W00351

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

DESCRIPTIVE REPORT

Type of Survey:	External Source Data
Registry Number:	W00351

LOCALITY

State(s):	New York
General Locality:	New York Coastline
Sub-locality:	Jones Beach Island to Southampton

2014

NOAA National Geodetic Survey

Remote Sensing Division

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

REGISTRY NUMBER:

HYDROGRAPHIC TITLE SHEET

W00351

INSTRUCTIONS: The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.

State(s):	**New York**
General Locality:	**New York Coastline**
Sub-Locality:	**Jones Beach Island to Southampton**
Scale:	**40000**
Dates of Survey:	**11/25/2013 to 07/20/2014**
Project Number:	**OSD-RSD-16**
Data Source:	**NOAA Remote Sensing Division**
Chief of Party:	**Michael Aslaksen, Chief, Remote Sensing Division**
Soundings by:	**Topo-bathymetric Lidar**
Imagery by:	**N/A**
Verification by:	**Atlantic Hydrographic Branch**
Soundings Acquired in:	**Meters at Mean Lower Low Water**

Remarks:

The purpose of this survey is to provide contemporary surveys to update National Ocean Service (NOS) nautical charts. All separates are filed with the hydrographic data. Any revisions to the Descriptive Report (DR) generated during office processing are shown in bold red italic text. The processing branch maintains the DR as a field unit product, therefore, all information and recommendations within the body of the DR are considered preliminary unless otherwise noted. The final disposition of surveyed features is represented in the OCS nautical chart update products. All pertinent records for this survey, including the DR, are archived at the National Centers for Environmental Information (NCEI) and can be retrieved via http://www.ncei.noaa.gov/.

Descriptive Report Summary to Accompany **W00303** *W00351 has been designated as a subset of W00303*	
Project	OSD-RSD-16
Survey	W00303
State	New York
Locality	N/A
Sub Locality	Long Island Outer Coastline
Scale of Survey	variable
LASER Used	Riegl VQ-820G Lidar Sensor
Horizontal Datum	North American Datum of 1983
Vertical Datum	Mean Lower Low Water (MLLW)
Vertical Datum Correction	VDATUM
Projection	Latitude-Longitude (NAD83) - UTM Zone 18
Field Unit	Dewberry, Quantum Spatial, RC&A, Woolpert
Survey Dates	Nov. 25 2013 to July 20 2014
Chief of Party /Data Originator	NOAA Remote Sensing Division Chief, Mike Aslaskan

A. Area Surveyed

This topo-bathy lidar survey was acquired in accordance with the requirements defined in the National Geodetic Survey (NGS) Sandy Supplemental Statement of Work Volume 4. Please see the NGS Remote Sensing Division (RSD) DR/DAPR report for any deviations from this requirement.

The data set contains outer coast and inlet data from Rockaway Inlet to Montauk Point, NY. This is a subset of a larger Post Hurricane Sandy topo-bathy lidar data set that extends from South Carolina to New York. The entire data set spans 140 blocks and has been broken down into four sections for submission to the Office of Coast Survey (OCS). This data set contains block 119 through block 140 (excluding 128-131), as outlined in Figure 1. See Appendix A. Bathymetric Coverage for grid coverage by block.

Data was acquired within the following survey limits:

Table 1 Bounding Coordinates

Northeast Limit	Southwest Limit
40.48 N	38.92 N
73.97 W	74.97 W

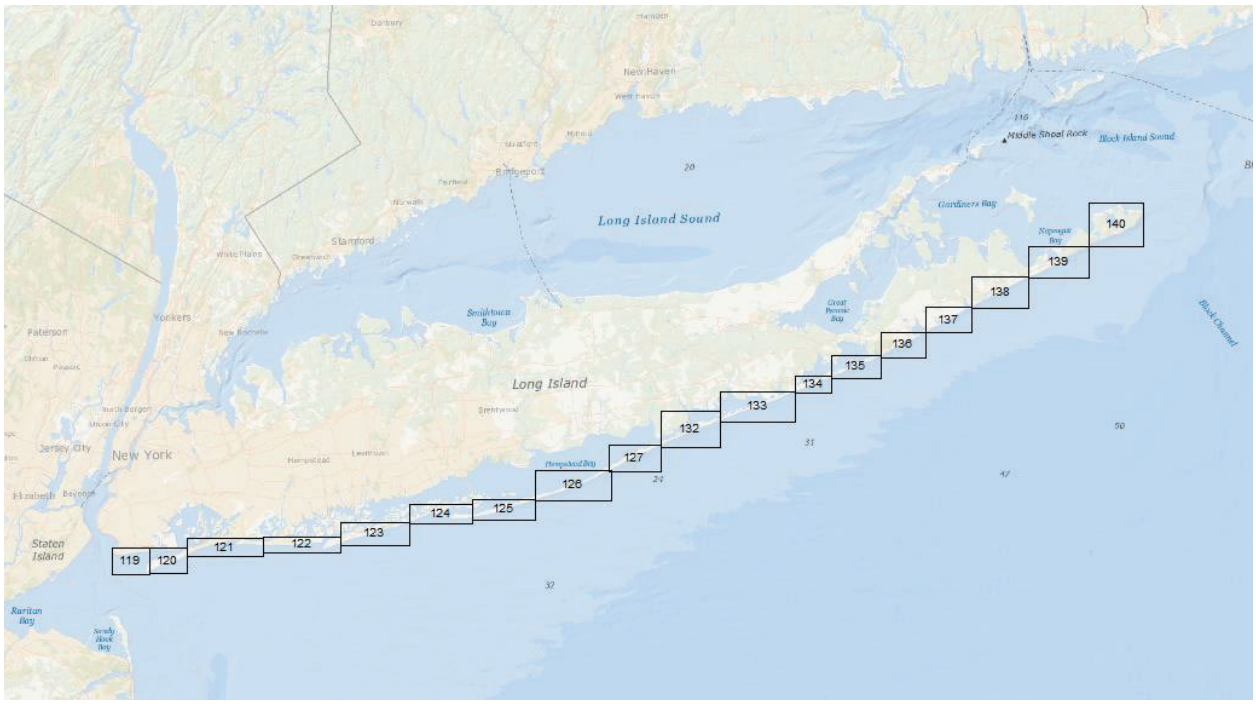


Figure 1 Image depicts region of coverage broken up by assigned block, 119 through 140. The data contains topo-bathy lidar coverage of inlets and near shore outer coast, gridded at 3m resolution. See Appendix A for bathymetric coverage by block.

B. Survey Purpose

The purpose of this survey was to update the national shoreline after Hurricane Sandy by the NOAA Remote Sensing Division (RSD). Data collection and processing was managed by private contractor, Dewberry. The survey limits and methods were determined by RSD.

C. Intended Use of Survey

In conjunction with RSD's Geographic Cell shoreline product, GC11176, data is adequate to supersede soundings and intertidal areas and add or modify features to the chart. The coverage meets Office of Coast Survey (OCS) Reconnaissance Coverage requirements for lidar data. The data should not be used to disprove submerged features due to excess water column noise described in Section D. Data Acquisition and Processing.

D. Data Acquisition and Processing

For a description of original data acquisition and processing systems, survey equipment, quality control procedures and data processing methods the following documents have been included with this data submission from the Remote Sensing Division and contractor:

DR_DAPR_VA1408_W00300_signed (RSD)
Supplemental_Sandy_Final_Report_of_Survey_20151030 (Dewberry)

Analysis for charting and additional product generation, as discussed in this document, was performed by the Sandy Integrated Ocean and Coastal Mapping Group at the UNH/NOAA Joint Hydrographic Center.

The lidar las files and aerial imagery were processed in ArcMAP 10.4.0, LP360 2015.1.76.7 for ArcMAP extension and Caris Base Editor 4.1. In LP360 the data was reviewed to confirm classification was correct, point source IDs were assigned to flight lines, data was in MLLW, fliers were removed, and to identify any additional features, not included in the RSD shoreline files. The aerial imagery was combined by block in ArcMAP and exported to GeoTIFF for ease of use within Caris. Caris Base Editor was used for final grid creation in CSAR and BAG format and S-57 feature file attribution.

Seven classes of data, identified in the following table, were extracted by RSD from the full lidar data set, converted to MLLW, inverted to Z positive down, and clipped to MHW for chart submission.

Table 2 Lidar Classes Submitted from RSD

Lidar Class	Category
1	Unclassified
2	Ground
25	Water Column
26	Bathymetry
27	Water Surface
29	Submerged Features
30	S-57 Features

Class 2 ground and class 26 bathymetry represent the bare earth points. Chart features are not represented in these classes. Class 29 and 30 are reserved for features. For block 119 through 140, no data was found classified to class 29 or 30. All additional features, including those represented in the shoreline file, are located in class 1 unclassified, along with noise and other miscellaneous points not classified. Occasionally, data points on features are also included in class 25 water column, class 2 ground, or 27 water surface.

The algorithm used to automatically classify the ground points for land and bathymetric elevations tracks and selects the bottom edge of the data set. This can result in data points not included in the ground or bathymetry class that may otherwise be considered ground or seafloor. As a consequence, the density of the gridded data can be reduced or shoal depths excluded. In the following image (Figure 3) the bottom edge of the bathymetry is classified bathy (red), while the top edge is classified water column (light blue). Of these classes, only the bathymetry class (red points) would be included in an elevation model.

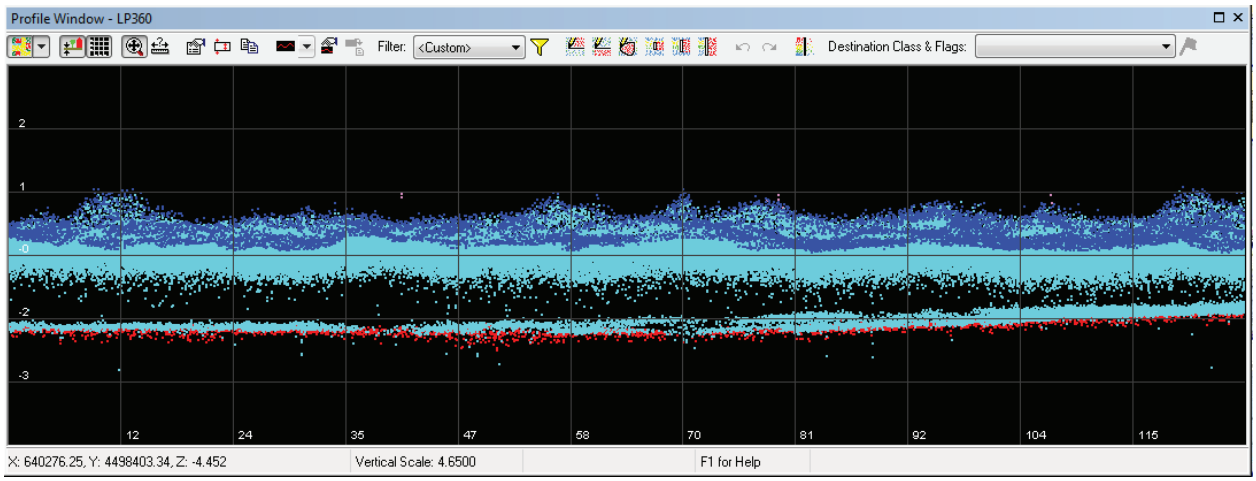


Figure 3 LP360 profile of shoal points on sand waves included in water column class (light blue), which ends up being excluded from the bare earth model. The surrounding classified bathymetry (red points) demonstrate how the bottom tracking algorithm only classifies the bottom edge of the ground/bathy points. This image also demonstrates the noise in the water column, extending down from the water's surface. Block 124.

In LP360, the chart, LAS files, aerial imagery, and shoreline GC11176 were used to search for and identify any additional features in the data. Increased noise in the system, due to an increase in the sensitivity of the sensor to improve bathymetric measurements, as described on page 31 of the RSD DR DAPR, hindered identification of submerged features. The majority of features identified were above water. The features are digitized at survey scale and included in the final feature file W00303_FFF.000. The features include pilings, shoreline construction, obstructions and cartographic notes.

While reviewing the las files, the data was found to be in appropriate format for grid generation. All files were in the correct datum and data was classified appropriately. Some fliers were removed from block 122 and point source ID's were not assigned for blocks 121-124. Lack of point source ID attribution inhibit identification of features across multiple flight lines, however was not problematic for these blocks.

A 3 m grid surface was generated for the entire data set and used to make additional product layers. At this resolution, 84% of nodes have 5 soundings or more (Figure 4). An additional 1m surface was created for reference. The flight lines were collected at 20% sidelap, which limits the dataset to meeting OCS Reconnaissance Coverage requirements for lidar. The RSD and contractor reports mistakenly state 50% sidelap. This discrepancy was confirmed with RSD.

Table 3 Bathymetric Surfaces

Surface Name	Surface Type	Resolution	Depth Range (m)	Surface Parameter	Purpose
W00303_LI_3m_MLLW	BAG/CSAR	3m	7.61 to -3.78	Shoalest Depth	Reconnaissance Coverage
W00303_LI_1m_MLLW	BAG/CSAR	1m	7.61 to -3.78	Shoalest Depth	Reference

The following four additional files were created from the 3 m surface and submitted with the data set;

- survey scale sounding layer with 40 m radius spacing (HOB)
- contour file containing NOAA rounded 3, 6, 12 and 18 ft contours (HOB)
- coverage polygon (HOB)
- block 119 through 140 outlines, as seen in Figure 1 (SHP)

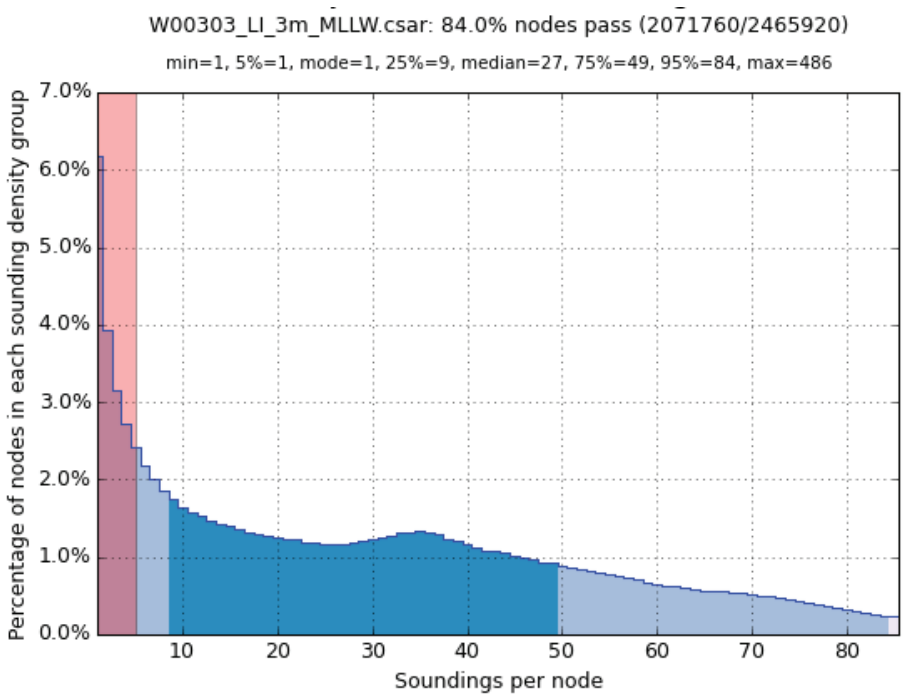


Figure 4 Representation of sounding density per node for the 3 m surface

E. Uncertainty

The standard deviation for the 3 m gridded surface ranges from 0 to 1.7 m with an average of 5.3 cm. These values are reflective of the bottom detection algorithm used to classify bottom points and not necessarily the standard deviation of the full ground points.

For information on positional accuracy of the data refer to pg 41, section 5.0 Uncertainty, of the RSD DR DAPR.

F. Results and Recommendations

The following are the largest scale RNCs and ENCs, which cover the survey area, 1:80,000 and higher, used to compare with W00303:

Table 4 Raster and electronic navigational charts used for comparison

Chart	Scale	Edition	Edition Date	LNM Date	NM Date
12326	1:80,000	53	1/1/2016	9/6/2016	8/27/2016
12327	1:40,000	106	3/1/2014	9/6/2016	9/17/2016
12350	1:20,000	60	8/1/2011	9/6/2016	8/27/2016
12352	1:20,000	35	2/1/2016	9/6/2016	9/17/2016
12353	1:80,000	19	11/1/2011	9/6/2016	8/27/2016
12402	1:15.000	12	6/1/2012	9/6/2016	9/17/201
13205	1:80,000	40	7/1/2014	9/6/2016	8/27/2016
13209	1:40,000	29	5/1/2014	9/6/2016	8/27/2016
13215	1:40,000	21	8/1/2014	9/6/2016	8/27/2016

ENC	Scale	Edition	Update Application	Issue Date
US4CN22M	1:80,000	8	8/25/2015	5/26/2016
US4NY1AM	1:80,000	28	6/24/2015	7/11/2016
US4NY1BM	1:80,000	4	8/13/2014	4/11/2016
US4NY53M	1:80,000	11	9/16/2015	2/29/2016
US5MA22M	1:40,000	21	5/8/2015	5/27/2016
US5NY19M	1:15,000	22	7/20/2016	7/20/2016
US5NY50M	1:20,000	20	9/9/2015	7/13/2016
US5NY52M	1:40,000	13	9/21/2015	8/24/2016
US5NY53M	1:20,000	14	1/4/2016	6/17/2016

Table 5 Survey blocks and corresponding RNC's and ENCs

Block	1:7,500	1:15,000	1:20,000	1:40,000	1:80,000	ENC
119		12402	12350	12327	12326	US4NY1AM , US5NY19M
120			12350	12327	12326	US4NY1AM , US5NY50M
121			12350, 12352		12326	US4NY1AM, US5NY50M, US5NY53M
122			12352		12326	US4NY1AM, US4NY1BM, US5NY53M
123			12352		12326	US4NY1BM, US5NY52M, US5NY53M
124			12352		12326	US4NY1BM, US5NY52M
125			12352		12353, 12326	US4NY1BM, US4NY53M , US5NY52M
126			12352		12353	US4NY53M , US5NY52M
127			12352		12353	US4NY53M , US5NY52M
132			12352		12353	US4NY53M , US5NY52M
133			12352		12353	US4NY53M , US5NY52M
134			12352		12353	US4NY53M , US5NY52M
135			12352		12353	US4NY53M , US5NY52M
136			12352		12353	US4NY53M , US5NY52M
137					13205, 12353	US4CN22M, US4NY53M
138				13209	13205	US4CN22M , US5MA22M
139				13209	13205	US4CN22M , US5MA22M
140	13209			13209, 13215	13205	US4CN22M , US5MA22M

The dataset was reviewed for dangers to navigation, and areas of significant shoreline change that may warrant return by a hydrographic platform. No dangers to navigation were found. Survey scale soundings generated from the three meter surface were used to evaluate differences with the chart. At the time of submission of the data to the processing branch the final RSD shoreline had not been applied to the charts. The majority of shoreline change for this data set exists at and around inlet mouths, as seen in Figure 5 and 6.

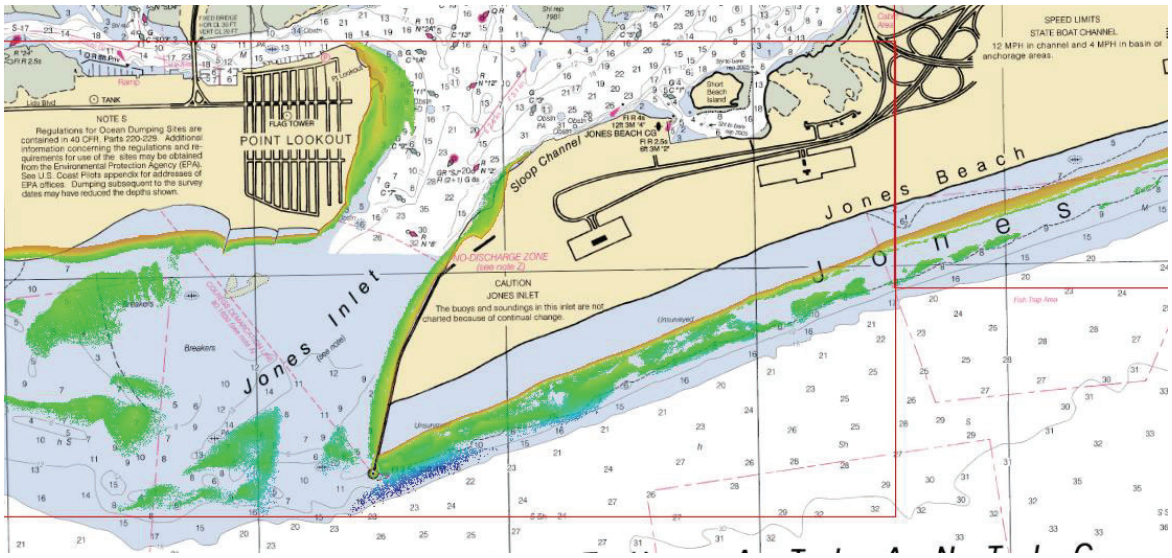


Figure 5 W00303 3m grid cropped to MHW over current chart of Jones Inlet demonstrates changing shoreline morphology.

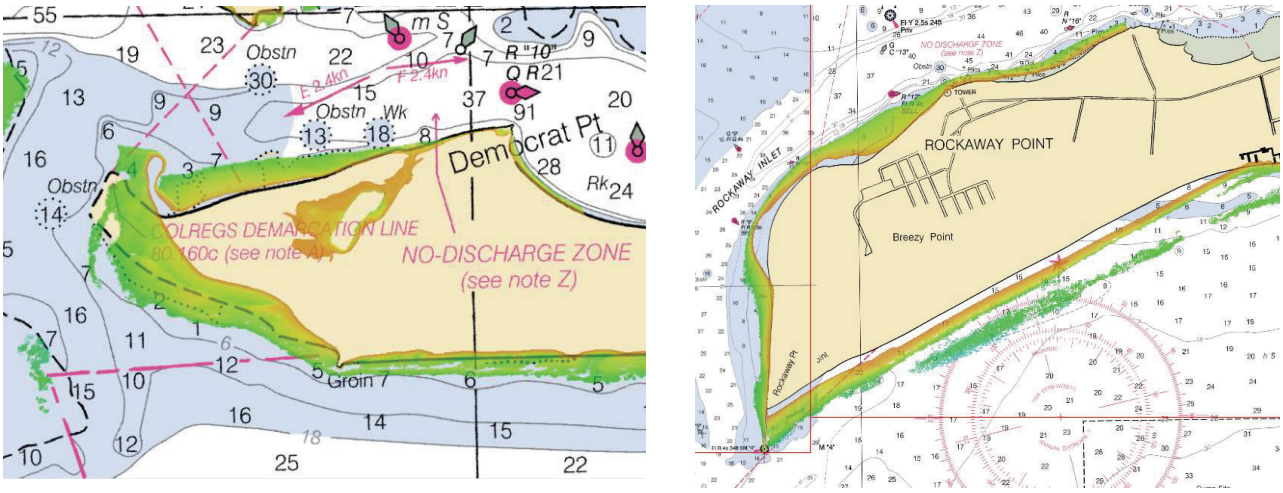


Figure 6 W00303 3m grid cropped to MHW over current charts of Rockaway Point (left) and Fire Island (right) demonstrate changing shoreline morphology.

The charted navigation aids and aids represented in the lidar and imagery, were cross referenced for inconsistencies. General agreement between floating aids and chart position was seen throughout the data set.

G. Vertical and Horizontal Control

The vertical datum for this project is Mean Lower Low Water. VDatum was used by RSD to convert the las files from the Geoid to MLLW. The horizontal datum for this project is North American Datum of 1983 (NAD83). For more details on the positioning methods used see the RSD DR DAPR submitted with this dataset.

H. Additional Results

Gaps in coverage exist due to variable extinction depths and environmental conditions as seen in Figure 7.

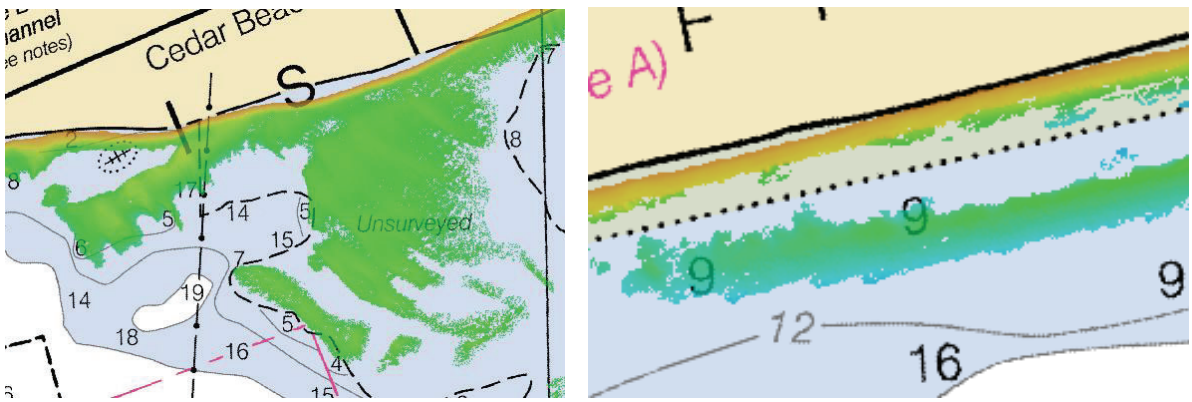


Figure 7 Examples of gaps in lidar coverage from W00303 due to variable lidar extinction depths and environmental conditions.

Seven recent Office of Coast Survey Hydrographic surveys archived at National Center for Environmental Information (NCEI) provided small areas of overlap with W00303 for depth comparison. The majority of the surveys were collected post Hurricane Sandy, between 2013 and 2014. Despite the relative closeness in time, depth changes are evident and variable between surveys. This is most likely due to the sandy, transient nature of the seabed along the outer coast. The average difference between all the surveys with W00303 is less than a half meter, however changes were observed up to 5m in depth. Table 6 breaks down the difference statistics by survey.

Table 6 Bathymetric surveys used for comparison with W00302

Survey	Year	Sub Locality	Avg. Diff. (m)	Std Dev. (m)	Range (m)
H11710	2009	Rockaway Beach	-0.45	0.237	-1.35 to 1
H12527	2013	SW of Jones Beach Island	0.383	0.641	-2.25 to 3.3
H12600	2014	North of Fire Island	0.346	0.232	-1.2 to 1.5
H12601	2014	Vicinity of Sinnecock Inlet	0.196	0.873	-3.8 to 2.2
H12602	2013	Vicinity of Moriches Inlet	-0.142	0.795	-3.4 to 3.0
H12604	2013	Lower Bay to Jamaica Bay	-0.33	1.11	-5 to 1.34
H12607	2014	East Rockaway Inlet to Zachs Bay	0.218	0.674	-3.6 to 2.2

+

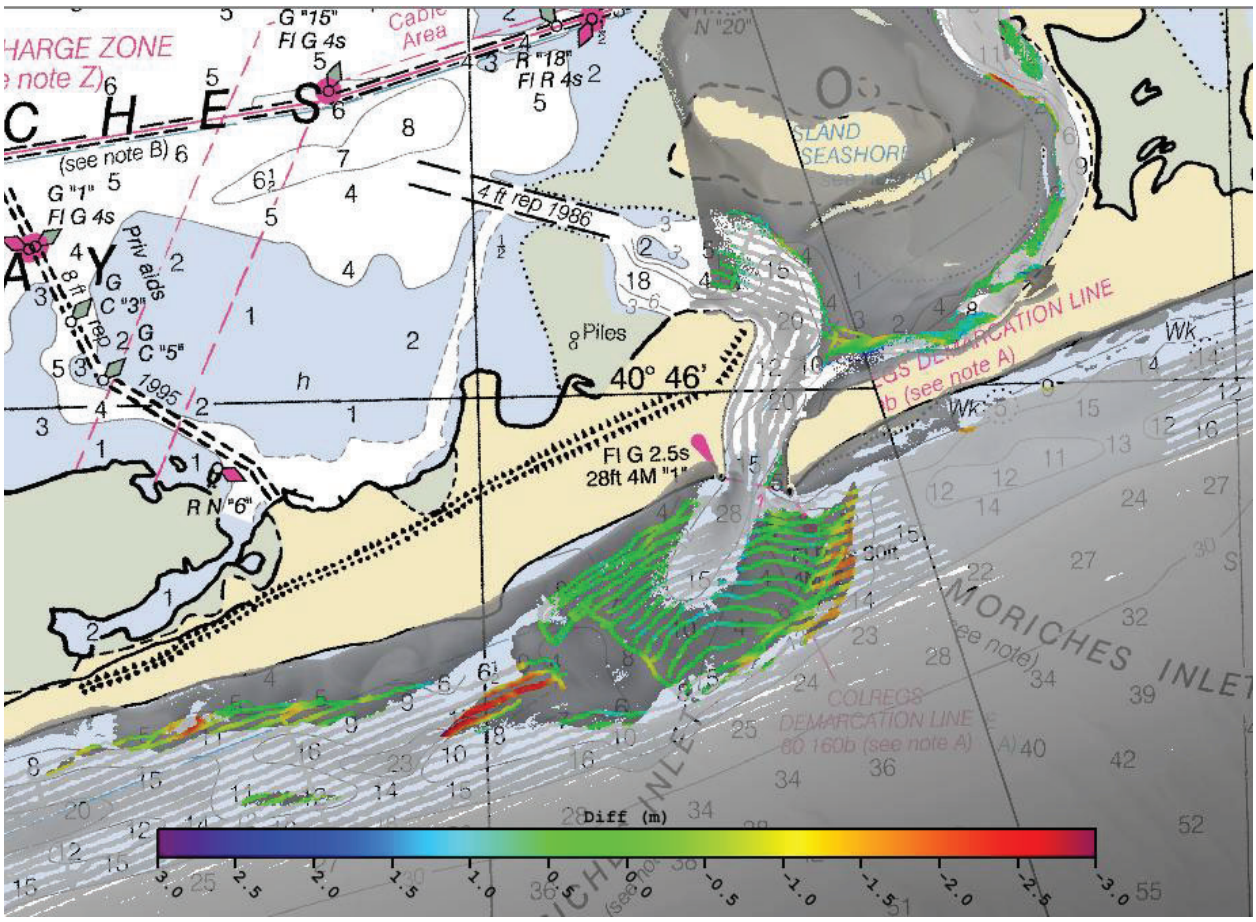


Figure 7 Area of overlap (rainbow) between survey H12602 (light grey) and W00303 (dark grey) at Moriches Inlet. Regions of variable change are highlighted as red or blue. Background chart 12352, 1:40,000.

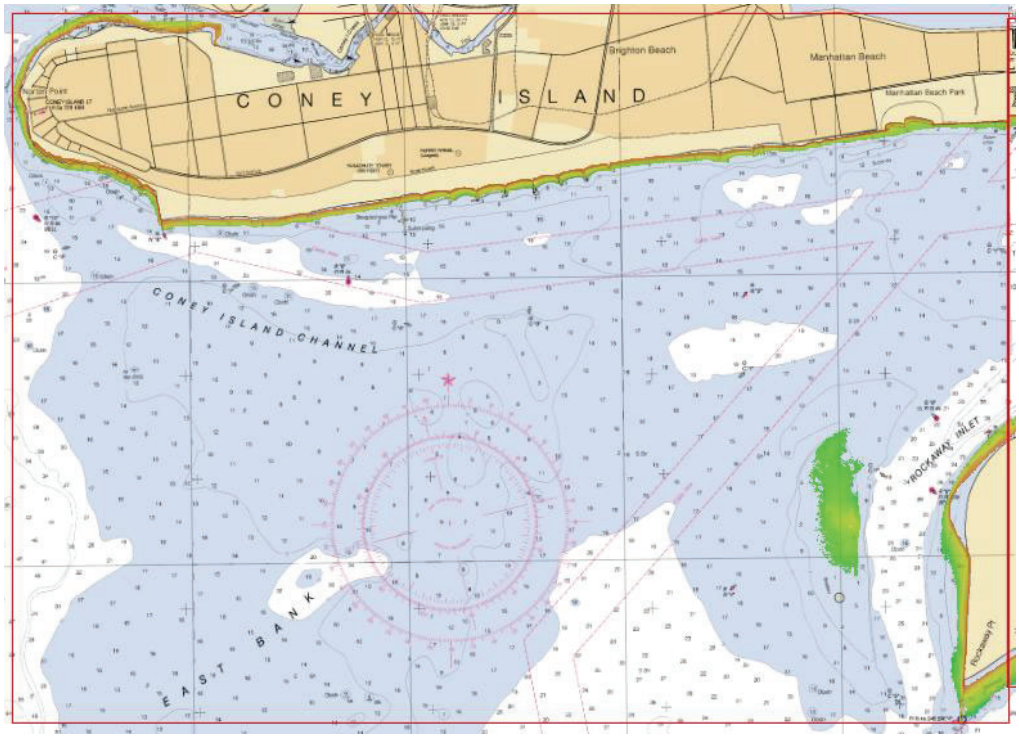
I. Approval

All records from RSD are included with the JHC IOCM products for final review and processing to the Processing Branch. The survey data meets or exceeds requirements for reconnaissance lidar data as set forth in the NOS Hydrographic Surveys and Specifications Deliverables Manual, Field Procedures Manual, Standing and Letter Instructions, and all HSD Technical Directives. These data are adequate to supersede charted data in their common areas. This survey is complete and no additional work is required with the exception of deficiencies noted in the Survey Summary Report.

Approver Name	Approver Title	Approval Date	Signature
Andrew A. Armstrong, III	Co-Director, Joint Hydrographic Center	28 October 2016	Andrew A. Armstrong III

Appendix A. Bathymetric Coverage

Images contain bathymetric coverage grid W00303_LI_3m_MLLW by block, over the largest scale chart.



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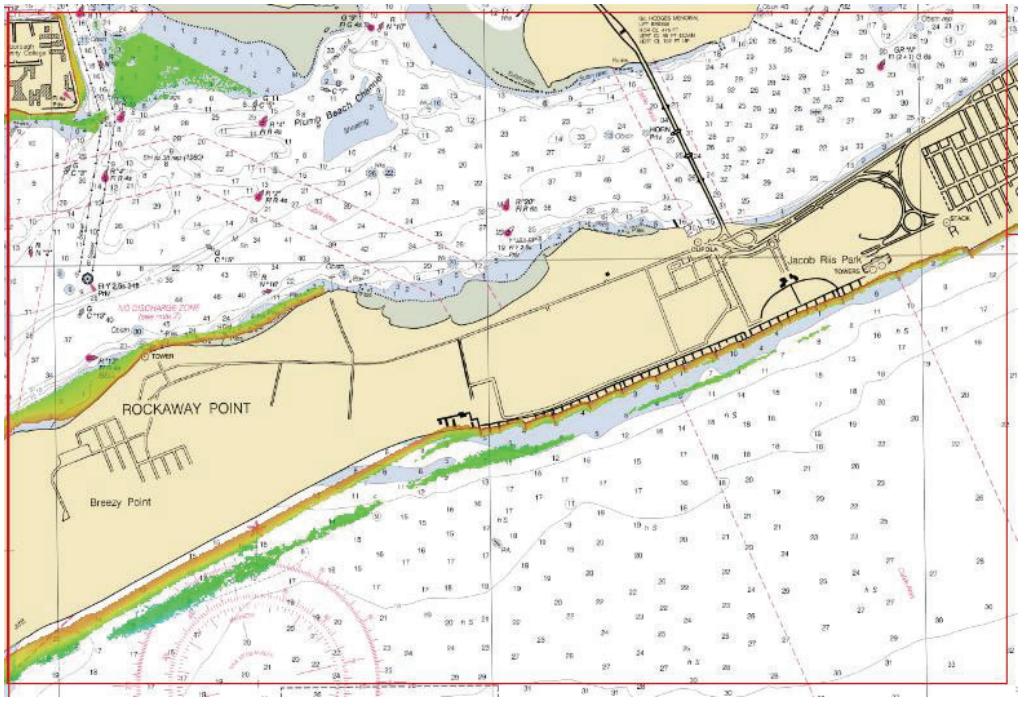

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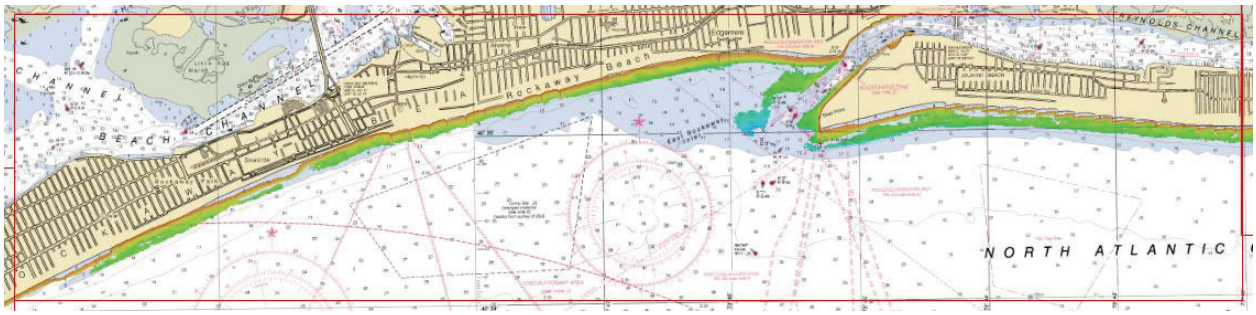

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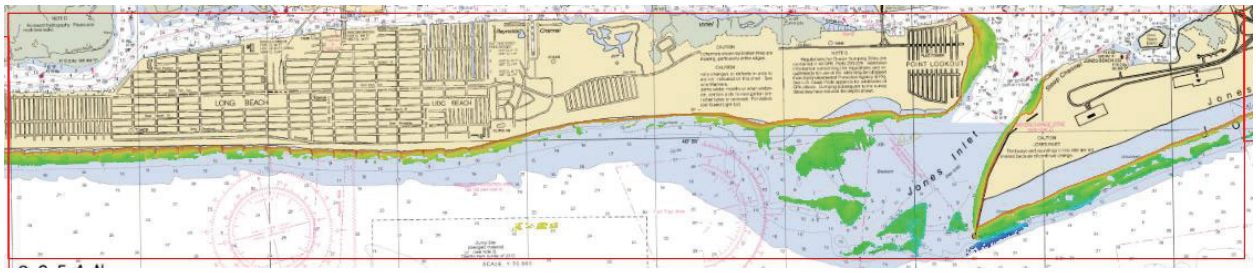

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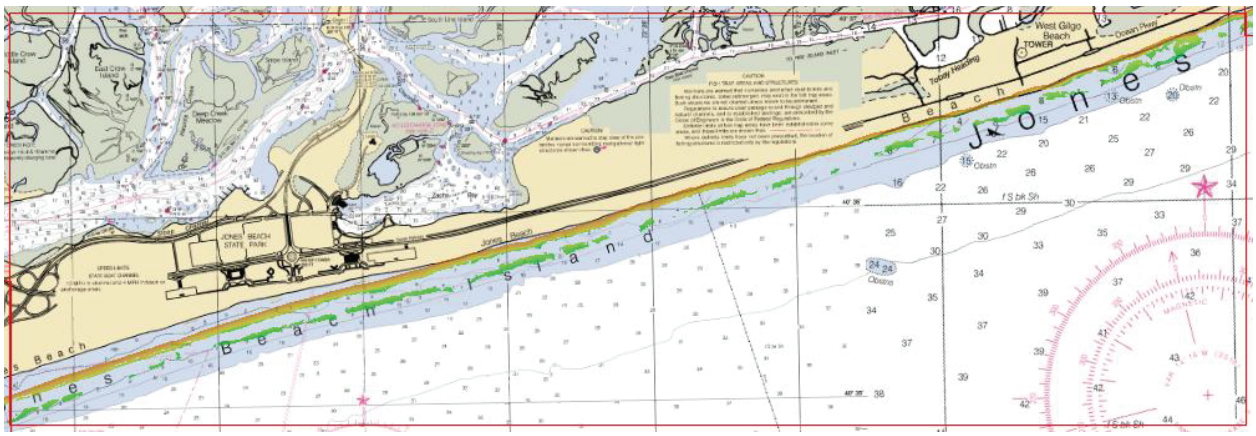

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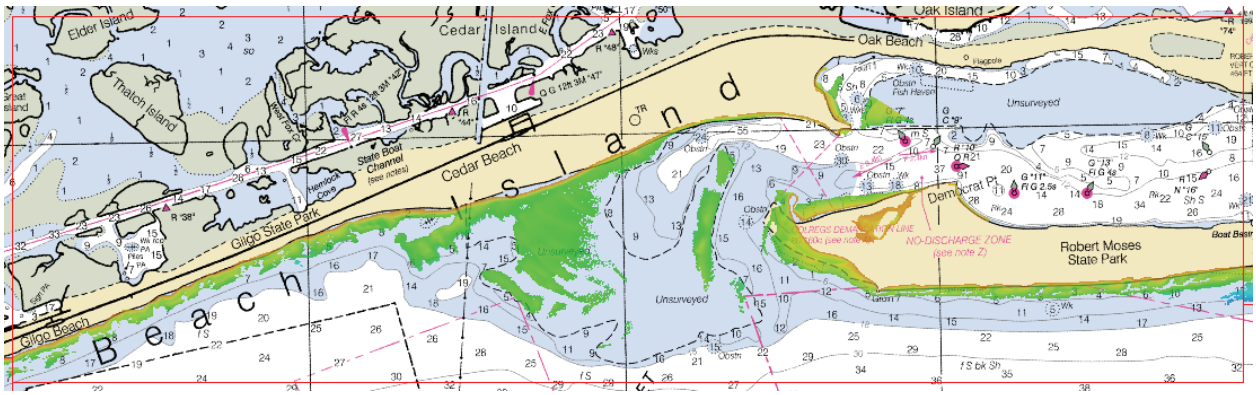

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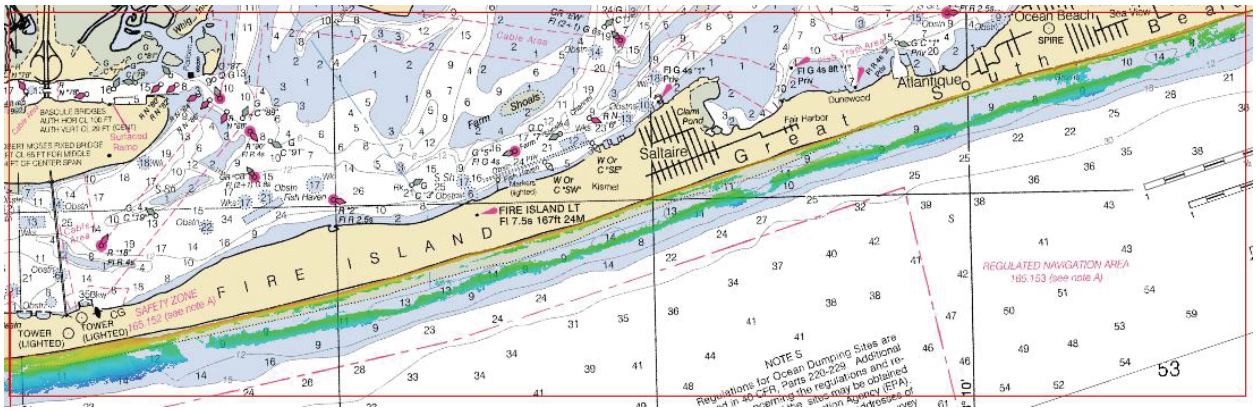

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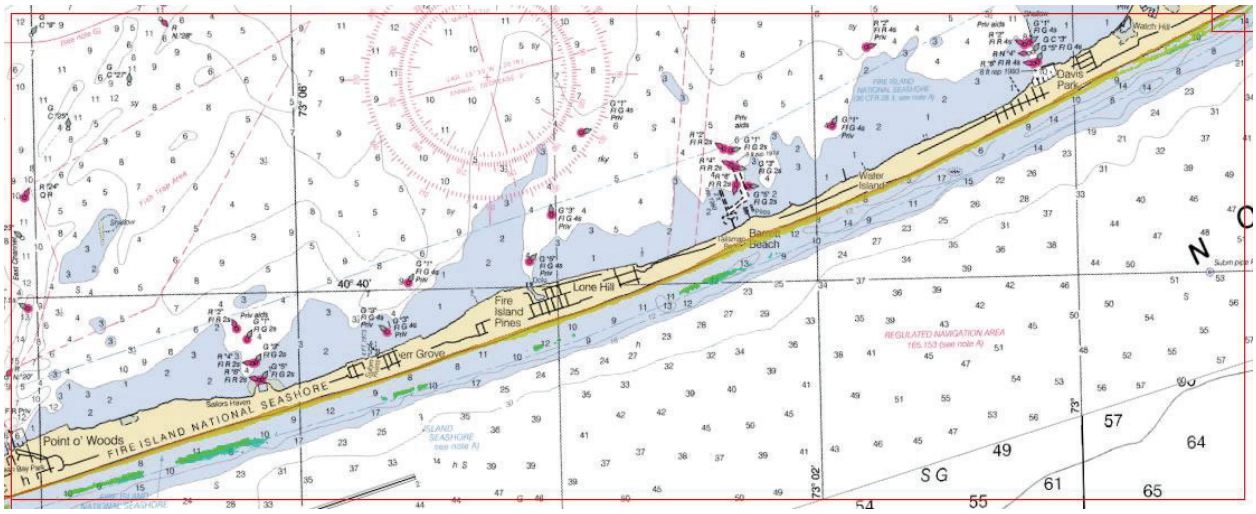

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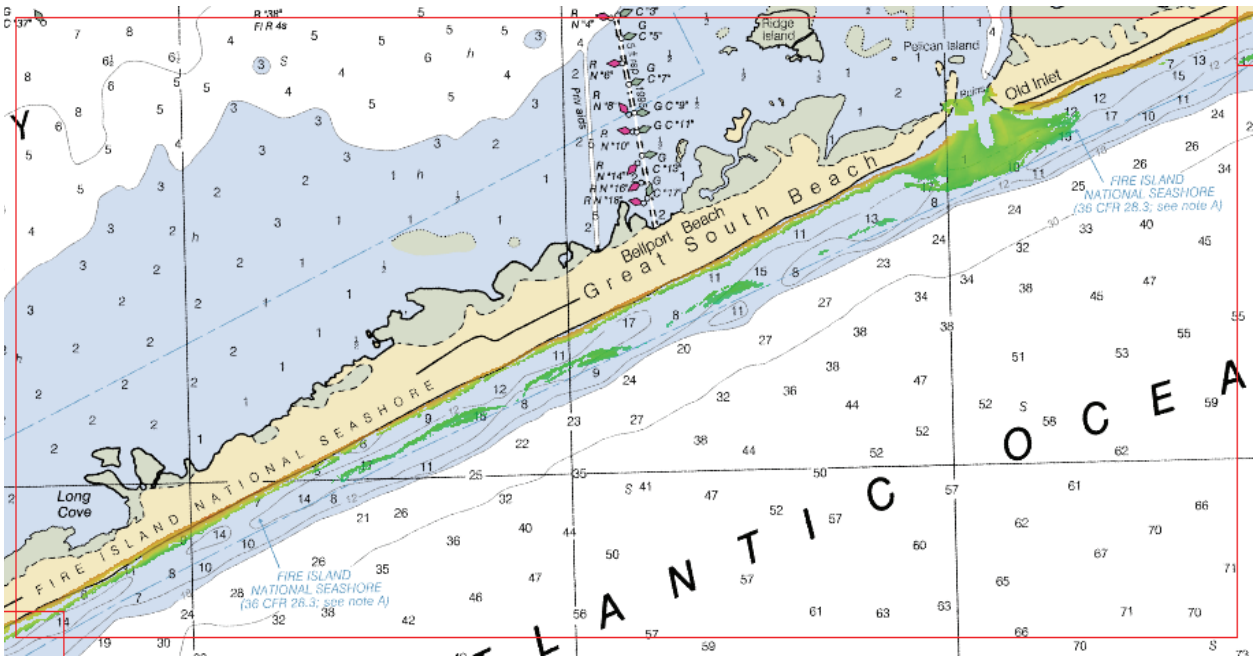

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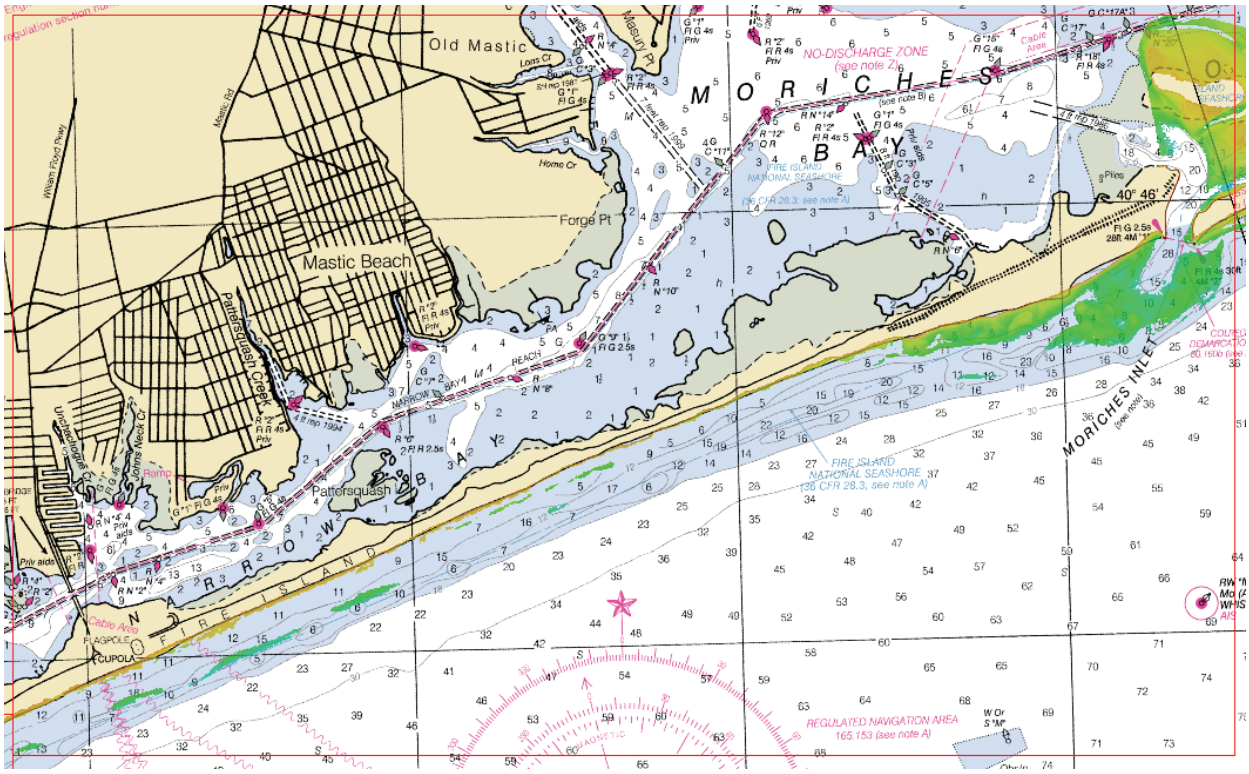

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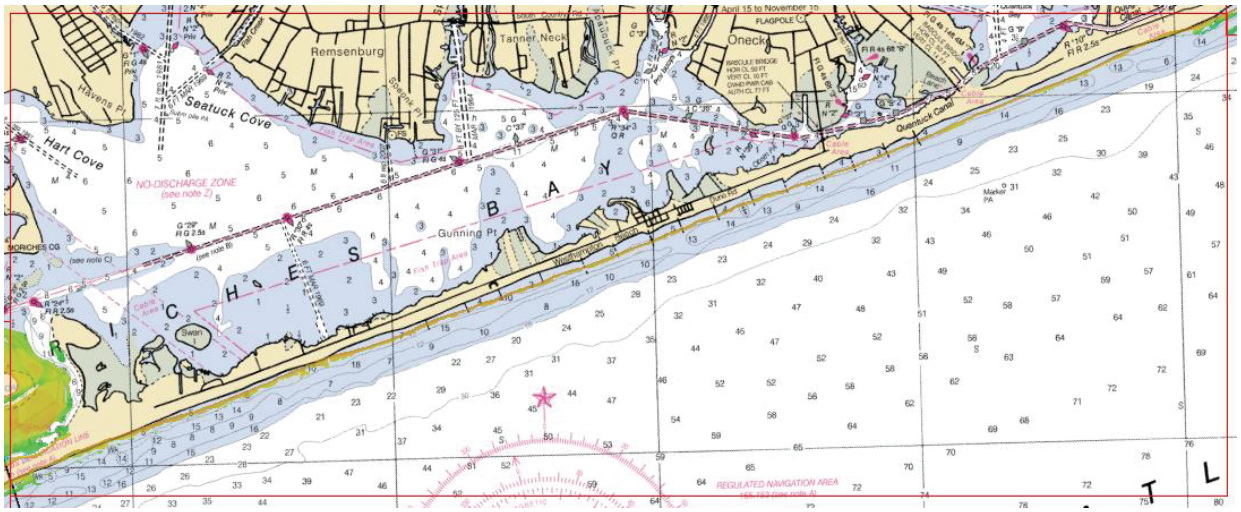

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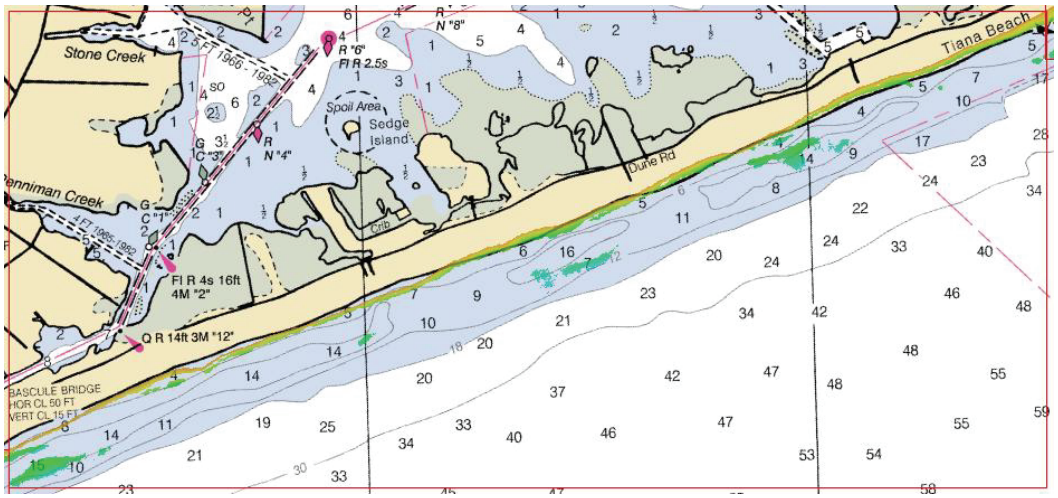

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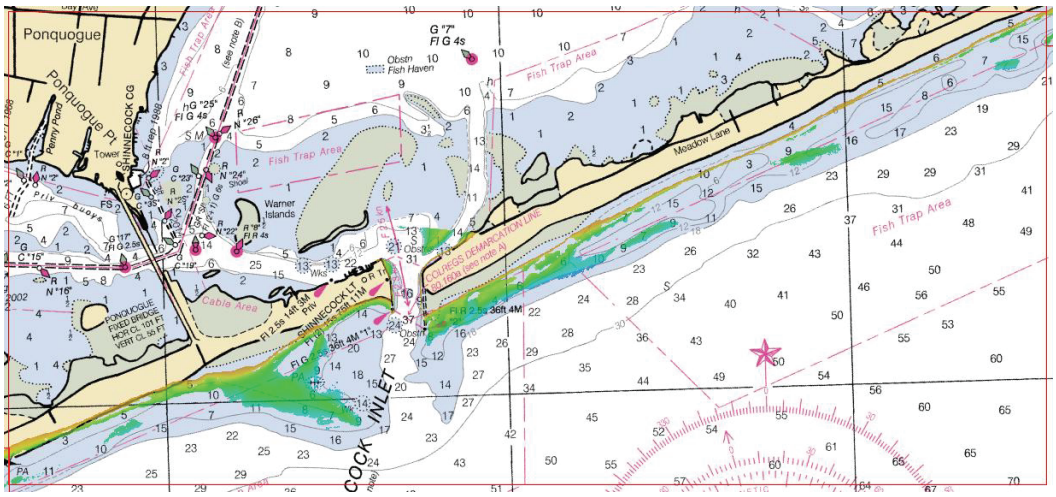

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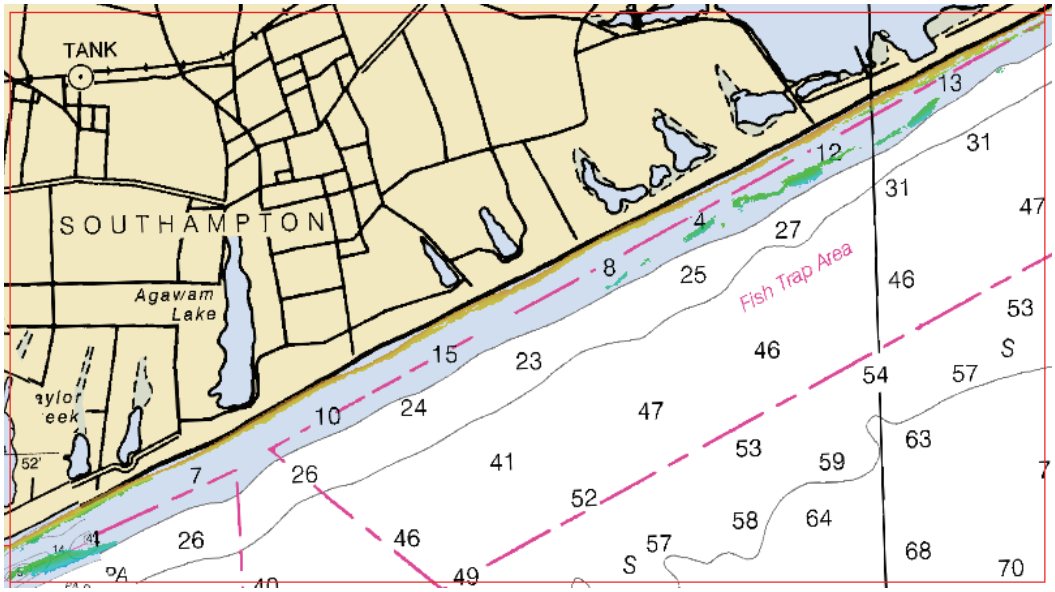

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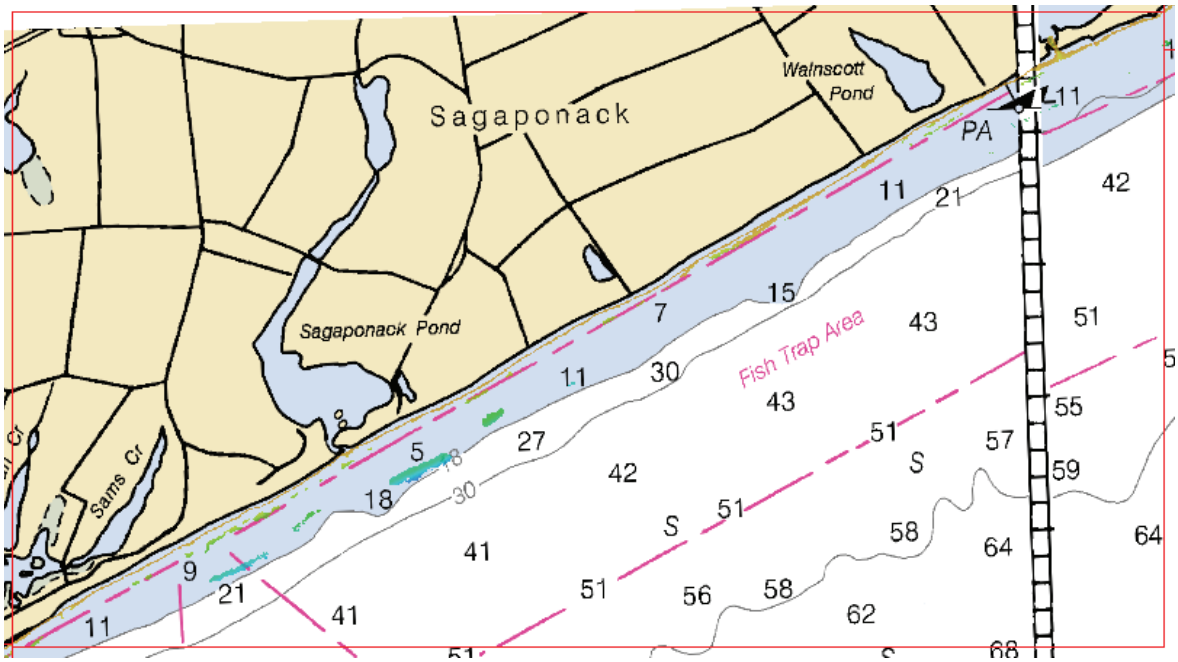

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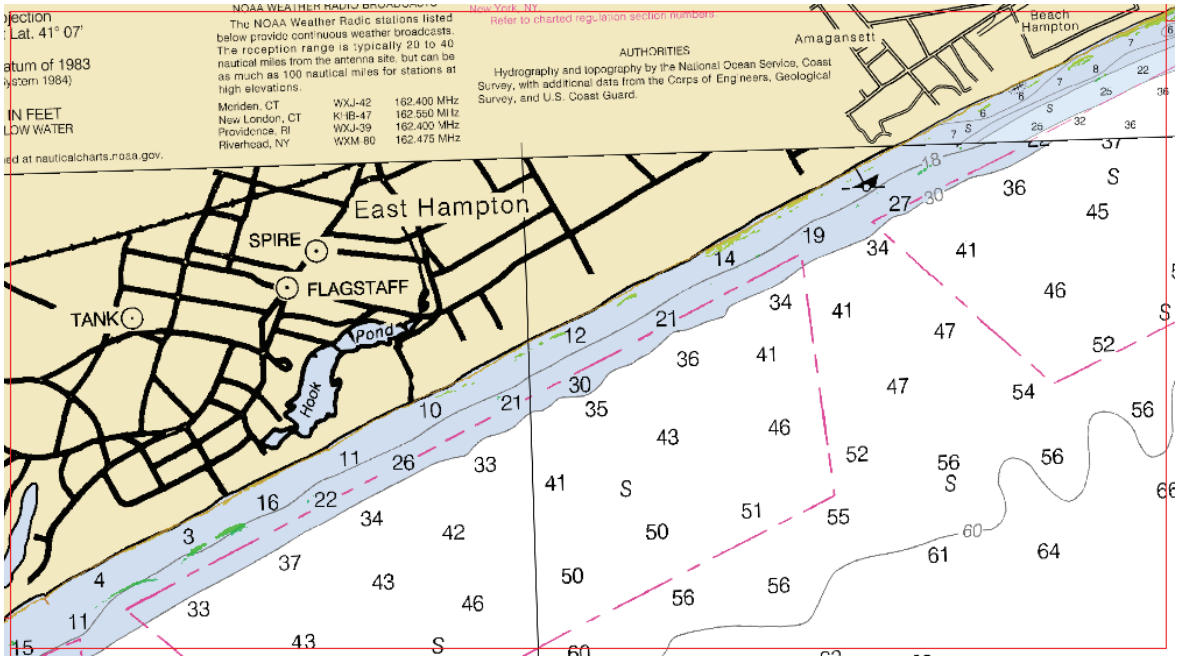

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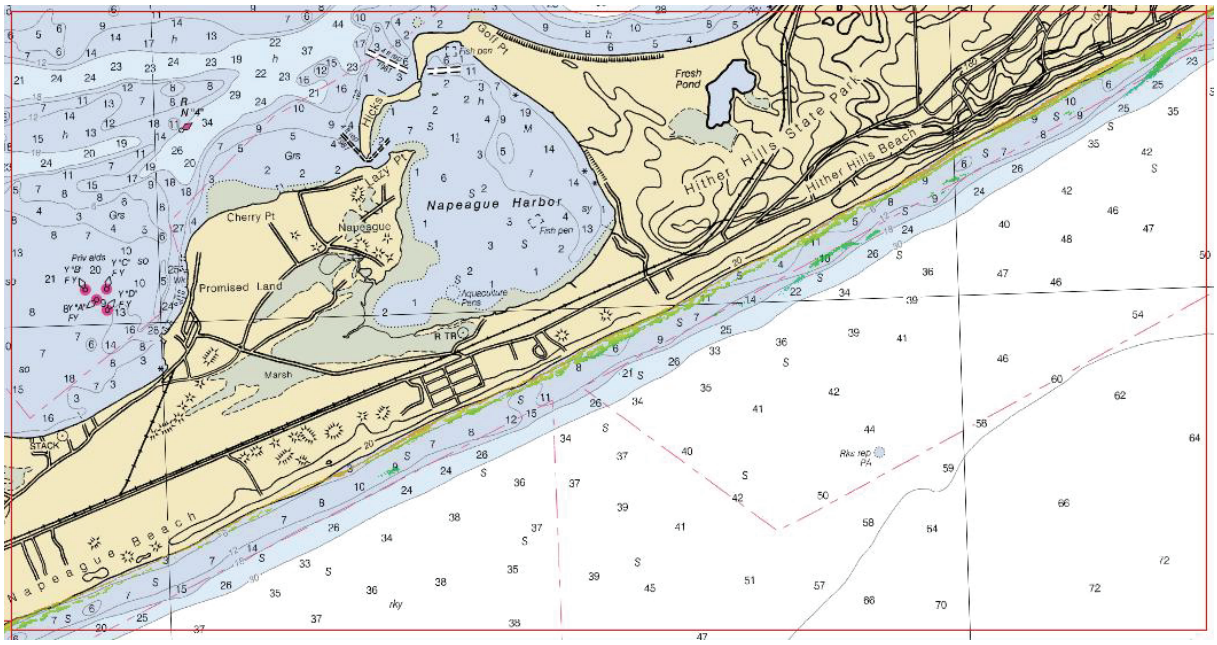

Block 139

Block 140

APPENDIX I

TIDES AND WATER LEVELS

Survey W00351 does not include supplemental tide or water level information.

APPENDIX II

SUPPLEMENTAL SURVEY RECORDS AND CORRESPONDENCE

Survey W00351 does not include supplemental survey records or correspondence.

APPROVAL PAGE

W00351

Data meet or exceed current specifications as certified by the OCS survey acceptance review process. Descriptive Report and survey data except where noted are adequate to supersede prior surveys and nautical charts in the common area.

The following products will be sent to NCEI for archive

- W00351_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records

The survey evaluation and verification has been conducted according current OCS Specifications, and the survey has been approved for dissemination and usage of updating NOAA's suite of nautical charts.

Briana J. Welton

Digitally signed by WELTON.BRIANA.JANE.1267667531
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Approved:_____

Lieutenant Commander Briana Welton, NOAA
Chief, Atlantic Hydrographic Branch