanes Michael (2018) and Irma (2017).



Mapping Priority Index

Feature Layer

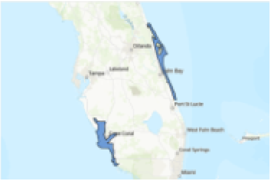
Feature Layer (hosted) of mapping priority values normalized by the number of responses per region for each



NOAA FL Offshore Regions

Feature Layer

NOAA mapped Florida coast near shore 0-20 meters, and far shore 20-200 meters of seafloor depth.

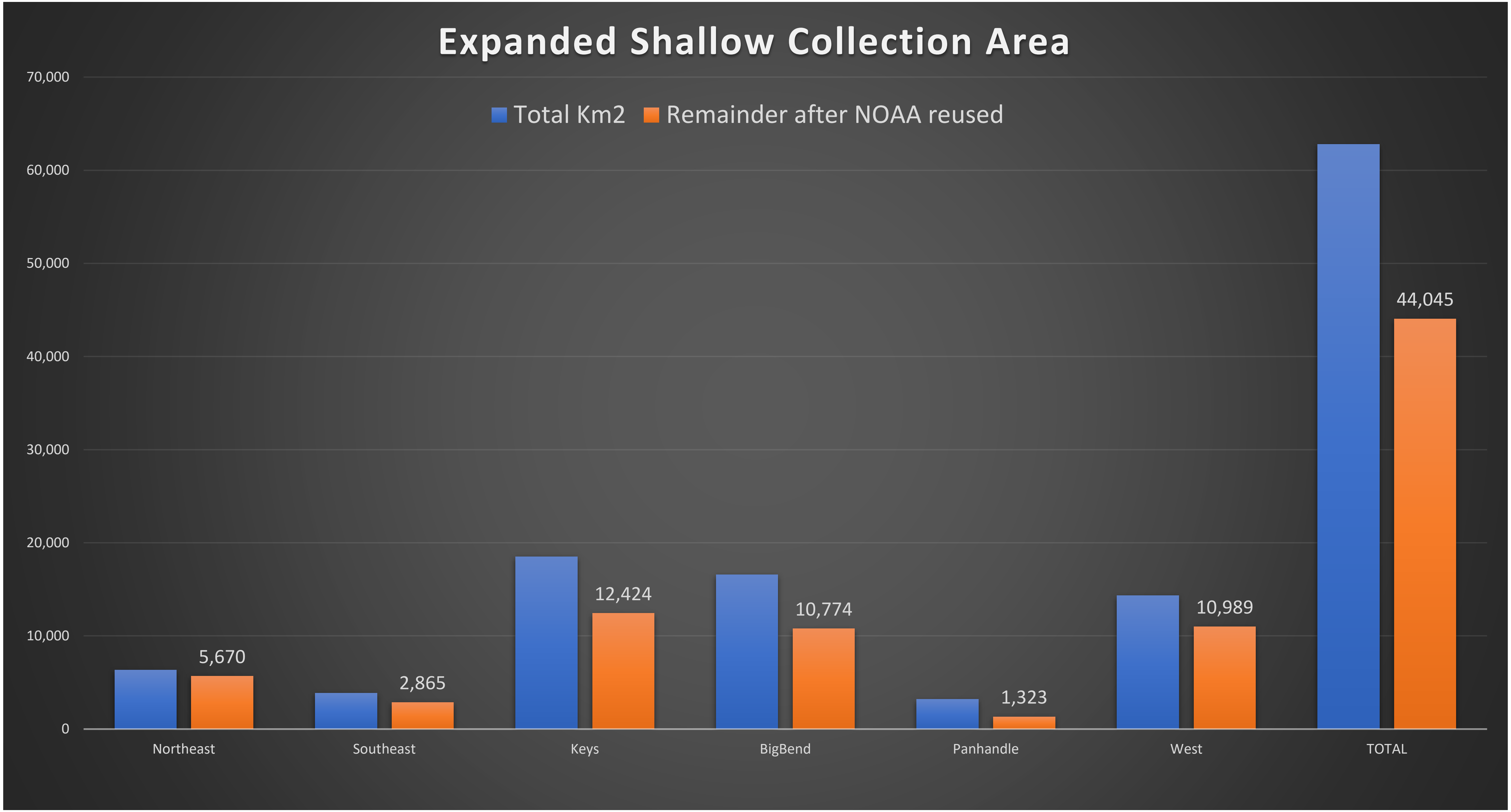


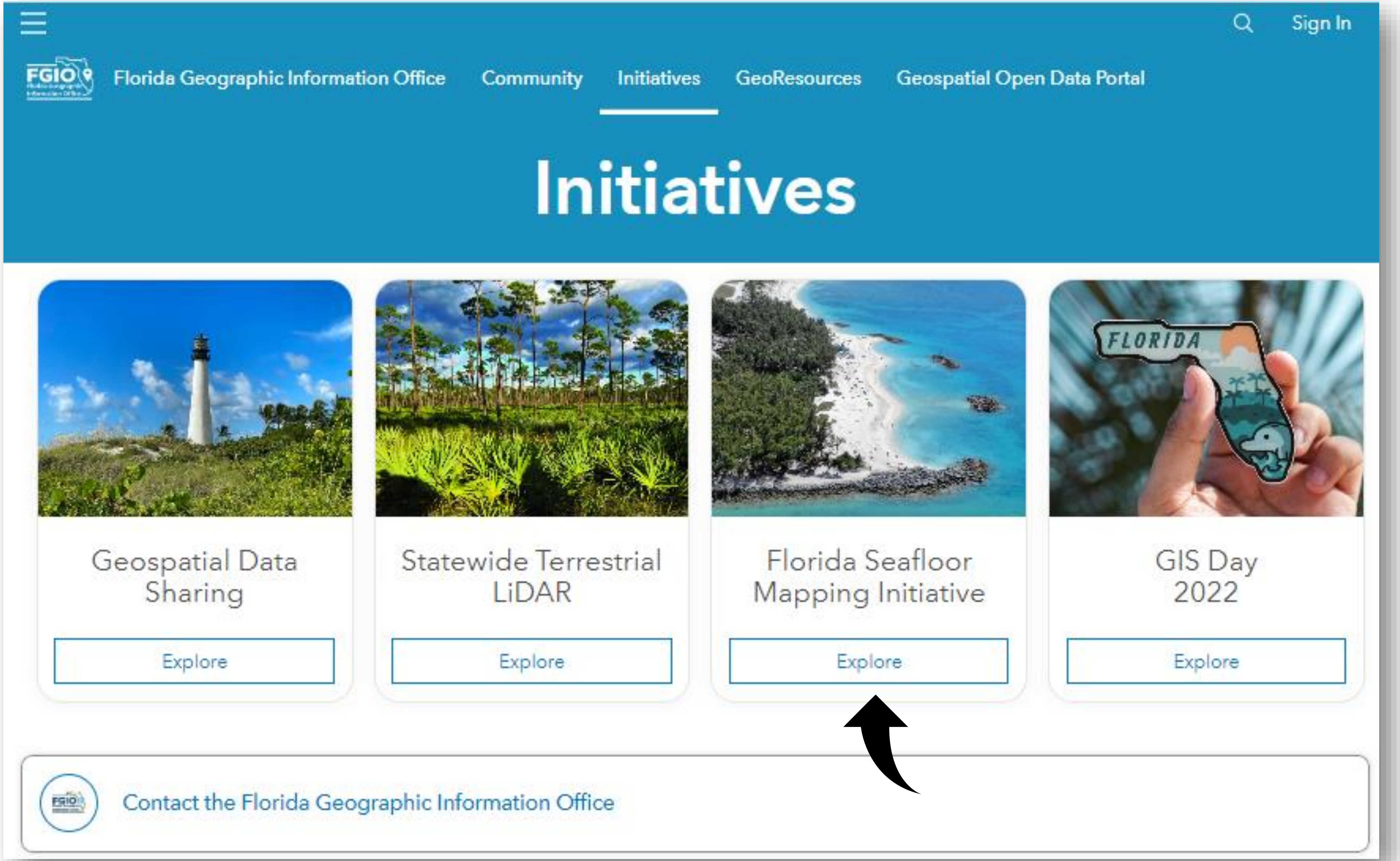
NOAA NOS NGS Planned Topobathy Lidar Jan 2022

Feature Layer

Planned Topobathy Lidar project footprints for NOAA

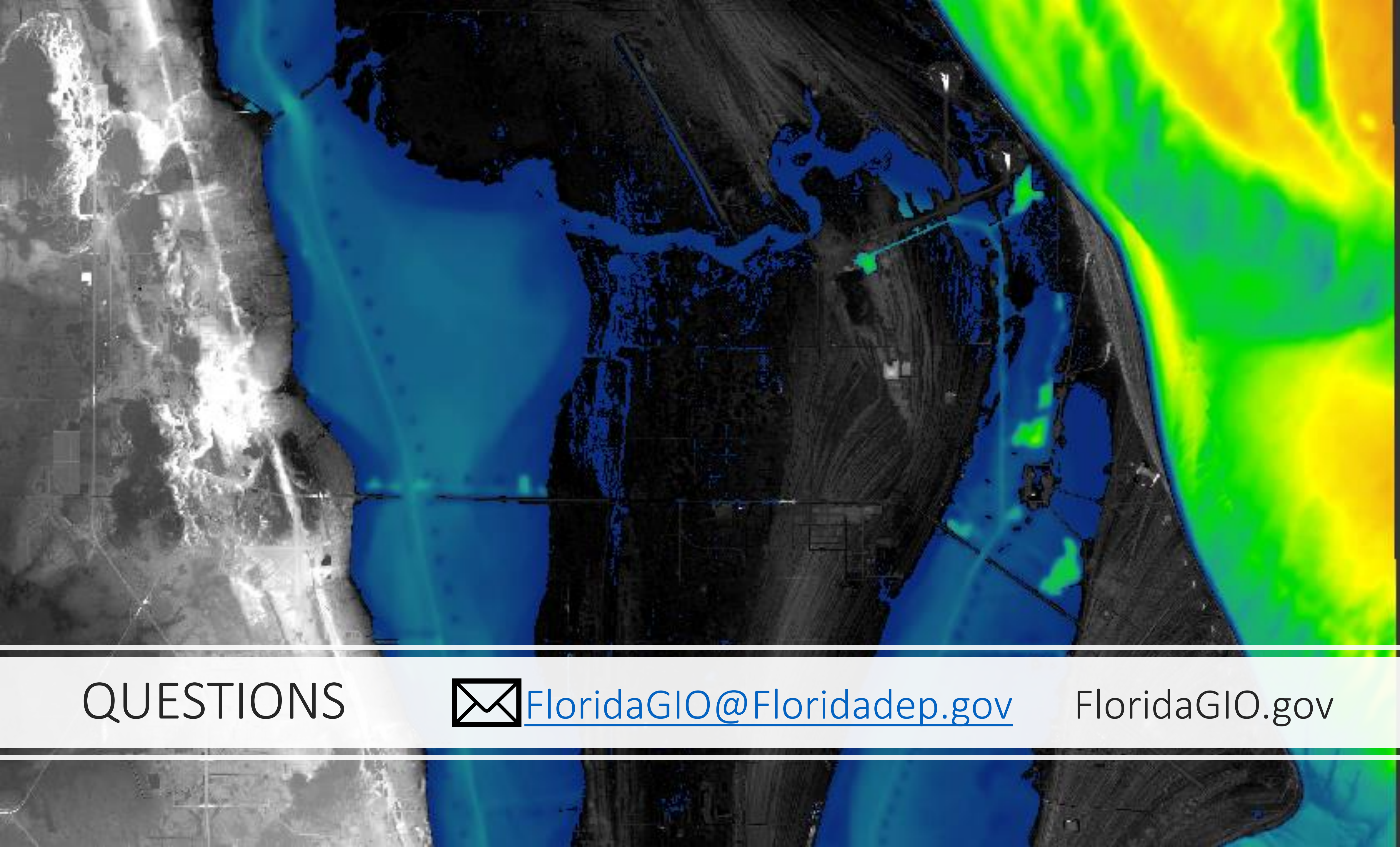
DATA ACCESSIBILITY


Expanded Shallow Collection Area
Total Km2
Remainder after NOAA reused
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
5,670
2,865
12,424
10,774
1,323
10,989
44,045
Northeast
Southeast
Keys
BigBend
Panhandle
West
TOTAL



What's Next

December 2022 FCMaP Workshop, virtual



QUESTIONS

FloridaGIO@Floridadep.gov

FloridaGIO.gov

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BY SMART PHONE
Go to **pollev.com/kwpoll1**
on your internet browser.

BY TEXT MESSAGE
Text **kwpoll1** to 22-333 on your
mobile device.

Use an underscore ("_") or tilde ("~") between words to submit them as a single word cloud response

What derived products or applications for FSMI LiDAR would be important to you? (DEM, bottom hardness, water column information, sediment management, temporal analysis, coastal vegetation, etc.)

Discussion: Florida Seafloor Bathymetry

Rene Baumstark

Discussion Questions

- What plans do you have for this data?
- Is there value in an integrating LiDAR and Multibeam products (similar to USGS 3D Elevation Program (3DEP) and CONED)?
- What quality level of LiDAR would best serve your needs?
- What level of processing would best serve your needs?
- Raw, point cloud, DEM
- Data accessibility needs?
- Online viewing vs. data download, file format, vertical Datum...
- Can/should these data be used to better understand the effects of storms on the seafloor or other temporal studies? For example, shifting sands that expose/cover hard bottom.
- Can/should these data be used to map bottom type? Possibly Hard vs. Soft or Structured vs. Unstructured?

Break

Florida Coastal Mapping Program Summit 2022

Hurricane Ian LiDAR

Michael Savarese, Dhruvkumar Bhatt

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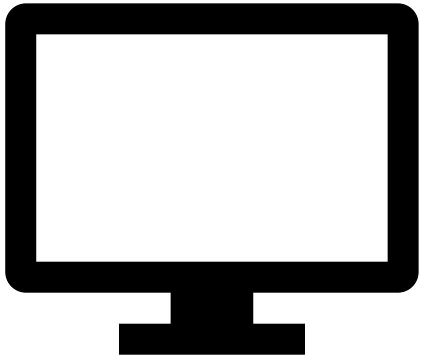

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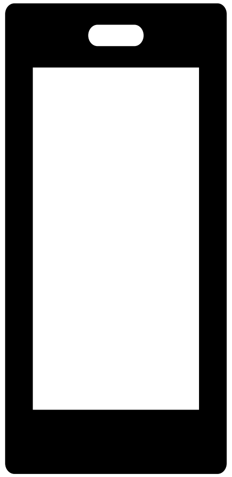
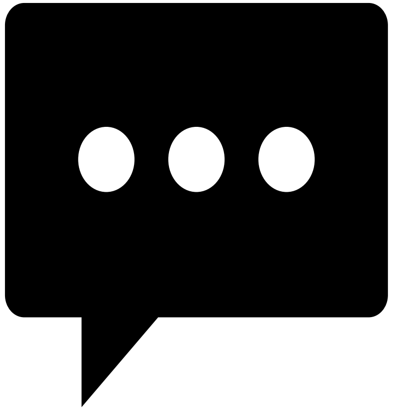
on your internet browser.



BY SMART PHONE
Go to **pollev.com/kwpoll1**
on your internet browser.



BY TEXT MESSAGE
Text **kwpoll1** to 22-333 on your
mobile device.

Use an underscore (“_”) or tilde (“~”) between words to submit them as a single word cloud response

What impacted resources are you most concerned with?

Mapping Hurricane Ian's Impact on the Geomorphology of the Southwest Florida Coast

(The data are currently proprietary and not yet vetted; they should not be used currently for decision making or as the basis for further scientific investigation).

Florida Coastal Mapping Program Summit

Michael Savarese[1], Dhruvkumar Bhatt[1],& Ilya Buynevich[2]

December 1, 2022

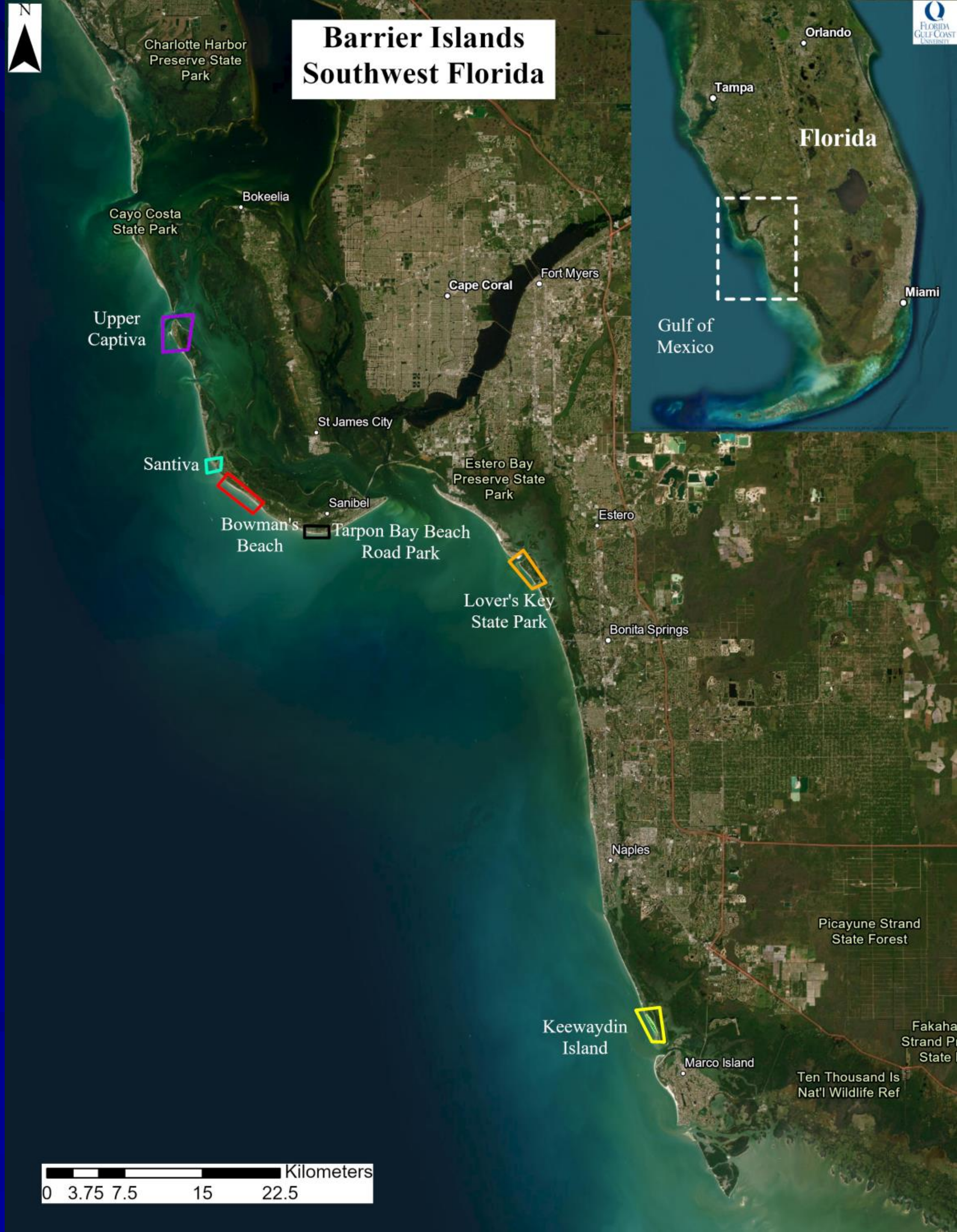
1 Florida Gulf Coast University
The Water School

Temple University 2

Interpret Past and Predict Future Anthropocene History of SWFL's Barrier Islands & Mainland Beaches to Assess & Build Resilience Capacity

- Research program at FGCU's Water School
  - Holocene history of coast in the context of changing sea-level rise rates (since 2010)
  - Paleotempestology (since 2015)
  - Ground & surface water hydrology (since 2021)
  - Mapping coastal geomorphology (since 2022)
  - Modeling future geomorphic response (since 2020)
  - Resilience capacity (since 2017)
  - Coastal management & restoration; science in the hands of decision makers (since 2017)
- Team: Dhruv Bhatt, Ilya Buynevich, Chris Daly, Felix Jose, Joanne Muller, Rachel Rotz, Michael Savarese, sedimentologist (to be hired)
- Field area: Cayo Costa Island south to Marco Island

(The data are currently proprietary and not yet vetted; they should not be used currently for decision making or as the basis for further scientific investigation).



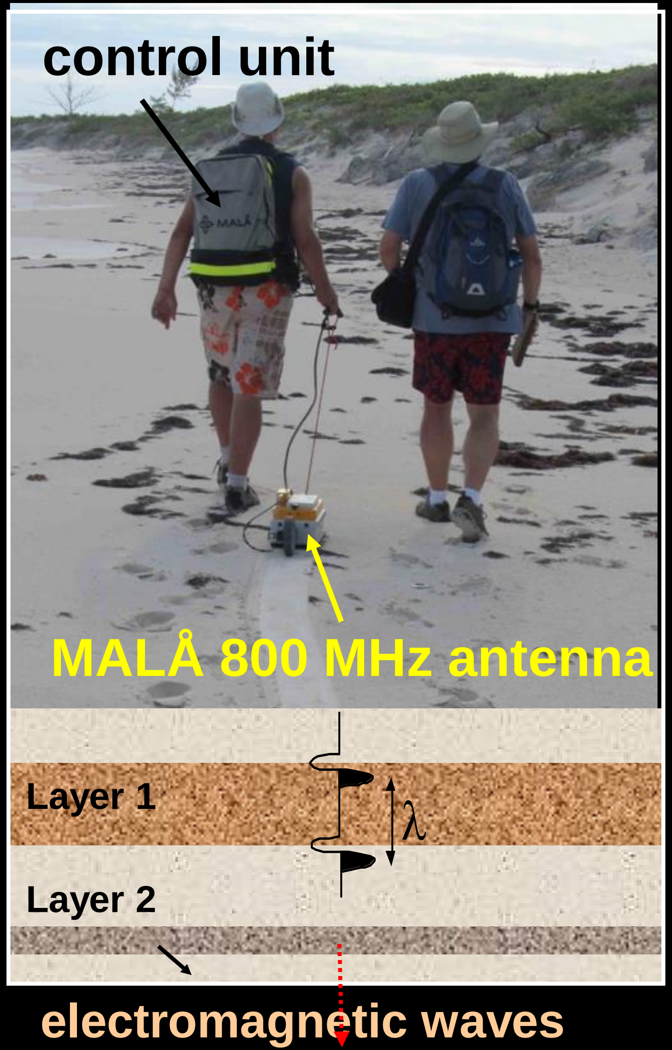
Assessing Ian's Geomorphic Impacts: Methods

1. Ground-penetrating radar (GPR): identify subsurface lithosomes and their stratigraphic & structural relationships.
   a) Relate diagnostic features to coastal processes.
2. UAV-based LiDAR: produce high-resolution DEMs.
3. Can extract beach profiles and quantify volumetric change.
4. "Ian . . . The storm that came a little too early": pre- and post-Ian mapping.
5. Pending Florida Sea Grant rapid response award.

(The data are currently proprietary and not yet vetted; they should not be used currently for decision making or as the basis for further scientific investigation).

Ground-Penetrating Radar (GPR)

- Revolutionized coastal geological research
- Continuous high-resolution imaging of subsurface stratigraphy



Causes of reflection:

- physical structures
- texture
- composition
  (+ iron oxides,
  clays, organics)
- bulk density
- porosity
- temperature
- water retention

Signal loss:

- saltwater, thick clay, metal

(The data are currently proprietary and not yet vetted; they should not be used currently for decision making or as the basis for further scientific investigation).

Drone & LiDAR Sensor

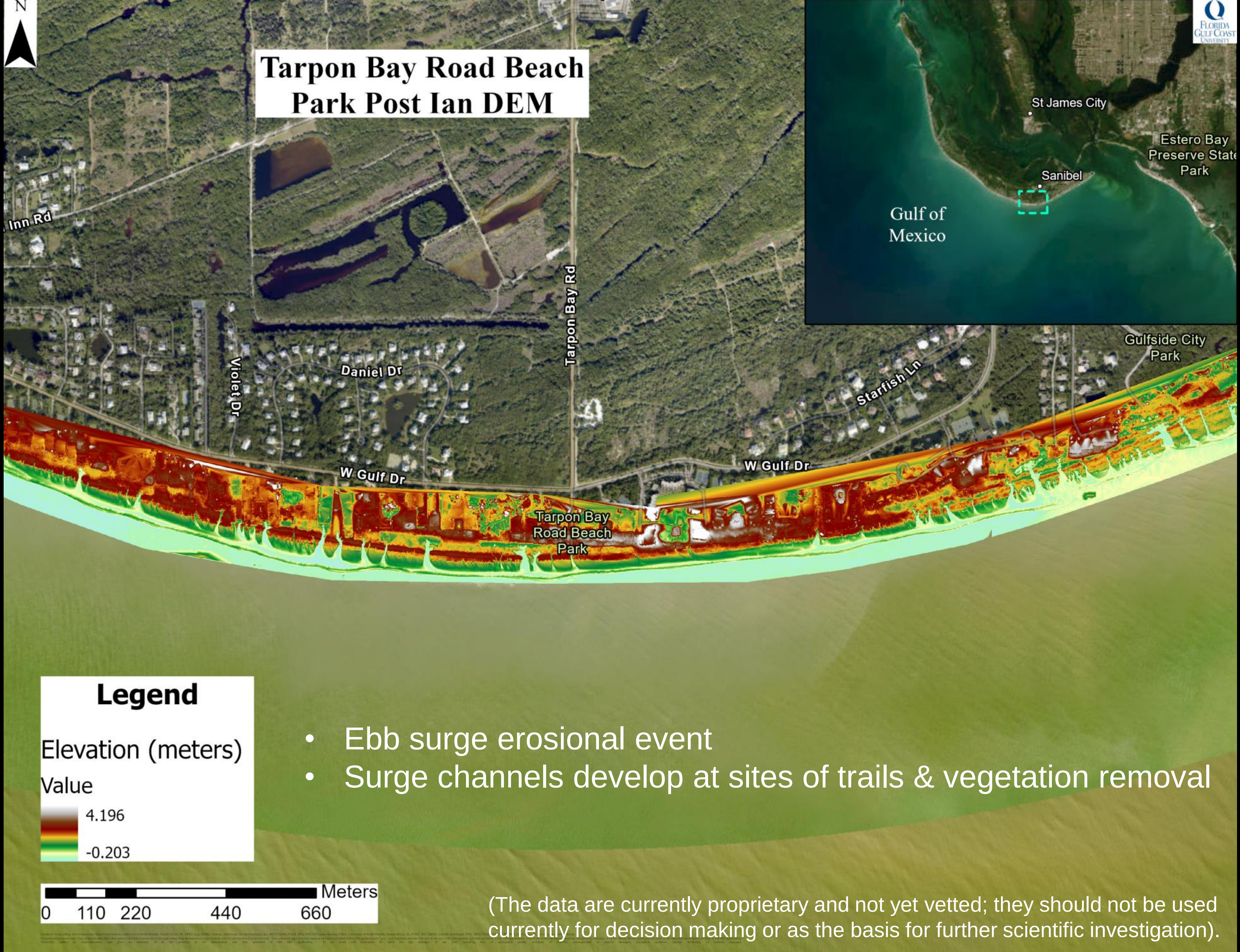
Drone / Sensor Specifications:

- DJI M 600 Pro
- Flight Height ~165 ft (50 meters)
- Flight Speed ~14 mph
- 80% Side Overlap and 60% Front Overlap (distance between each cross-sectional path is about 45-50 meters)
- ~25 – 30 acres covered per flight
- Velodyne HDL-32E Sensor

(The data are currently proprietary and not yet vetted; they should not be used currently for decision making or as the basis for further scientific investigation).

Results: Geomorphic Erosion

1. New scars from Ian: overtop & overwash surge channels and fans
   a) Tarpon Bay Beach, Sanibel
2. Old scars from former storms
   a) Hurricane Charley (2004) on Upper Captiva Island
   b) Multiple storms on Lover's Key



- Ebb surge erosional event
- Surge channels develop at sites of trails & vegetation removal

(The data are currently proprietary and not yet vetted; they should not be used currently for decision making or as the basis for further scientific investigation).

Upper Captiva Island, Hurricane Charley (2004) Cut

(The data are currently proprietary and not yet vetted; they should not be used currently for decision making or as the basis for further scientific investigation).

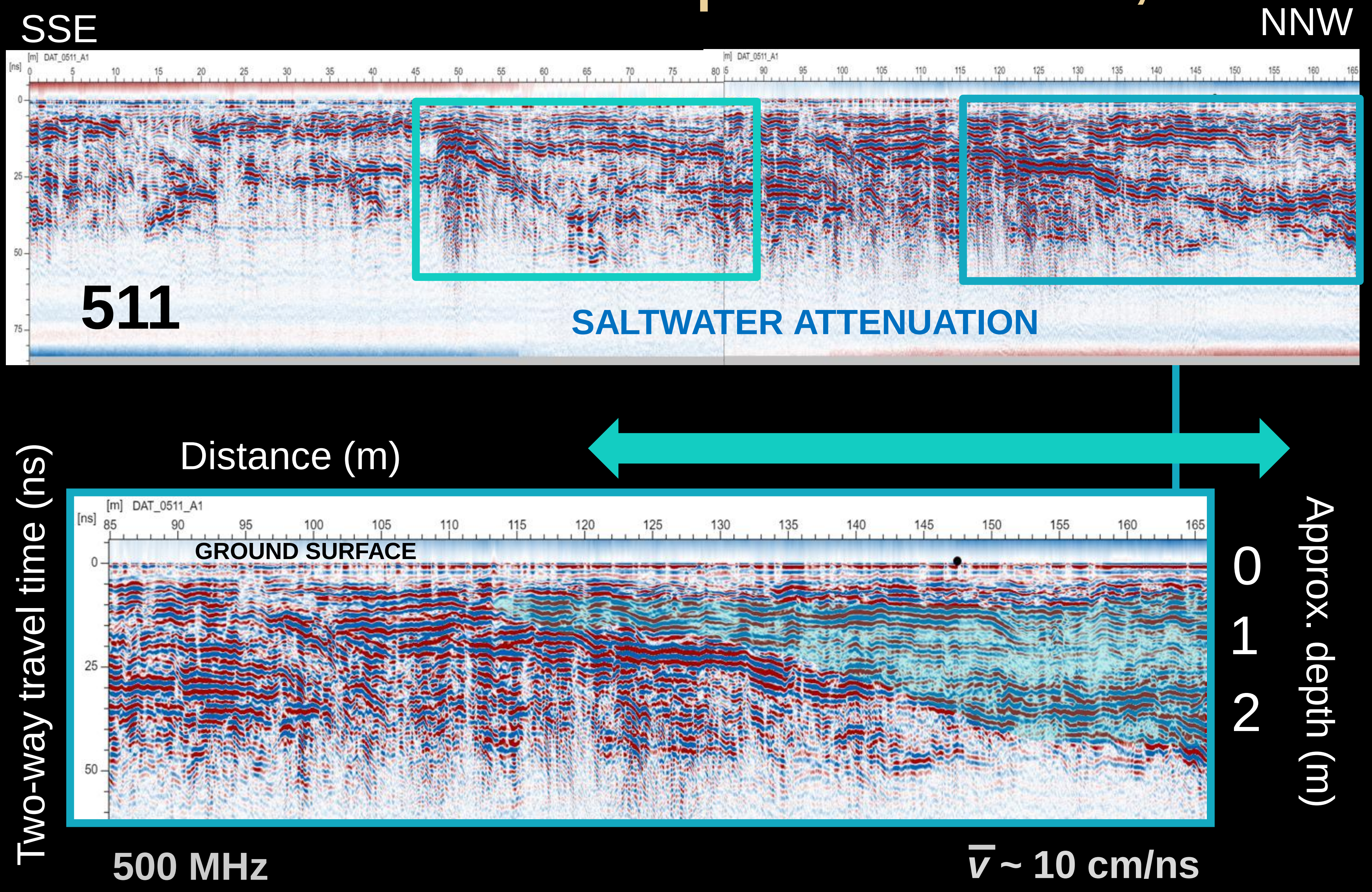
Upper Captiva Island, Hurricane Charley Cut

- Charley created storm surge deltas, not genuine flood tidal deltas
- Ian did not reactivate the former surge channels

Position of GPR Transect 511

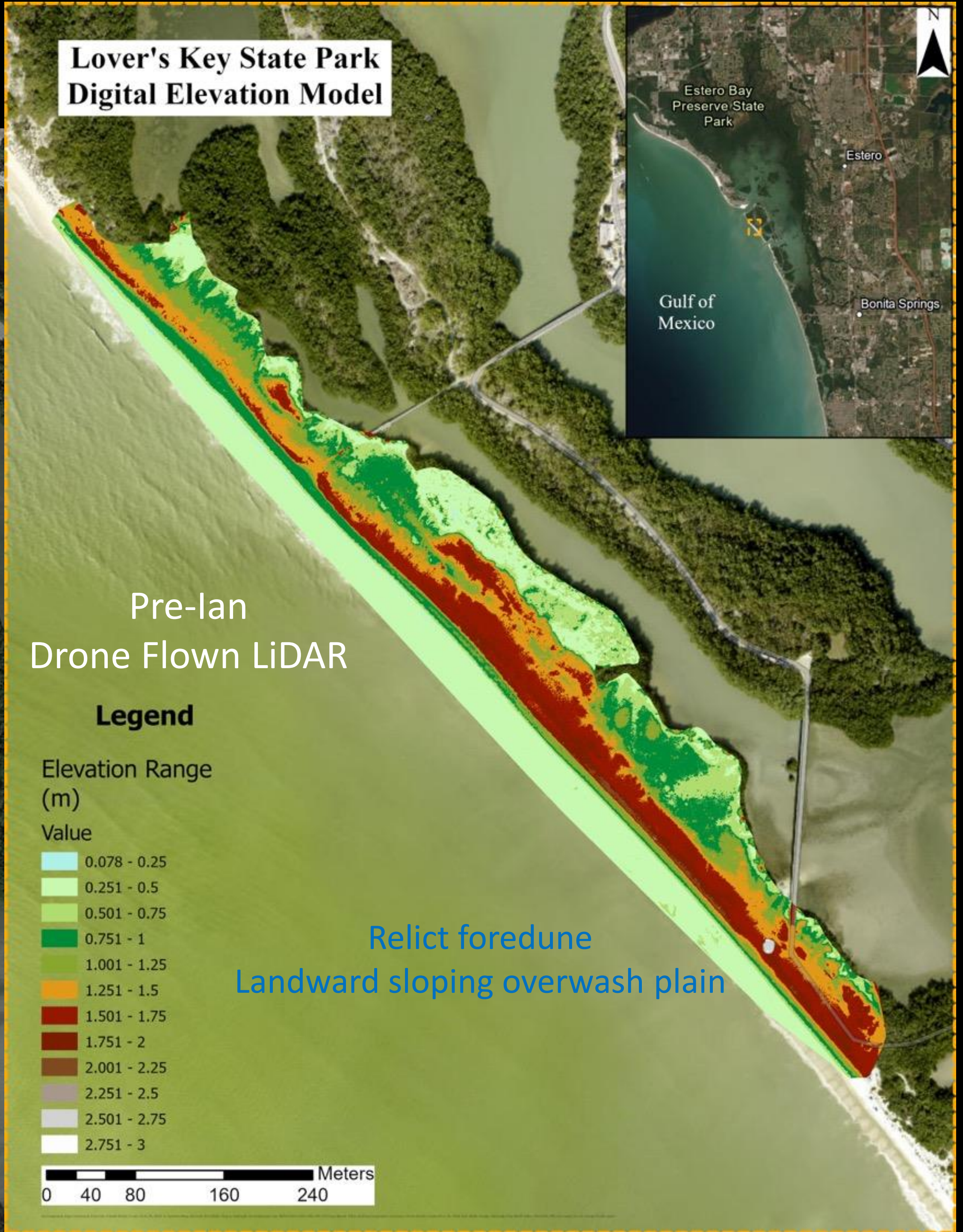
(The data are currently proprietary and not yet vetted; they should not be used currently for decision making or as the basis for further scientific investigation).

GPR North Captiva Island, FL

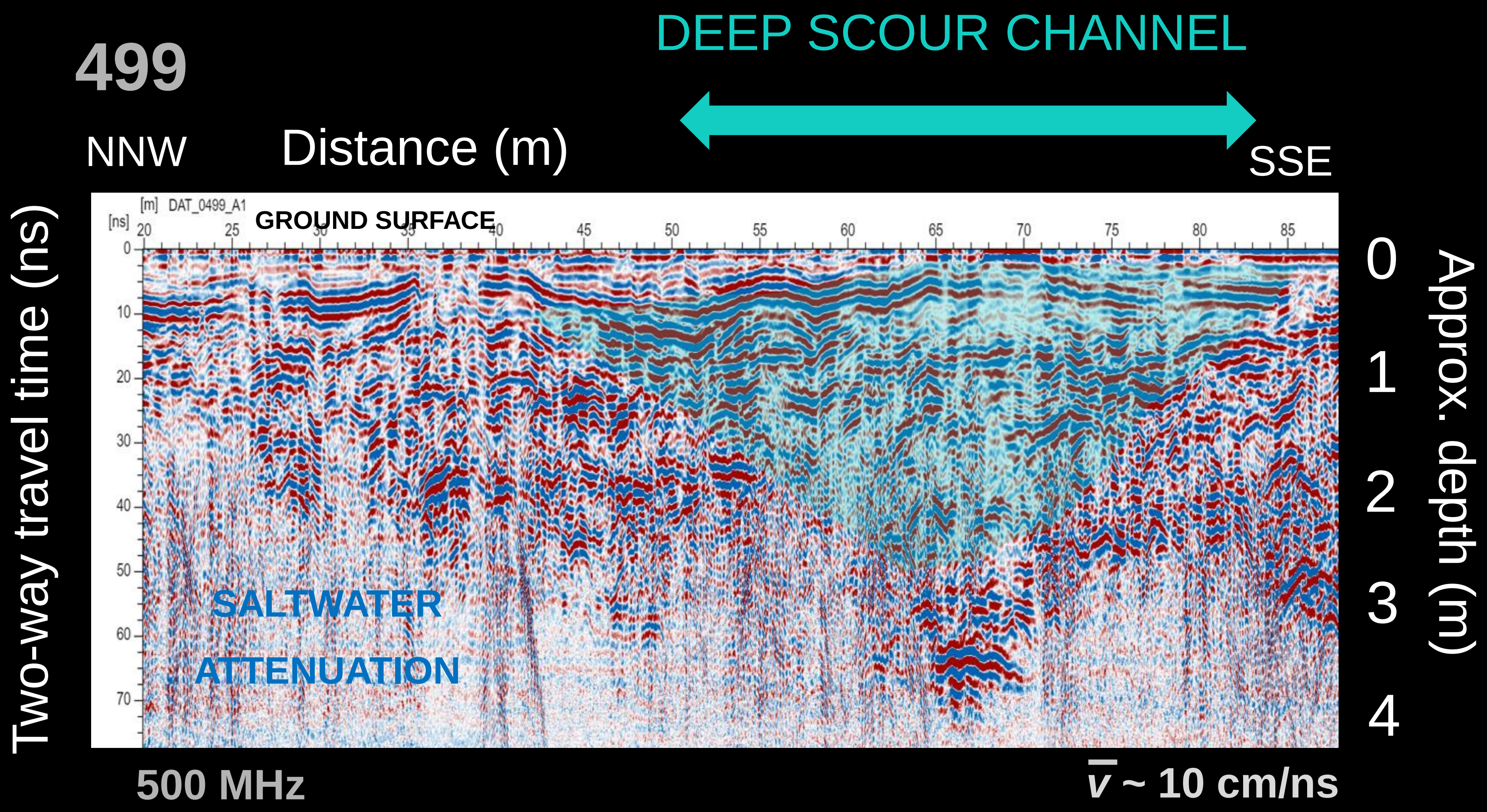


Lover’s Key Barrier Island

(The data are currently proprietary and not yet vetted; they should not be used currently for decision making or as the basis for further scientific investigation).



GPR Lovers Key State Park, FL



(The data are currently proprietary and not yet vetted; they should not be used currently for decision making or as the basis for further scientific investigation).

(The data are currently proprietary and not yet vetted; they should not be used currently for decision making or as the basis for further scientific investigation).

Results: Quantifying Change / Recognizing Hot & Cold Spots

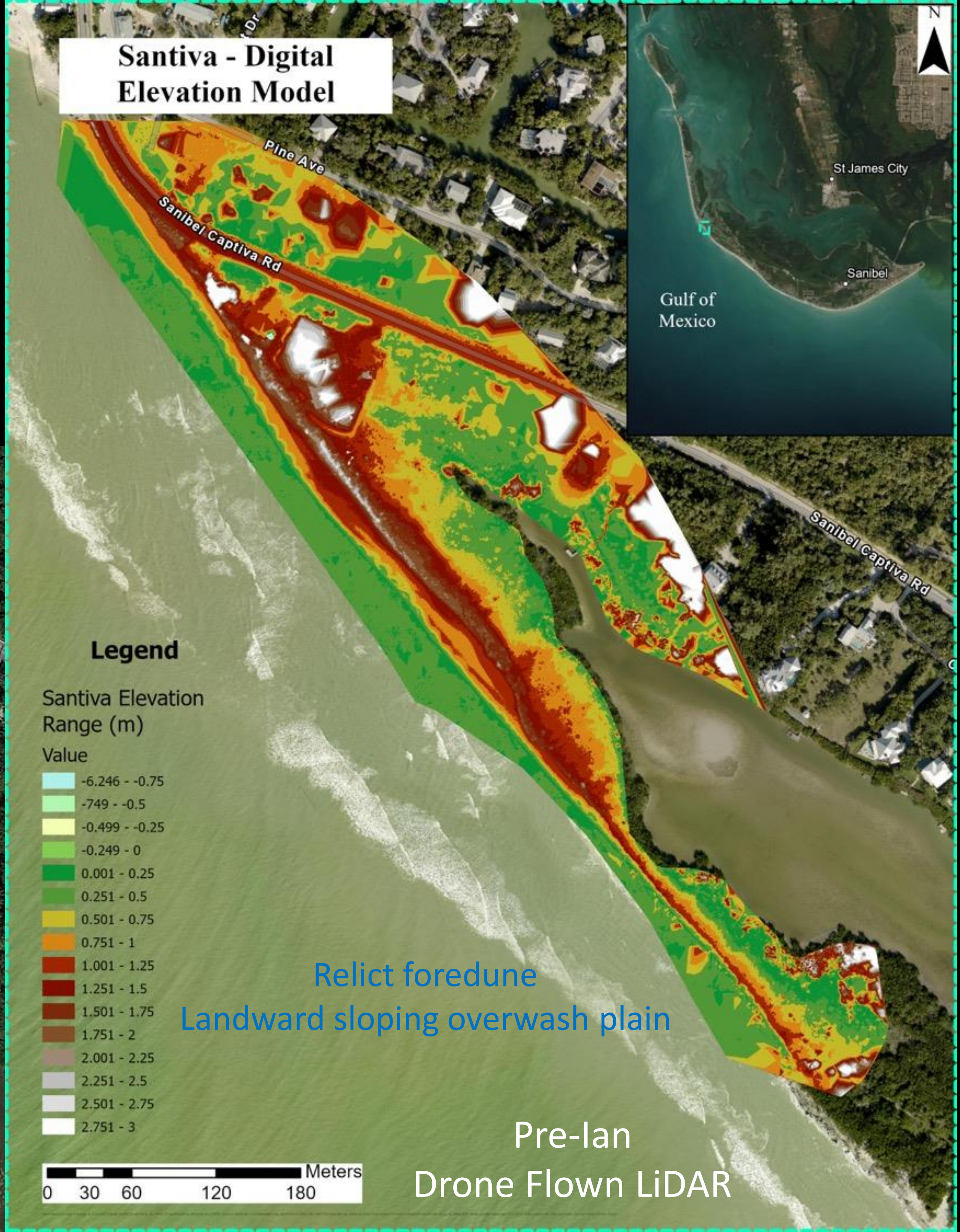
Before and after Ian glimpses . . .

1. Santiva, Sanibel (hot spot)
2. Lovers Key (hot spot)
3. Sanibel's strandplains, Bowman's Beach (cold spot)
4. South Keewaydin Island (hot spot)

(The data are currently proprietary and not yet vetted; they should not be used currently for decision making or as the basis for further scientific investigation).

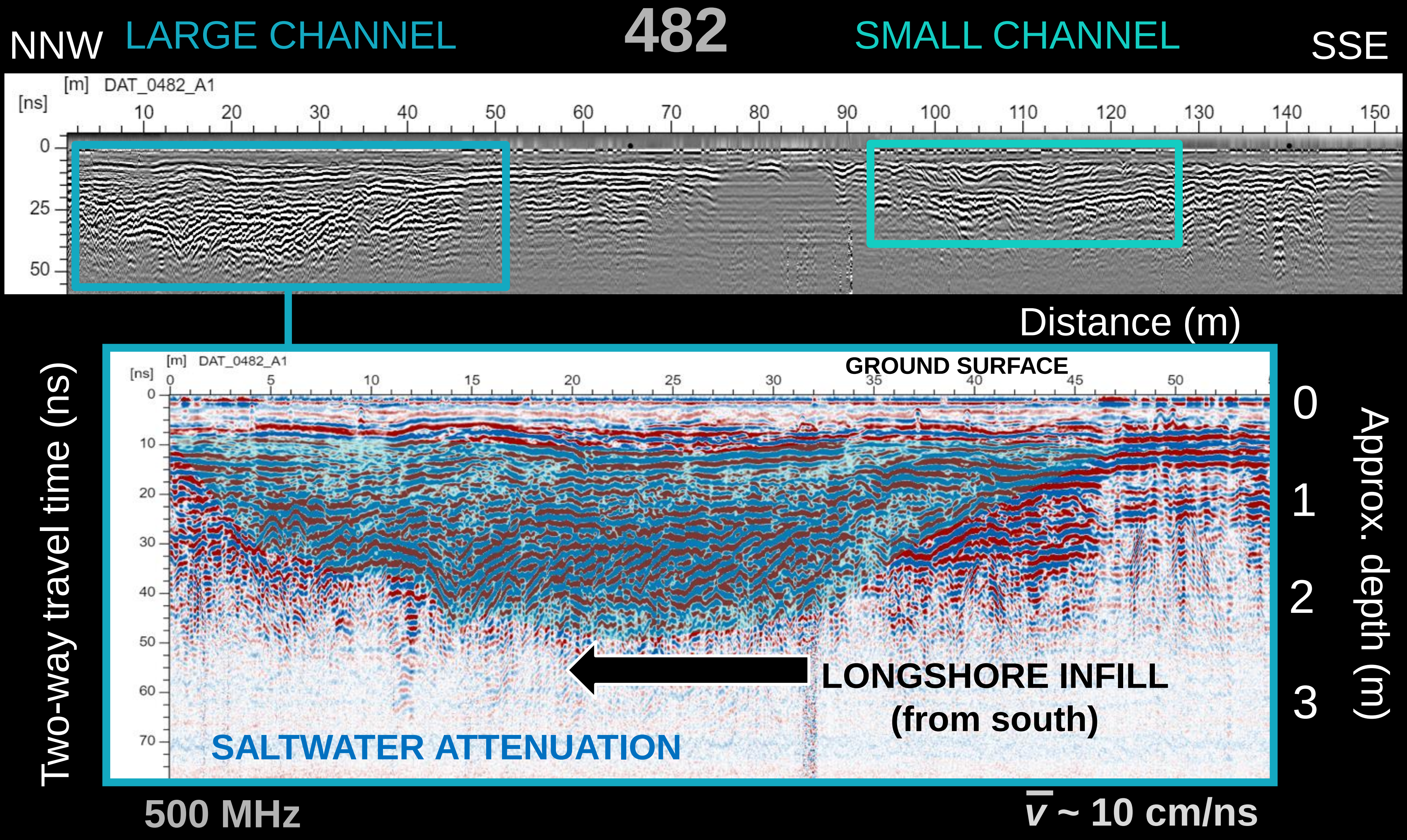
Santiva, NW Region of Sanibel Island

(The data are currently proprietary and not yet vetted; they should not be used currently for decision making or as the basis for further scientific investigation).

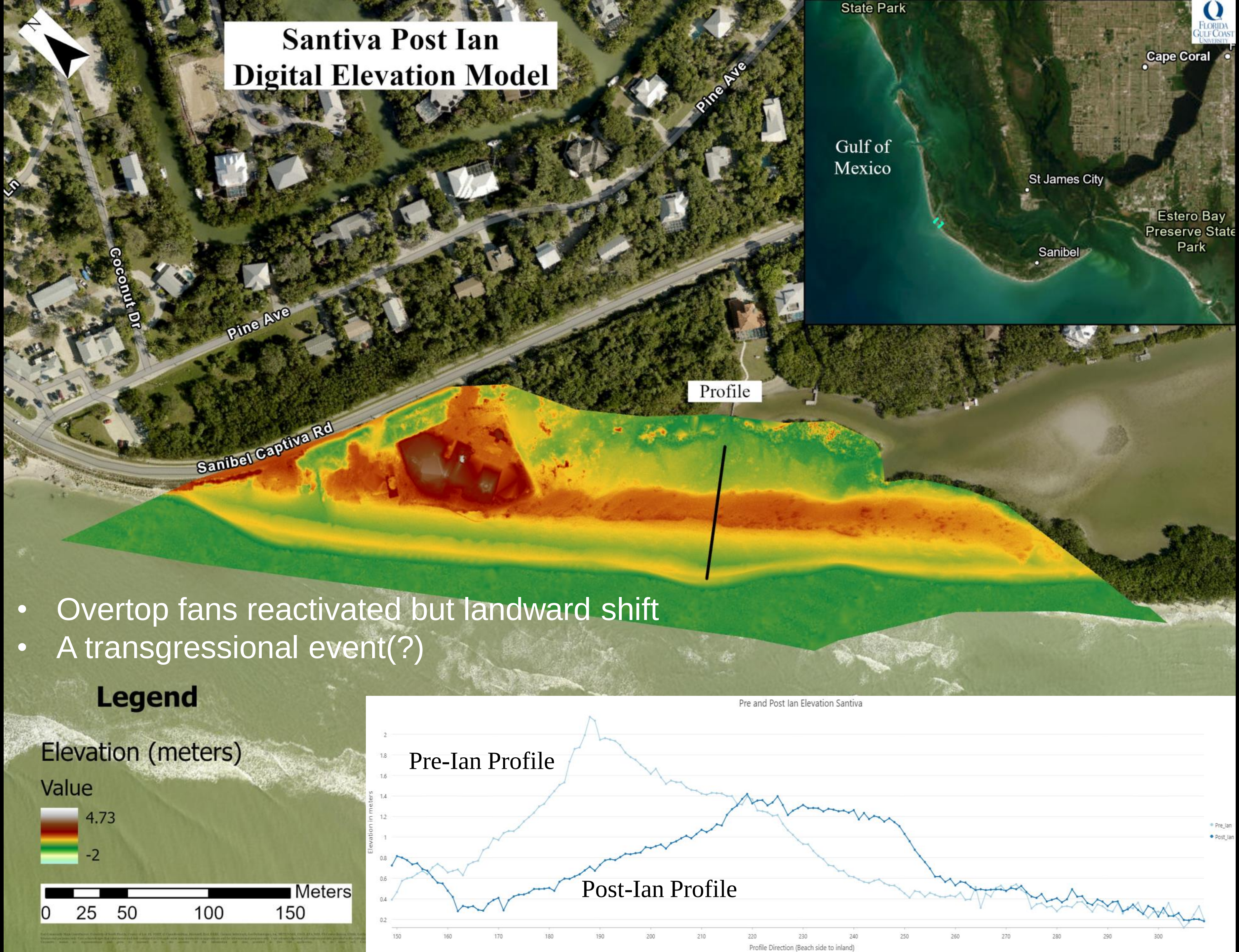


(The data are currently proprietary and not yet vetted; they should not be used currently for decision making or as the basis for further scientific investigation).

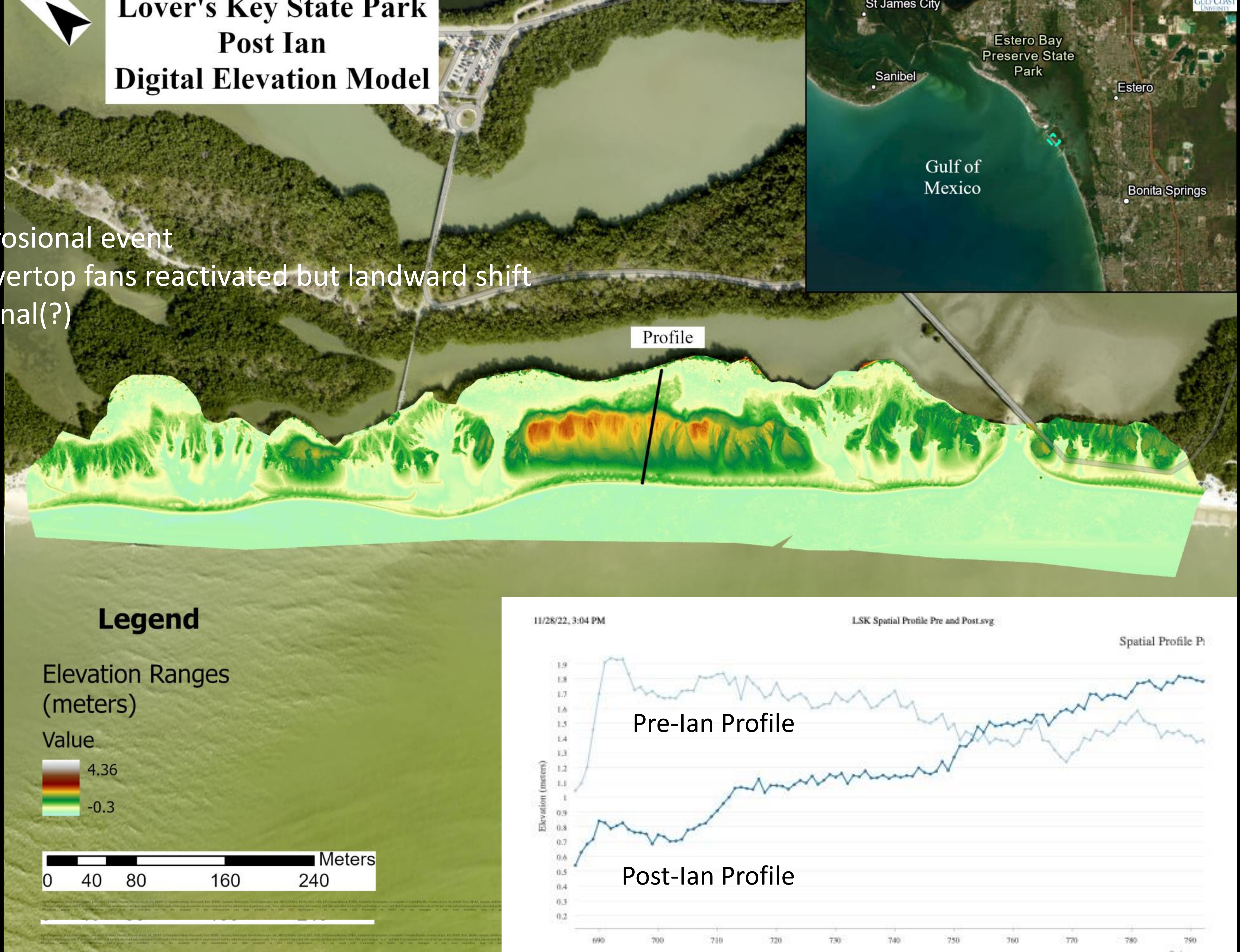
GPR Blind Pass ("Santiva"), FL



- 2 buried channels, each > 20 m wide.
- Neither channel obvious from surficial geomorphology.
- Overtop deposition since at least 1995.
- One with laterally prograded fill due to longshore transport.


Santiva Post Ian
Digital Elevation Model
N
Pine Ave
Coconut Dr
Sanibel Captiva Rd
Profile
State Park
Cape Coral
Gulf of Mexico
St James City
Estero Bay Preserve State Park
Sanibel
Florida Gulf Coast University
• Overtop fans reactivated but landward shift
• A transgressional event(?)
Legend
Elevation (meters)
Value
4.73
-2
Meters
0 25 50 100 150
Pre and Post Ian Elevation Santiva
Pre-Ian Profile
Post-Ian Profile
Elevation in meters
Profile Direction (Beach side to inland)
Pre_Ian
Post_Ian

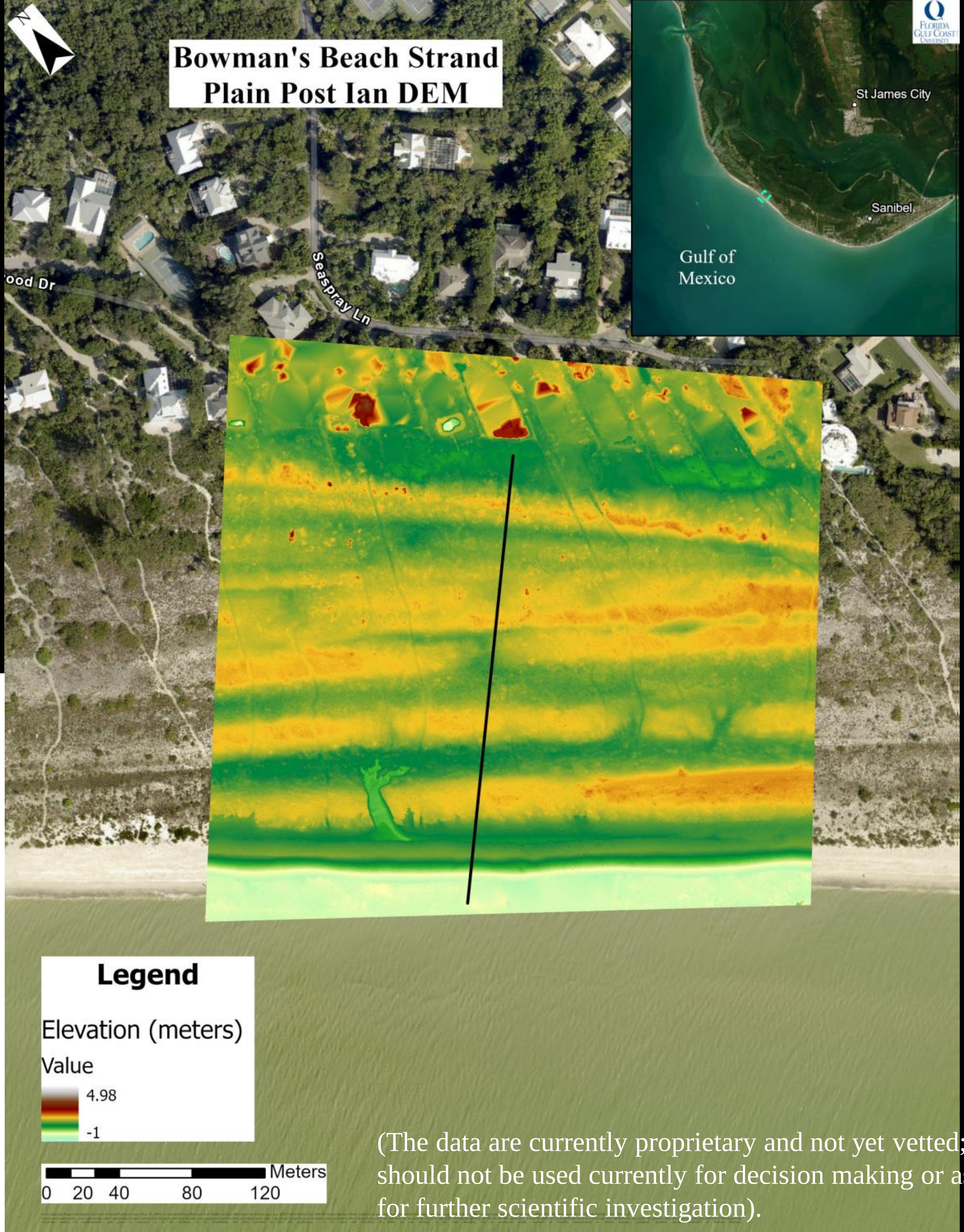
- Ebb surge erosional event
- At profile, overtop fans reactivated but landward shift
- Transgressional(?)



Bowman’s Strandplain at Sea Spray

- Foredune overtopped
- No significant erosion
- Strandplain resilience

(The data are currently proprietary and not yet vetted; they should not be used currently for decision making or as the basis for further scientific investigation).

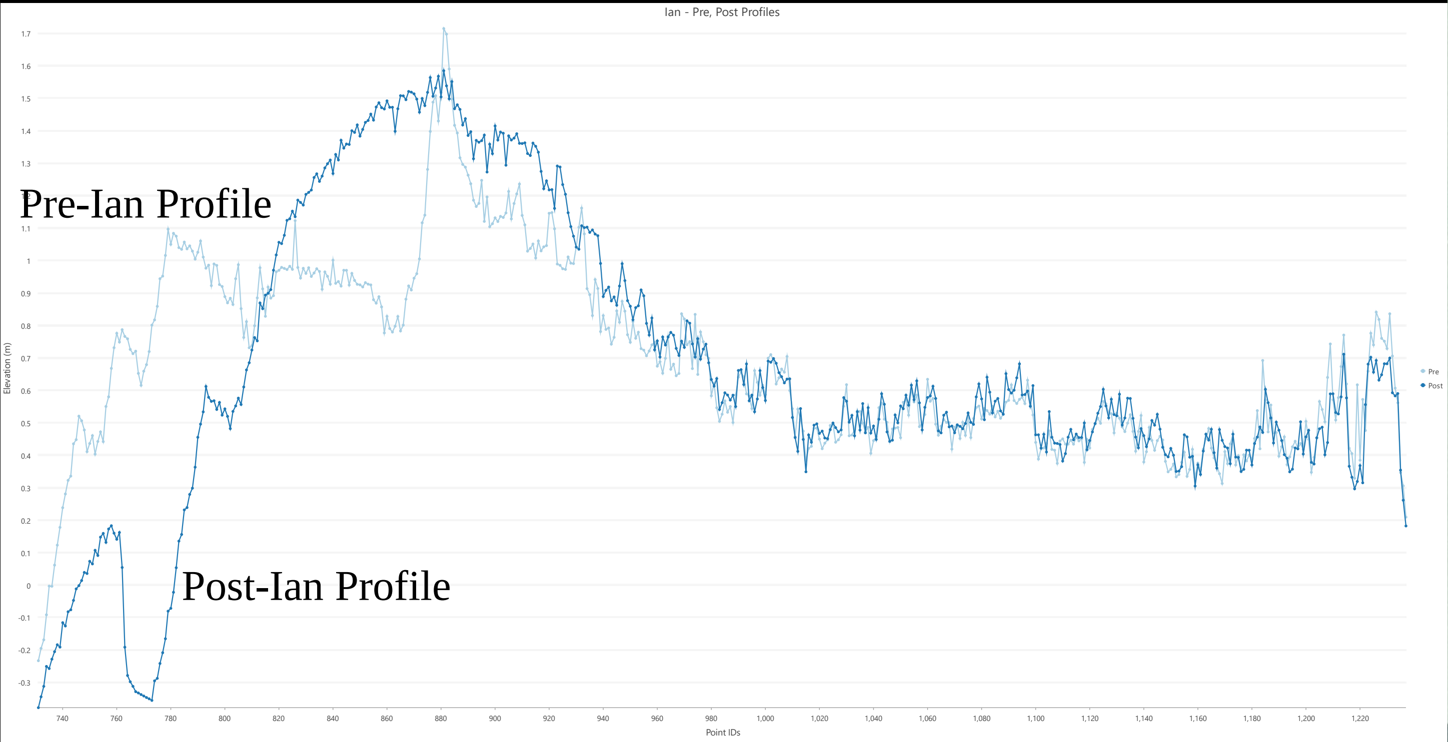


(The data are currently proprietary and not yet vetted; they should not be used currently for decision making or as the basis for further scientific investigation).

South Keewaydin Island

- Overtop fans reactivated
- No significant erosion
- A progradational event here(?)

(The data are currently proprietary and not yet vetted; they should not be used currently for decision making or as the basis for further scientific investigation).



Concluding Thoughts

- GPR is remarkably powerful for “seeing” below surface geomorphology in coastal settings.
- Pre / post event mapping allows for quantifying geomorphic change, informing predictive geomorphic models, and assisting management / restoration.
- Our limitations . . . Nearshore bathymetry. Looking for collaborative opportunities.

(The data are currently proprietary and not yet vetted; they should not be used currently for decision making or as the basis for further scientific investigation).

Thanks . . .

Acknowledge:

- Funding from FL Department of Environmental Protection, NSF Geopath Program
- Pending funding from Florida Sea Grant
- Many students
- City of Sanibel
- Residents of Upper Captiva
- Our hearts go out to all the SWFL coastal communities who were impacted by the storm “that arrived too early”

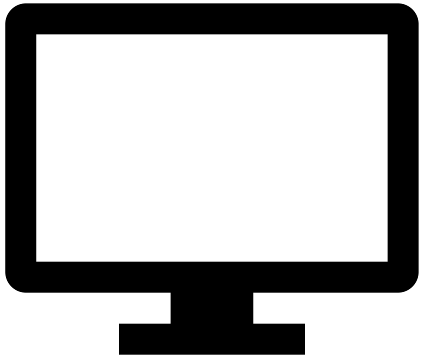
Discussion: Storm Response

Open comment and discussion

Day 2 Wrap Up

Jenna Tourje-Maldonado, Kearns & West

Poll Everywhere Instructions



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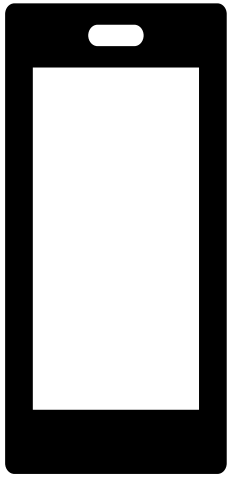

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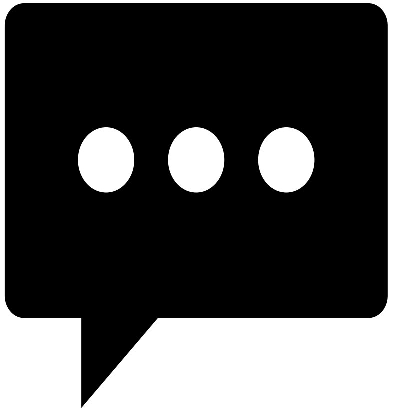

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What was your favorite part of the summit?

Start the presentation to see live content. For screen share software, share the entire screen. Get help at **pollev.com/app**

THANK YOU!

December 1, 2022

Florida Coastal Mapping Program Summit 2022

December 1, 2022

Appendix C:

Resource Links and Contacts

Description	Link	Contact	Email
FCMaP Hub	https://fcmap-myfwc.hub.arcgis.com/	Rene Baumstark	Rene.Baumstark@MyFWC.com
FIO FCMaP website	https://www.fio.usf.edu/research-programs/florida-coastal-mapping-program/	Kristin Erickson	klerickson@usf.edu
IOCM NOAA Strategic Plans	https://iocm.noaa.gov/about/strategic-plans.html		
Progress Reports	https://iocm.noaa.gov/seabed-2030-status.html		
Bathy Gap Analysis	https://iocm.noaa.gov/seabed-2030-bathymetry.html		
Follow NOMEC progress	https://iocm.noaa.gov/seabed-2030.html		
Follow regional activities	https://iocm.noaa.gov/projects/regional-activities.html		
Got Data?	https://iocm.noaa.gov/data-sharing/provider-engagement-form.html		
Office Of Coast Survey	https://usgs.gov/3DEP/3DNationStudy	Sharla Robinson	shoegberg@dewberry.com
NOAA NCEI CSB Resources	iho.int/uploads/user/pubs/bathy/B_12_CSB-Guidance_Document-Edition_3.0.0_Final.pdf		
NOAA NCEI CSB Resources	ncei.noaa.gov/maps/iho_dcdb		
NOAA NCEI CSB Resources	noaacoastsurvey.wordpress.com/2016/06/14/beta-test-csb/		
NOAA NCEI CSB Resources	iho.int/uploads/user/pubs/bathy/B_12_CSB-Guidance_Document-Edition_3.0.0_Final.pdf		
CoNED	https://topotools.cr.usgs.gov/topobathy_viewer/		
IHO CSBWG Communication Material	iho.int/en/communication-material		
IHO CSB	iho.int/en/crowdsourced-bathymetry		
Bathyglobe	https://bathyglobe.ccom.unh.edu		
NOAA OCS Resources	https://www.ngdc.noaa.gov/		

NOAA OCS Resources	http://seasketch.org/#projecthomepage/5272840f6ec5f42d210016e4/about		
NOAA OCS Resources	https://iocm.noaa.gov/data-sharing/provider-engagement-form.html		
NOAA NGS CMP	https://nsde.ngs.noaa.gov/		
NOAA NGS CMP	https://storms.ngs.noaa.gov/		
NOAA NGS CMP	https://coast.noaa.gov/digitalcoast/		
USACE NCMP Links	https://arcg.is/qeoSz	Jennifer Wozencraft	jennifer.m.wozencraft@usace.army.mil
3DEP/USGS Links	https://www.usgs.gov/3DEP	Xan Fredericks	afredericks@usgs.gov
3DEP/USGS Links	https://apps.nationalmap.gov/		
3DEP/USGS Links	https://apps.nationalmap.gov/lidar-explorer		
3DEP/USGS Links	https://www.usgs.gov/programs/national-geospatial-program/training		
USGS Publications	https://cmgds.marine.usgs.gov/data-releases/datarelease/10.5066-P93RIIG9/		
USGS Publications	https://cmgds.marine.usgs.gov/data-releases/datarelease/10.5066-P9WSF09G/		
MDPI Publication	https://doi.org/10.3390/data7070092		
SPCMSC	https://www.usgs.gov/centers/spcmsc	Jim Flocks	jflocks@usgs.gov
COMIT Webpage	www.marine.usf.edu/COMIT		
FSMI Webpage	https://www.floridagio.gov/pages/fsmi		
Florida GIO	FloridaGIO@Floridadep.gov		
USGS CoNED	https://www.usgs.gov/special-topics/coastal-national-elevation-database-applications-project		

Appendix D:

FCMaP Summit Photographs

Participants meet in the FWRI conference room.

Happy hour at the Maritime Defense and Technology Hub in St. Petersburg sponsored by Woolpert.

Facilitator Jenna Tourje-Maldonado

Appendix E:

Participant List

Attendees	Affiliation
Al Karlin	Dewberry
Alex Ilich	University of South Florida
Alexander Cruz	USF
Amar Nayegandhi	Dewberry
Amber Butler	NOAA
Anna Braswell	The University of Florida/Florida Sea Grant
Ashley Chappell	NOAA
Ashley Snyder	Manatee County Government
Beau Suthard	APTIM
Bradley Ennis	University of Florida
Brandon Barnett	Volusia County
Brian Walker	Nova Southeastern University
Casey Craig	FWC
Catherine Dietrick	USF College of Marine Science
Charles Jacoby	St. Johns River Water Management District
Chelsea Stalk	USGS
Cheryl Hapke	USF
Chris Taylor	NOAA
Christian Robinson	Duke
Claire Kiedrowski	Eagleview
Darren Goodbar	NOAA
Dave Neff	Woolpert
Dave Reed	Gulf of Mexico Alliance
Dave White	Fugro
David Millar	Fugro
David Naar	USF College of Marine Science
Denise Wright	University of South Florida Libraries
Dennis Lorence	Tampa Deep Sea Xplorers
Dylan Hess	Bayonet Ocean Vehicles
Dyllan Furness	Flood Hub
Edward Albada	EOMAP
Edward Larson	Tampa Deep Sea Xplorers
Emily Macduff	Duke Energy
Emily Klipp	Dewberry
Erin McCormick	Axim Geospatial
Gerardo Rojas	AGL Geosolutions
Greg Onorato	FWC
Guy Means	Florida Geological Survey
Harrison Clark	USF-CMS/COMIT
Jackie Harrell	FDACS
Jeff Jalbrzikowski	NOAA's National Geodetic Survey
Jeff Lovin	Woolpert

Attendees	Affiliation
Jeffrey Danielson	USGS EROS
Jeffrey Waldner	BOEM Marine Minerals
Jennifer Steele	BOEM
Jing Chen	USF CMS
John Bean	Ocean Surveys
John Taylor	NA
Joselyn Gutierrez	Duke Energy
Joseph Daum	Tampa Deep Sea Xplorers
Kara Radabaugh	Florida Fish and Wildlife Conservation Commission
Kate Rose	Northern Gulf Institute/MS State University
Kathy FitzPatrick	Martin County
Kayla Adolph	N/A
Keith Patterson	Dewberry
Kim Hansen	Woolpert
Kimberly Mendez	USF
Kitch Kennedy	Saildrone
Kristen Becker	Florida Department of Environmental Protection
Kristen Kusek	USF College of Marine Science
Kristopher Krasnosky	USF
Kyle Kelso	US Geological Survey
Liesl Hotaling	USF
Lora Turner	BOEM
Mark Smits	Woolpert
Matt Laluzerne	McKim & Creed
Matt Paulson	Saildrone
Matthew Searle	Marine Arresting Technologies
Matthew Hommeyer	USF-COMIT
Maureen Goff	Freerange GIS
Meagan Anderson	Ayres
Meredith Westington	NOAA/NOS/OCS/IOCM
Michael Baranowski	Dewberry
Mike Aslaksen	NOAA
Mike Maluda	DOT
Monique LaFrance Bartley	National Park Service
Nicholas Johnson	USACE JALBTCX
Nick Hartman	Bayonet Ocean Vehicles
Nicolas Alvarado	NOAA
Nicole Raineault	FIO
Oliwia Ignas	Duke Energy
Owen Roberge	MAS Environmental
Paul Turner	NOAA/NOS/OCS - IOCM
Rachel Bobich	RMB GEO

Attendees	Affiliation
Rene Baumstark	FWC Fish & Wildlife Research Institute
Richard Goosen	Saildrone
Rick Househoulder	Woolpert
Rick Wallace	NV5 Geospatial
Robert Thomas	UC Davis
Rosemary Burkhalter-Castro	University of South Florida
Sandra Fox	St Johns River Water Management District
Sarah Grasty	USF College of Marine Science
Sarita Karki	Hillsborough County
Sherryl Gilbert	University of South Florida/COMIT
Stacy Cecil	Florida Department of Environmental Protection
Starla Robinson	NOAA
Stephanie Ingle	Fugro
Steven Murawski	USF
Sue Hoegberg	Dewberry
Tim Kearns	Great Lakes Observing System
Tom Murphy	Woolpert
Tylar Murray	USF IMaRS
Vincent Lecours	University of Florida
Vladimir Kadatskiy	Aviator Geospatial
Wendy Edwards	Manatee County Government
Xan Fredericks	USGS
Xaymara Serrano	NMFS
Yonggang Liu	University of South Florida
Zach Westfall	Pinellas County
Zachary Smith	CDHGI