

**W00333**

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

**DESCRIPTIVE REPORT**

Type of Survey: External Source Data

Registry Number: W00333

**LOCALITY**

State(s): North Carolina

General Locality: Outer Banks, NC

Sub-locality: Ocracoke, NC to Atlantic, NC

**2014**

NOAA National Geodetic Survey  
Remote Sensing Division

**LIBRARY & ARCHIVES**

Date:

**HYDROGRAPHIC TITLE SHEET**

**W00333**

**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): **North Carolina**

General Locality: **Outer Banks, NC**

Sub-Locality: **Ocracoke, NC to Atlantic, NC**

Scale: **10000**

Dates of Survey: **11/25/2013 to 07/20/2014**

Project Number: **OSD-RSD-15**

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: W00333 has been designated a sub-region of W00300.**

*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 <https://www.ncei.noaa.gov/>.*

| <b>Descriptive Report Summary to Accompany</b><br><b>W00300</b> |   |
|---|---|
| Project   | OSD-RSD-15  |
| Survey  | W00300  |
| State   | Virginia, North Carolina, South Carolina          |
| Locality  | VA, NC, SC Coastline                              |
| Sub Locality  | Cape Henry, VA to Winyah Bay, SC                  |
| 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  | 25 NOV 2013 to 20 JUL 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 Winyah Bay, SC to Norfolk, VA. 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 01 through block 60, 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 |
|-----------------|-----------------|
| 36.97 N         | 33.18 N         |
| 76.30 W         | 79.18 W         |

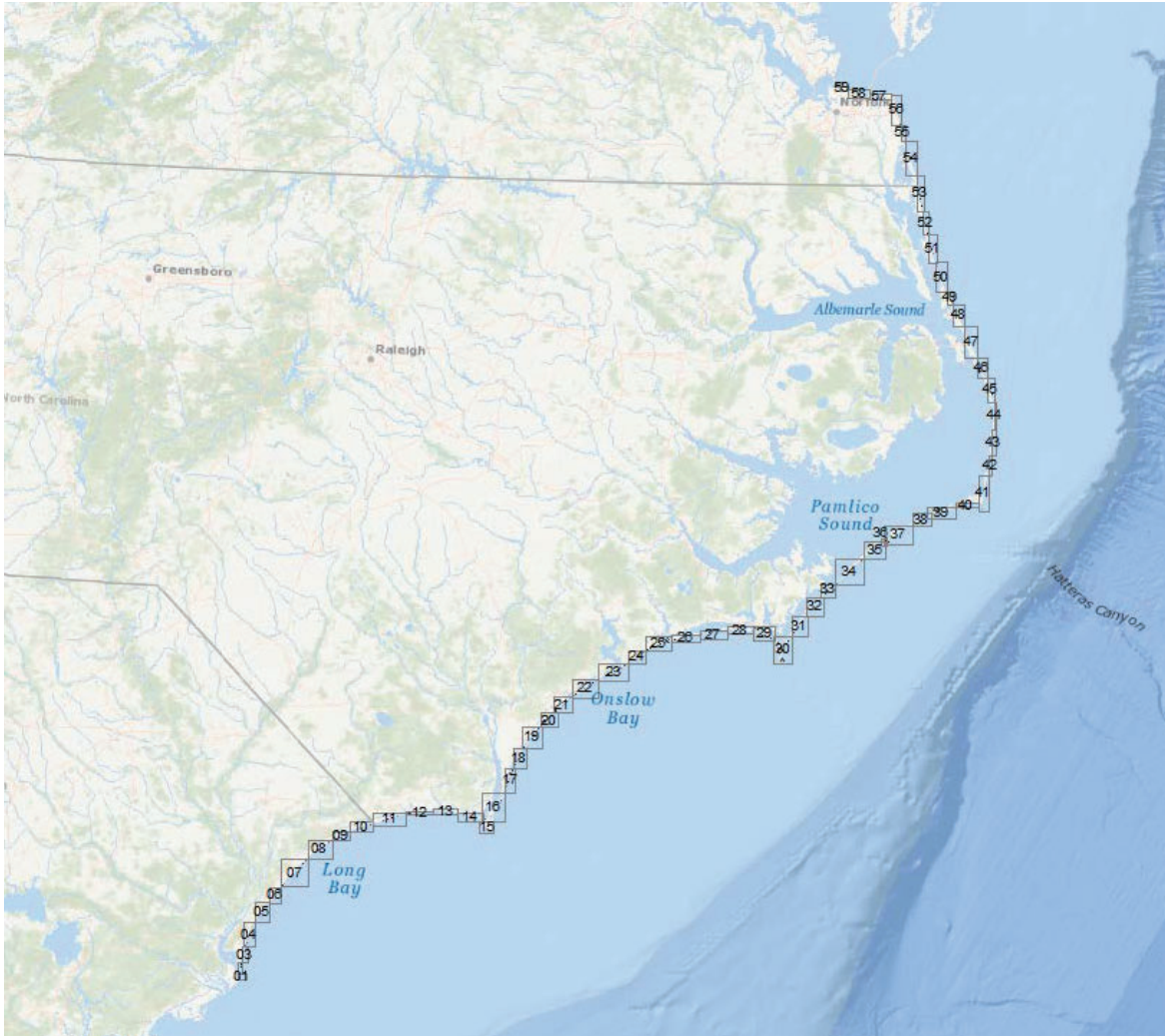


Figure 1 Image depicts region of coverage broken up by assigned block 01 through 60. The data contains topo-bathy lidar coverage of inlets and near shore outer coast gridded at 3m resolution. See Appendix A for bathymetric coverage by block.

## 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 (GC11173), 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.

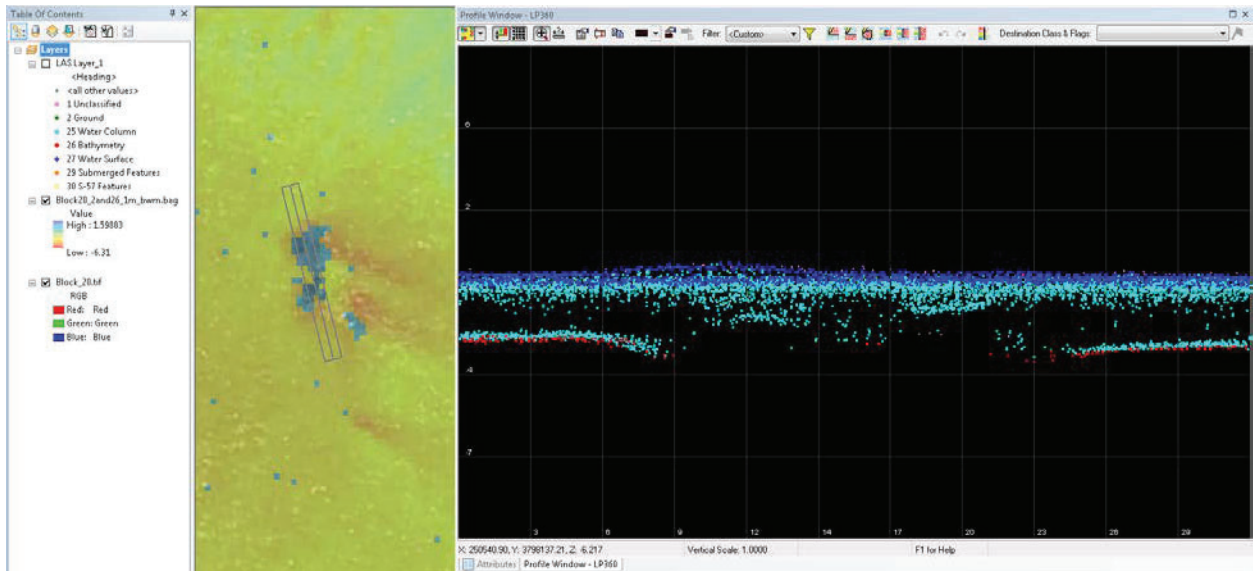
The lidar las files and aerial imagery were processed in ArcMAP 10.4.0, LP360 2015.1.76.7 for ArcMAP extension and Caris Base Editor 4.1. In LP360 the data were reviewed to confirm classification was correct, point source IDs were assigned to flight lines, data were in MLLW, fliers were removed, and 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**

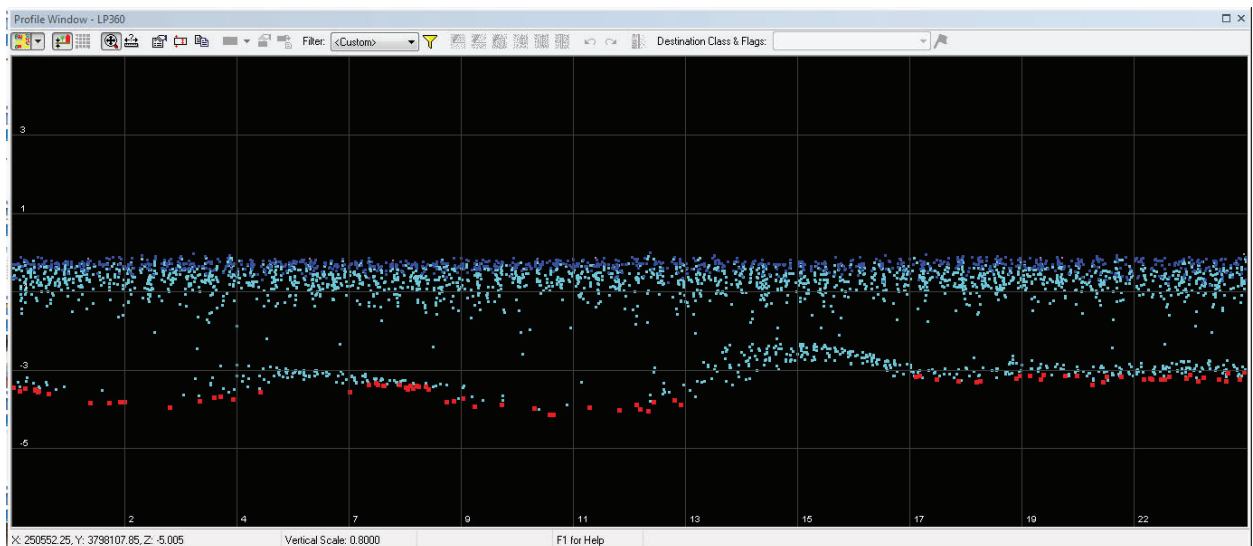
| Lidar Class | Category           |
|-------------|--------------------|
| 1           | Unclassified       |
| 2           | Ground             |
| 25          | Water Column       |
| 26          | Bathymetry         |
| 27          | Water Surface      |
| 29          | Submerged Features |
| 30          | 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. No data points were found within class 29 or 30 for these blocks. All features, such as those represented in the shoreline file (piers, buoys, pilings, etc.), are located in class 1 unclassified, along with noise and other miscellaneous points not classified. Occasionally, features are also included in additional classes, such as 25 water column or 27 water surface (Figure 2).



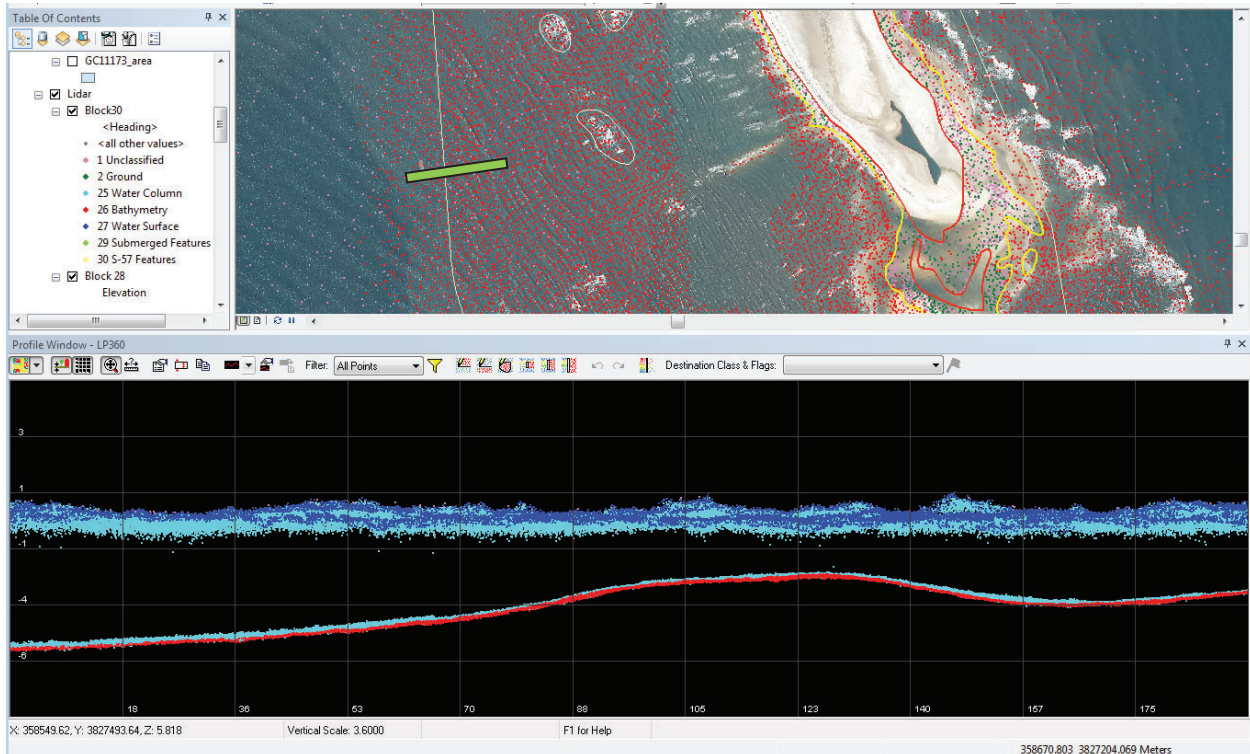
**Figure 2 LP360 profile of submerged wreck represented in water column class, light blue points. Red points represent classified bathymetry and royal blue points represent classified water surface. Block 20.**

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 intertidal area 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. Block 20.**

The data were reviewed for submerged features outside of the RSD shoreline boundary extent. Blocks 1-60, represent the most southern extent of the full Sandy data set and have better clarity and less noise than northern blocks, however in shallow areas water column noise is enough to inhibit identification of features. The increased noise in the system was due to an increase in the sensitivity of the sensor to improve bathymetric measurements, as described on page 31 of the RSD DR DAPR.



**Figure 4** Block 28, off Cape Fear, favorable conditions achieved bathymetric coverage up to 6 m depth. Water column and surface noise only affected the top meter of water.

In LP360, the chart, LAS files, aerial imagery, and final shoreline GC11174 were used to search for and identify any additional features in the data, not included in the RSD shoreline. The features are digitized at survey scale and included in the final feature file W00300\_FFF.000. The features include pilings, breakers, shoreline construction, beacons/buoys, obstructions and cartographic notes.

While reviewing the las files, minor edits and corrections were made to the las files before generating the final csar grid. Missing las files were obtained from RSD in blocks 2, 6, 7 and 39. Block 28 was received referenced to the Geoid and was converted to MLLW using VDatum. Some points were reclassified in block 14 and 16 and exported for gridding.

A 3 m grid surface was generated for the entire data set and used to make additional product layers. At this resolution, 92.4% of nodes have 5 soundings or more (Figure 5). 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.

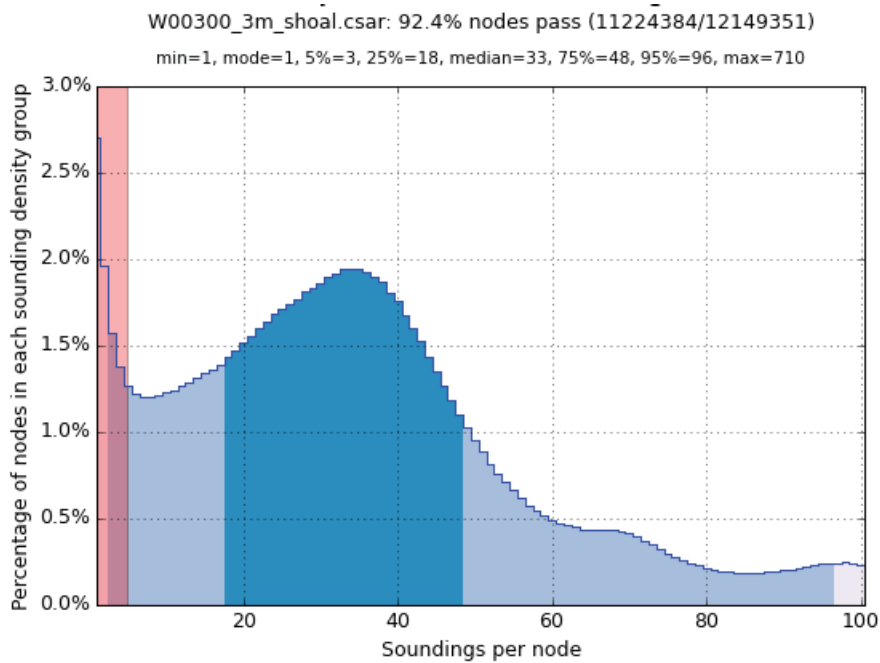


**Table 3 Bathymetric Surfaces**

| Surface Name      | Surface Type | Resolution | Depth Range (m) | Surface Parameter | Purpose                 |
|-------------------|--------------|------------|-----------------|-------------------|-------------------------|
| W00300_LI_3m_MLLW | BAG/CSAR     | 3m         | -4.48 to 8.26   | Shoalest Depth    | Reconnaissance Coverage |
| W00300_LI_1m_MLLW | BAG/CSAR     | 1m         | -14.7 to 27.1   | 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 01 through 60 outlines, as seen in Figure 1 (SHP)



**Figure 5 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 1.9 m with an average of 4 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 ENC, which cover the survey area, 1:80,000 and higher, used to compare with W00300:

| Chart | Scale    | Edition | Edition Date | LNM Date  | NM Date   |
|-------|----------|---------|--------------|-----------|-----------|
| 12255 | 1:5,000  | 18      | 9/01/2014    | 7/2/2016  | 7/12/2016 |
| 11547 | 1:15,000 | 40      | 7/1/2015     | 7/2/2016  | 7/12/2016 |
| 11545 | 1:20,000 | 66      | 6/01/2015    | 7/2/2016  | 7/12/2016 |
| 12245 | 1:20,000 | 68      | 05/01/2013   | 7/2/2016  | 7/12/2016 |
| 12254 | 1:20,000 | 49      | 08/01/2011   | 7/2/2016  | 7/12/2016 |
| 12256 | 1:20,000 | 18      | 01/01/2014   | 7/2/2016  | 7/12/2016 |
| 11532 | 1:40,000 | 22      | 10/01/2012   | 7/2/2016  | 7/12/2016 |
| 11534 | 1:40,000 | 39      | 11/01/2015   | 7/2/2016  | 7/12/2016 |
| 11537 | 1:40,000 | 40      | 02/01/2015   | 7/2/2016  | 7/12/2016 |
| 11541 | 1:40,000 | 41      | 11/01/2015   | 7/9/2016  | 7/12/2016 |
| 11542 | 1:40,000 | 19      | 08/01/2014   | 7/16/2016 | 7/12/2016 |
| 11545 | 1:40,000 | 66      | 06/01/2015   | 7/2/2016  | 7/12/2016 |
| 11550 | 1:40,000 | 31      | 07/01/2015   | 7/2/2016  | 7/12/2016 |
| 12222 | 1:40,000 | 55      | 02/01/2015   | 7/2/2016  | 7/12/2016 |
| 11531 | 1:80,000 | 23      | 09/01/2012   | 7/2/2016  | 7/12/2016 |
| 11535 | 1:80,000 | 13      | 02/01/2012   | 7/2/2016  | 7/12/2016 |
| 11536 | 1:80,000 | 20      | 01/01/2015   | 7/2/2016  | 7/12/2016 |
| 11539 | 1:80,000 | 20      | 09/01/2014   | 7/2/2016  | 7/12/2016 |
| 11543 | 1:80,000 | 25      | 04/01/2015   | 7/2/2016  | 7/12/2016 |
| 11544 | 1:80,000 | 41      | 12/01/2013   | 7/2/2016  | 7/12/2016 |
| 11555 | 1:80,000 | 42      | 04/01/2015   | 7/2/2016  | 7/12/2016 |
| 12204 | 1:80,000 | 38      | 12/01/2012   | 7/2/2016  | 7/12/2016 |
| 12205 | 1:80,000 | 34      | 04/01/2014   | 7/2/2016  | 7/12/2016 |
| 12207 | 1:80,000 | 24      | 07/01/2014   | 7/2/2016  | 7/12/2016 |
| 12221 | 1:80,000 | 82      | 02/01/2014   | 7/2/2016  | 7/12/2016 |

| ENC      | Scale    | Edition | Update Application | Issue Date |
|----------|----------|---------|--------------------|------------|
| US4NC11M | 1:80,000 | 13      | 7/20/2016          | 7/20/2016  |
| US4NC13M | 1:80,000 | 14      | 6/22/2016          | 6/22/2016  |
| US4NC15M | 1:80,000 | 19      | 7/1/2016           | 7/1/2016   |
| US4NC16M | 1:80,000 | 15      | 3/15/2016          | 5/4/2016   |
| US4NC30M | 1:80,000 | 21      | 7/15/2016          | 7/15/2016  |
| US4NC31M | 1:80,000 | 18      | 6/22/2016          | 6/22/2016  |
| US4NC32M | 1:80,000 | 10      | 10/28/2014         | 2/17/2016  |
| US4NC53M | 1:80,000 | 24      | 7/18/2016          | 7/18/2016  |
| US5NC12M | 1:40,000 | 38      | 6/8/2016           | 6/8/2016   |
| US5NC14M | 1:40,000 | 8       | 7/13/2016          | 7/13/2016  |
| US5NC17M | 1:15,000 | 37      | 6/17/2016          | 6/17/2016  |
| US5NC18M | 1:40,000 | 12      | 6/30/2016          | 6/30/2016  |
| US5NC19M | 1:40,000 | 9       | 6/20/2016          | 6/20/2016  |
| US5NC51M | 1:40,000 | 11      | 7/12/2016          | 7/12/2016  |
| US5NC53M | 1:40,000 | 10      | 6/15/2016          | 6/15/2016  |
| US4SC20M | 1:80,000 | 11      | 6/14/2016          | 6/14/2016  |
| US4SC31M | 1:80,000 | 12      | 6/15/2016          | 6/15/2016  |
| US5SC32M | 1:40,000 | 20      | 3/17/2016          | 3/17/2016  |
| US5SC34M | 1:40,000 | 22      | 6/7/2016           | 6/7/2016   |
| US5VA11M | 1:50,000 | 19      | 3/17/2016          | 3/28/2016  |
| US5VA13M | 1:40,000 | 32      | 3/17/2016          | 5/6/2016   |
| US5VA15M | 1:20,000 | 44      | 4/14/2016          | 4/20/2016  |
| US5VA17M | 1:20,000 | 27      | 4/12/2016          | 6/24/2016  |
| US5VA18M | 1:5,000  | 14      | 7/20/2016          | 7/20/2016  |
| US5VA19M | 1:20,000 | 27      | 3/17/2016          | 4/5/2016   |
| US5VA20M | 1:20,000 | 13      | 7/20/2016          | 7/20/2016  |

The dataset was reviewed for dangers to navigation, areas of significant bathymetric cover related to chart scale, and areas of significant shoreline change that may warrant return by a hydrographic platform. Survey scale soundings generated from the three meter surface were used to evaluate differences with the chart.

During evaluation several regions of significant change were detected around inlets and capes and submitted to the Atlantic Hydrographic Branch for consideration as Danger to Navigation (Dton). The Branch analyzed the data and submitted 59 shoal soundings as Dtons to MCD. The report created by the Branch, W00300\_Dton\_#1, has been included in this data submission. As stated in the report, final sounding selection will be performed during HCell compilation. Figure 6 and 7 highlight two areas of significant change included in the Dton submission.

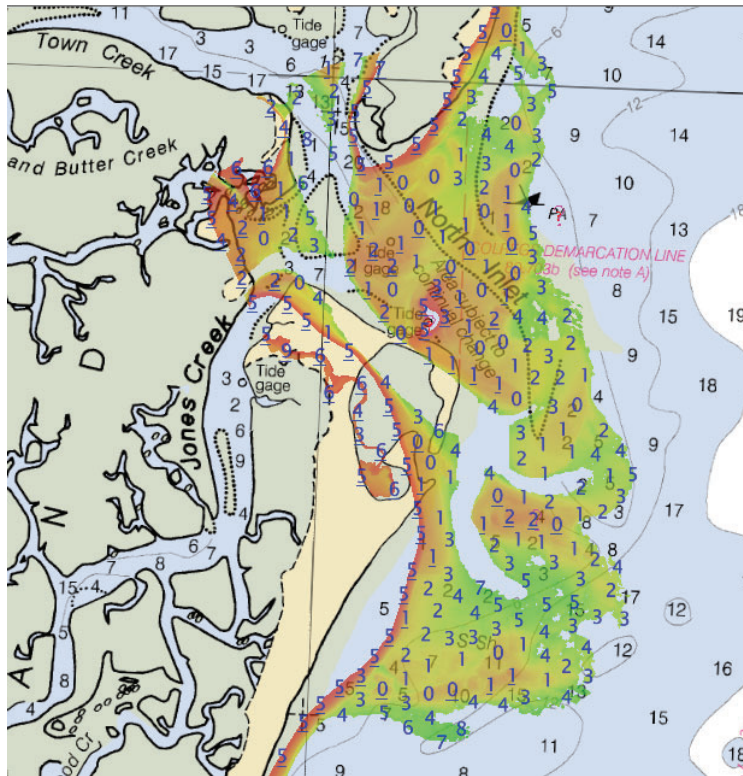


Figure 6 Lidar coverage over North Inlet, SC demonstrating extended shoaling offshore, not captured on chart 11532.

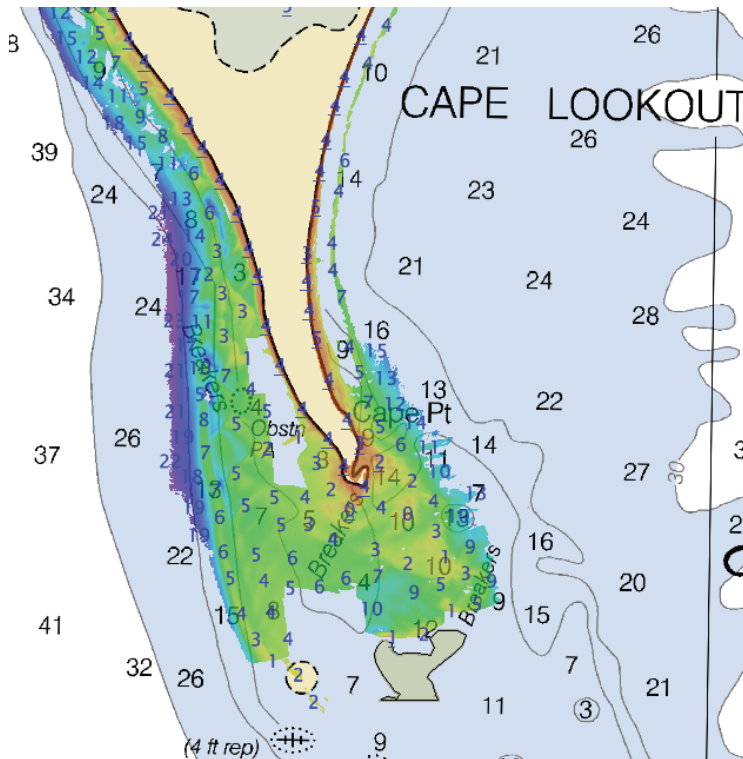


Figure 7 Topo-bathy lidar coverage over Cape Lookout, NC illuminating significant shoaling off the point. Background chart 11543.

Of the sixty blocks of data submitted, fifty-seven have significant bathymetric coverage (SBC) that could be used to update soundings on the chart. Thirteen blocks do not have significant bathymetric coverage. The following table highlights which blocks do (light grey) or do not (dark grey) have bathymetry and the corresponding RNCs and ENC that cover the area. Blocks are considered insignificant bathymetric coverage if the laser did not penetrate the water surface, there is no data below MLLW, or the bathymetric coverage is so close to shore it would not warrant a sounding on the largest scale chart.

| Block | SBC | 1:5,000 | 1:15,000 /<br>1:20,000 | 1:40,000 /<br>1:50,000 | 1:80,000            | ENC                                    |
|-------|-----|---------|------------------------|------------------------|---------------------|--|
| 1     | Y   |         |                        | 11532                  | 11531, 11535        | US5SC32M                               |
| 2     | Y   |         |                        | 11532                  | 11531, 11535        | US5SC32M                               |
| 3     | Y   |         |                        | 11532                  | 11531, 11535        | US5SC32M                               |
| 4     | Y   |         |                        | 11532                  | 11531, 11535        | US5SC32M                               |
| 5     | Y   |         |                        | 11534                  | 11531, 11535        | US4SC20M, US5SC34M                     |
| 6     | Y   |         |                        | 11534                  | 11535               | US4SC20M, US5SC34M                     |
| 7     | N   |         |                        | 11534                  | 11535               | US4SC20M, US5SC34M                     |
| 8     | N   |         |                        | 11534                  | 11535               | US4SC20M, US5SC34M                     |
| 9     | N   |         |                        | 11534                  | 11535               | US4SC20M, US5SC34M                     |
| 10    | Y   |         |                        | 11534                  | 11535               | US4SC20M, US5SC34M                     |
| 11    | Y   |         |                        | 11534                  | 11535, 11536        | US4SC20M, US5SC34M, US4NC11M           |
| 12    | Y   |         |                        | 11534                  | 11536               | US5SC34M, US4NC11M                     |
| 13    | Y   |         |                        | 11534                  | 11536               | US5SC34M, US4NC11M                     |
| 14    | Y   |         |                        | 11534                  | 11536               | US5SC34M, US4NC11M, US4NC12M           |
| 15    | Y   |         |                        | 11534                  | 11536, 11539        | US4NC11M, US4NC12M                     |
| 16    | Y   |         |                        | 11534                  | 11536, 11539        | US4NC11M, US4NC12M, US4NC13M           |
| 17    | Y   |         |                        | 11534                  | 11539               | US4NC12M, US4NC13M, US5SC34M           |
| 18    | Y   |         |                        | 11534, 11541           | 11539               | US4NC13M, US5SC34M, US5NC51M           |
| 19    | Y   |         |                        | 11541                  | 11539               | US4NC13M, US5NC51M                     |
| 20    | Y   |         |                        | 11541                  | 11539               | US4NC13M, US5NC51M                     |
| 21    | Y   |         |                        | 11541                  | 11539               | US4NC13M, US5NC51M                     |
| 22    | Y   |         |                        | 11541                  | 11539               | US4NC13M, US5NC51M, US5NC14M           |
| 23    | Y   |         |                        | 11541                  | 11539, 11543        | US4NC13M, US5NC14M                     |
| 24    | Y   |         |                        | 11541                  | 11539, 11543        | US4NC15M, US5NC14M, US5NC51M           |
| 25    | Y   |         |                        | 11541                  | 11543               | US4NC15M, US5NC51M                     |
| 26    | Y   |         |                        | 11541                  | 11543               | US4NC15M, US5NC51M                     |
| 27    | Y   |         |                        | 11541                  | 11543               | US4NC15M, US5NC51M                     |
| 28    | Y   |         | 11547                  | 11541, 11545           | 11543, 11544        | US4NC15M, US5NC51M, US5NC18M, US5NC17M |
| 29    | Y   |         | 11547                  | 11541, 11545           | 11543, 11544        | US4NC15M, US5NC18M, US5NC17M           |
| 30    | Y   |         |                        | 11545                  | 11543, 11544        | US4NC15M, US5NC18M, US4NC16M           |
| 31    | N   |         |                        | 11545                  | 11544               | US5NC18M, US4NC16M                     |
| 32    | N   |         |                        | 11545                  | 11544               | US5NC18M, US4NC16M                     |
| 33    | N   |         |                        | 11550, 11545           | 11544               | US5NC19M, US5NC18M, US4NC16M           |
| 34    | N   |         |                        | 11550                  | 11544, 11548        | US5NC19M, US4NC16M                     |
| 35    | N   |         |                        | 11550                  | 11544, 11555, 11548 | US5NC19M, US4NC16M                     |
| 36    | Y   |         |                        | 11550                  | 11555, 11548        | US4NC30M, US5NC19M                     |

|    |   |       |                        |              |              |                              |
|----|---|-------|------------------------|--------------|--------------|------------------------------|
| 37 | Y |       |                        | 11550        | 11555, 11548 | US5NC19M, US4NC30M           |
| 38 | Y |       |                        |              | 11555        | US4NC30M                     |
| 39 | Y |       |                        |              | 11555        | US4NC30M                     |
| 40 | N |       |                        |              | 11555        | US4NC30M                     |
| 41 | Y |       |                        |              | 11555        | US4NC30M                     |
| 42 | N |       |                        |              | 11555        | US4NC30M                     |
| 43 | Y |       |                        |              | 11555        | US4NC30M                     |
| 44 | N |       |                        |              | 12204, 11555 | US4NC31M, US5NC19M           |
| 45 | Y |       |                        |              | 12204, 12205 | US4NC53M                     |
| 46 | Y |       |                        |              | 12204, 12205 | US4NC31M                     |
| 47 | Y |       |                        |              | 12204, 12205 | US4NC53M                     |
| 48 | N |       |                        |              | 12204, 12205 | US4NC53M                     |
| 49 | N |       |                        |              | 12204, 12205 | US4NC53M                     |
| 50 | Y |       |                        |              | 12204, 12205 | US4NC53M                     |
| 51 | Y |       |                        |              | 12204, 12205 | US4NC53M                     |
| 52 | Y |       |                        |              | 12204, 12205 | US4NC53M, US4NC32M           |
| 53 | Y |       |                        |              | 12205        | US4NC32M                     |
| 54 | Y |       |                        | 12207        | 12205        | US4NC32M, US5VA11M           |
| 55 | Y |       |                        | 12207        | 12205        | US4NC32M, US5VA11M           |
| 56 | Y | 12205 |                        | 12207, 12222 | 12205, 12221 | US4NC32M, US5VA11M, US5VA13M |
| 57 | Y |       | 12256, 12254           | 12207, 12222 | 12205, 12221 | US5VA19M, US5VA20M           |
| 58 | Y | 12255 | 12256, 12245,<br>12254 | 12222        | 12205, 12221 | US5VA18M, US5VA20M           |
| 59 | Y |       | 12256, 12245,<br>12254 | 12222        | 12221        | US5VA20M, US5VA15M           |
| 60 | Y |       | 12256, 12245           | 12222        | 12221        | US5VA15M                     |

At the time of submission of the data to the processing branch, shoreline GC11173 has been applied to several charts. Prior to the application of the shoreline to the chart, significant shoreline change was observed around several inlets and capes and further development of the surrounding bathymetry may be necessary at Cape Fear, Barden Inlet, North Inlet, Rich Inlet, Browns Inlet, and Beaufort Inlet.

The charted navigation aids, aids represented in the lidar and imagery, and 5<sup>th</sup> District local notice to mariners (2013 - 2016) were cross referenced for inconsistencies. Several discrepancies are highlighted with carto-notes in the final feature file. Due to the variable nature of the sandy inlets in this region, many charts do not represent the navigation aids, as the buoys are moved frequently. Even charted buoys have moved several times since this data set was collected, making buoy positions represented in the lidar and imagery outdated.

#### **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 flight line patterns and environmental conditions as seen in Figure 7.

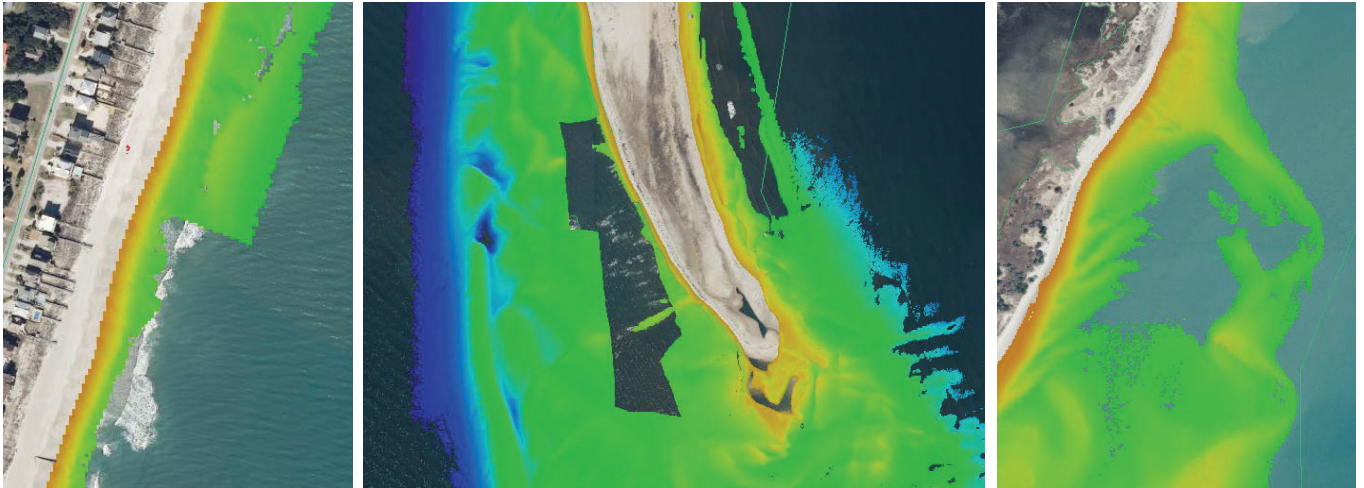


Figure 7 Examples of gaps in lidar coverage due to flight line patterns and extinction depth from W00301.

Several recent Office of Coast Survey Hydrographic surveys available at the National Center for Environmental Information (NCEI) appear to junction with W00300, however upon investigation, only one provides significant overlap. A surface comparison was performed with H12266, a 2010 survey by NRT2, in Beaufort Inlet, NC. W00300 was found on average 1.3 m shoaler, with differences ranging from -2.9 m to 7.6 m. These variable differences, from a four year period, reflect the transient nature of the seabed in this area, and possible need for frequent resurvey.

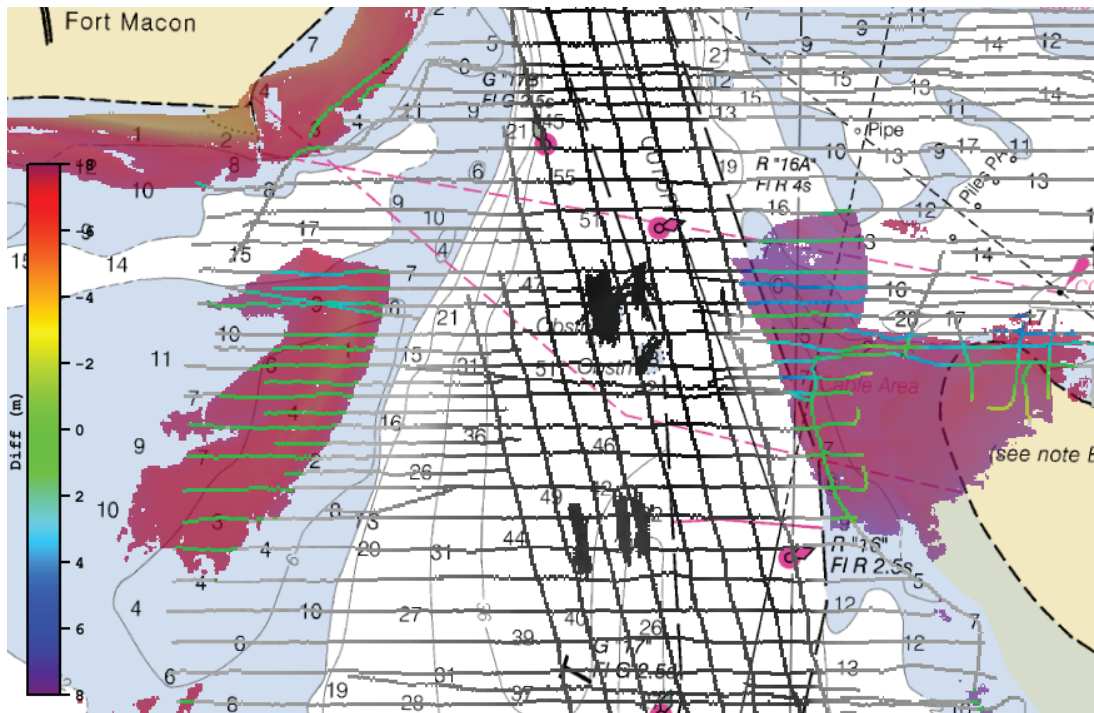



Figure 8 Area of overlap between survey H12266 (grey scale) and W00300 (red scale) in Beaufort Inlet. W00300 was found on average 1.3 m shoaler, as demonstrated in the rainbow colored difference grid. Background Chart 11547, 1:15,000.

### I. Approval

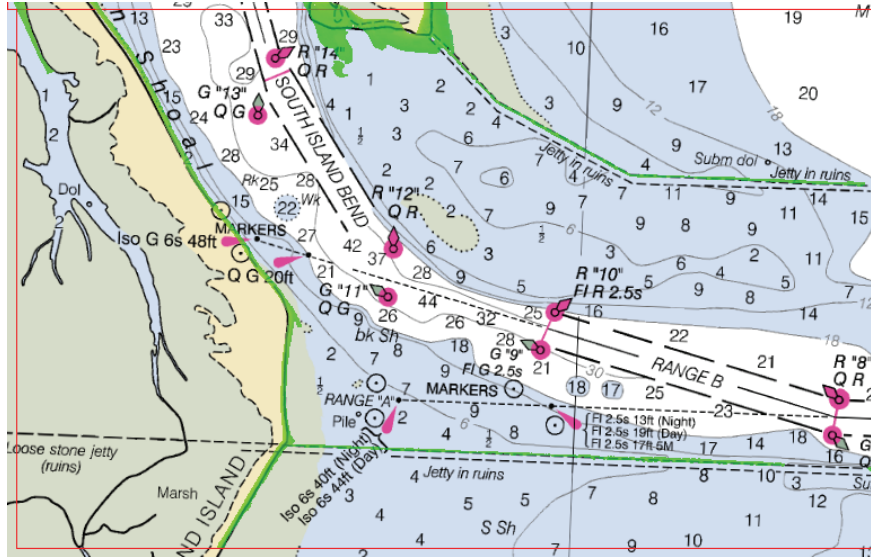
All records from RSD are included with the JHC IOCM products for final review and processing to the Processing Branch. The survey data meets or exceeds requirements for reconnaissance lidar data as set forth in the NOS Hydrographic Surveys and Specifications Deliverables Manual, Field Procedures Manual, 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 | 8/24/2016     |  |

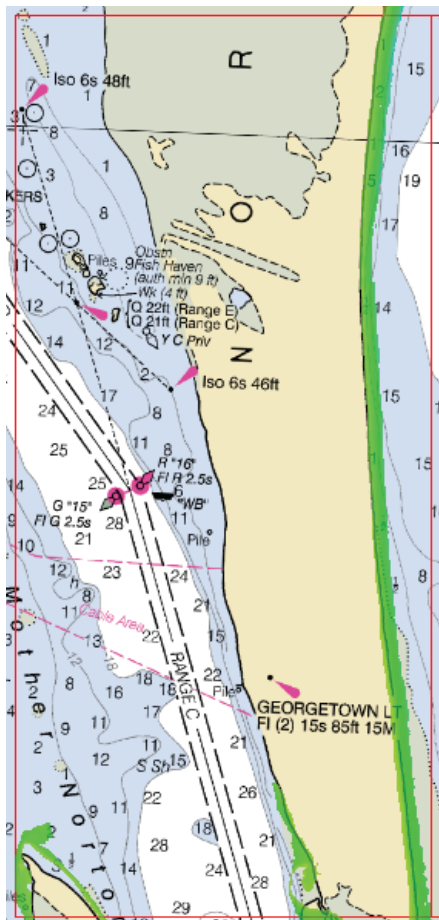


## Appendix A. Bathymetric Coverage

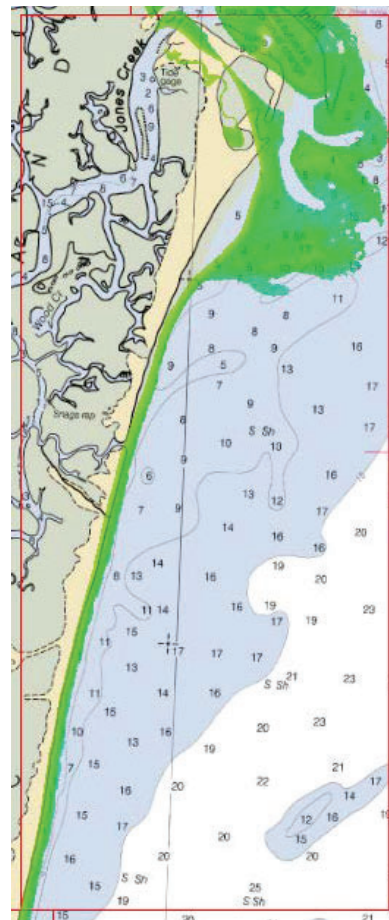
Images contain bathymetric coverage grid W00300\_LI\_3m\_MLLW by block, over the largest scale chart.



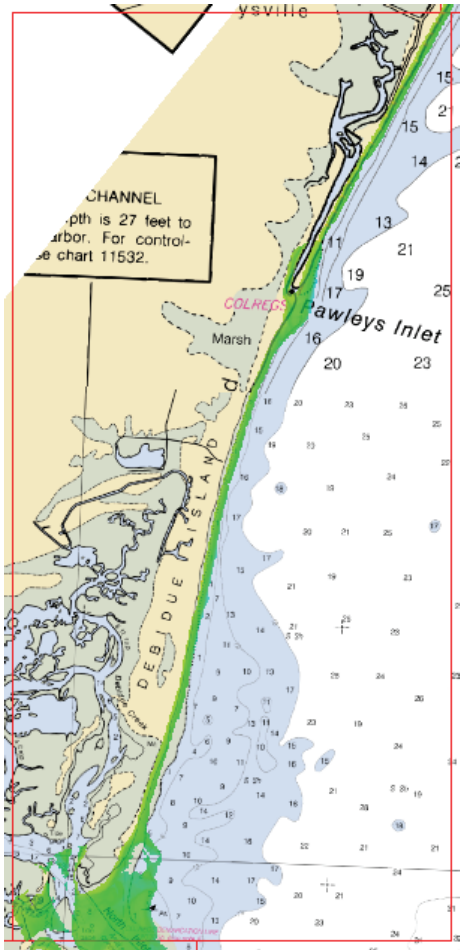
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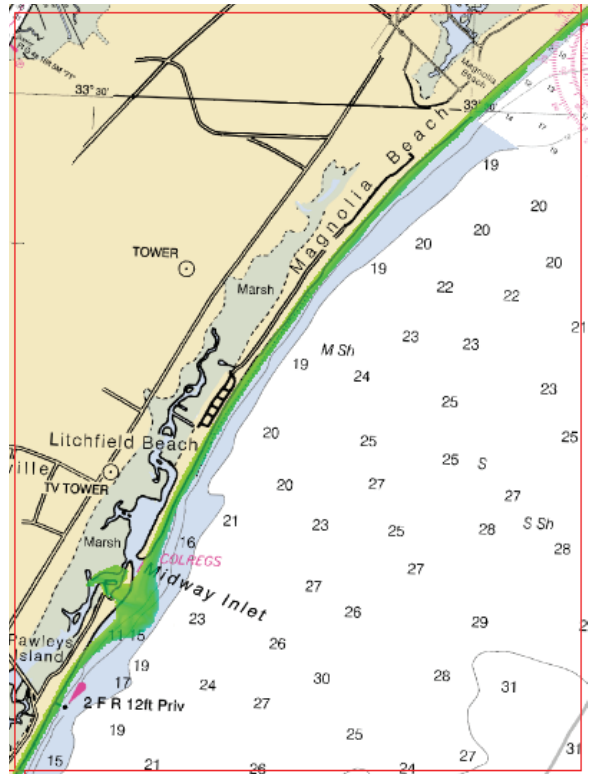
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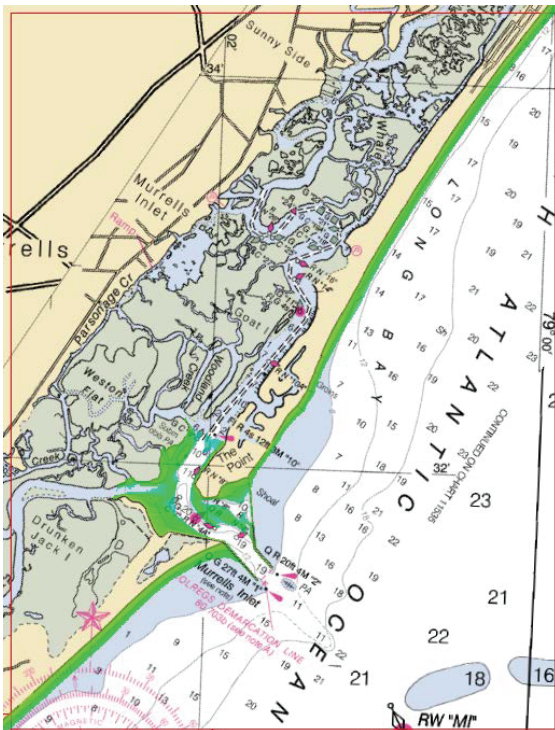
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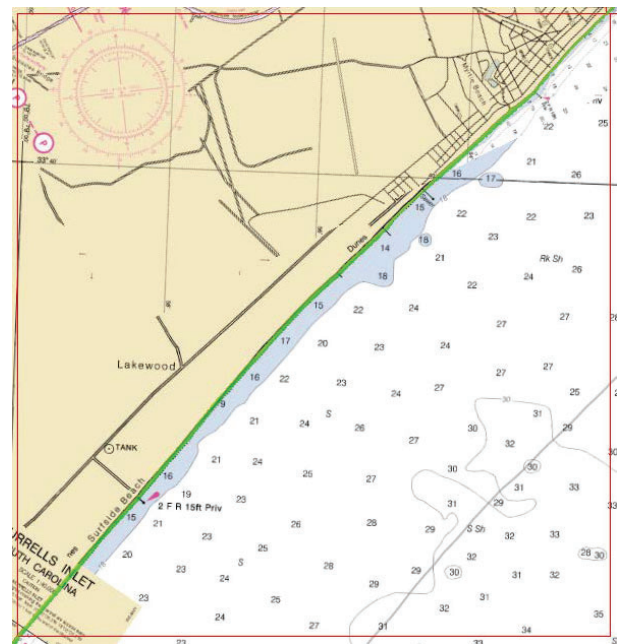
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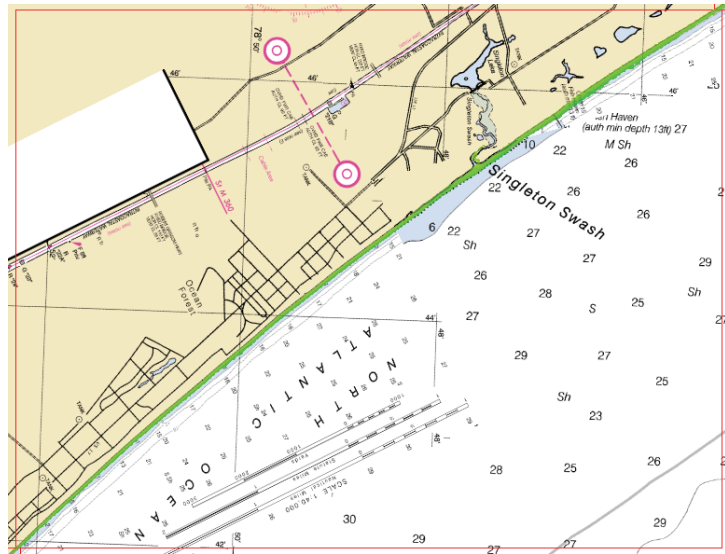
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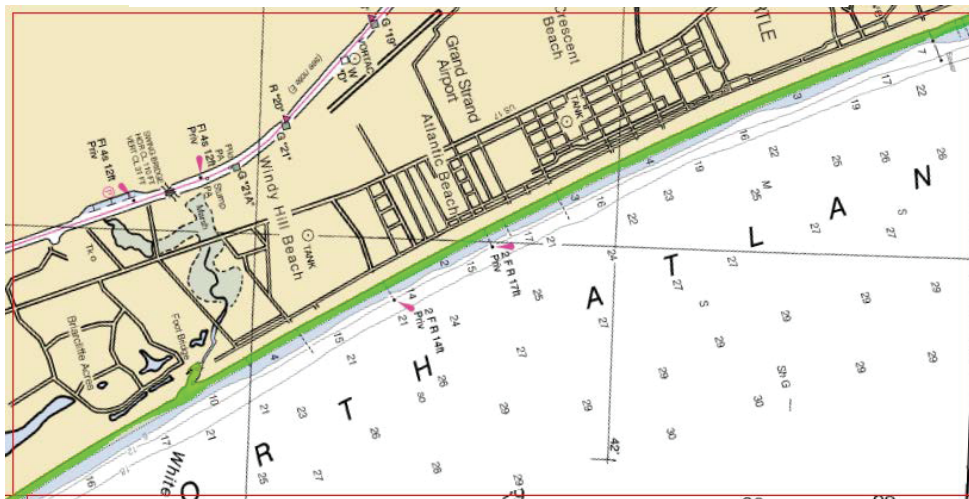
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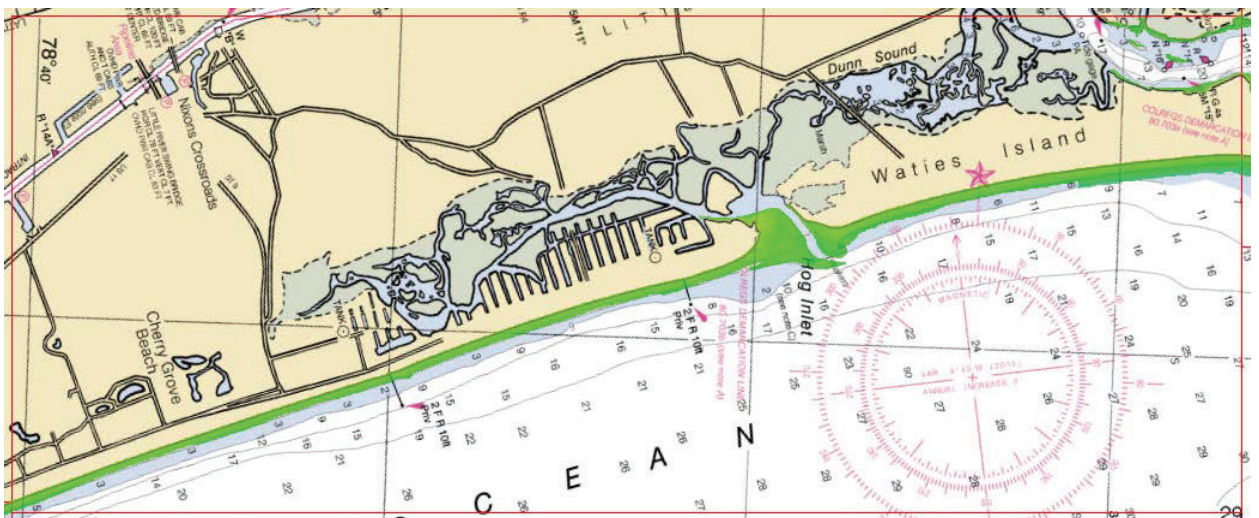
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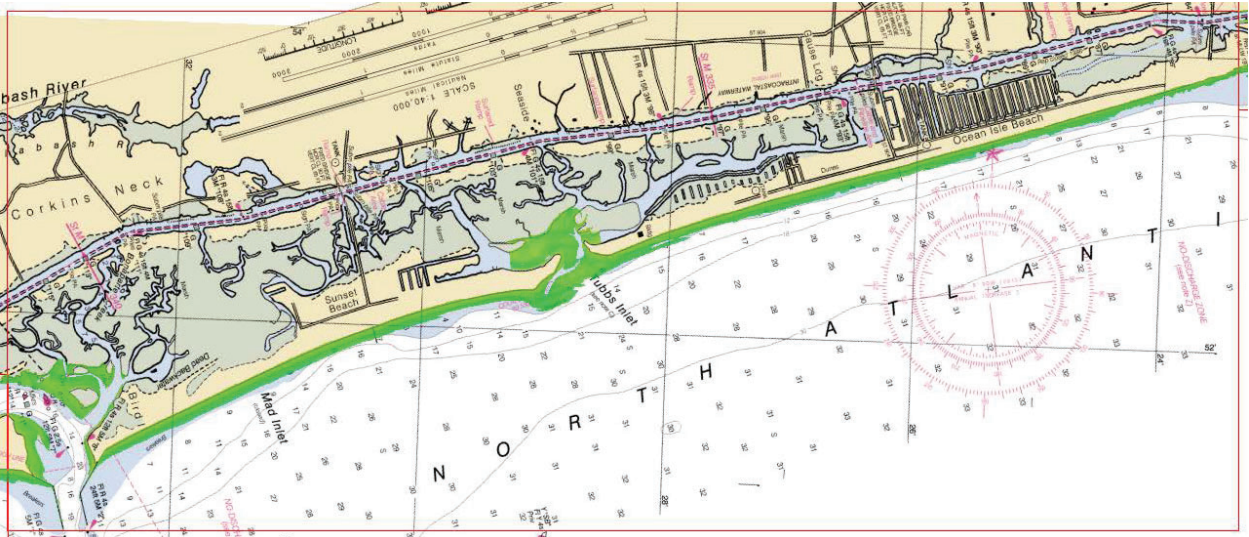
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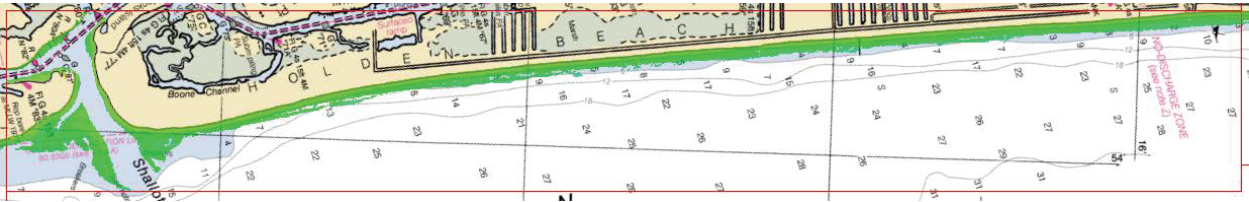
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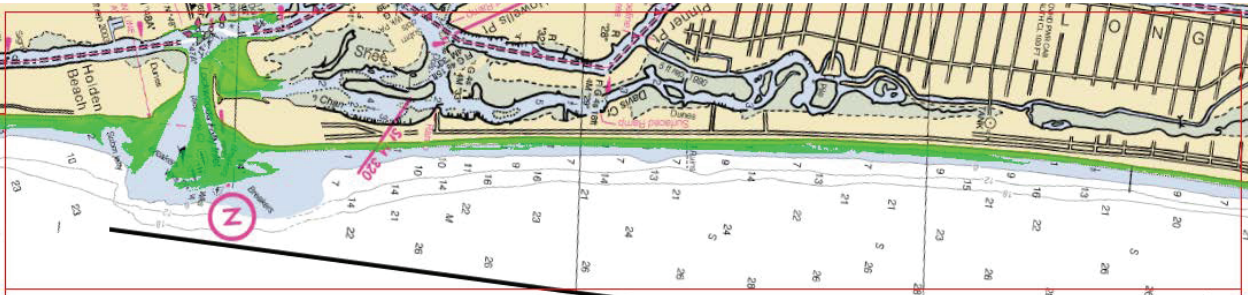
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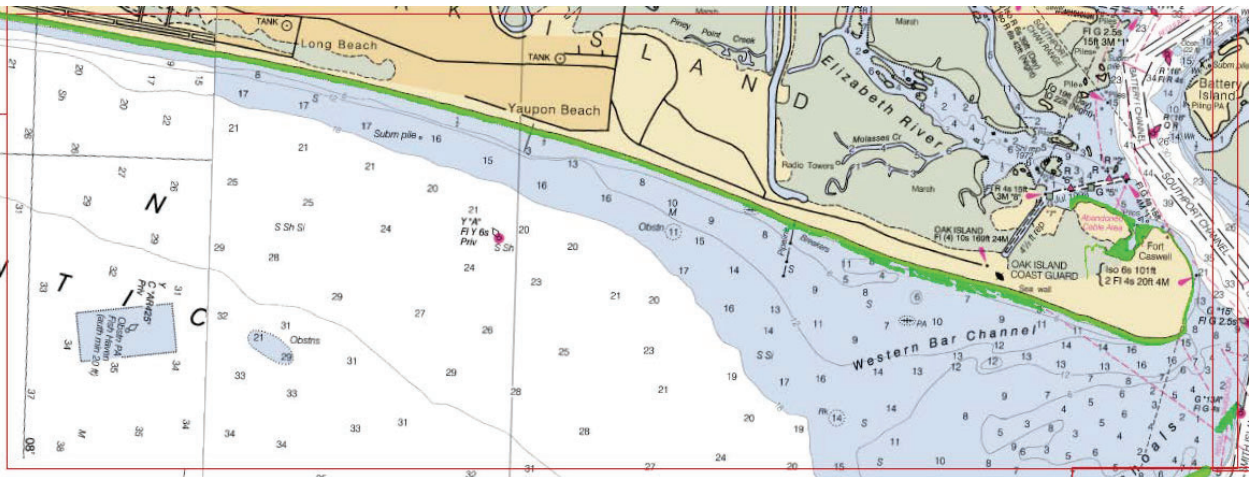
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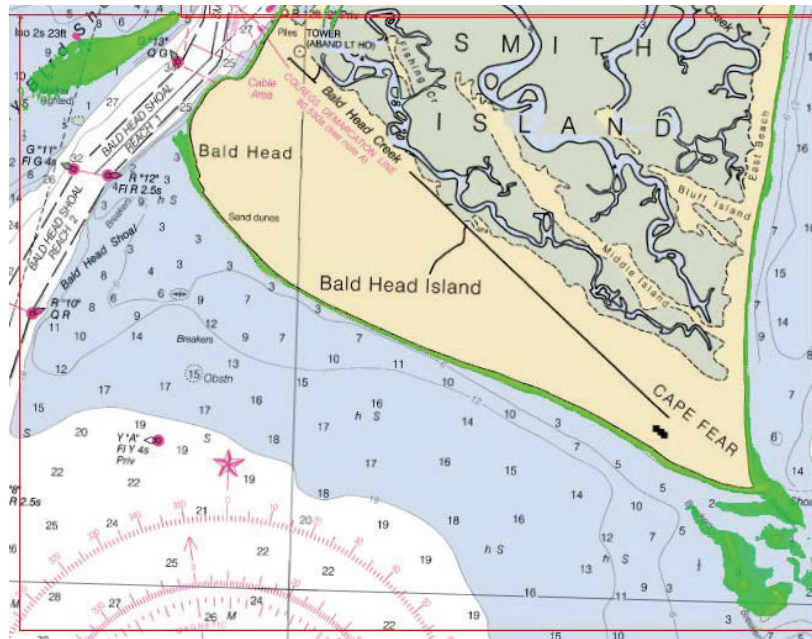
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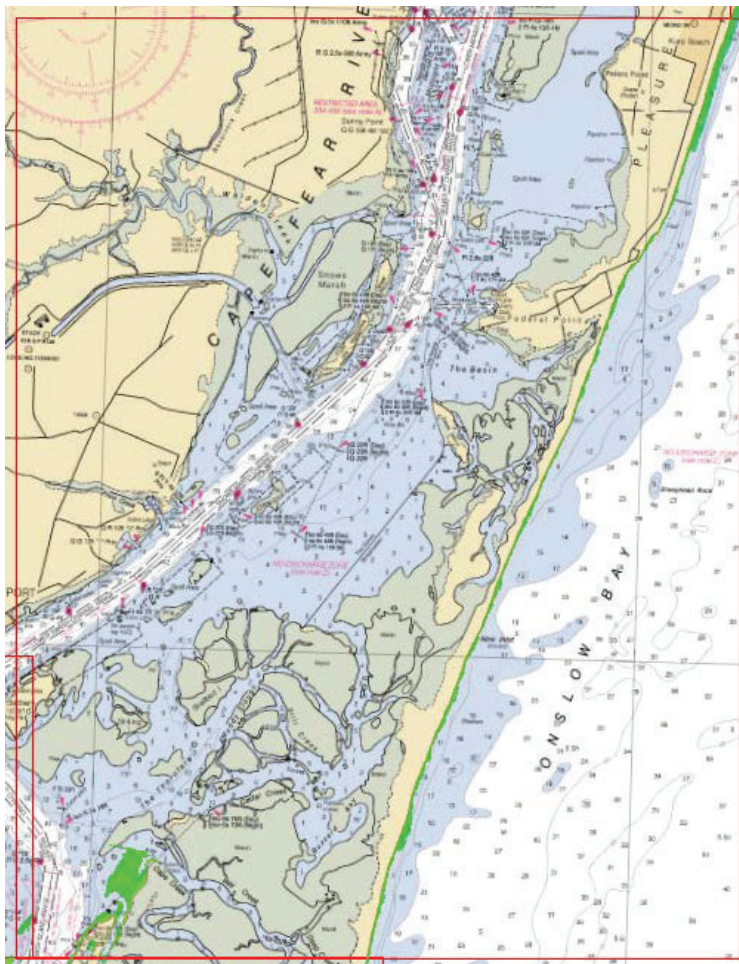
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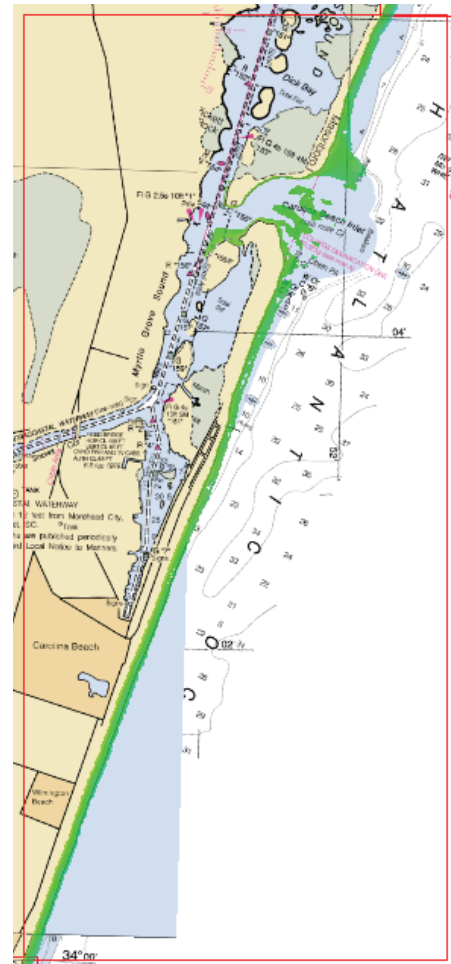
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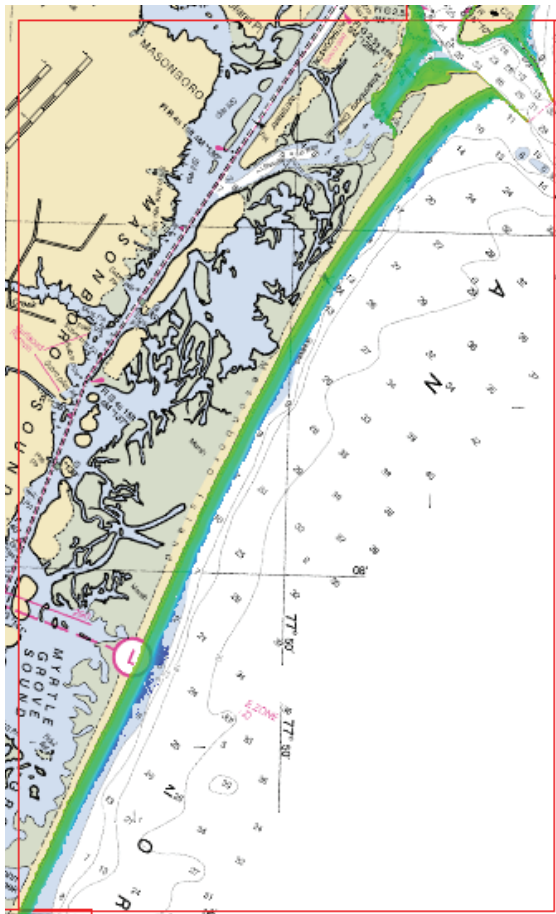
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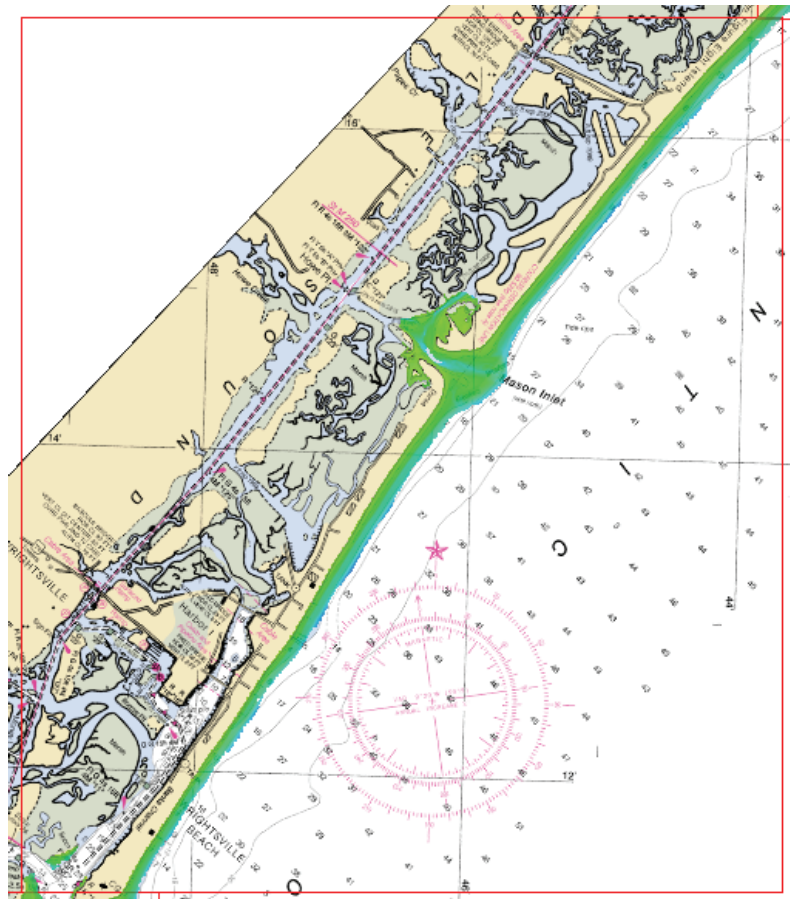
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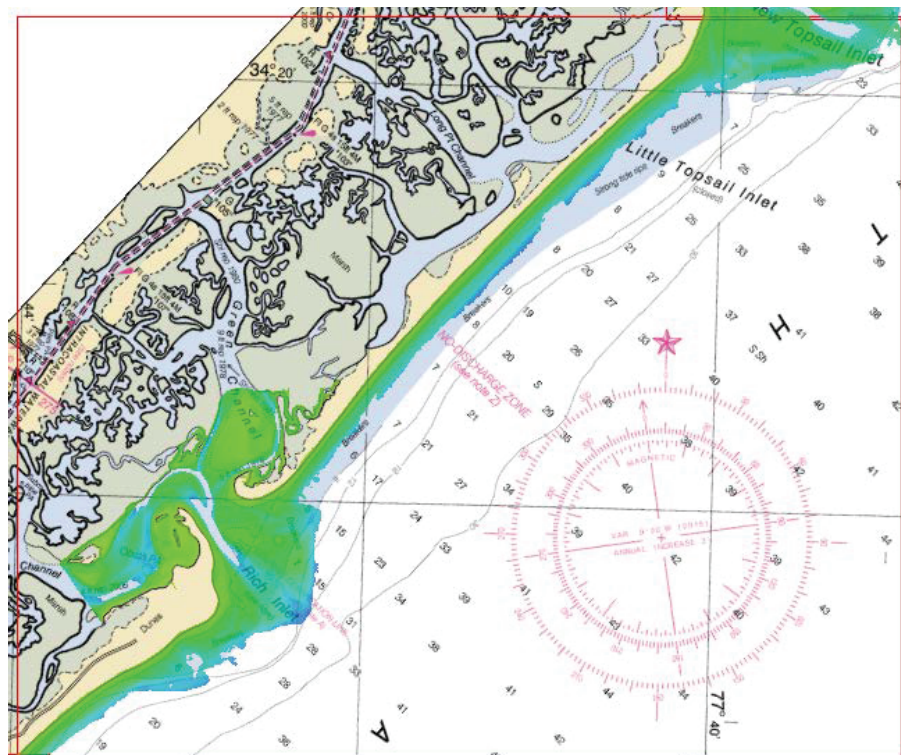
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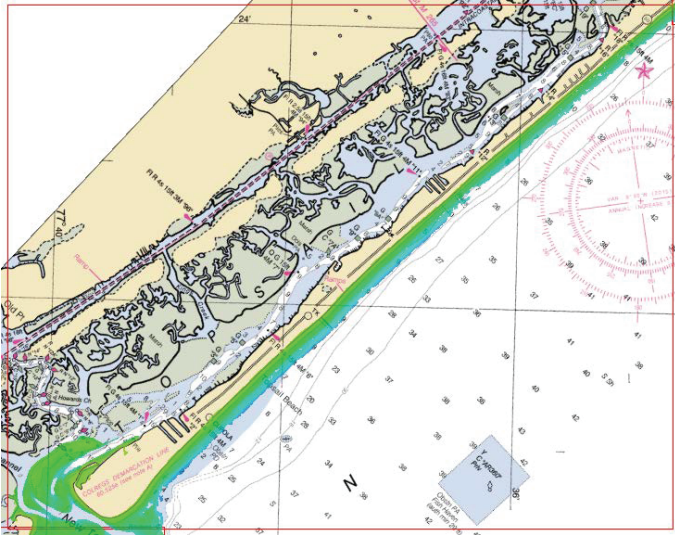
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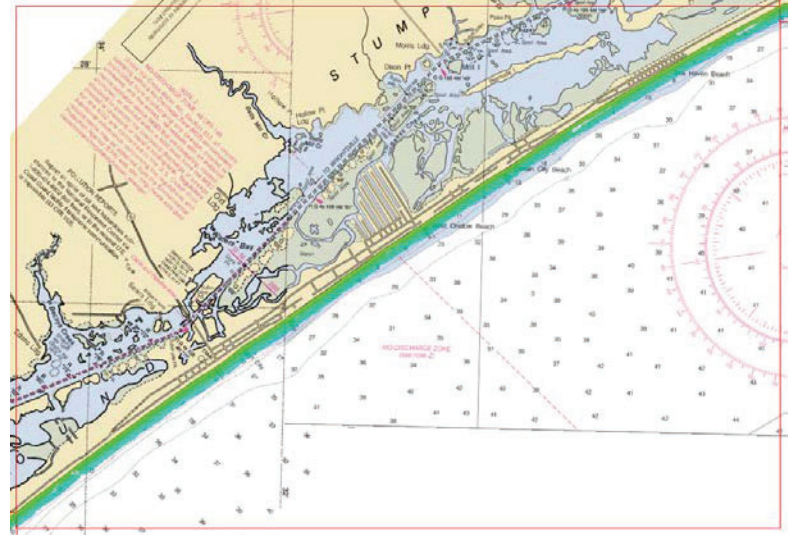
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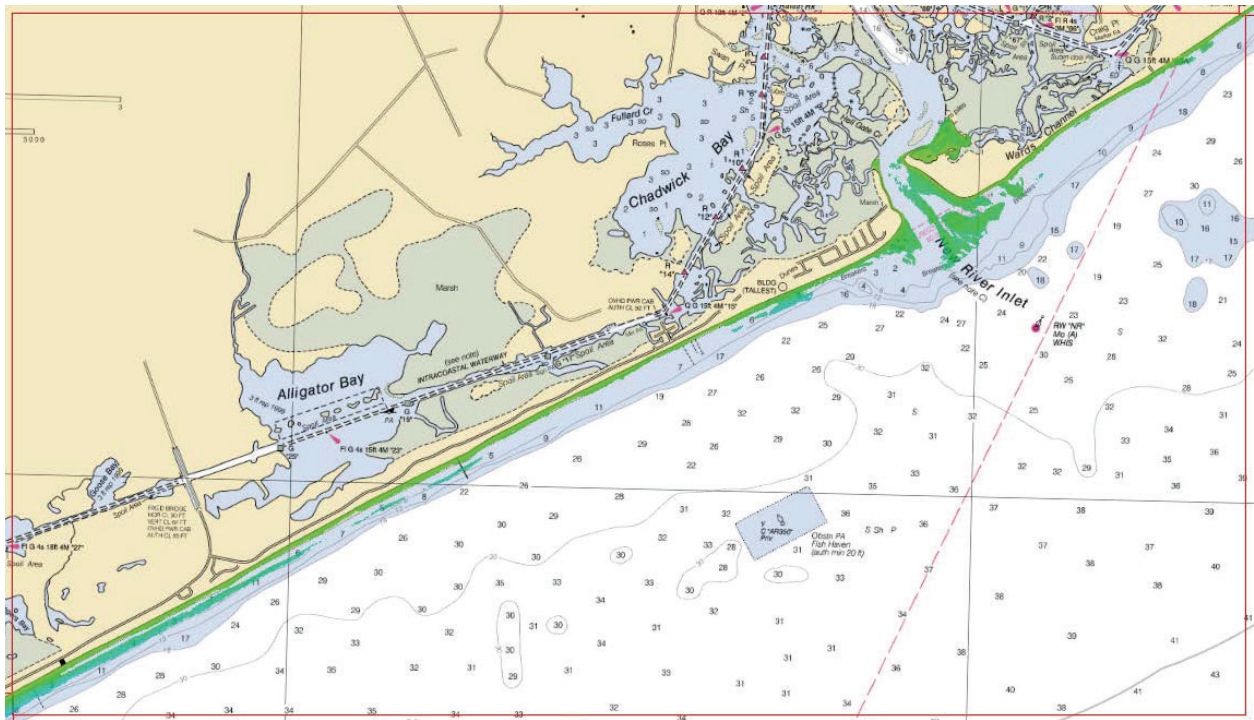
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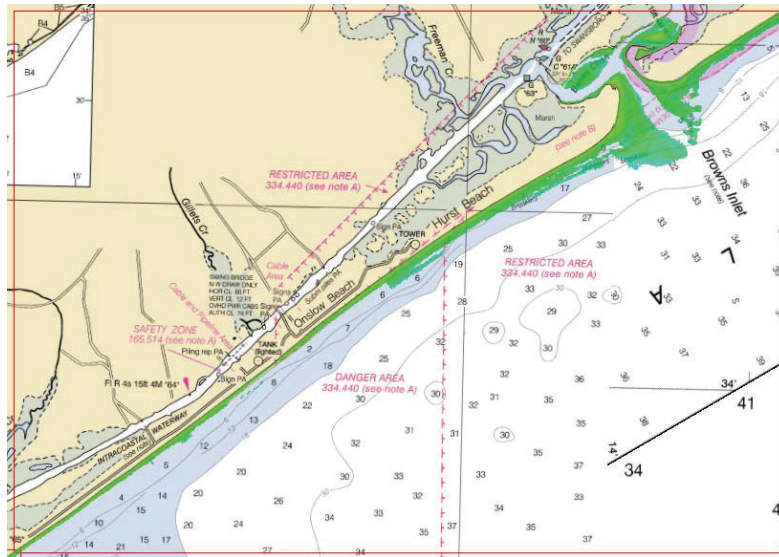
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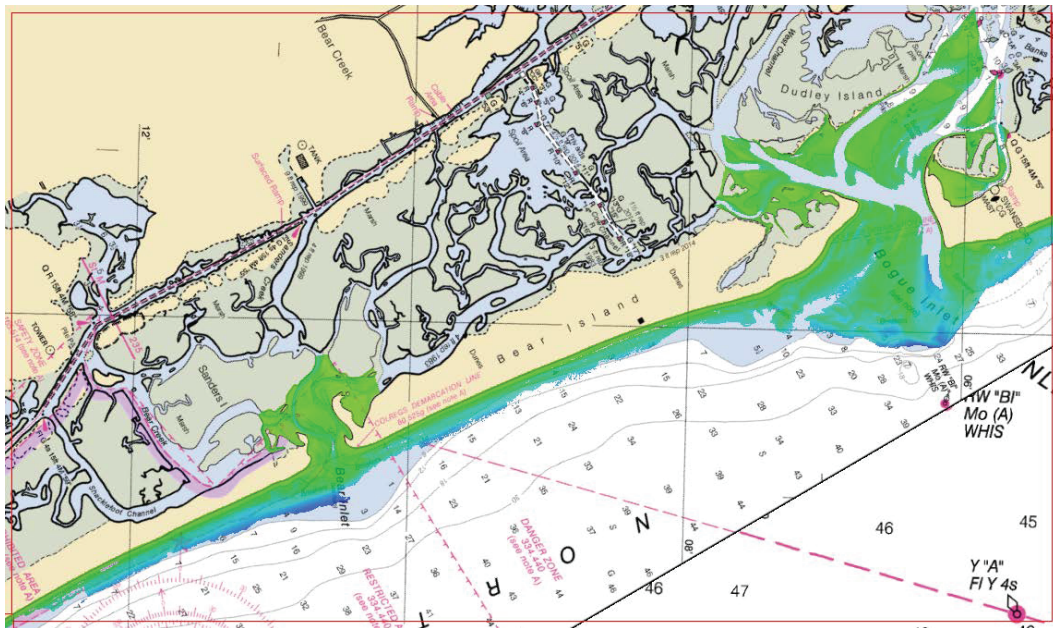
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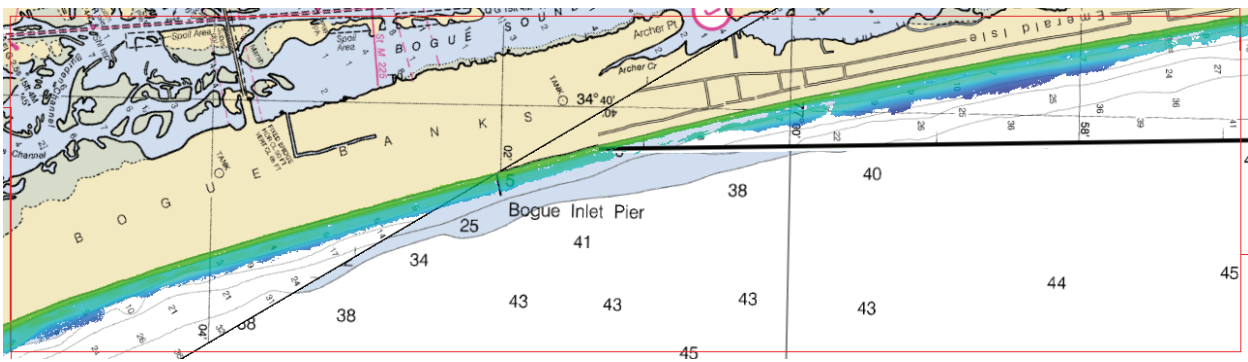
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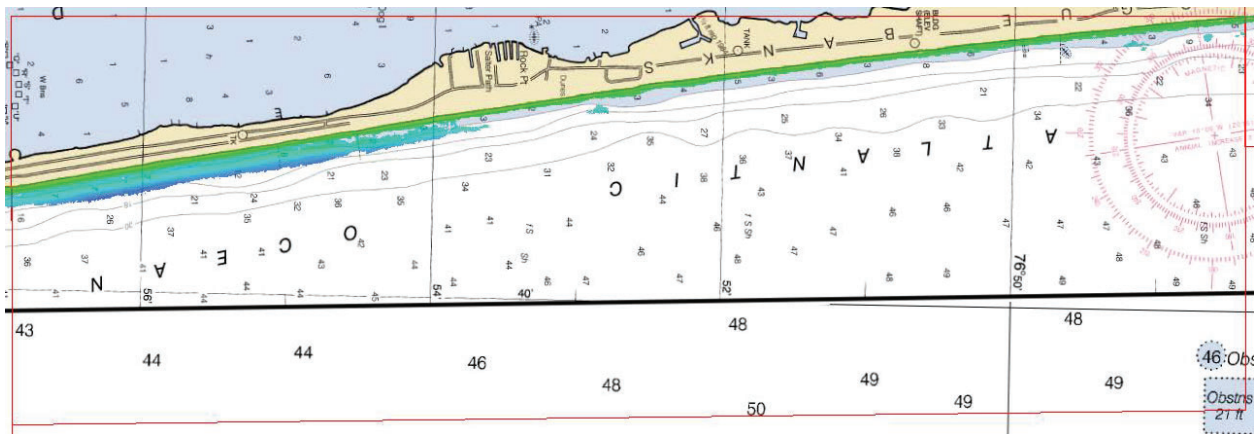


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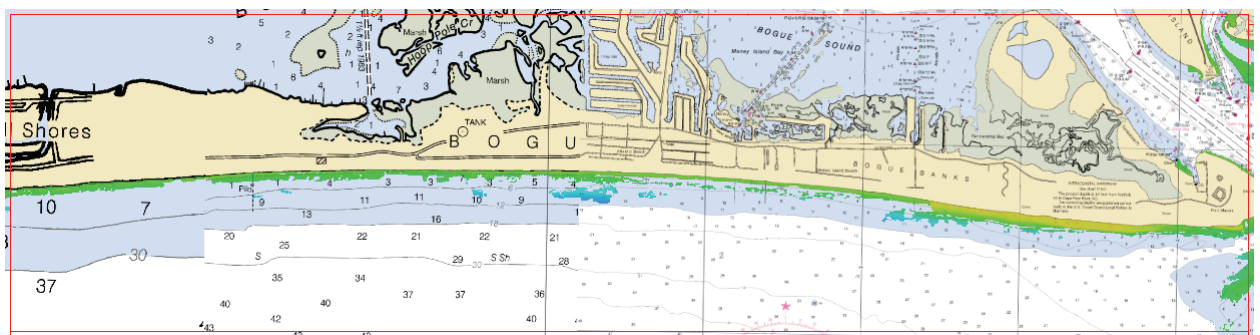


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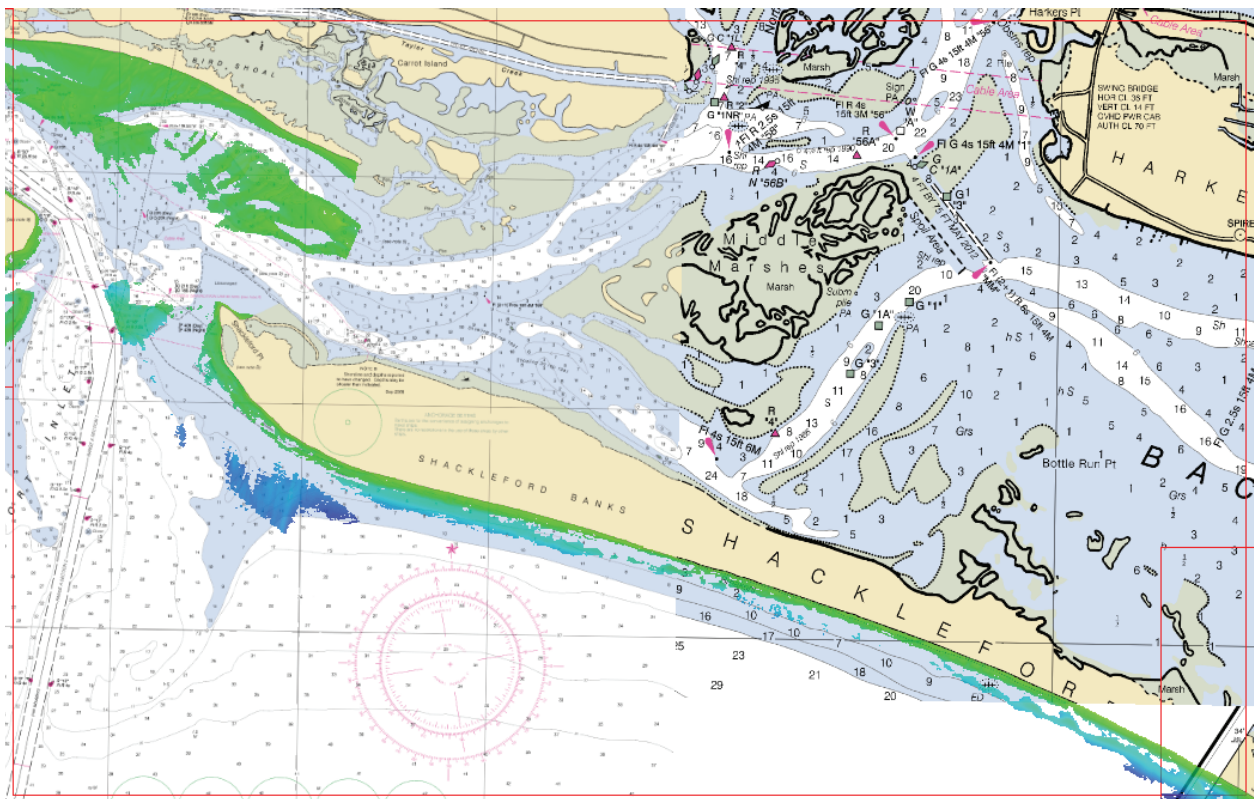




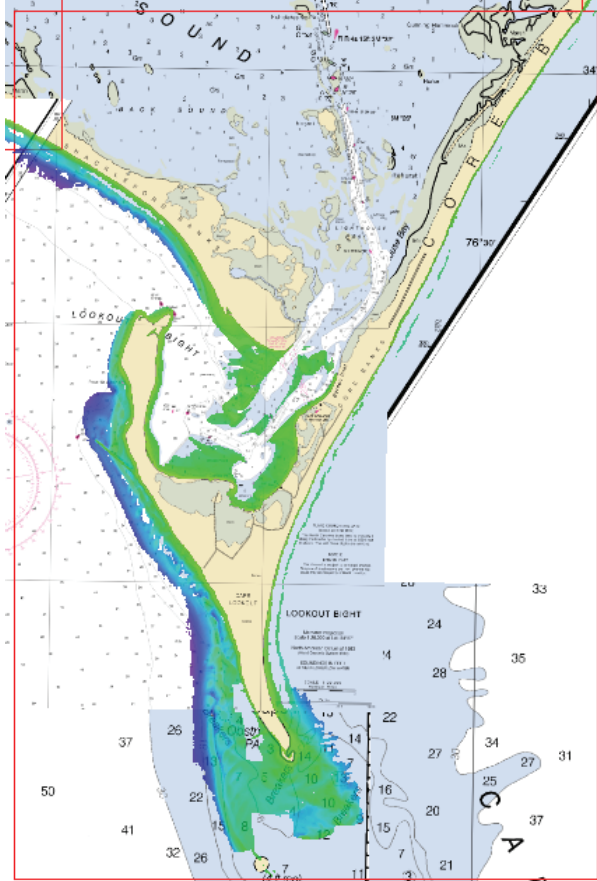
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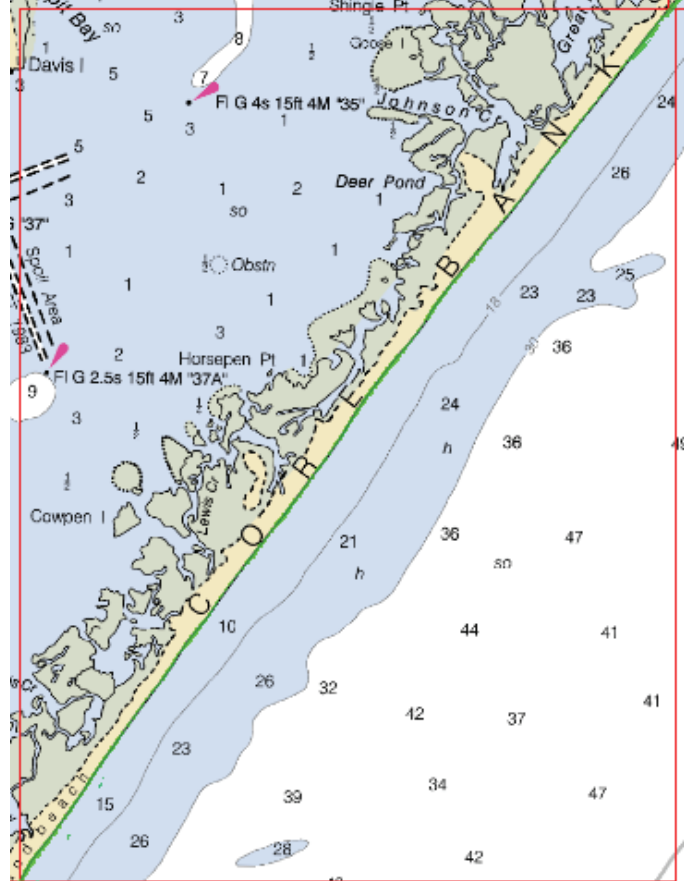
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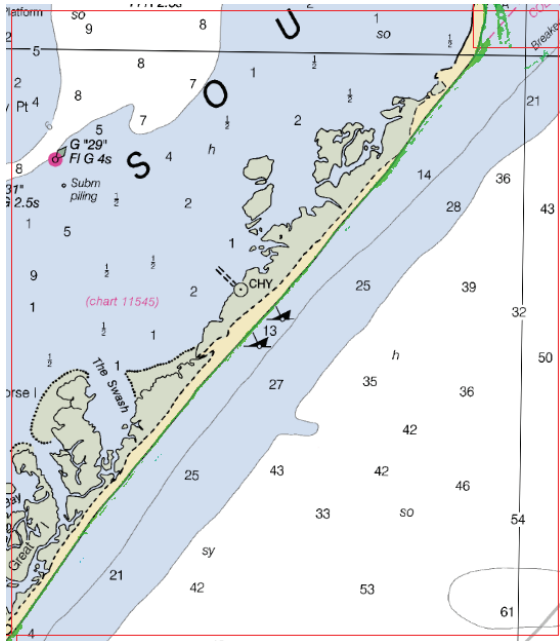
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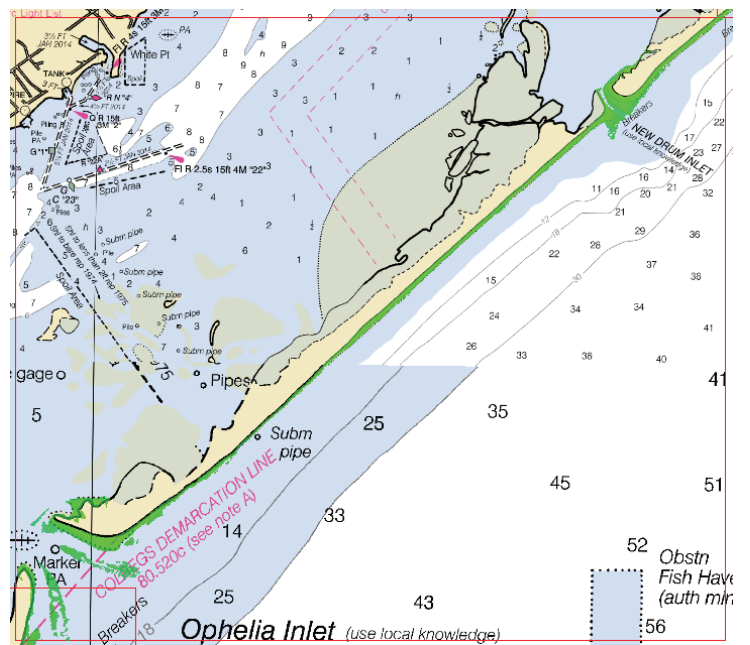
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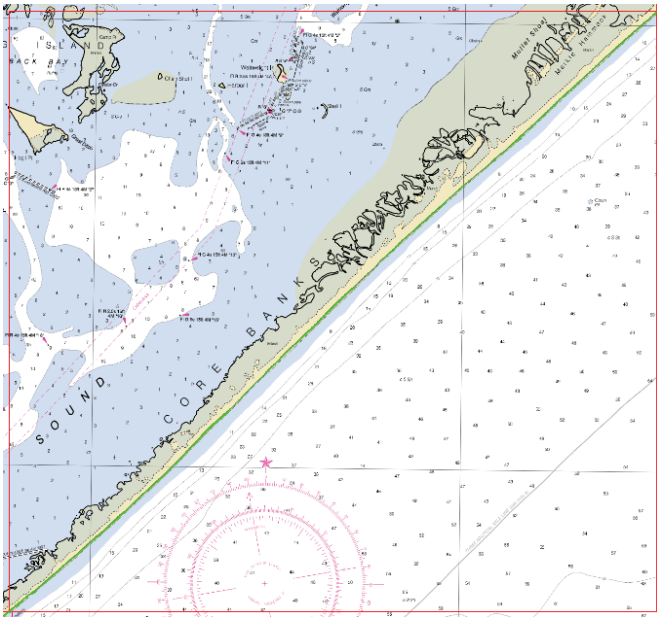
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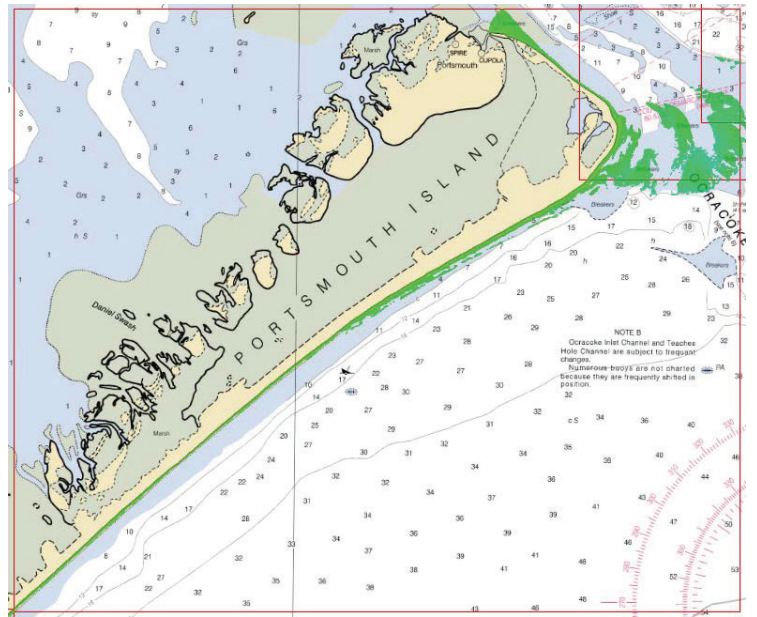
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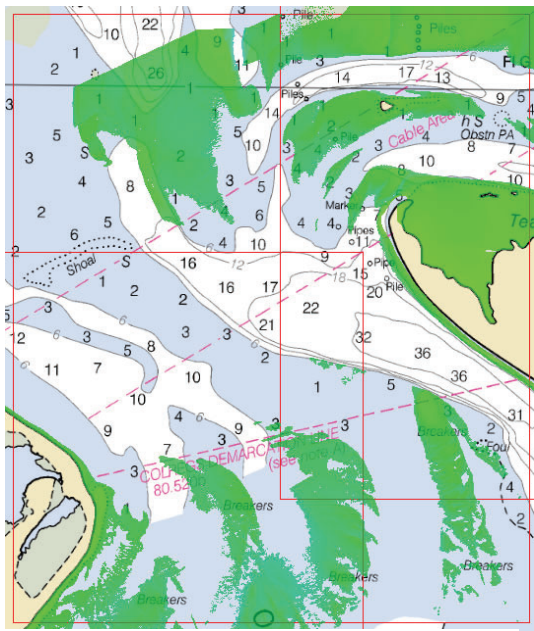
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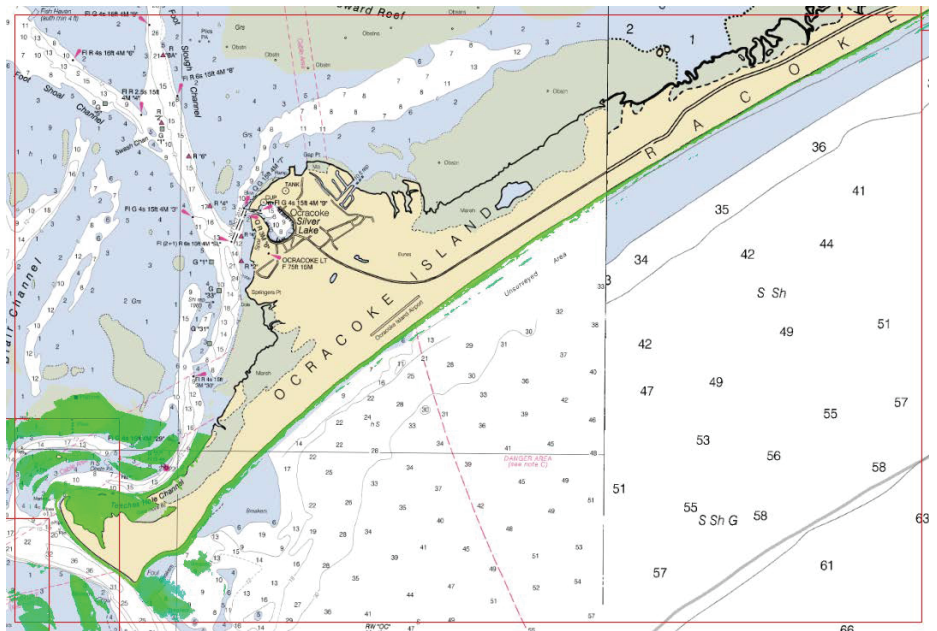
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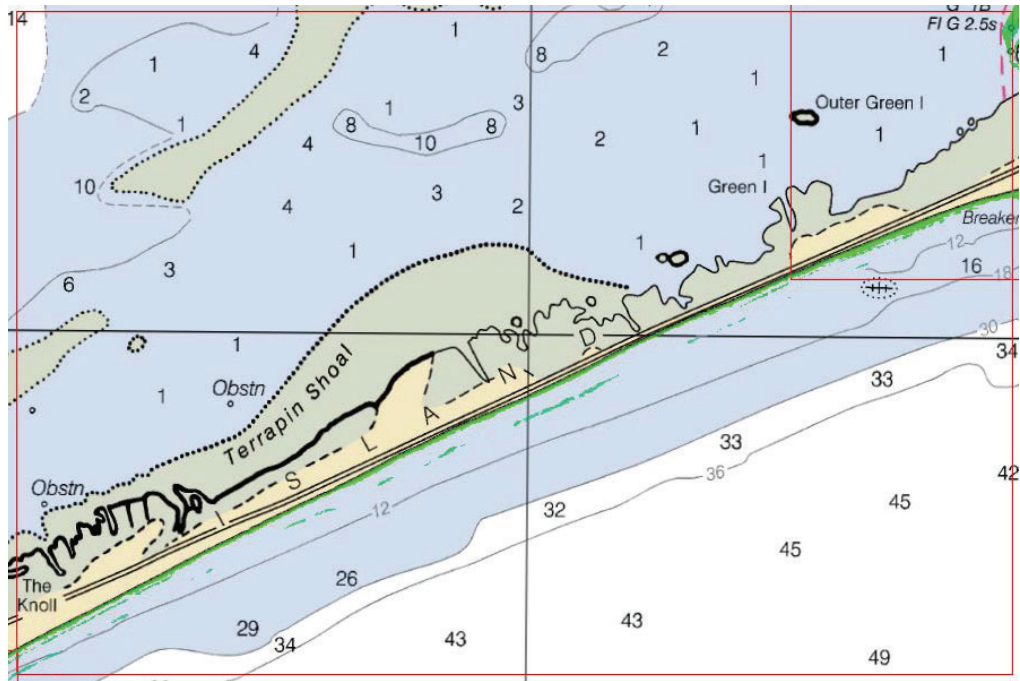
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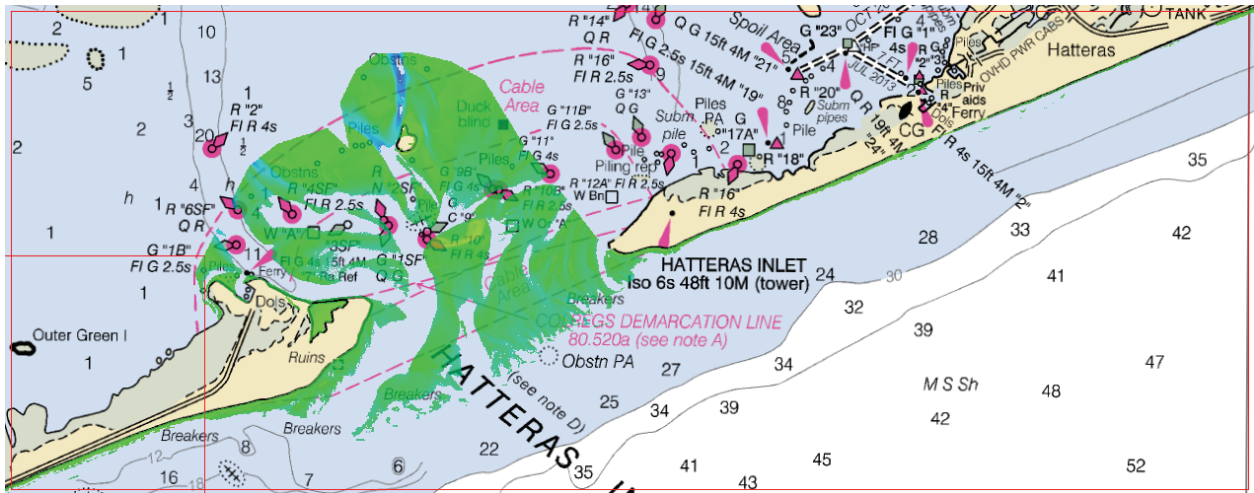
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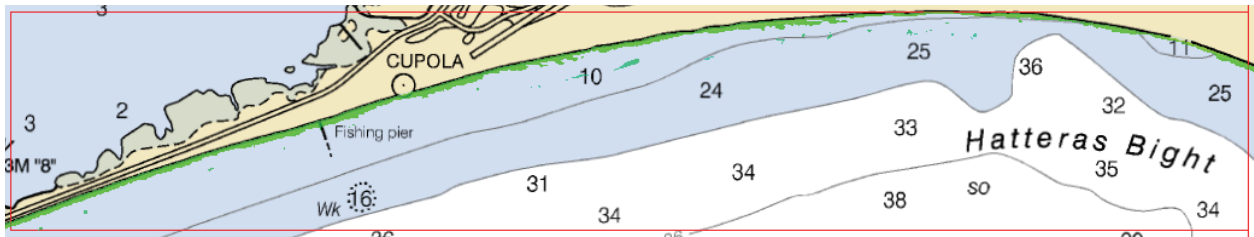
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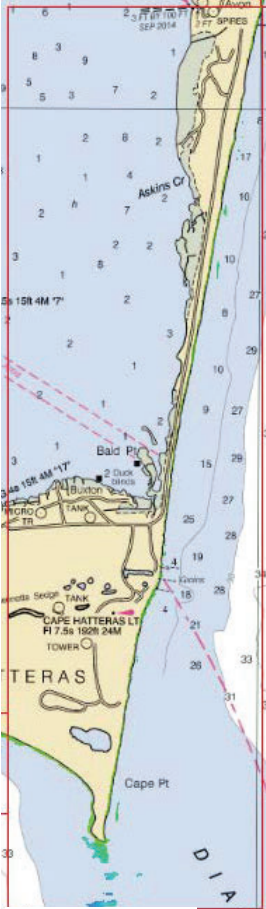
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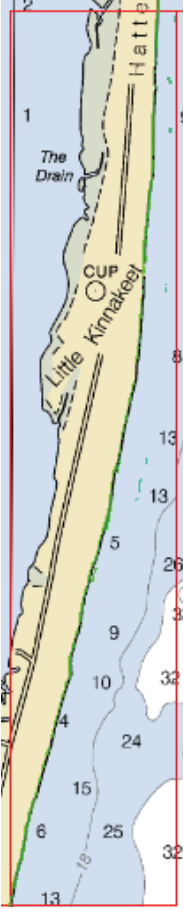
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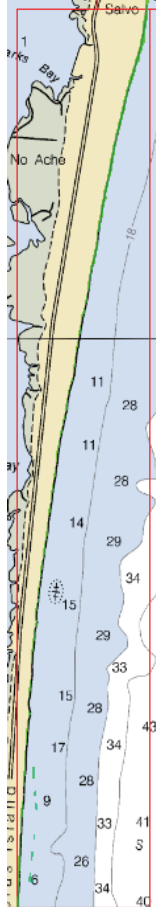
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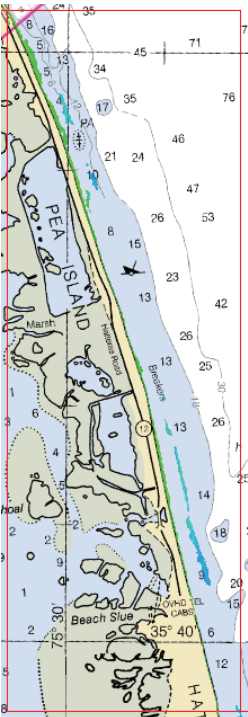
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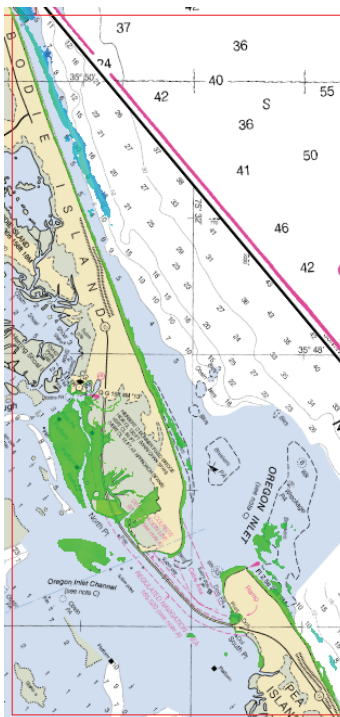
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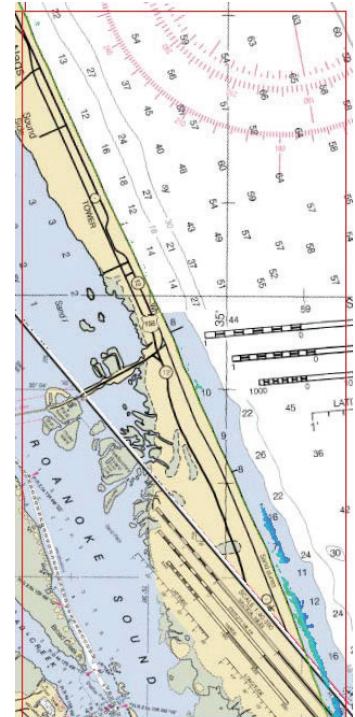
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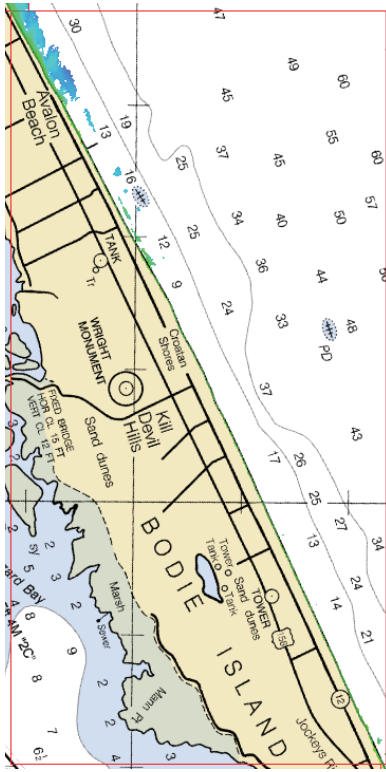
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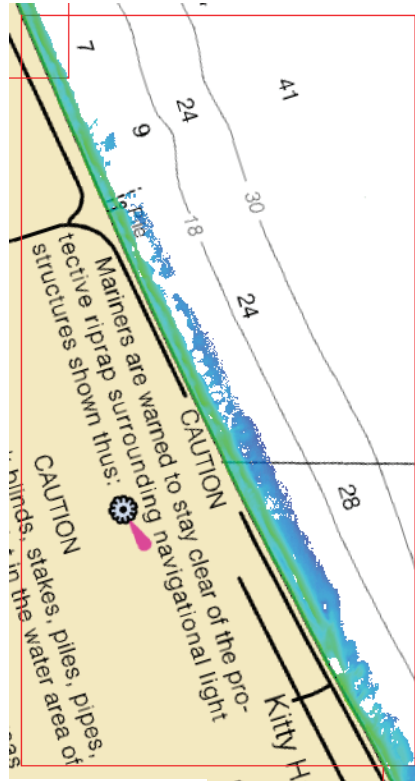
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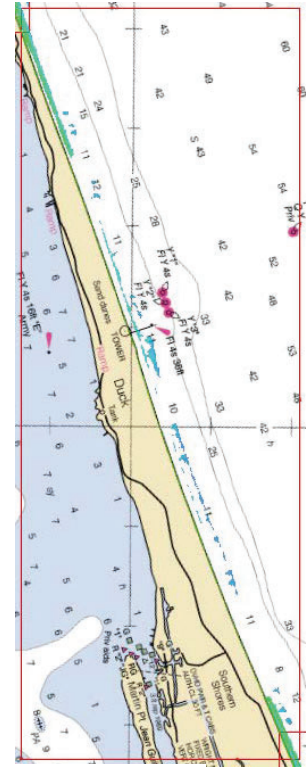
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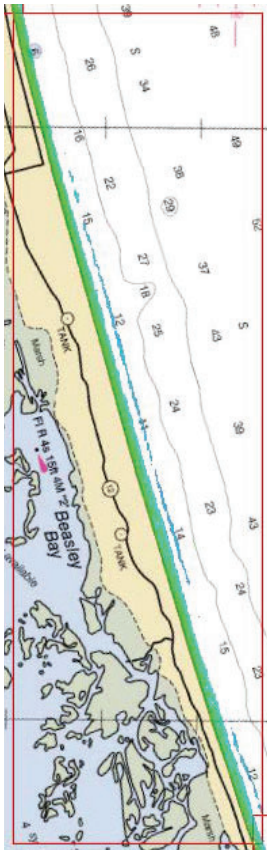
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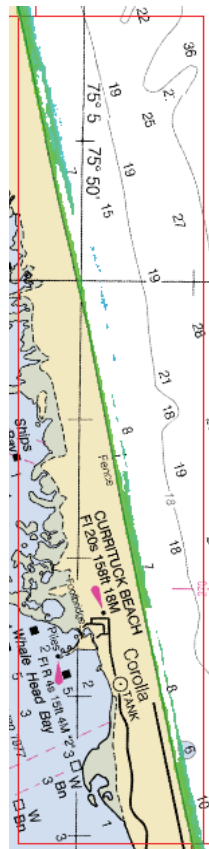
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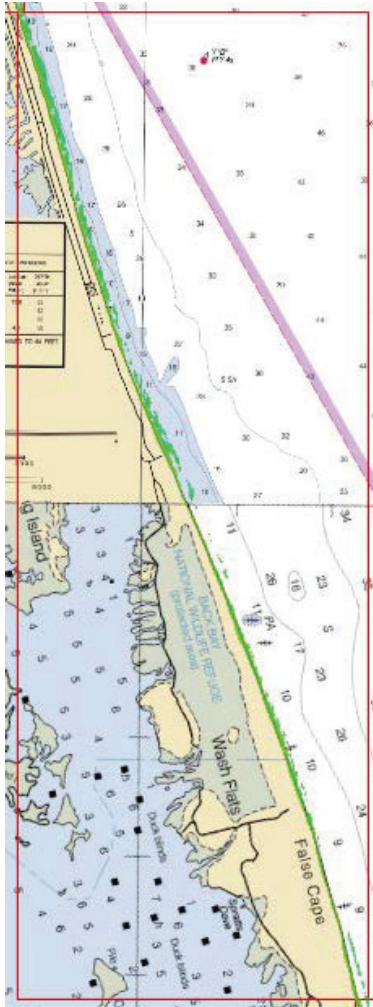
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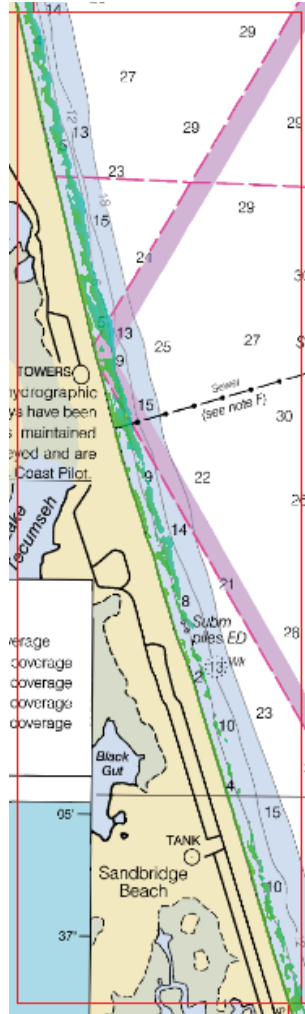
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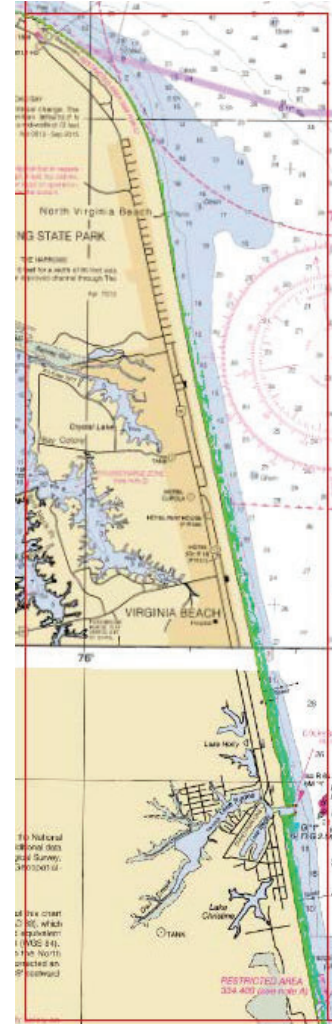
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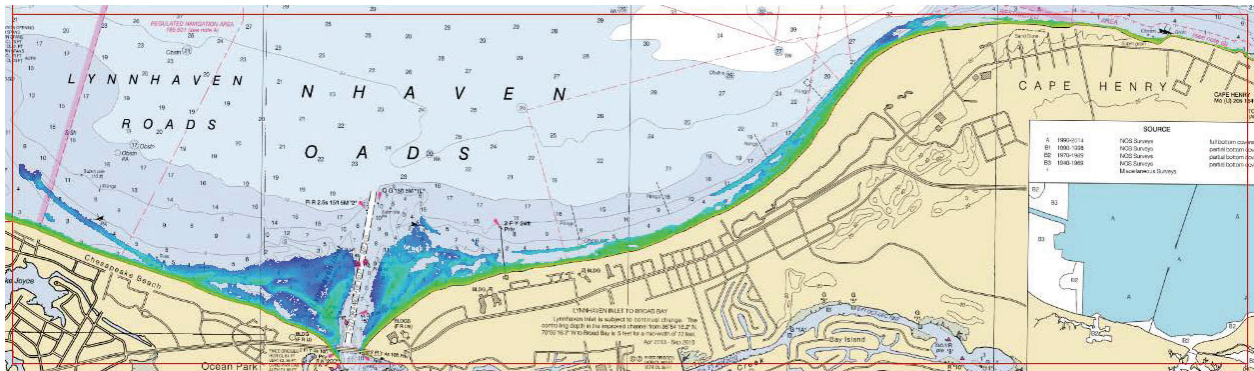
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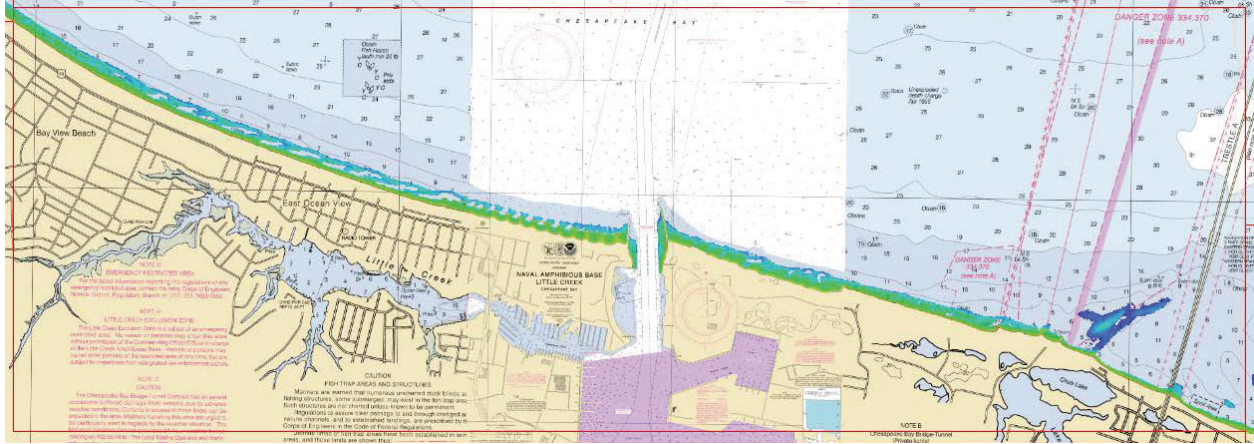
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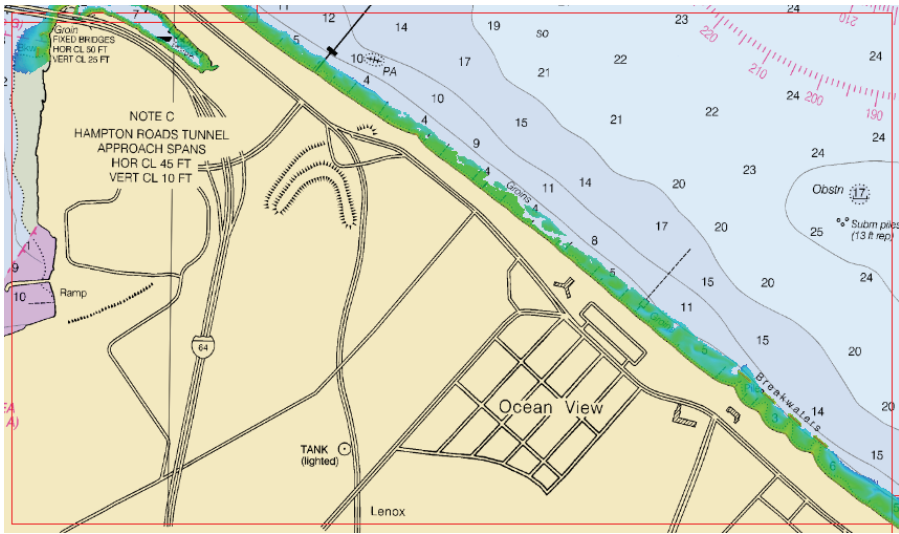
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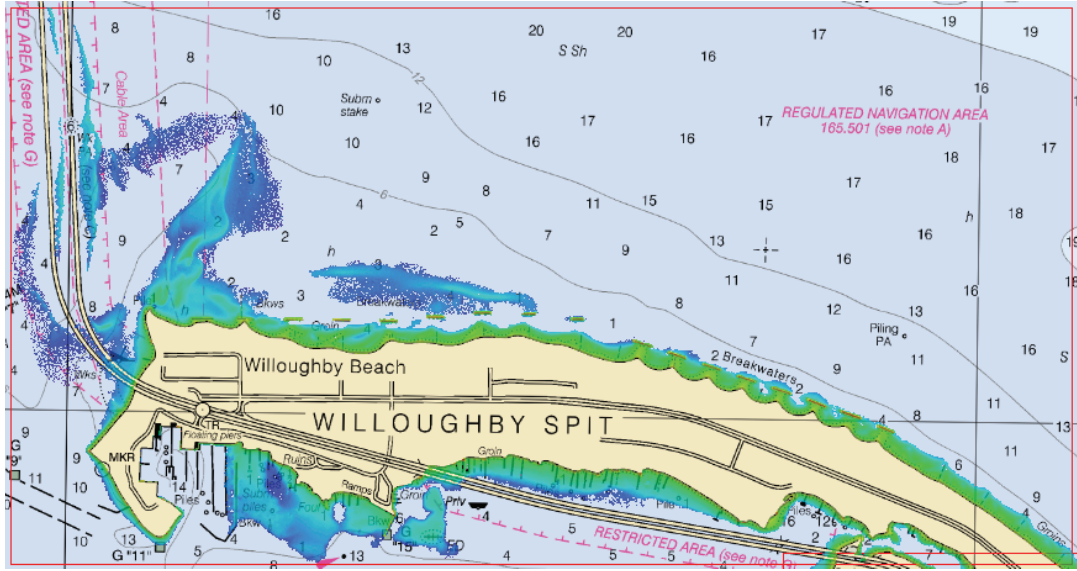
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Block 50



Block 51



Block 52



APPENDIX I

TIDES AND WATER LEVELS

Survey W00333 does not include supplemental tide or water level information.

APPENDIX II

SUPPLEMENTAL SURVEY RECORDS  
AND CORRESPONDENCE

Survey W00333 does not include supplemental  
survey records or correspondence.

APPROVAL PAGE

W00333

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

- W00333\_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.



Digitally signed by  
HILLSTROM.BRIANA.WELTON.12676675

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Date: 2018.05.31 09:39:05 -04'00'

Approved: \_\_\_\_\_

**Lieutenant Commander Briana Hillstrom, NOAA**  
Chief, Atlantic Hydrographic Branch