

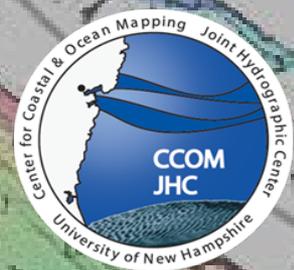
# INGESTION OF JALBTCX ALB DATASET INTO NOAA'S CHART PRODUCTION

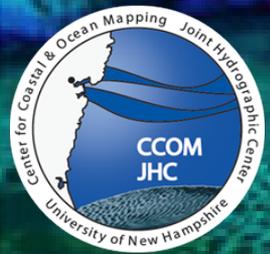
Shachak Pe'eri (JHC/CCOM) and Gretchen Imahori (NOAA)

OCS/MCD (NOAA): John Barber, Anthony Klemm, Julia Powell,  
Mike Brown and John Nyberg

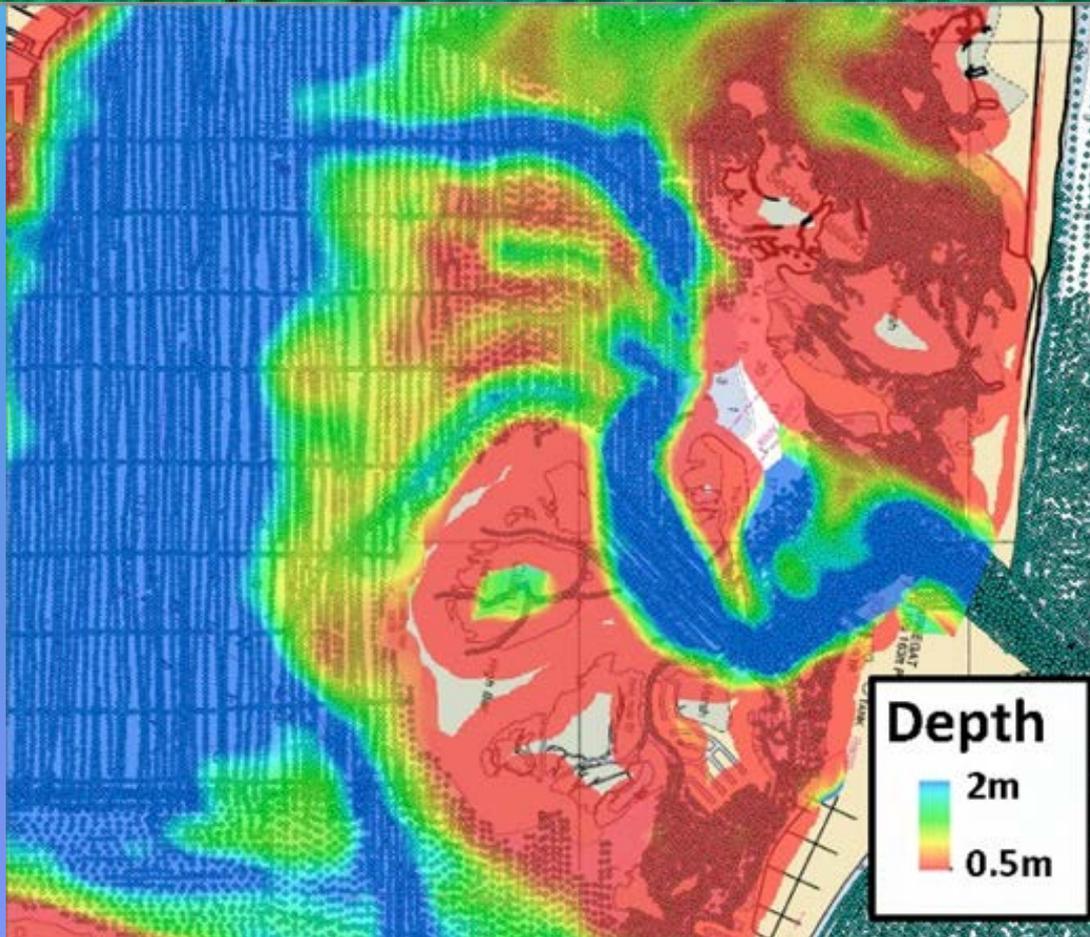
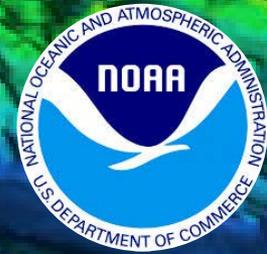
NGS/RSD (NOAA): Josh Witmer, Stephen White and Mike Aslaksen

OCS/HSD (NOAA): Michael Gonsalves and Eric Berkowitz

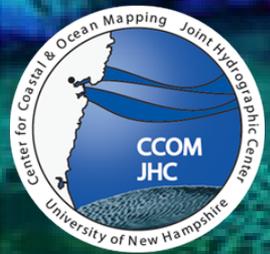




# Barnegat Inlet, NJ



**Outdated bathymetry of Barnegat Inlet, NJ. Smooth-sheet soundings from the 1930's are overlaid on a NOAA Nautical chart**



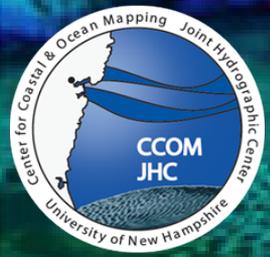
# Did you know?



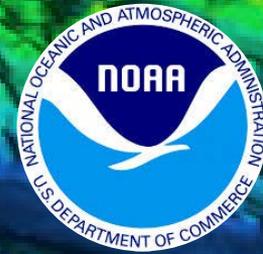
That in addition to NOAA...

*The navigable waters of the United States are also under the USACE jurisdiction that includes all ocean and coastal waters within a zone of three nautical miles seaward from the coastline.*

*(33 CFR 329.12 - .14)*



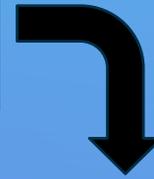
# Survey to Chart procedure



IHO S-44 Order 1a  
(equivalent to  
IHO CATZOC A1)



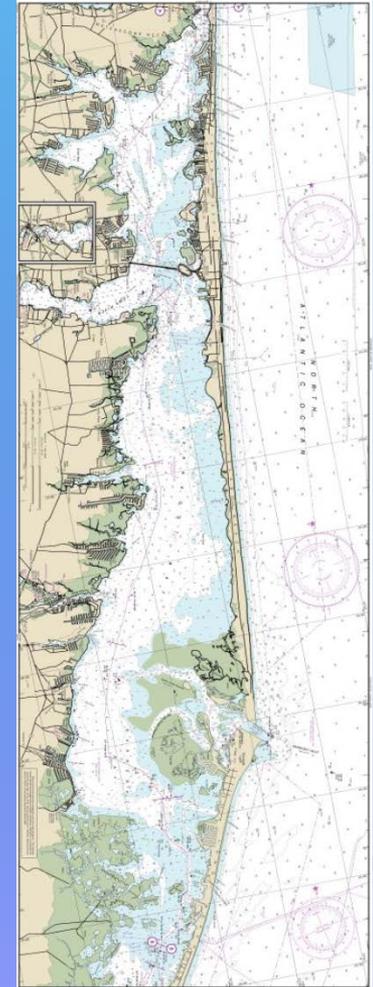
Hydrographic  
Surveys  
Division



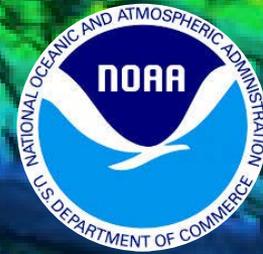
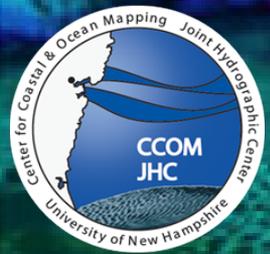
Marine Chart  
Division



IHO S-44 Order 1b or lower (USACE,  
USCG, US power Squadron, etc.)

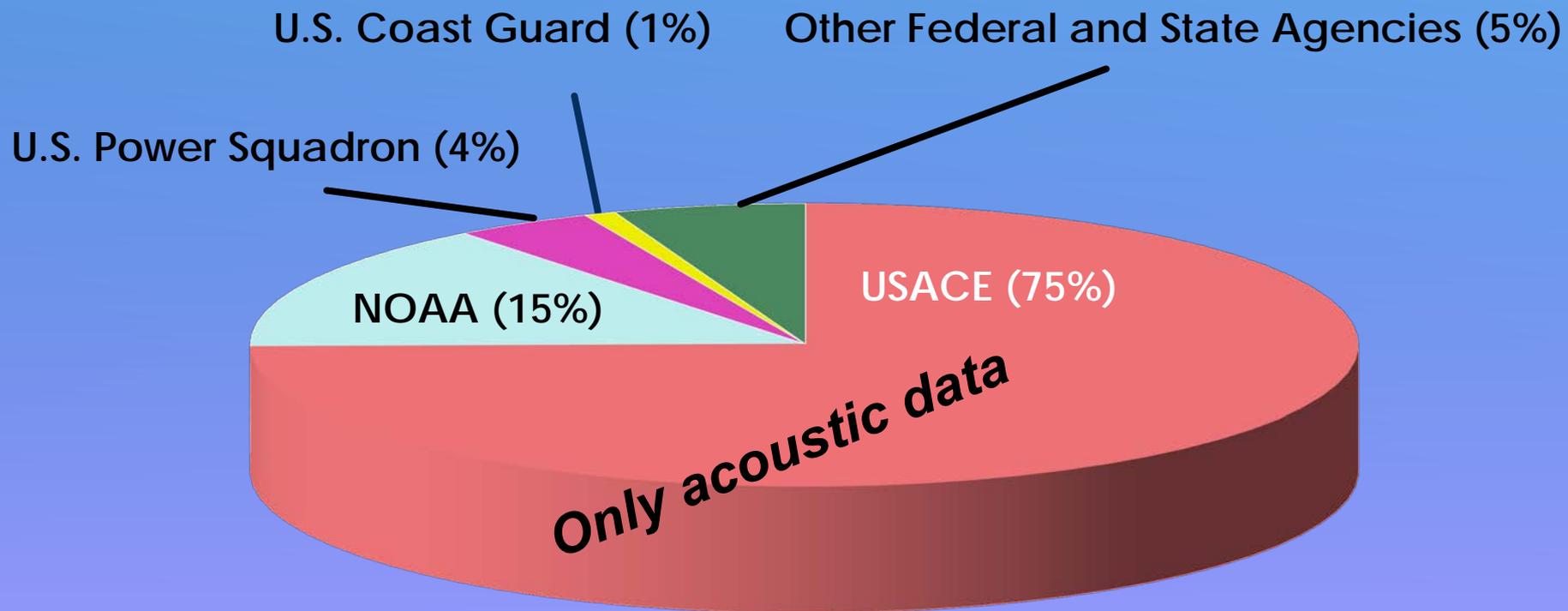


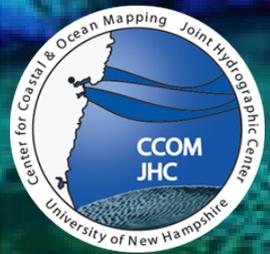
Every survey that is used for charting is compiled into a source document and delivered to Marine Chart Division.



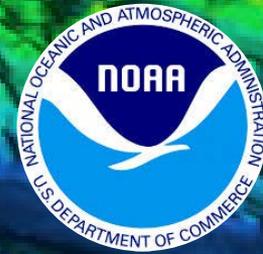
# Data flow into NOAA

The Nautical Data Branch (NDB) at MCD receives annually between 7,000 to 9,000 potential source documents from these sources:





# Marine Chart Division (source flow)



**Tracked by Application to Chart Standards, DREG, & Log Books**

**Potential Source Documents**



**Evaluated & Processed By  
Nautical Data Branch (NDB)**



**Source Documents**



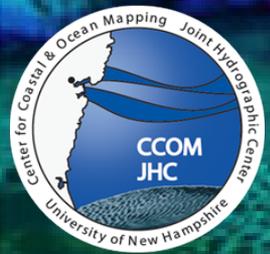
**Applied to Base Products  
In Teams**



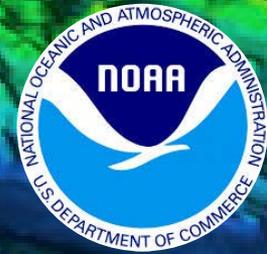
**Tracked by Histories**



**Archived by NDB**



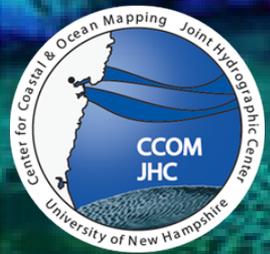
# MCD's Motivation (for incoming data)



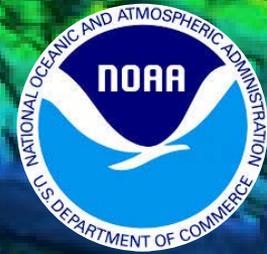
**Quantity** – NDB compilers evaluate approximately 9,000 source documents annually and about 70% of the total source documents (6,200) received are compiled to nautical products.

**Quality** – In 1992, an effort was made to measure the quality of document processing by NDB compilers. NDB has implemented a ranking system for documents to ensure that high priority source documents are assessed first.

**Timeliness**– Compilers are responsible for processing source documents based on criticality of information within an accepted period of time.



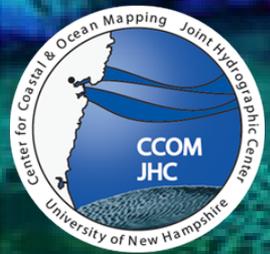
# Revised ~~Old~~ policy



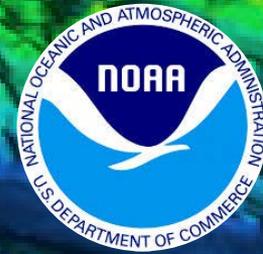
The current data processing workflow at NOAA's Office of Coast Survey is designed for CATZOC A1 data products. As a result, USACE ALB data is not included in the process.

However, ...

Following the need to maintain and update many of the shallow waters within NOAA's nautical charts, new sensor-derived policies were added to NOAA's Nautical Chart Manual.



# Passage Key Inlet, FL (NOAA Chart 11425)



Paper Charts (RNC & PDF) | Electronic Charts (ENC) | Coast Pilot | Help

Map | Satellite | Place Names | Standard Place Name Search... | Search | Auto Zoom

38.06° W 83°11'17.13"

Map data ©2016 Google, INEGI | Terms of Use | Report a map error

### General Information & Links

- NOAA RNCs (RNC):**  
Geo-referenced charts in BSB format.
- Terms & Conditions**
- Print-on-Demand (POD):**  
Order POD charts from **Certified Agents**.
- NOAA PDFs (PDF):**  
Full-size, 400dpi printable charts.
- NOAA BookletChart (BC):**  
8.5" x 11" printable panels of the charts.
- Notice to Mariner (NM):**  
Weekly corrections to the RNCs.
- NOAA ChartViewer (View)**
- Historical Map & Chart Collection**

### Map Selection Information

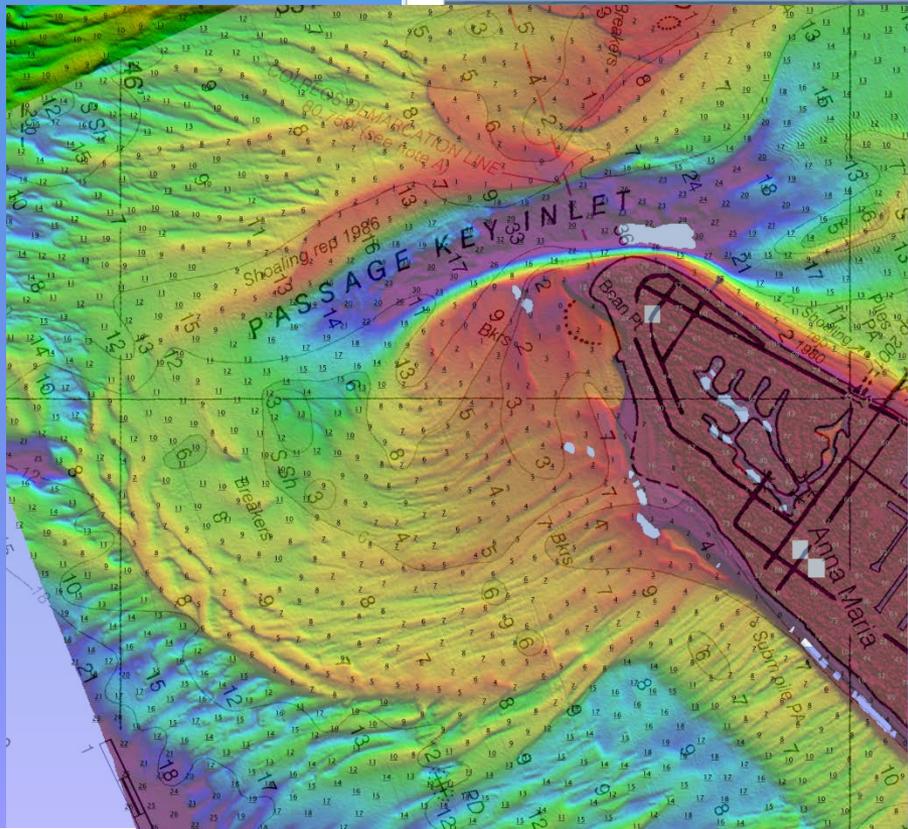
Chart: 11411	1:40,000
Chart: 11415	1:40,000
Chart: 11416	1:40,000
<b>Chart: 11425</b>	<b>1:40,000</b>
Chart: 11412	1:80,000

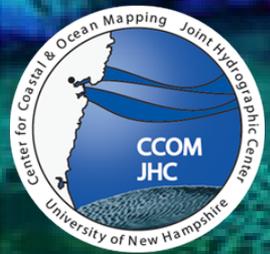
Title:	Intracoastal Waterway Charlotte Harbor to Tampa Bay
Type:	Small Craft Route, IWW Route Chart
Scale:	1:40,000
Edition:	39
Print Date:	5/1/2013

**Available Products**

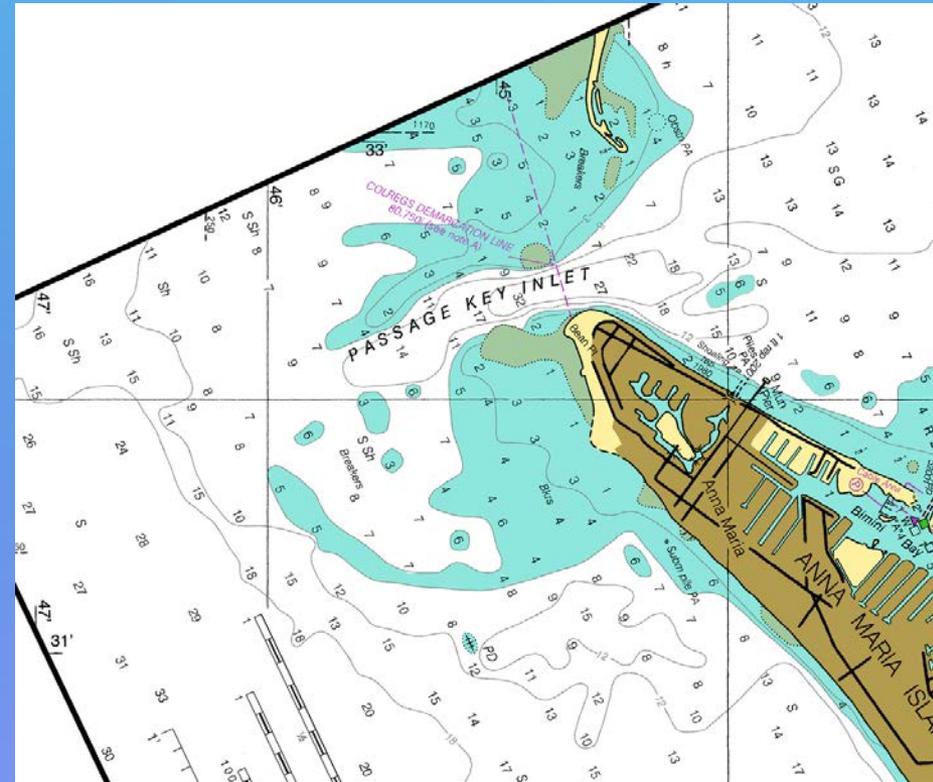
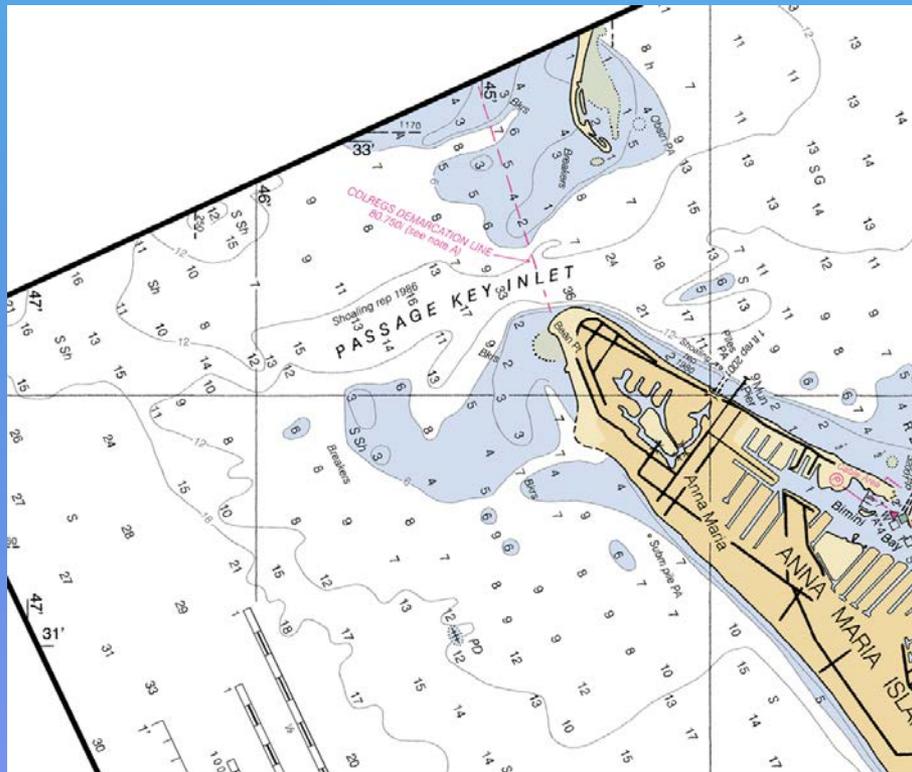
[View](#) [PDF](#) [BC](#) [RNC](#) [NM](#) [Buy](#)



JALBTCX 2010

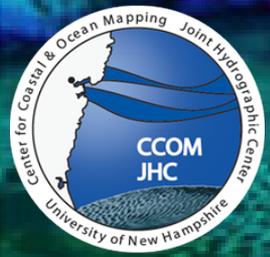


# Passage Key Inlet, FL (NOAA Chart 11425)

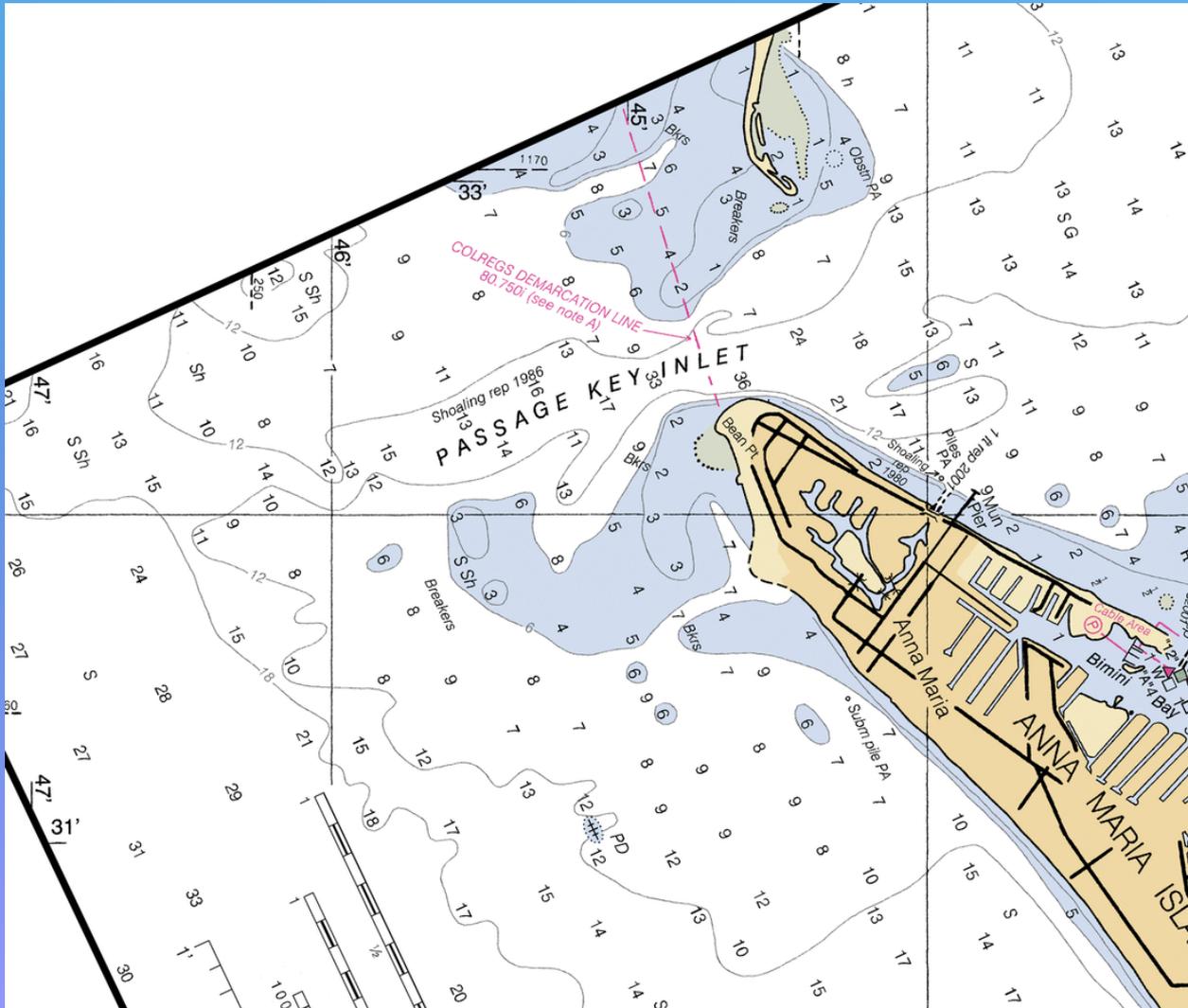


**NOAA Chart pre-JALBTCX  
update**

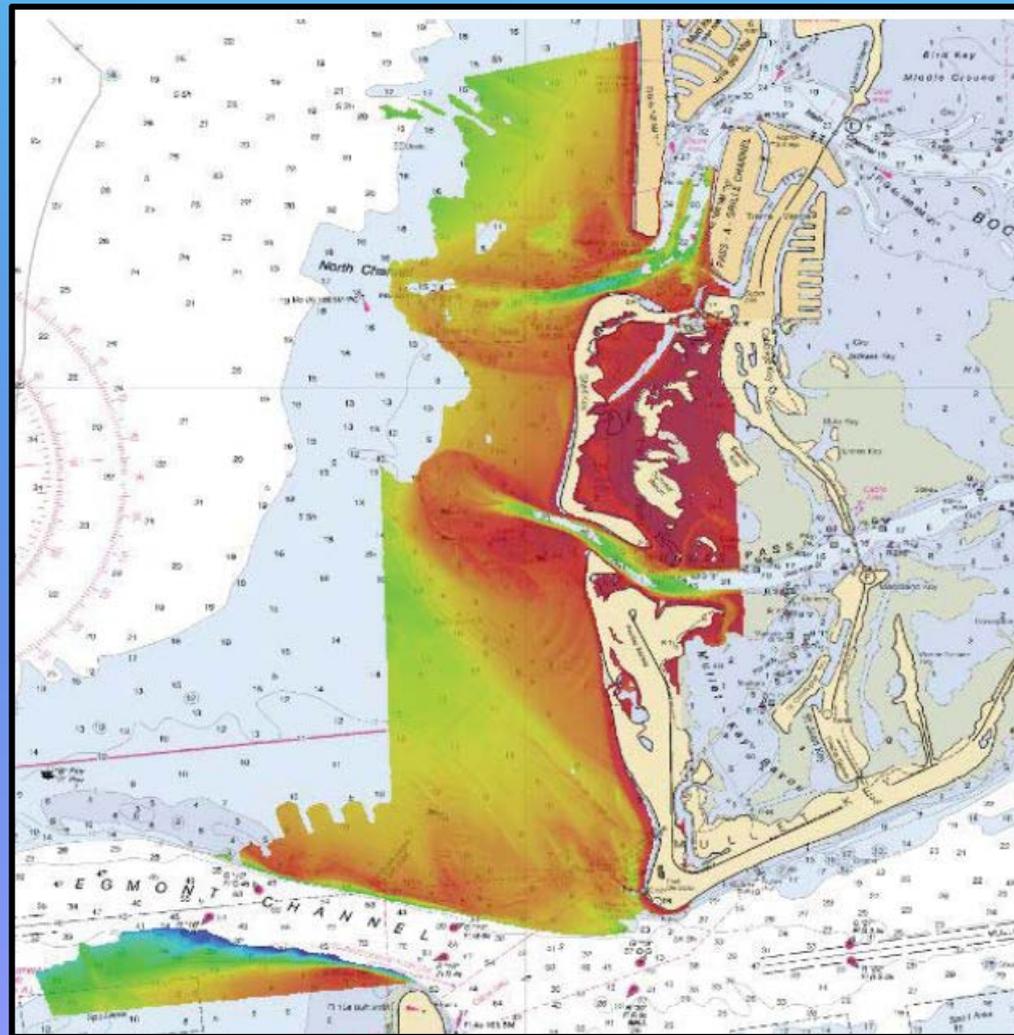
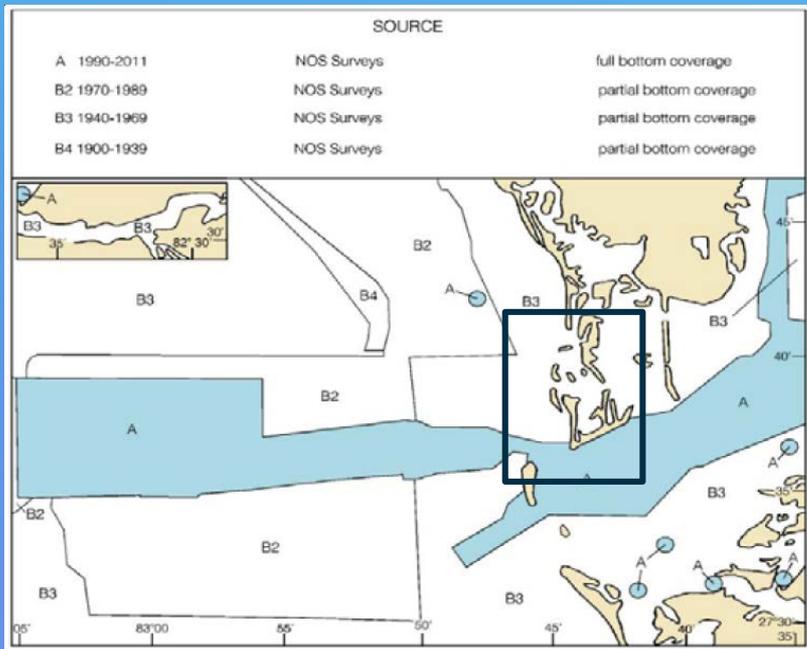
**NOAA Chart post-JALBTCX  
update**



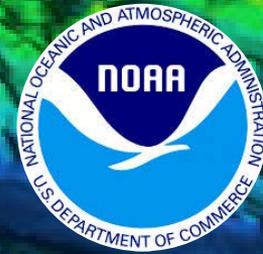
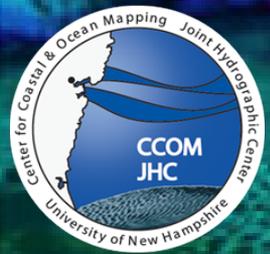
# Passage Key Inlet, FL (NOAA Chart 11425)



# Approaches to Tampa Bay, FL (NOAA Chart 11415)



**Chart 11415 source diagram.** Most of the survey coverage is located within the B3 source area (partial bottom coverage 1940-1969). The remainder of the survey coverage is located within the A source area (full bottom coverage 1990-2011).



# Approaches to Tampa Bay, FL

## 1. What files are included in the submission?

- |  |  |  |  |
|--|--|--|--|
| <input checked="" type="checkbox"/> Metadata | <input type="checkbox"/> Raw survey data       | <input type="checkbox"/> Processed survey data | <input checked="" type="checkbox"/> Bathymetric surfaces |
| <input type="checkbox"/> Imagery mosaics     | <input type="checkbox"/> Tide files, ERS files | <input type="checkbox"/> Sound velocity files  |  |

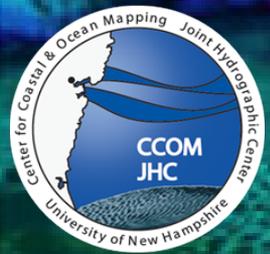
### Comments:

This survey was conducted by the Joint Airborne Lidar Bathymetry Technical Center of Expertise (JALBTCX). Data was collected in the vicinity of St. Petersburg, Florida, using a Compact Hydrographic Airborne Rapid Total Survey (CHARTS) topo-bathymetric lidar system. The data has been reviewed by the Marine Chart Division (MCD) and submitted to the Atlantic Hydrographic Branch (AHB).

The submission does not include raw data, processed data, imagery mosaics, tide files, ERS files, or sound velocity files, in part because some of these data types are not applicable for lidar data. In contrast to traditional surveys, the submission only includes the bathymetric surface and not the source data. The intent is for AHB to forgo the Survey Acceptance Review, proceed directly to HCell compilation, and apply updated soundings, depth contours, and depth areas. The HCell will not address or supersede charted features.

(Courtesy to James Miller, OCS/HSD/AHB)

“ ..., the submission only includes the bathymetric surface and not the source data.”



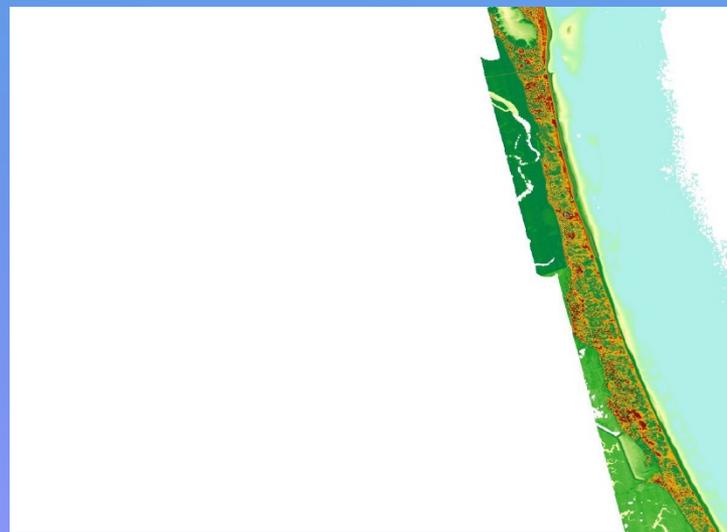
# Challenges



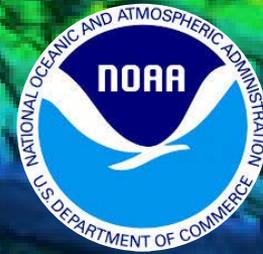
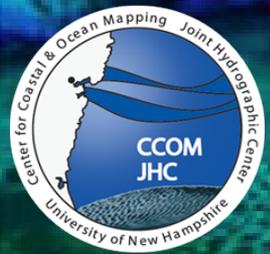
- NCMP targets mostly the ocean-side  
**(typically 500 m from the shoreline)**
- Vertical datum NAVD88



JALBTCX 2013



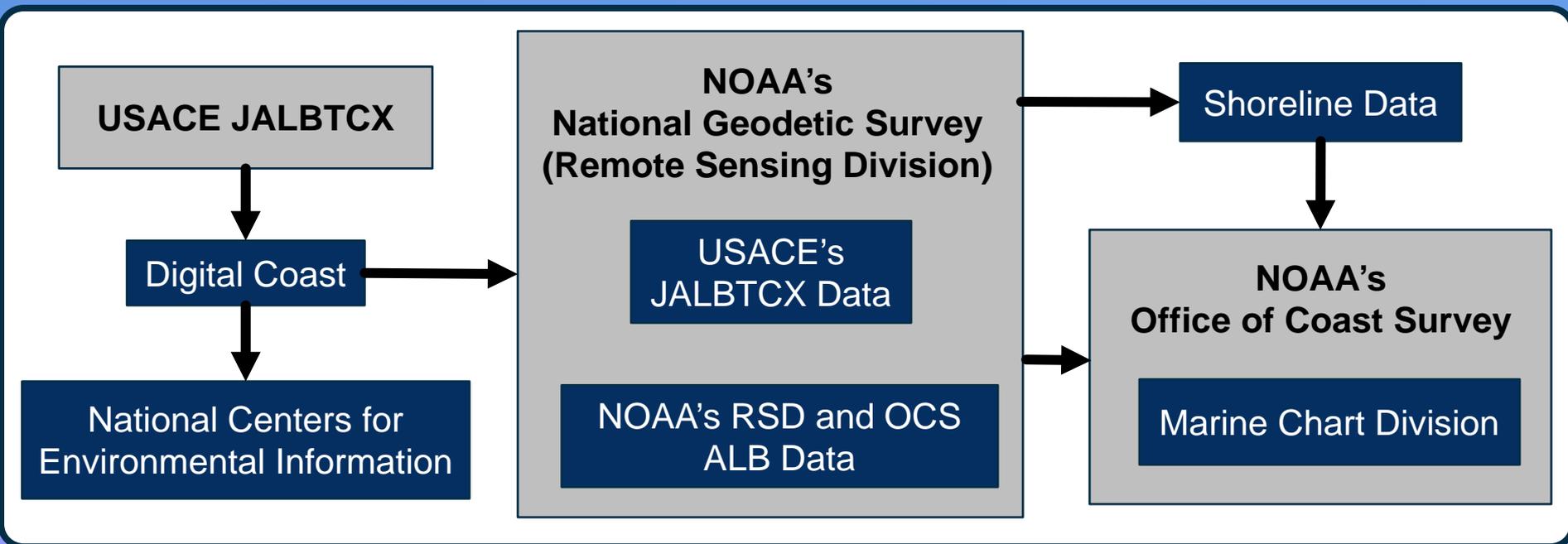
JALBTCX 2010

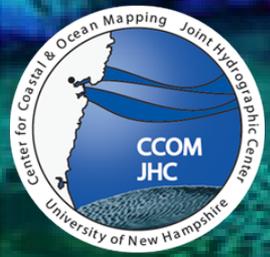


# Solution

## NOAA's RSD as a clearing house:

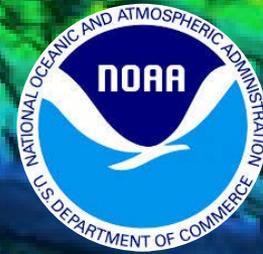
- Plans for RSD surveys to fill the gaps in JALBTCX surveys
- RSD vertically transforms JALBTCX data to Chart Datum using VDATUM.



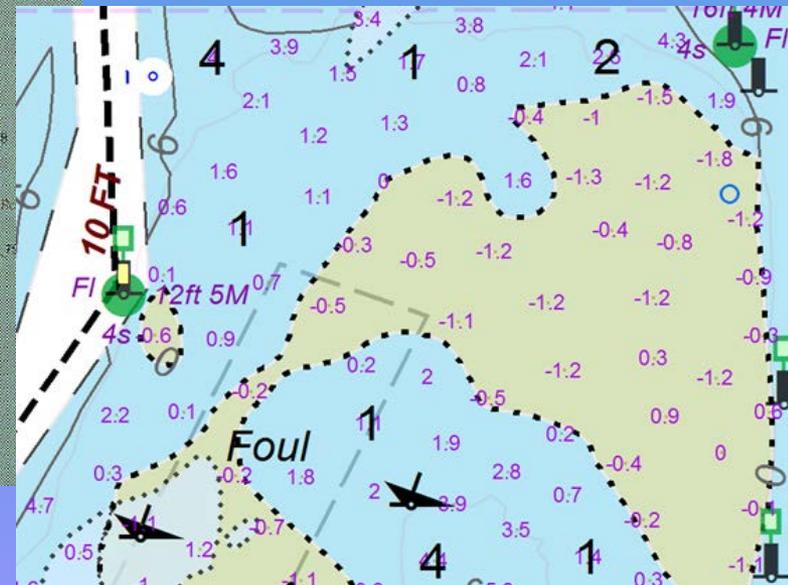
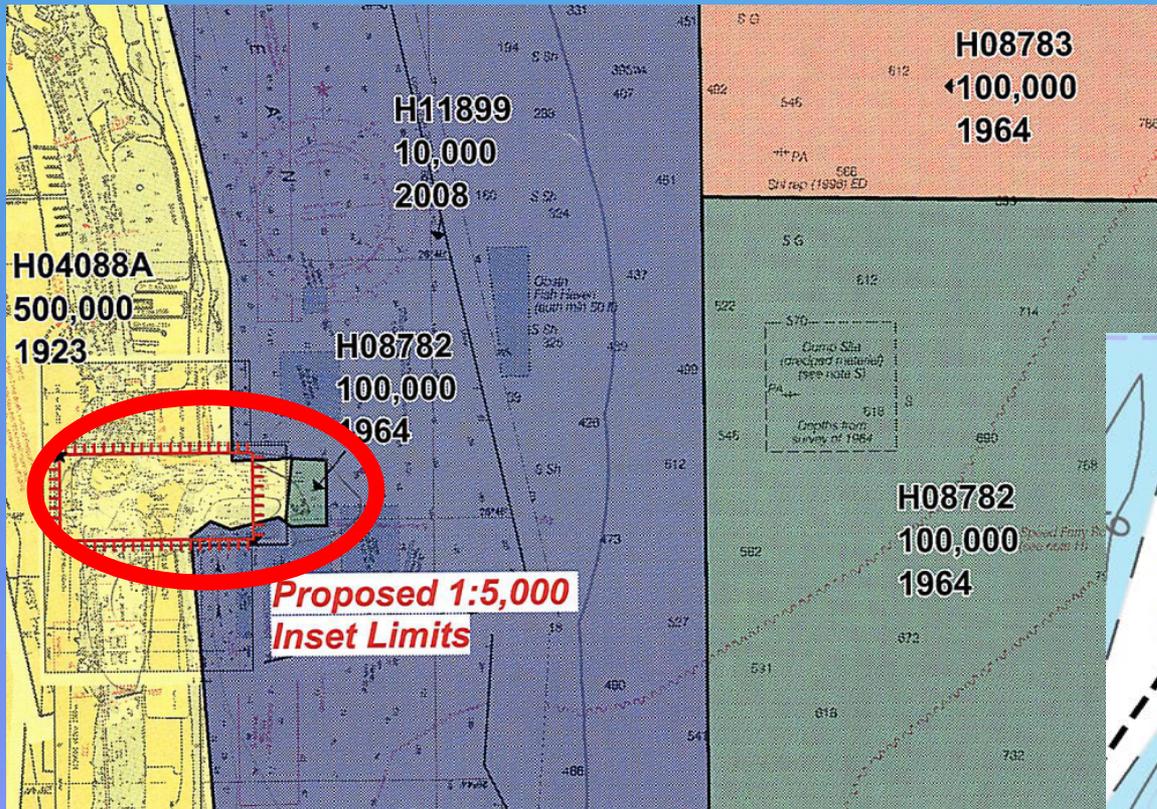


# RSD survey Examples

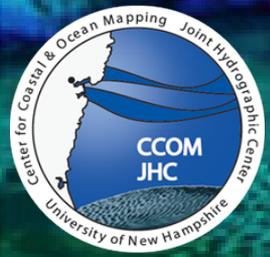
## Palm Beach, FL (Lake Worth)



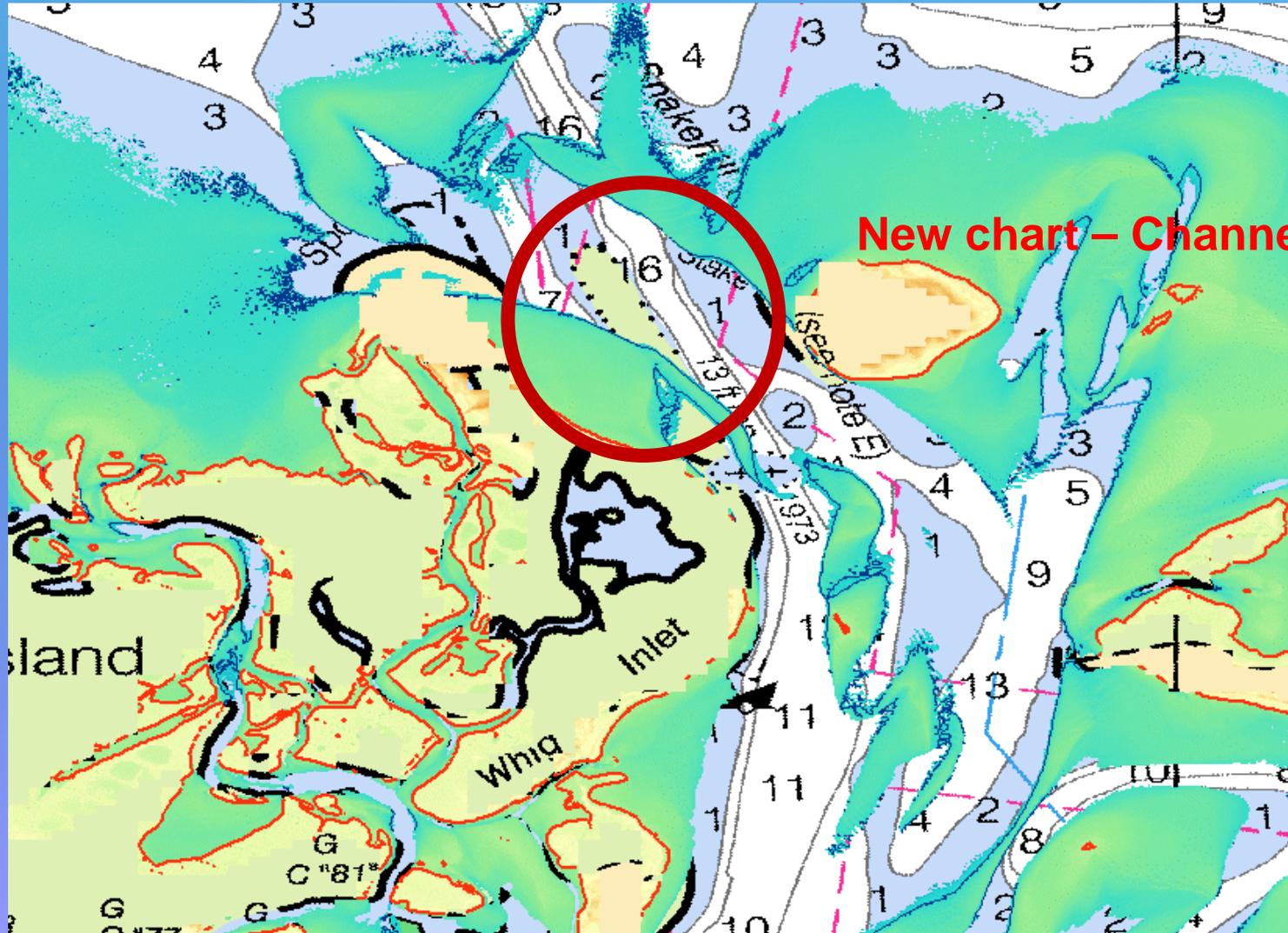
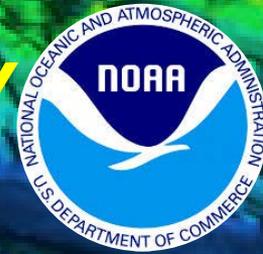
RSD ALB data was fully applied to the new ENC US5FL59M



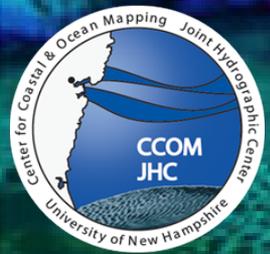
RSD was requested by NSD to acquire ALB data for the new chart



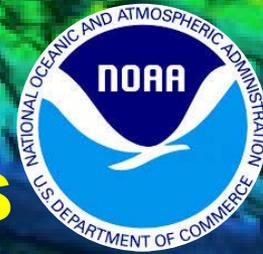
# Snakehill Channel: Long Island, NY (NOAA Chart 12352)



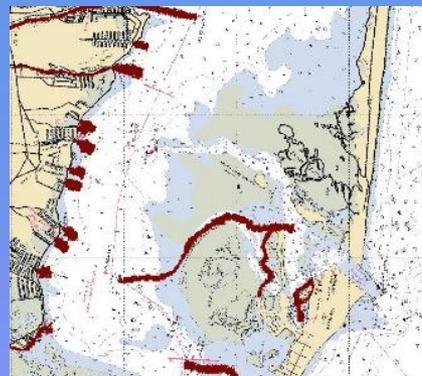
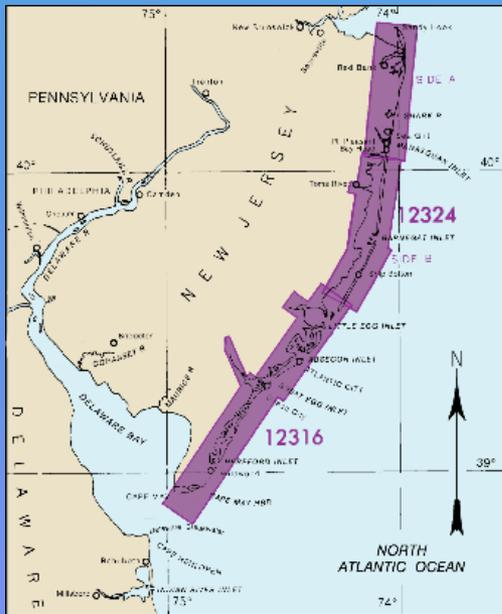
New chart - Channel removed



# Chart Adequacy Example: Super Storm Sandy Relief efforts



**MBES** (NOAA Survey H12596)      **ALB** (NOAA Survey H12606)      **USGS ALB surveys**



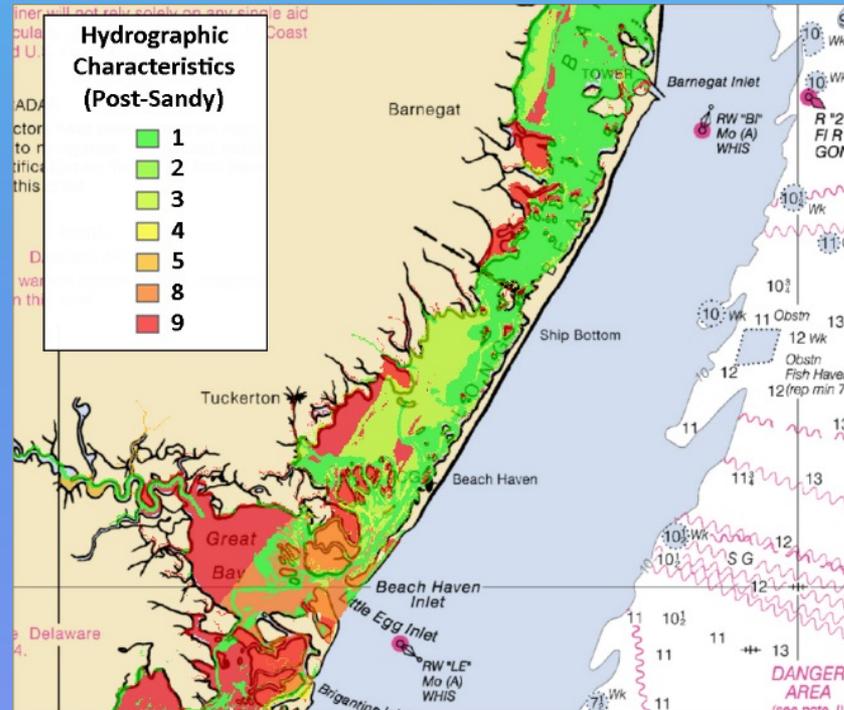
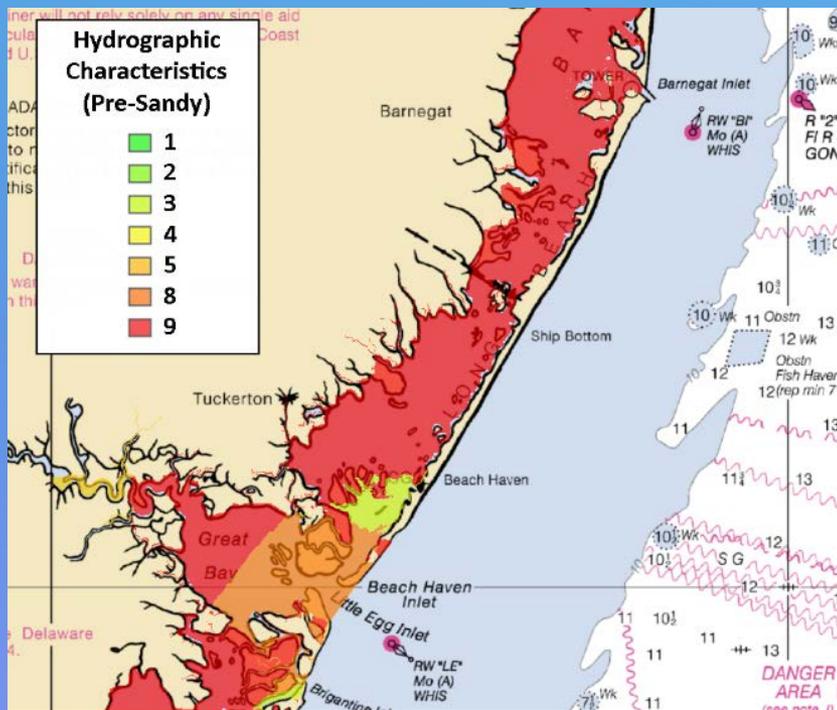
**NJDOT surveys**

**USACE ICW surveys**

**USACE Inlet surveys**

# Hydrographic Characteristics

## Barnegat Inlet, NJ

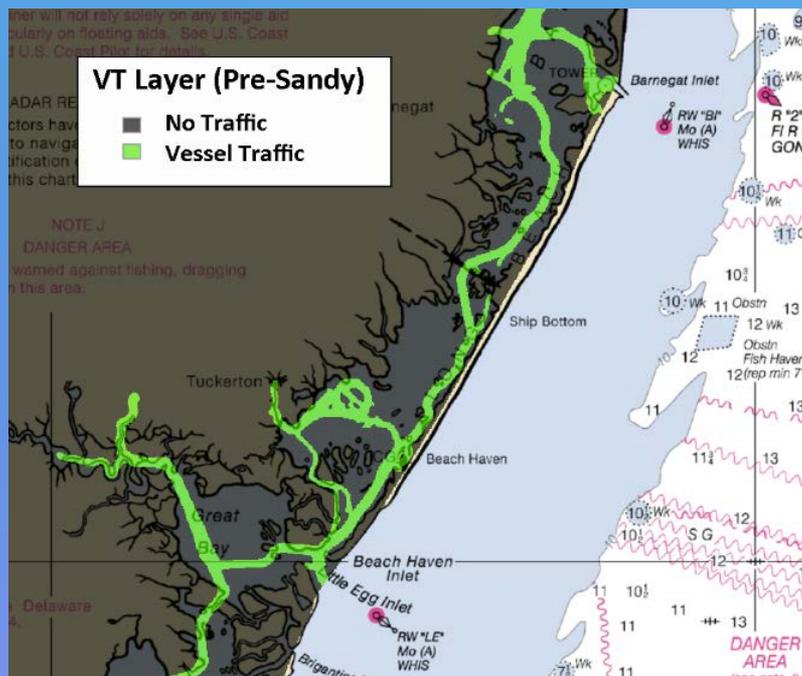


**Pre-Sandy  
hydrographic characteristics**

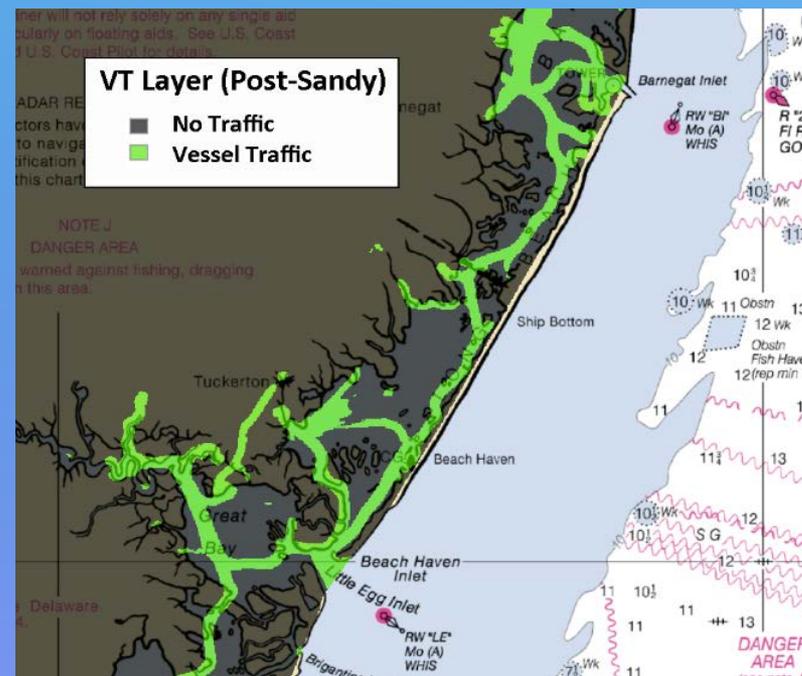
**Post-Sandy  
hydrographic characteristics**

# Vessel Traffic

## Barnegat Inlet, NJ



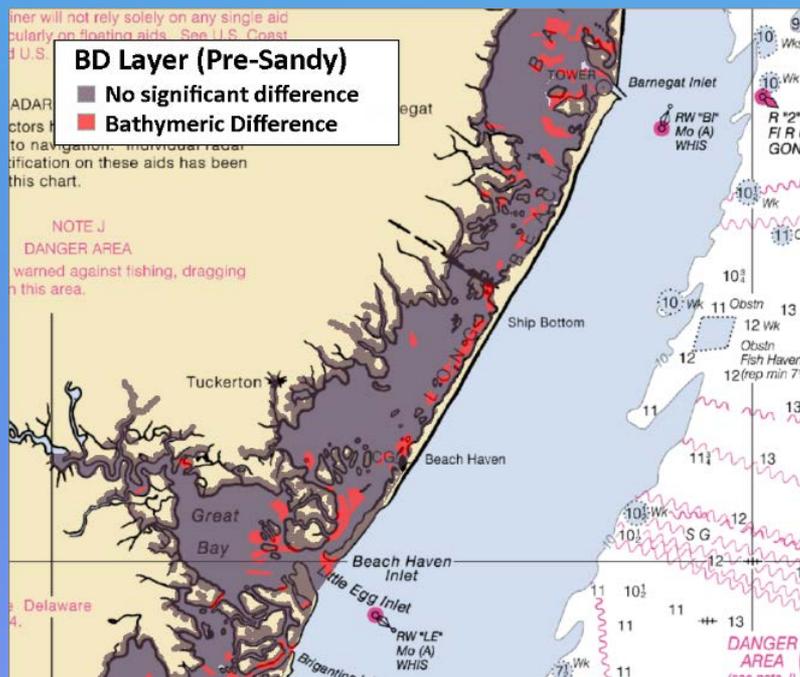
**Pre-Sandy (2011) Vessel Traffic based on AIS**



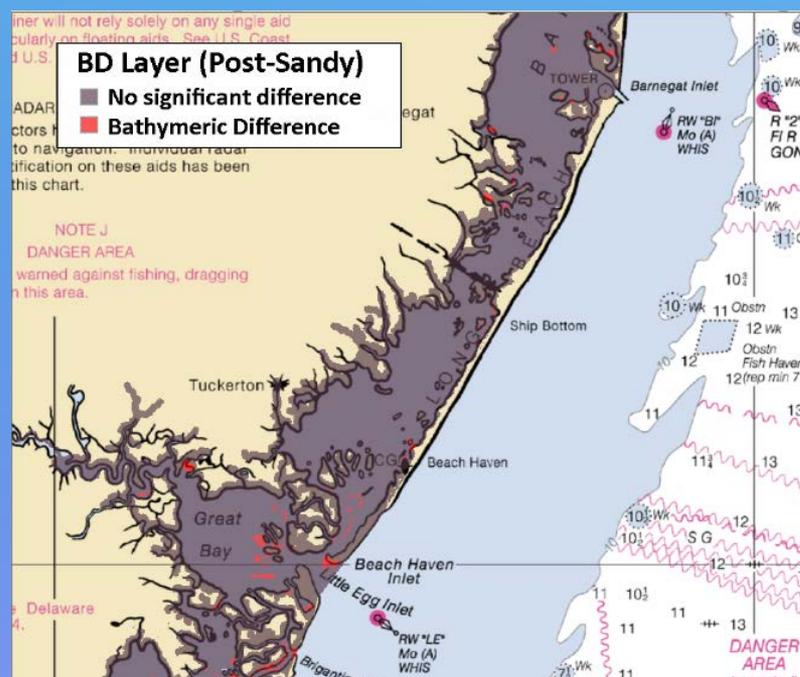
**Post-Sandy (2012) Vessel Traffic based on AIS**

# Bathymetric difference (Landsat imagery)

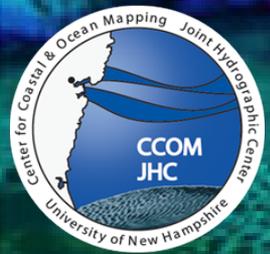
## Barnegat Inlet, NJ



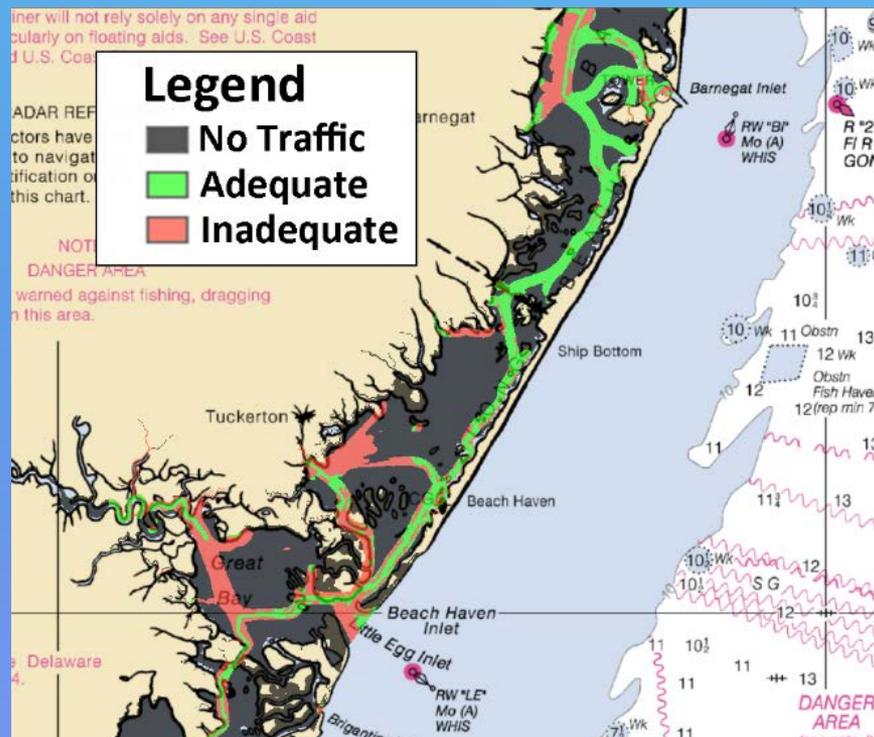
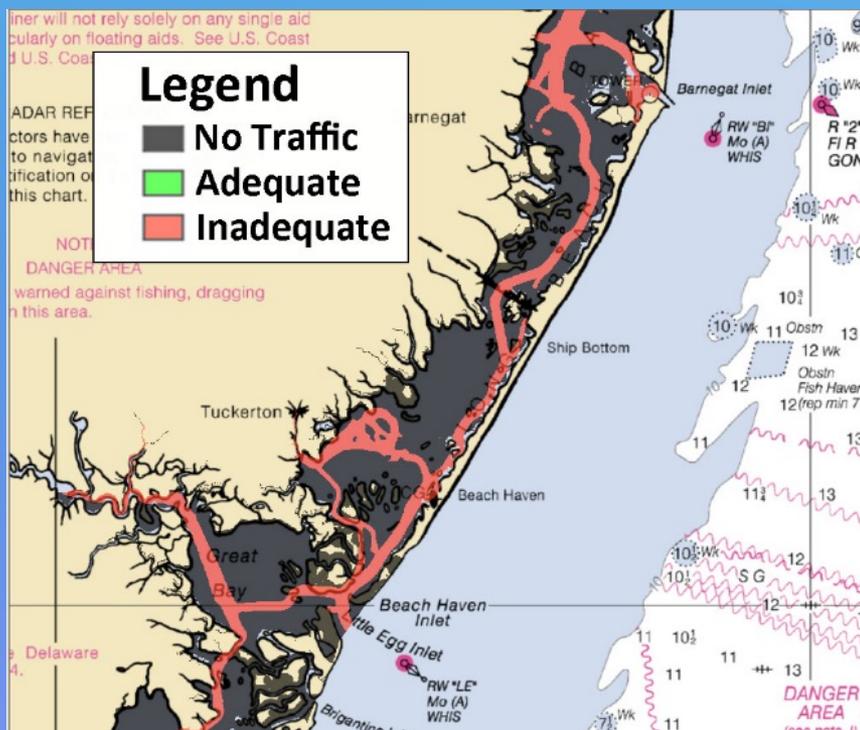
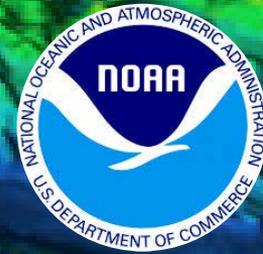
**Pre-Sandy (2011) bathymetric  
difference using SDB**



**Post-Sandy (2012) bathymetric  
difference using SDB**



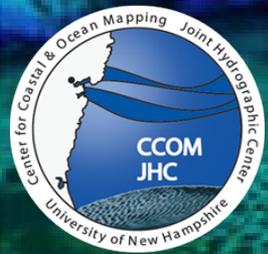
# Adequacy Maps



**NJ Chart Adequacy evaluation using the original survey data**

**NJ Chart Adequacy evaluation using external datasets**

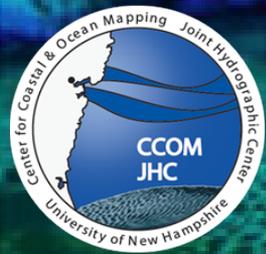




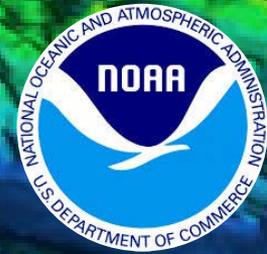
# Hierarchy of the incoming source layers using groups that correlates with CATZOC classification



CATZOC	Dataset	Priority
A1	NOAA acoustic surveys and contracts	Bottom detection, dense coverage and high accuracy
A2	USACE acoustic surveys of the New Jersey's inlets and ICW	Bottom detection and high accuracy
A2	NJ DOT SBES surveys	Bottom detection
B	NOAA's RSD and OCS ALB surveys	<b>Dense coverage and high accuracy. Bottom detection is dependent on water clarity.</b>
B	USACE NCMP ALB surveys	<b>Dense coverage and high accuracy. Bottom detection is dependent on water clarity.</b>
C	USGS ALB surveys	Dense coverage. Bottom detection is dependent on water clarity. USGS is not certified for surveying navigational channels.
C	SDB	Least turbid

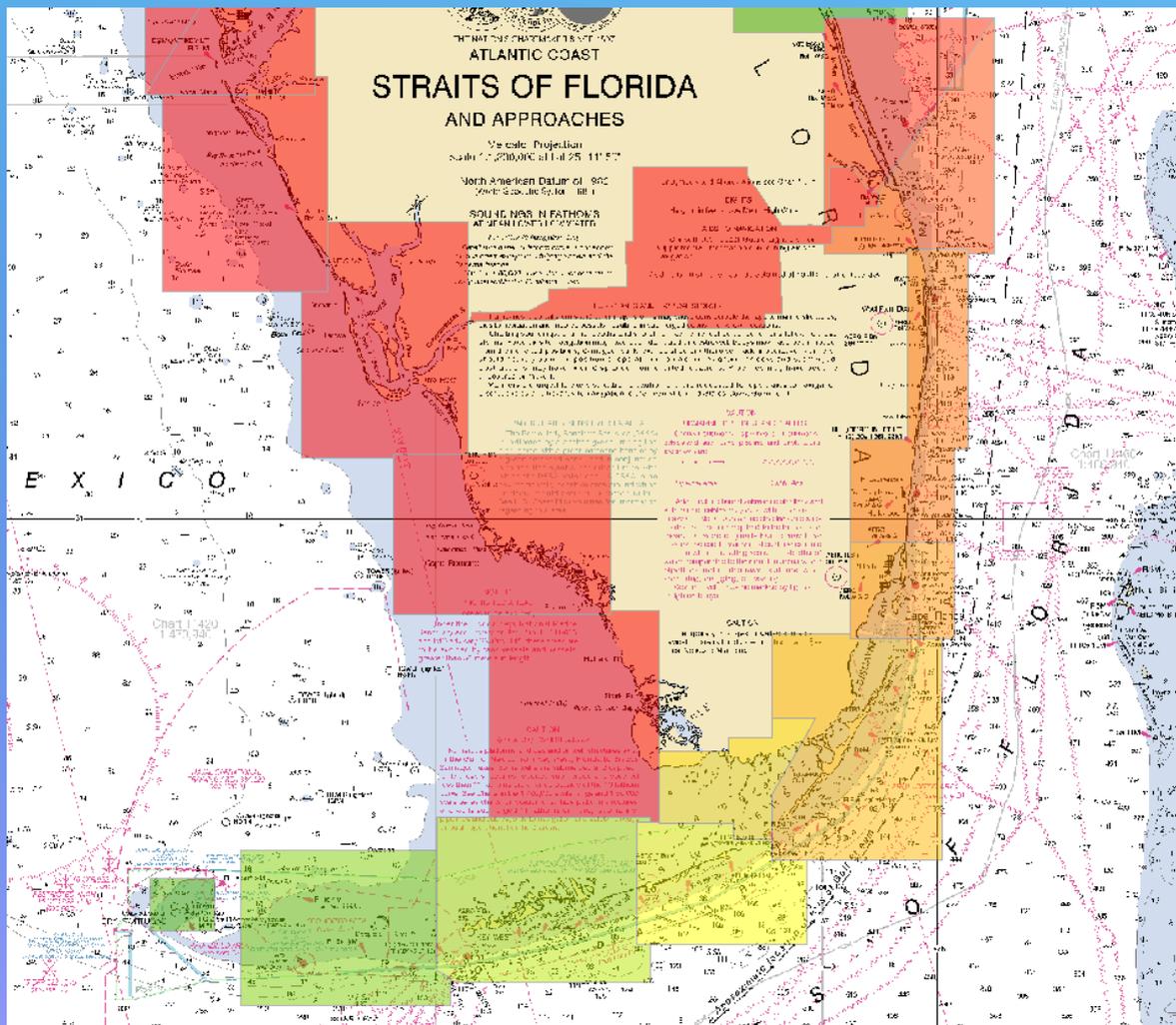


# Coming soon: Production line



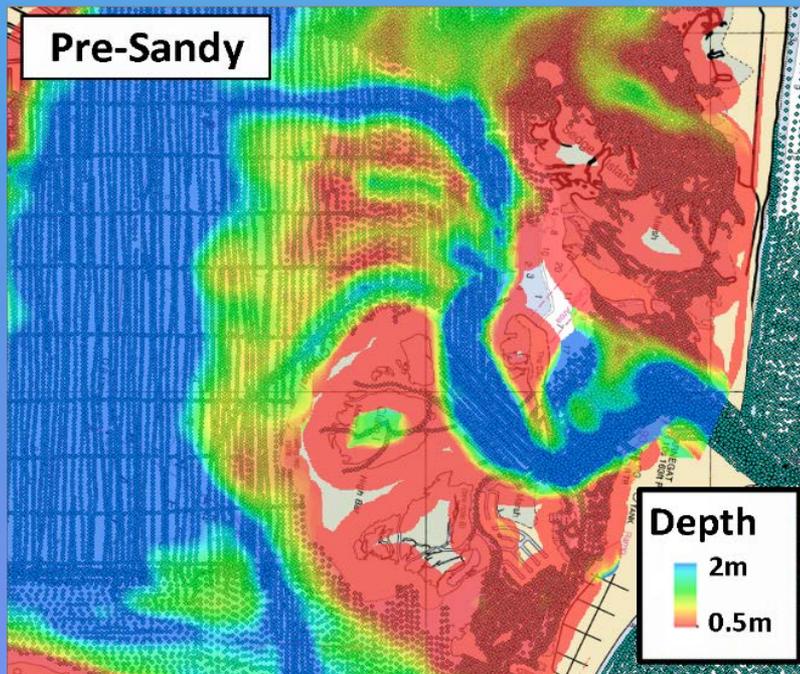
**NOAA ENC coverage  
(1:80,000)**

**Color-coded ingestion  
production line  
NOAA/USACE ALB  
datasets (dark green as  
first and dark red as last)**

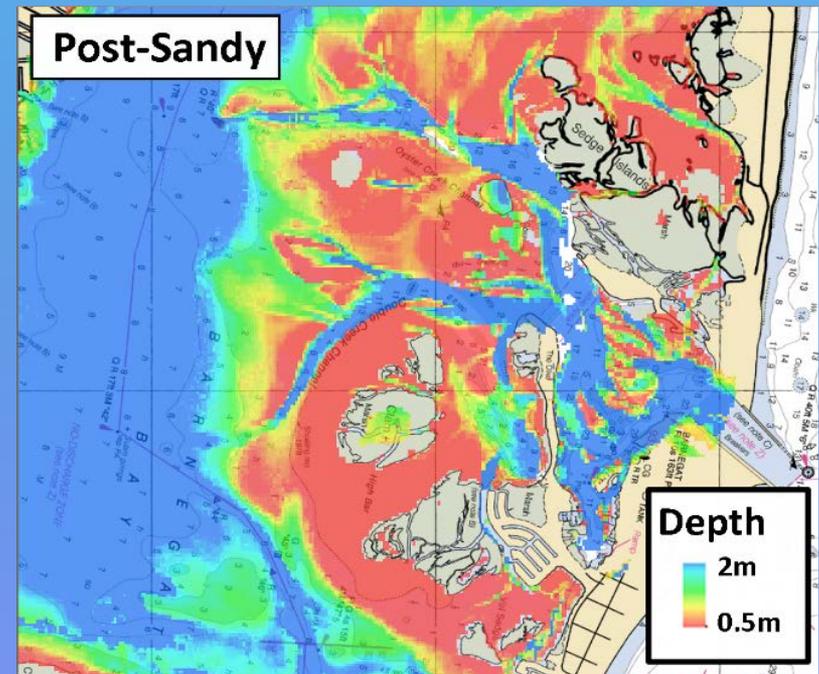


# More than just bathymetry

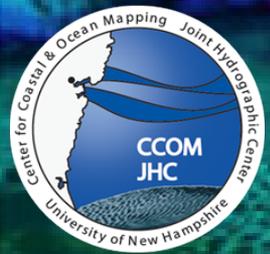
## Reference bathymetry for Barnegat Inlet, NJ



Bathymetry derived from  
1930s sooth-sheet soundings



Bathymetry derived from  
Post-Sandy datasets



# Conclusions

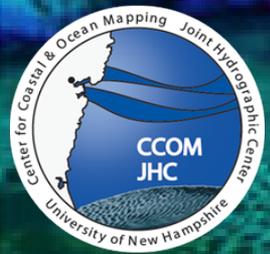


**The revised new NOAA policies discuss the potential incorporation of surveys collected using new CATZOC B technologies (namely, SDB and ALB).**

**The contribution of a sensor-derived data policy is for areas which are not transited by large (SOLAS) class vessels with critical under-keel clearance.**

**It is important to account for the environmental and technological constraints of the data when considering appropriate use cases.**

**The Nautical Chart Manual is on a non-publically facing website. Access can be provided upon demand, and feedback on the policy is welcomed.**



# Further reading



- Barber, J., Pe'eri, S., Klemm, A., Nyberg, J., and Powell, J. (2016). Sensor-Derived Policy and Localized Chart Updates at NOAA's Marine Chart Division. Canadian Hydrographic Conference 2016, Halifax, NS, Canada, 16-19 May.
- Imahori, G. Ferguson, J., Wozumi, T., Scharff, D., Pe'eri, S., Parrish, C.E., White, S.A., Jeong, I., Sellars, J., and Aslaksen, M.L. (2013). A procedure for developing an acceptance test for airborne bathymetric lidar data application to NOAA charts in shallow waters. NOAA Technical Memorandum NOS CS-32, 53 pp.
- Pe'eri, S., Parrish, C.E., Johnson, N., Macon, C., and White, S. (2016). Performance Evaluation, In: *Airborne Lidar Hydrography II* (Editor: Philpot, W.D.), U.S. Army Corps of Engineers, Stennis, Mississippi, USA.
- Witmer, J., Imahori, G., Aslasken, M., Gonsalves, M., Berkowitz, M., Pe'eri, S. (2016). Integration of U.S. Army Corps of Engineers Airborne Lidar Bathymetry (ALB) Survey Data into NOAA's Processing workflow. NOAA Technical Memorandum NOS CS-36, 39 pp.



**THANK YOU**

**Acknowledgments**  
**NOAA - OCS/MCD/NDB**  
**NOAA - OCS/IOCM UNH**  
**USACE- JALBTCX**