



H11296

NOAA FORM 76-35A

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

DESCRIPTIVE REPORT

Type of Survey: **Navigable Area**
Field No: **OPR-A321-KRL-05**
Registry Number: **H11296**

LOCALITY

State: New Hampshire
General Locality: Approaches to Portsmouth, NH
Sub-locality: Rye Harbor and Isle of Shoals

2005

CHIEF OF PARTY

Dushan Arumugam, Fugro Pelagos, Inc.

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NOAA FORM 77-28
(11-72)

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

REGISTRY NUMBER:

HYDROGRAPHIC TITLE SHEET

H11296

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: **New Hampshire**

General Locality: **Approaches to Portsmouth, NH**

Sub-Locality: **Bigelow Bight and Isle of Shoals**

Scale: **1:10,000** Date of Survey: **09/09/05 to 09/12/05**

Instructions Dated: **08/26/2005** Project Number: **OPR-A321-KRL-05**

Vessel: **Beechcraft King Air 90 (N91S)**

Chief of Party: **Dushan Arumugam, Fugro Pelagos, Inc.**

Surveyed by: **Arumugam, Martinez, Wong, Johnson, Kurras, Ruiz (Fugro Pelagos, Inc.)**

Soundings by: **SHOALS-1000T Bathymetric and Topographic LiDAR**

Graphic record scaled by: **Fugro Pelagos, Inc. Personnel**

Graphic record checked by: **Fugro Pelagos, Inc. Personnel**

Protracted by: **N/A** Automated Plot: **HP Design Jet 500**

Verification by: ***Atlantic Hydrographic Branch***

Soundings in: **Feet (Meters) at MLLW**

Remarks: ***Bold, Italic, Red notes in the Descriptive Report were made during office processing.***

- 1) All Times are UTC.***
- 2) This is a Standard Navigable Area Hydrographic Survey.***
- 3) Projection is UTM Zone 18.***



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- 1. Acquisition and Processing Logs***
- 2. Hydrographic Survey Letter Instructions/Statement of Work***
- 3. Crossline Comparisons***
- 4. Charts, Plots, and Graphics***

**Data Filed with original field records*



A - Area Surveyed

H11296 (Sheet A), is bounded by the coordinate listing below, and encompasses the Approaches to Portsmouth, NH.

LiDAR flights began on September 9, 2005 and ended on September 12, 2005.

Table 1 – H11296 Survey Limits

Survey Limits Task Order # T0007 H11296 Sheet A Scale 1:10,000		
Point #	Positions on NAD83	
	Degrees Latitude (N)	Degrees Longitude (W)
1	45°57'02.25" N	70°46'18.25" W
2	45°57'02.25" N	70°35'37.75" W
3	43°01'03.25" N	70°35'37.75" W
4	43°01'03.25" N	70°46'18.25" W

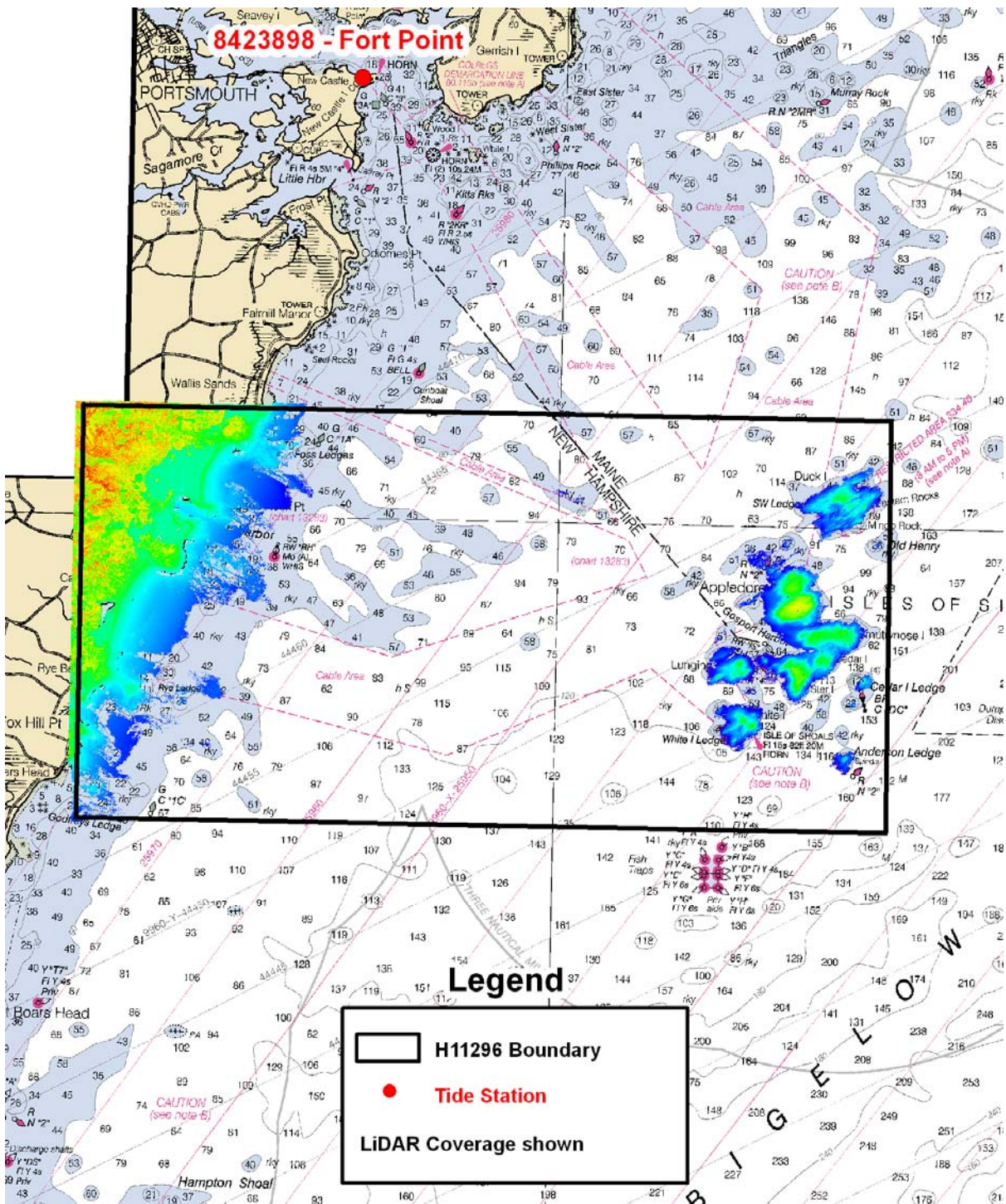


Figure 1 – H11296 Survey Limits



B – Data Acquisition & Processing *See also the Evaluation Report.*

Refer to the OPR-A321-KRL-05 Data Acquisition and Processing Report* for a detailed description of all equipment, survey platforms, LiDAR suite, processing procedures and quality control features. Items specific to this survey and any deviations from the Data Acquisition and Processing Report are discussed in the following sections.

**Data Filed with original field records*

Equipment & PlatformsLiDAR

The Beechcraft King Air 90 (call sign N91S) acquired all LIDAR data for H11296. The aircraft is 35 feet 6 inches in length with a wing span of 47 feet 10.5 inches. It was equipped with the SHOALS-1000T Bathymetric and Topographic LiDAR System. Aircraft motion was measured with an Applanix Position and Orientation System for Airborne Surveys (POS/AV), a OmniStar 3100LM DGPS receiver was used for Airborne Positioning. Raw data was collected in Optech's proprietary file formats.

Refer to OPR-A321-KRL-05 Data Acquisition & Processing Report for a complete listing of equipment and vessel platform.

Quality ControlLiDAR Crosslines

Six cross lines, using the bathymetry laser, were planned and acquired over the survey area. A difference analysis between the cross line and the remainder of the bathymetry lines was performed using the QC Tool in CARIS GIS.

The majority of QC Reports fell well within the required accuracy specifications. However, there were few cases where the results fell below the 95% confidence level in the QC Report are associated with specific areas with steep slopes. It should be noted that data at these locations are in agreement with the surrounding offset lines and are considered well within the required specifications.

Topographic data were not included because any specification for vertical accuracy must assume relatively flat bottom (due to laser footprint size in relation to the irregularity of the seafloor) and topographic data were typically over target rich or steep slope environments such as houses, vegetation, jetties, steep sloped beaches, etc.

Note: The QC reports were generated based on the given accuracy specification of:

$$\pm \sqrt{[a^2 + (b * d)^2]}$$

where, a = 0.5, b = 0.013 and d = depth.



However, since a variance of a difference, rather than a variance from a mean is being used, the a and b values defined in the Portsmouth.cla file within CARIS will use:

$$a = 0.5 * \sqrt{2} = 0.707$$

$$b = 0.013 * \sqrt{2} = 0.018$$

Table 2 – Summary of QC Results

DATE	QC NUMBER	SURVEY LINE	TIELINE	IHO 1 st ORDER
09/09/05	1	006_050909_1101_A_00231	005_050911_1949_A_01601	100 %
09/09/05	2	006_050909_1101_A_00251	005_050911_1949_A_01601	100 %
09/09/05	3	006_050909_1101_A_00321	005_050911_1949_A_01601	98.9 %
09/09/05	4	006_050909_1101_A_00191	005_050911_1949_A_01581	96.5 %
09/09/05	5A	009_050909_1725_A_01161	005_050911_1949_A_01541	96.2 %
09/09/05	5B	009_050909_1725_A_01161	005_050911_1949_A_01571	100 %
09/09/05	6	009_050909_1725_A_01171	005_050911_1949_A_01581	95.5 %
09/09/05	7	009_050909_1725_A_01191	005_050911_1949_A_01541	96.1 %
09/10/05	8A	007_050910_1139_A_00411	005_050911_1949_A_01541	99.9 %
09/10/05	8B	007_050910_1139_A_00411	005_050911_1949_A_01571	100 %
09/10/05	9	007_050910_1139_A_00421	005_050911_1949_A_01571	100 %
09/10/05	10	007_050910_1139_A_00431	005_050911_1949_A_01541	100 %
09/10/05	11	007_050910_1139_A_00441	005_050911_1949_A_01571	99.7 %
09/10/05	12	007_050910_1139_A_00471	005_050911_1949_A_01591	94.4 %
09/10/05	13	007_050910_1139_A_00481	005_050911_1949_A_01591	97.8 %
09/10/05	14	007_050910_1139_A_00531	005_050911_1949_A_01591	96.0 %
09/10/05	15	007_050910_1139_A_00541	005_050911_1949_A_01591	94.5 %
09/10/05	16	008_050910_1809_A_00881	005_050911_1949_A_01601	99.9 %
09/10/05	17	008_050910_1809_A_00911	005_050911_1949_A_01581	96.4 %
09/10/05	18	008_050910_1809_A_00941	005_050911_1949_A_01581	95.7 %
09/10/05	19	008_050910_1809_A_00951	005_050911_1949_A_01581	96.6 %
09/10/05	20	008_050910_1809_A_00981	005_050911_1949_A_01601	100 %
09/10/05	21	008_050910_1809_A_01001	005_050911_1949_A_01601	100 %
09/11/05	22	006_050911_1254_A_00132	005_050911_1949_A_01601	100 %
09/11/05	23A	006_050911_1254_A_00152	005_050911_1949_A_01551	99.9 %
09/11/05	23B	006_050911_1254_A_00152	005_050911_1949_A_01581	92.1 %
09/11/05	24A	006_050911_2056_A_00172	005_050911_1949_A_01551	100 %
09/11/05	24B	006_050911_2056_A_00172	005_050911_1949_A_01581	94.2 %
09/11/05	25A	006_050911_2056_A_00185	005_050911_1949_A_01551	99.9 %
09/11/05	25B	006_050911_2056_A_00185	005_050911_1949_A_01581	95.7 %
09/11/05	25C	006_050911_2056_A_00185	005_050911_1949_A_01601	98.8 %
09/11/05	26	007_050911_1541_A_00572	005_050911_1949_A_01591	95.5 %
09/11/05	27	007_050911_1541_A_00582	005_050911_1949_A_01591	95.7 %

DATE	QC NUMBER	SURVEY LINE	TIELINE	IHO 1 st ORDER
09/11/05	28	007_050911_1541_A_00592	005_050911_1949_A_01591	81.4 %
09/11/05	29	009_050911_1716_A_01294	005_050911_1949_A_01591	92.2 %
09/12/05	30	010_050912_1648_A_01821	005_050911_1949_A_01601	99.9 %
09/12/05	31	010_050912_1648_A_01831	005_050911_1949_A_01571	100 %
09/12/05	32	010_050912_1648_A_01851	005_050911_1949_A_01571	100 %
09/12/05	33	010_050912_1648_A_01881	005_050911_1949_A_01551	99.1 %

LiDAR Data Quality

In general, the LiDAR data quality for H11296 was good along the coastline and was excellent in the Isles of Shoals; there were no unusual conditions encountered, but a few areas to note are as follows:

- Due to water clarity and white water (evident from the aerial photo below) there were sections such as the one shown below (between Rye Harbor and Lockes Nest) with sparse LiDAR coverage. Such area will require further investigation to confirm there are no navigationally significant features. *See also the Evaluation Report.*

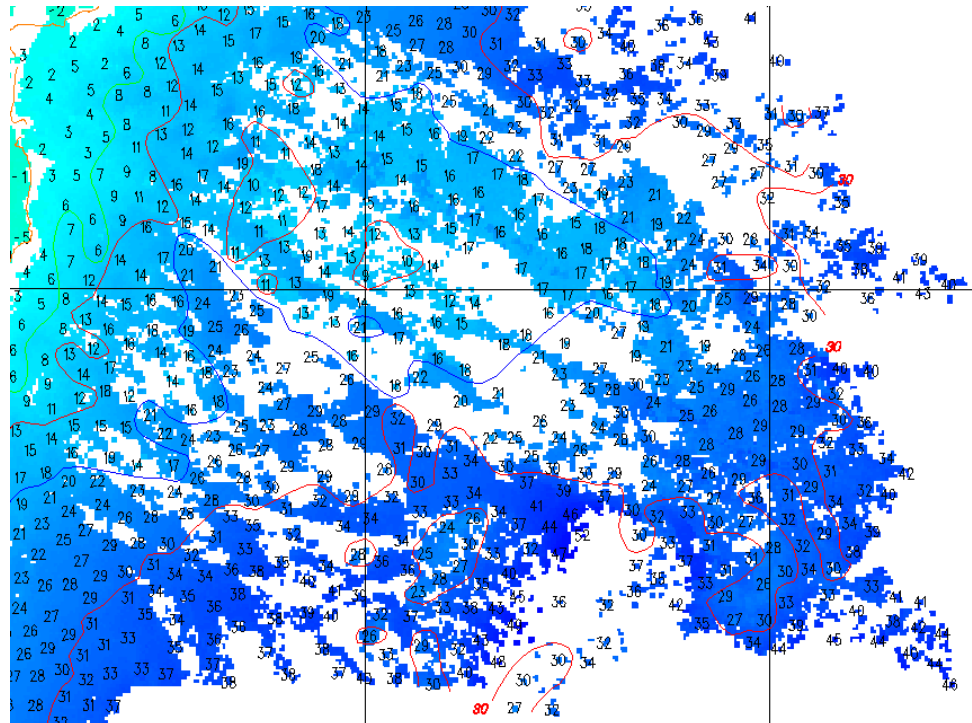


Figure 2 – LiDAR Coverage (South of Rye Harbor)



Figure 3 – Aerial Photo (water quality)

- LIDAR data was also limited in the vicinity of Fox Hill Point because of water quality and turbidity.

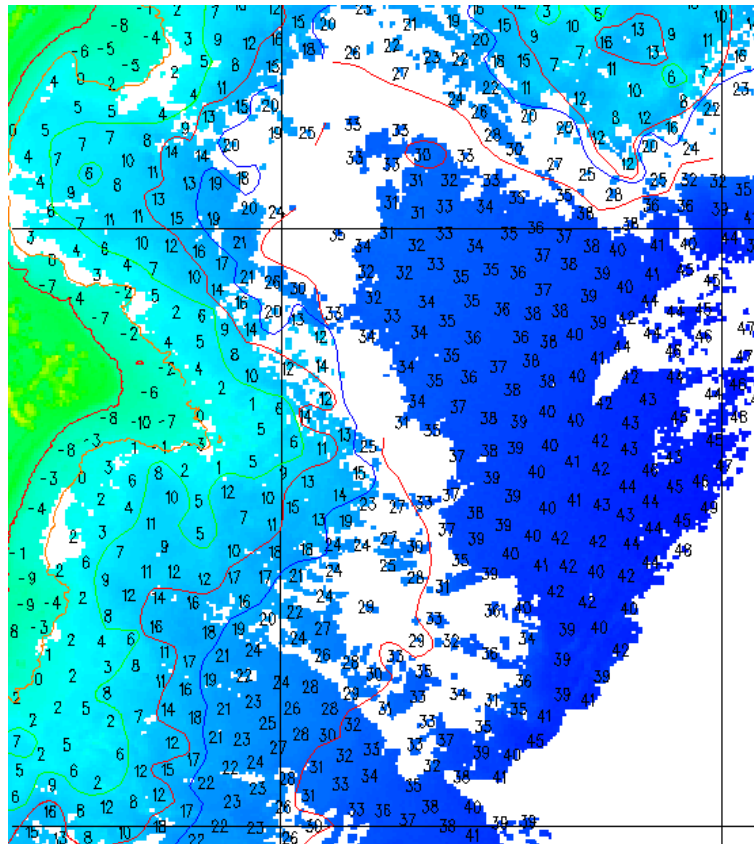


Figure 4 – LiDAR Coverage (Fox Hill Point)

- As mentioned above the data coverage around the Isles of Shoals were excellent as there was *not* much of a surf zone that causes the water clarity to deteriorate.

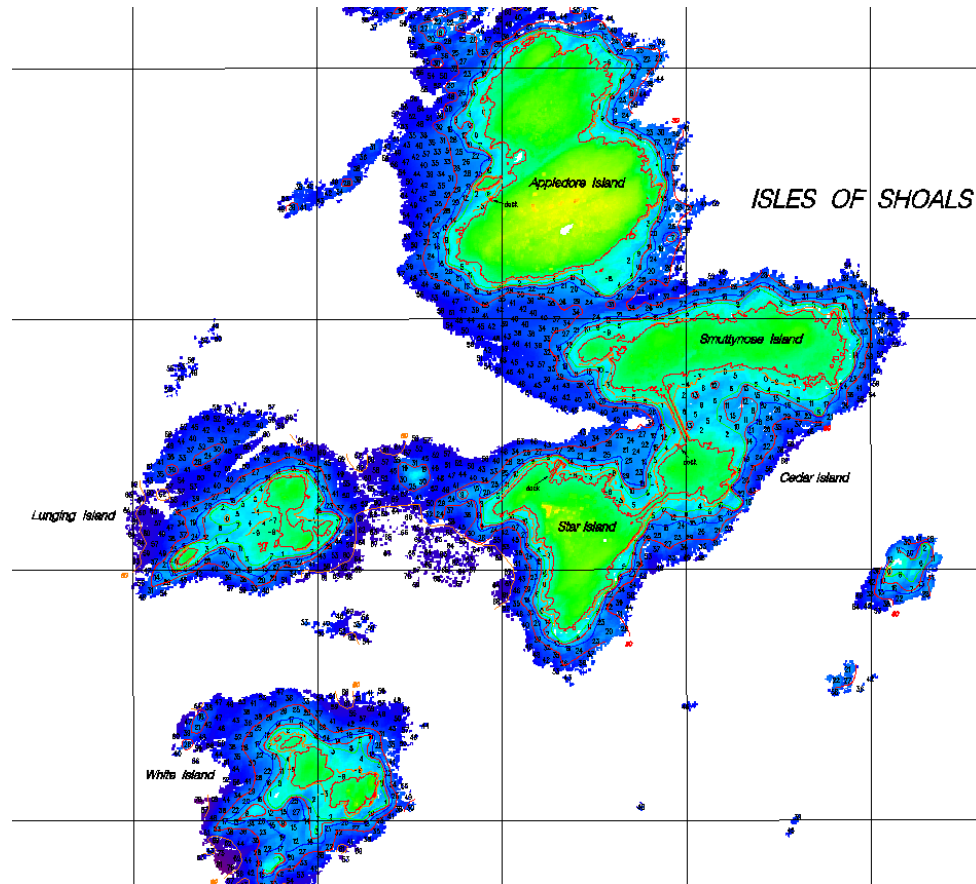


Figure 5 – LiDAR Coverage (Isles of Shoals)

Survey Junctions

H11296 (Sheet A) was the only sheet assigned under OPR-A321-KRL-05. There are no contemporary junctions.

LIDAR Quality Control Checks

To confirm the agreement of the LiDAR system with previously surveyed multibeam data the plane flew over the Lake Ontario ground truth site prior to collecting data over the survey area. The LIDAR data collected reviewed in Fledermaus and revealed that the system was operating to specifications.

Positioning system confidence checks were conducted using the POS/AV controller software. The controller software has numerous real time displays that were monitored



throughout the survey to ensure the positional accuracies specified in the NOS Hydrographic Surveys Specifications and Deliverables (version March 2003) were achieved. These include, but are not limited to the following: GPS Status, Position accuracy, Receiver Status (which included HDOP) and Satellite Status. Note: Flights were planned to avoid periods of high PDOP/HDOP and/or low number of available satellites.



C – Horizontal & Vertical Control *See also the Evaluation Report.*

Refer to the OPR-A321-KRL-05 Horizontal and Vertical Control Report* for a detailed description of the horizontal and vertical control used on this Survey. A summary of the projects horizontal and vertical control follows. No deviations from the report occurred.

**Data Filed with original field records*

Horizontal Control

The horizontal control datum for this survey was the North American Datum of 1983 (NAD83), UTM (Central Meridian 69°00'00"). All raw positions were originally collected in WGS84 and transformed to NAD83 during the post-processed kinematic GPS (KGPS) routine.

It was necessary to acquire dual frequency GPS data at a known location on the ground so that a KGPS solution could be used for final positioning. The National Geodetic Survey (NGS) benchmark AB2631 was used as the ground control point for this survey. Refer to the Horizontal and vertical Control report for more Horizontal Control results and procedures.

Additionally, it was critical to know the elevations of the control points in both the processed ellipsoidal datum and the final charting datum, in this case NAD83 and MLLW respectively. The offset between these two datums was applied during post-processing to depict data in the final charting datum. It should be noted that at no time was the final data set corrected with KGPS altitude data (except for Topographic data); only horizontal position. Altitude data were evaluated for accuracy against traditional tide zone and tide gauge methodology. The evaluation of vertical data was for experimental purposes only.

The positioning for the LiDAR system was determined in real time using DGPS. The primary position GPS antenna was a NovAtel 512 airborne L1/L2, which was connected to a Dual frequency NovAtel Millennium GPS card residing in the POS/AV. Two differential receivers were available: an OmniStar 3100LM DGPS receiver and a CSI MBX-3S Coast Guard beacon receiver. The OmniStar 3100LM received corrections from the Fugro differential GPS network; and was the primary source of differential corrections for this project. However, final positions were determined using a post-processed KGPS solution using the POSpac 4.2 processing software.

Vertical Control

All sounding data were reduced to MLLW initially using unverified tidal data from the NOAA tide station (ID #: 8423898), located in Fort Point, Newcastle Island, NH.

Table 3 – Tide Gauges

Gauge	Model	Gauge Type	Location	Latitude	Longitude	Operational
8423898	NOAA Gauge	Acoustic	Fort Point, NH	43°04'18"N	70°42'42" W	N/A

**Table 4 – Final Tide Zones**

Zone	Primary			
	Site	Number	Time	Range Ratio
NA169	Fort Point	8423898	-6 min	1.00

Preliminary tidal data was downloaded from the NOAA CO-OPS website (http://www.co-ops.nos.noaa.gov/data_res.html) approximately 5 hours after each flight. The data was downloaded in UTC time (Eastern Standard Time to UTC was +4 hours) and appended to a cumulative file which was then applied to the data.

On November 3, 2005, the verified tidal data was downloaded from the NOAA CO-OPS website for OPR-A321-KRL-05. On November 20, 2005, using the GCS software, the tide zone file and verified tides were imported into GCS and all LiDAR sounding data were tide corrected. Verified tidal data was used for the Preliminary Smooth Sheet.

During the OPR-A321-KRL-05, Approaches to Portsmouth Survey, there were no unusual conditions regarding tidal information to note. Refer to Appendix A for a more detailed description and Tidal Data.

**D – Results and Recommendations** *See also the Evaluation Report.*Chart Comparison

H11296 survey was compared with charts:

Table 5 – NOAA Chart List

Chart Number	Scale	Edition	Edition Date as of August 28, 2005
OPR-A321-KRL-05			
13003	1: 200,000	48th	October 2004
13006	1: 675,000	32nd	February 2005
13009	1:500,000	31 st	October 2004
13260	1:378,838	39th	June 2003
13274	1:40,000	26 th	April 2005
13278	1: 80,000	26 th	June 2005
13283	1:20,000	19 th	February 2005

Comparison of Soundings *See also the Evaluation Report.*

The soundings and contours, in general, compare well with the existing charts. Soundings from charts 13283 and 13274 coincide with the soundings from H11296 to within 2 to 3 feet; areas that do vary to any degree are noted separately and are as follows:

- Hydrographic survey H11296 revealed that the 5 foot shoal on chart 13283 located at 43-00-30.37N, 70-35-58.07W is actually located approximately 75m to the southwest. This area was surveyed with 100% LIDAR coverage.
- Hydrographic survey H11296 revealed a depth of 28 feet in the vicinity of a 12 foot sounding on chart 13283 located at 43-00-21.82N, 70-35-48.40W. This area was surveyed with 100% LIDAR coverage.
- Hydrographic survey H11296 revealed a depth of 37 feet in the vicinity of a 16 foot sounding on chart 13283 located at 43-00-17.60N, 70-35-46.57W.

Others soundings that differed from the chart, were documented in a Danger to Navigation report and are listed in Appendix A Danger to Navigations.

The contours from H11296 take on the same general shape. Differences can be associated with the following; since the contours on H11296 are derived from a dense shoal biased LiDAR data set with more detail than the existing charts. *See also the Evaluation Report.*



Automated Wreck and Obstruction Information System

There were no AWOIS items assigned to OPR-A321-KRL-05.

Charted Features

There were no charted features labeled PA, ED, PD, or Rep within the limits of H11296.

Dangers to Navigation

Six dangers to navigation were located during the hydrographic survey of H11296. Refer to Appendix A for Submitted Report.

Additional Results

Additional Item Investigations

No additional item investigations were performed on this contract.

Results and recommendations *See also the Evaluation Report.*

The ERDAS Image V8.7 software was utilized to create the orthomosaic that was used for the mapping and verifying of shoreline features. The accuracy of the orthomosaic is apparent when viewing photos from reciprocal lines in the orthomosaic, the horizontal alignment of distinct features are within IHO Order 1 (+5m). The positional accuracy of the orthomosaic was verified by ground truth methods

The following features require further investigation. These features were either not found with the LiDAR system or are in additional features that were found with the system and are of question. The new features that were found with confidence are listed in the Danger to Navigation Section.

- Charted rock at 43-00-44.45N, 70-43-50.73W was not found during this survey, recommend further investigation.
- Charted rock at 43-00-38.56N, 70-43-55.51W was not found during this survey, recommend further investigation.
- Charted rock at 43-00-32.57N, 70-43-57.07W was not found during this survey, recommend further investigation.
- Charted rock at 42-58-07.85N, 70-46-07.26W was not found during this survey, it appears to be approximately 80m to the northwest, recommend further investigation.

- Charted rock at 42-58-08.40N, 70-46-05.25W was not found during this survey, it appears to be approximately 80m to the northwest, recommend further investigation.
- Charted rock at 42-58-12.26N, 70-45-41.23W was not found during this survey, it appears to be approximately 65m to the northeast, recommend further investigation.
- New rock at 43-00-01.45N, 70-36-17.25W was located by LiDAR which is covered 2 ft at MLLW. The rock is present on the Orthomosaic.
- Charted rocks at 42-58-00.31N, 70-37-47.01W were not found during this survey, recommend further investigation.

Due to poor water quality, Turbidity, white water and other reasons the coverage at the following locations was poor. It is recommended that these areas be visited with a multibeam echo-sounder system or other techniques to verify no navigation hazards exist.

- The area just south of Rye Harbor.

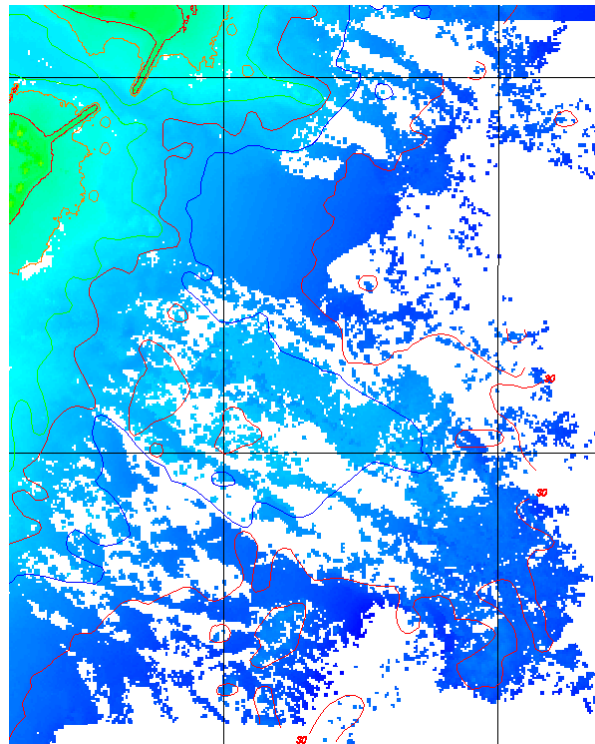


Figure 6 – Additional work (South of Rye Harbor)

- The area along Fox Hill Point.

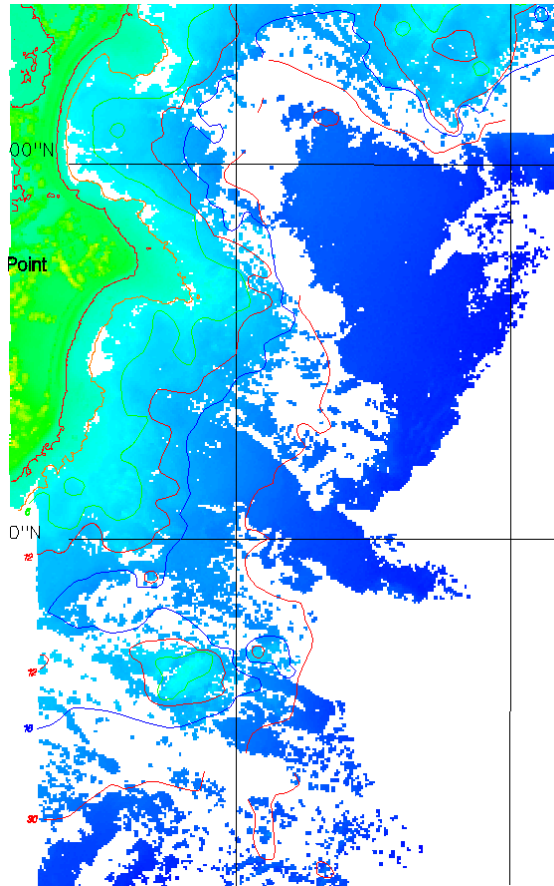


Figure 7 – Additional work (Fox Hill Point)

Additional Notes: *See also the Evaluation Report.*

- The MHW and MLLW lines were created in CARIS HIPS & SIPS 5.4. The data was gridded at 5m with a 3 X 3 foot print size and contoured via CARIS Fieldsheet Editor at the appropriate intervals. The MLLW line was not interpolated manually to rectify breaks in the MLLW line. If there are areas on the smooth sheet where the MLLW is present and there are no soundings present, the soundings were either suppressed during the sounding suppression stage in CARIS or put on an excess level (level 52) in Microstation because they touched the MHW line.
- The source of the MHW line (solid red line) on the smooth sheet for H11296 is from the SHOALS-1000T.
- An area where the MHW was broken, the orthomosaic was used to derive the MHW and is represented by a dashed red line on the smooth sheet.



Tidal Range

The published tidal range for OPR-A321-KRL-05 to be 2.743 meters (9.000 feet). This value was used in determining height above MHW. *The MHW value used was -2.4m (-7.874 ft.) as per HTD 2008-5, "Use of Mean High Water Values in Hydrographic Products".*

Bottom Samples

Bottom Samples were not required under this contract.

Aids to Navigation

None were positioned, however, if required these could be picked off the orthomosaic.



E – Approval Sheet

Approval Sheet

For

H11296

Standard field surveying and processing procedures were followed in producing this survey in accordance with the following documents:

OPR-A321-KRL-05 statement of work and hydrographic manual;
Fugro Pelagos, Inc. LiDAR Acquisition Procedures;
Fugro Pelagos, Inc. LiDAR Processing Procedures;

The data were reviewed daily during acquisition and processing.

This report has been reviewed and approved. All records are forwarded for final review and processing to the Chief, Atlantic Hydrographic Branch.

Approved and forwarded,

A handwritten signature in cursive script, appearing to read "Dushan Arumugam".

Dushan Arumugam, Fugro Pelagos, Inc.
Lead Hydrographer
Fugro Pelagos, Inc. Survey Party

REPORT OF DANGERS TO NAVIGATION
H11296 DtoN#1

Hydrographic Survey Registry Number: H11296
Survey Title: State: New Hampshire
Locality: Approaches to Portsmouth
Sub-locality: Rye Harbor Isles of Shoals

Project Number: OPR-A321-KR-05

Field Unit: Fugro Pelagos, Inc
Survey Vessel: KingAir 90 (N91S)

Survey Date: September 9, 2005 and On Going

Depths are reduced to Mean Lower Low Water using *Verified Water Levels* and preliminary tidal zoning. Positions are referenced from USCG DGPS beacon and horizontal datum is North America Datum 83 (NAD83).

Charts affected:

- 13274 26th Edition April 2005 1:40,000 scale
- 13278 26th Edition June 2005 1:80,000 scale

The following items were found during hydrographic survey operations:

DANGERS TO NAVIGATION

	<u>Feature</u>	<u>Depth (FT)</u>	<u>Latitude (N)</u>	<u>Longitude (W)</u>
1.	Rock	2	43° 00' 01.45"	070° 36' 17.25"
2.	Rock	9	42° 59' 59.82"	070° 36' 22.52"
3.	Rock	9	42° 57' 59.69"	070° 37' 35.68"
4.	Sounding	13	42° 59' 55.74"	070° 36' 25.80"
5.	Sounding	12	42° 57' 57.56"	070° 37' 33.63"
6.	Sounding	14	42° 57' 47.89"	070° 36' 05.20"
7.	Sounding	3	42° 57' 58.75"	070° 37' 30.21"

Questions concerning this report should be directed to the Chief, Atlantic Hydrographic Branch at (757) 441-6746.

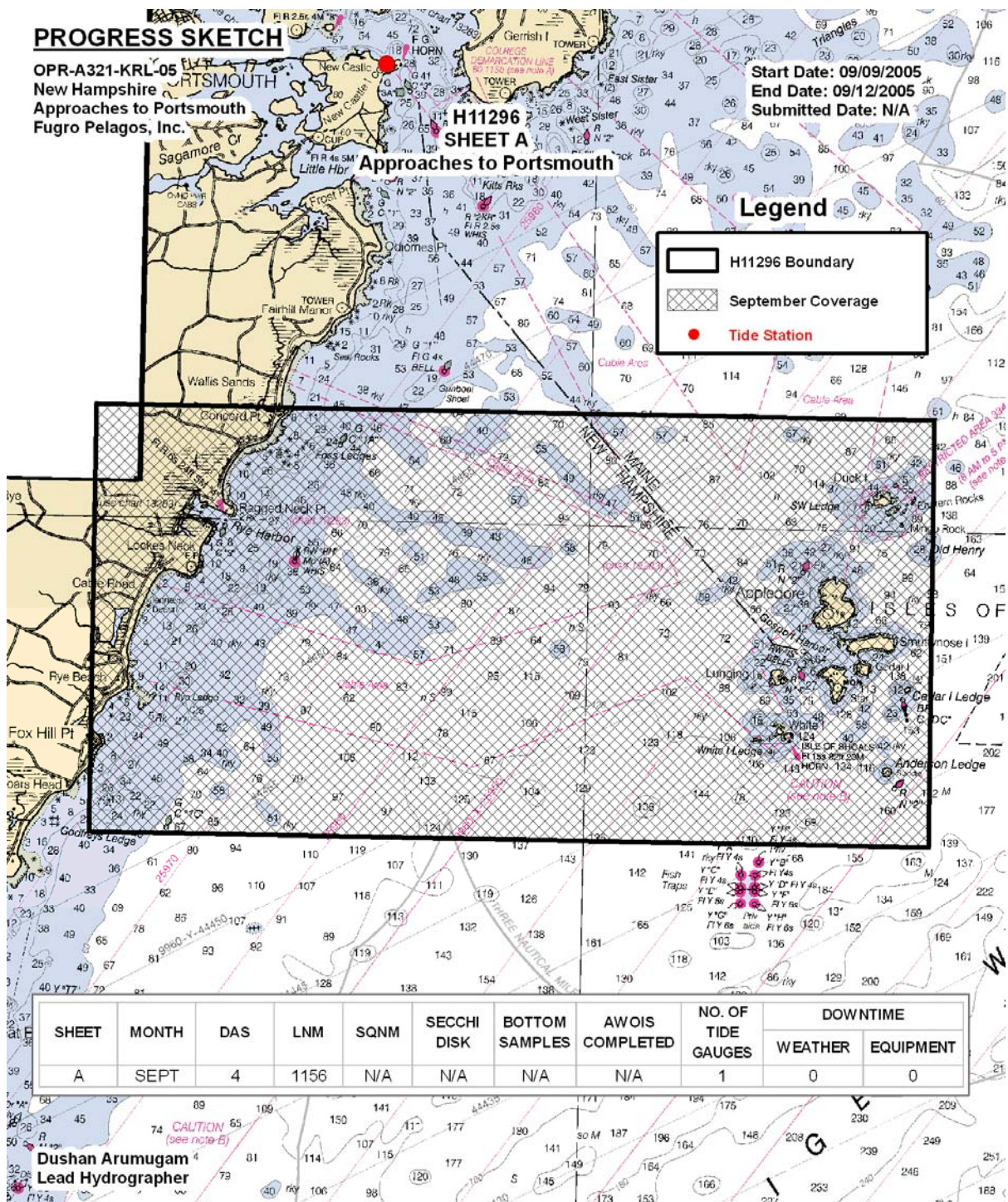
Atlantic Hydrographic Branch 439 W. York St., Norfolk, VA 23510 Feb. 9, 2006 naw



Appendix B - List of Geographic Names

No new geographic names in the survey were discovered.

Appendix C – Progress Sheet





Appendix D - Tides and Water Levels

Abstract of Times of Hydrography for Smooth Tides

Project Number: OPR-A321-KRL-05

Registry Number: H11296

Contractor Name: Fugro Pelagos Inc.

Date: January 8, 2006

Sheet Letter: A

Inclusive Dates: September 9, 2005 to September 12, 2005

Fieldwork is complete and verified tides were applied for the production of the smooth sheet.

Table 7 - Abstract of Times of Hydrography for LiDAR

YEAR	DAY	START TIME (UTC)	END TIME (UTC)	COMMENTS
2005	252	11:00:00	15:55:00	
2005	252	17:20:00	22:15:00	
2005	253	11:35:00	15:05:00	
2005	253	18:05:00	23:15:00	
2005	254	12:50:00	14:45:00	
2005	254	15:40:00	17:50:00	
2005	254	19:45:00	21:25:00	
2005	255	15:40:00	18:30:00	



Appendix E - AWOIS

No AWOIS items were assigned under OPR-A321-KRL-05.

**ATLANTIC HYDROGRAPHIC BRANCH
EVALUATION REPORT to Accompany
Survey H11296 (2006)**

This Evaluation Report has been written to supplement and/or clarify the original Descriptive Report. Sections in this report refer to the corresponding sections of the Descriptive Report.

B. DATA ACQUISITION AND PROCESSING

B.1 DATA PROCESSING

The following software was used to process and review data at the Atlantic Hydrographic Branch (AHB):

CARIS HIPS/SIPS version 6.1 SP2 hotfix 1
CARIS BASE Manager 2.1 SP1 hotfix 8
S-57 Composer 1.0 hotfix 1
PYDRO, version 8.6 (build r2366)
dKart Inspector V. 5.0 Build 732 (SP1)

B.2 QUALITY CONTROL

H-Cells

The AHB source grid was the “shoal” layer extracted from a 5m resolution BASE surface. A generalized Product Surface was created from the extracted 5m shoal surface at a 1:10,000 scale using a radius of 50m maintaining the resolution of 5m. Survey scale soundings were then extracted from this Product Surface at a 1:10000 scale using a defined sounding radius of 1.25m to obtain as dense a sounding set as possible. Chart scale soundings were manually selected from the full density survey scale sounding set, referencing the latest editions of raster charts 13283 and 13278, the submitted contractor’s Preliminary Smooth Sheet (dgn) file, the AHB 5m shoal surface, and the AHB chart scale smoothed contours as guides for sounding placement and to ensure that the selected soundings portrayed the bathymetry within the common area. Soundings were then checked for conflicts, corrected to remove conflicts, and edited to allow for proper sounding compilation placement with respect to existing charted depths outside the survey area.

Survey scale depth contours were digitized from the contractor’s submitted Preliminary Smooth Sheet (dgn) file, then edited based on the full density survey scale soundings. Chart scale smoothed contours were then created by hand.

The compilation products and Stand Alone HOB Files (SAHOB) are detailed in the Compilation Process Log of this document. All individual SAHOB files were assembled in BASE Editor during H-Cell compilation.

The completed H-Cell was exported as a Base Cell File (ENC.000) in S-57 format with all values in metric units. The metric equivalent ENC.000 file was then converted to NOAA chart units (ENC_CU.000) with all values measured in fathoms following NOAA sounding rounding rules.

Chart compilation was performed by Atlantic Hydrographic Branch personnel in Norfolk, Virginia. Compilation data will be forwarded to Marine Chart Division, Silver Spring, Maryland.

The H11296 CARIS H-Cell final deliverables include the following products:

US511296_CS.000	1:10,000 Scale	H11296 H-Cell with Chart Scale Soundings
US511296_SS.000	1:10,000 Scale	H11296 Survey Scale Soundings
US511296_BlueNotes.000	1:10,000 Scale	H11296 Cartographic Notes

C. VERTICAL AND HORIZONTAL CONTROL

Horizontal control used for this survey during data acquisition is based upon the North American Datum of 1983 (NAD83), UTM projection zone 19. Office ENC processing of this survey required translating the datum to meet S-57 ENC requirements. The horizontal geodetic datum was translated to Latitude and Longitude (LLDG) World Geodetic System-84 (WGS-84) during CARIS HOM processing.

D. RESULTS AND RECOMMENDATIONS

D.1 Chart Comparison

13283 (20th Edition, Oct/07)

Corrected through NM Oct. 27/07
 Corrected through LNM Oct. 23/07
 1:20,000 Scale

13278 (26th Edition, Jun./05)

Corrected through NM Jun. 11/05
 Corrected through LNM May. 31/05
 1:80,000 Scale

ENC Comparison

US5NH02M

Portsmouth Harbor - Cape Neddick
Harbor to Isles of Shoals
Edition 7
Update Application Date 2007-09-13
Issue Date 2008-07-09
References: Charts 13283

US4MA04M

Portsmouth to Cape Ann
Edition 8
Update Application Date 2006-12-13
Issue Date 2007-12-10
References: Chart 13278

Hydrography

The charted hydrography originates with prior surveys and requires no further consideration. The hydrographer makes adequate chart comparisons in Section D. of the Descriptive Report. The following should be noted:

Charted Features

Rye Ledge, located in the vicinity of Latitude 42-58-18.08N, Longitude 70-45-35.95W, contains many rocks that are categorized with drying heights between 0-30 cm above the surveyed MHW limits. It is recommended Rye Ledge be marked for a follow-up survey to verify the existence of these dry rocks. Defer charting recommendations for rocks above the MHW limits to Marine Chart Division, Source Data Branch.

Comparison with Prior Surveys

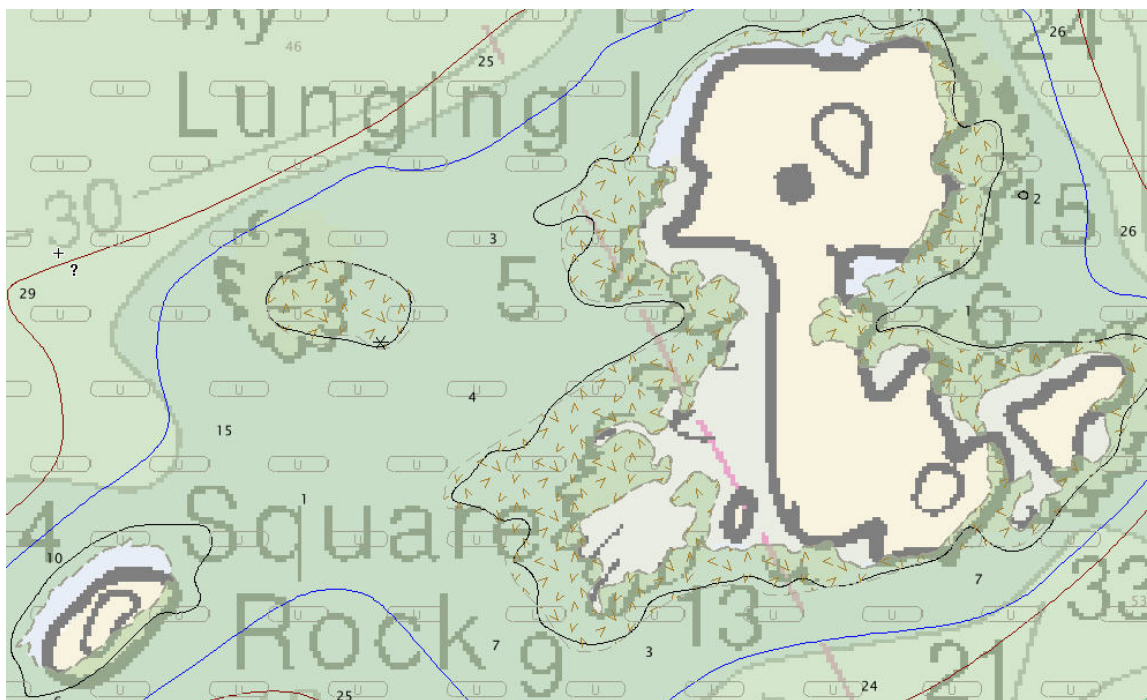
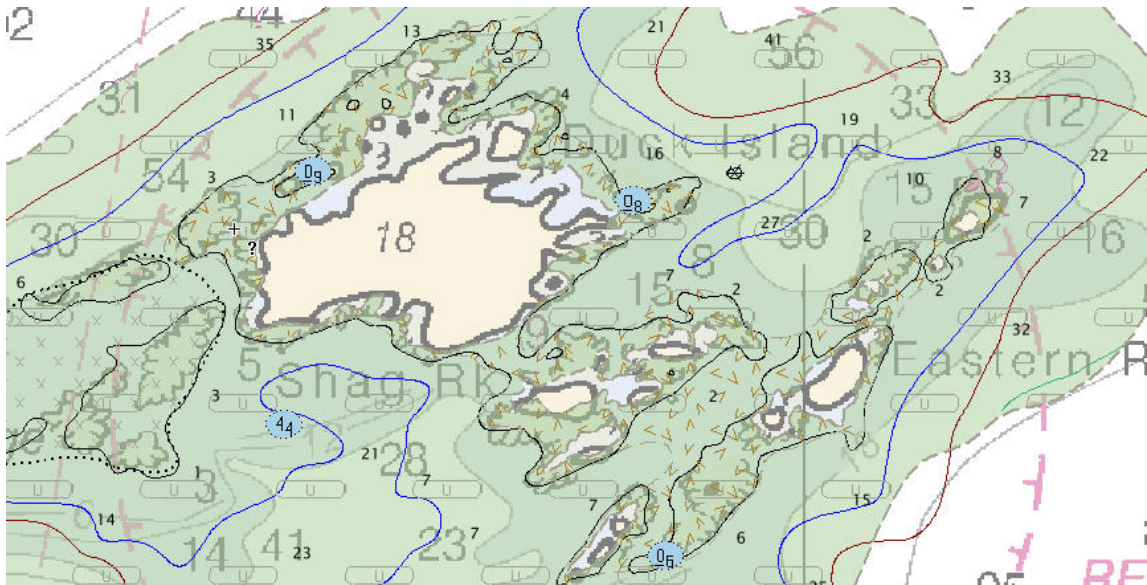
A comparison with prior surveys was not done during office processing in accordance with section 4. of the memorandum titled "Changes to Hydrographic Survey Processing", dated May 24, 1995.

Adequacy of Survey

The present survey is adequate to supersede the charted bathymetry within the common area except as noted below which are recommended for further survey investigations. Any features not specifically addressed either in the H-Cell or the Blue Notes should be retained as charted. Refer to the Descriptive Report for further survey requirements recommended by the hydrographer.

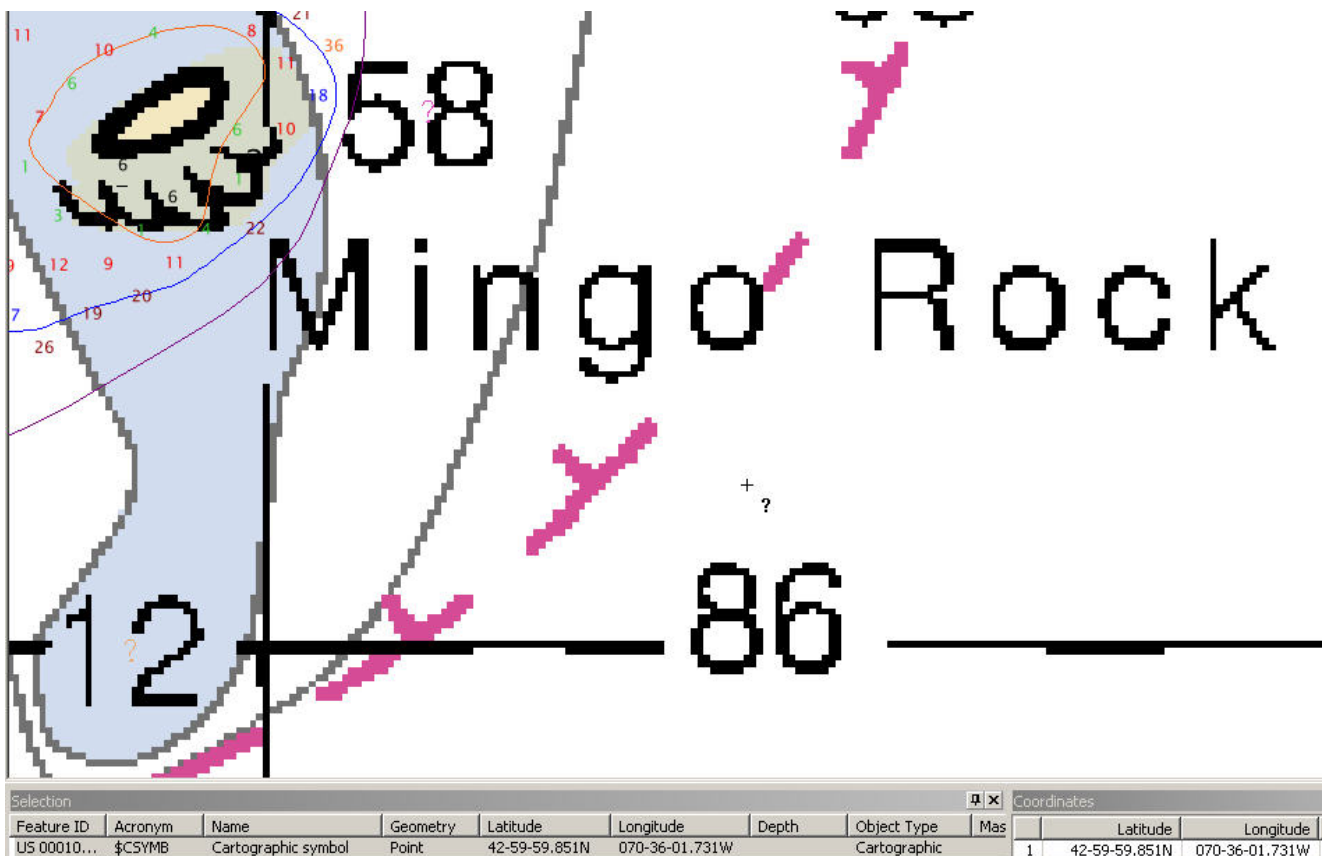
Recommended Additional Survey Work

There have been dramatic changes in contours, MLLW, MHW, and shoreline limits around the Isle of Shoals. It is recommended that new photogrammetry and multibeam surveys be undertaken on the Isle of Shoals to update the charted bathymetry and shoreline. Reference the following for examples. Depths are in feet, contours colored by depth (MHW limit is the edge of the surveyed area, MLLW limit is black, 6 ft. contour is blue, 12 ft. contour is red)

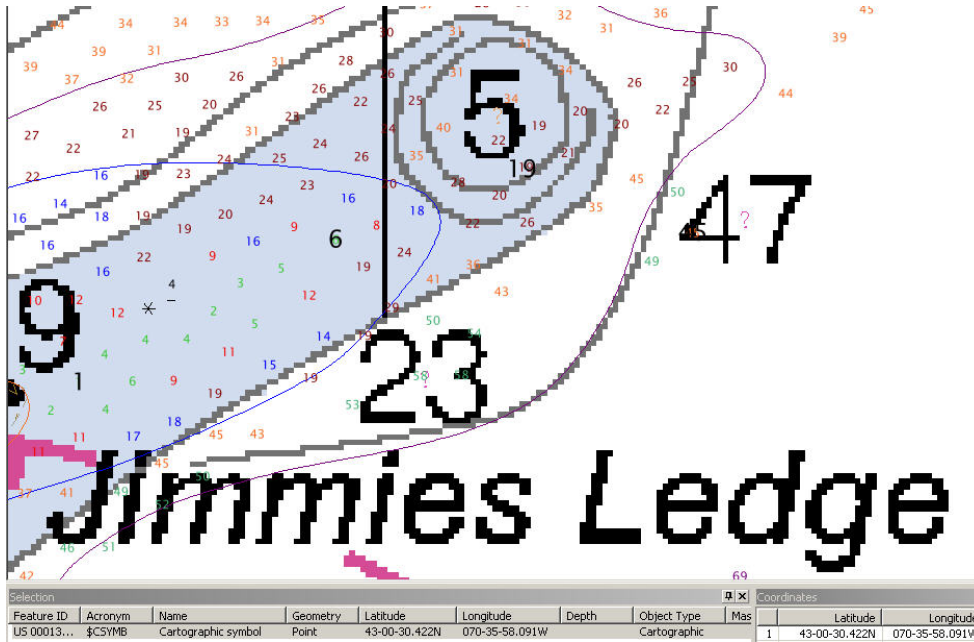


There are observed discrepancies between the current charted MHW limits and the current survey. It is recommended that new photogrammetry be obtained to update the charted MHW limits and shoreline within the surveyed area. The MHW limits were digitized from the current survey data. All rocks with drying heights between the range of 0cm and 30cm above MHW were digitized where possible. Defer charting recommendations for rocks above the MHW limits to Marine Chart Division, Source Data Branch. The following should also be noted:

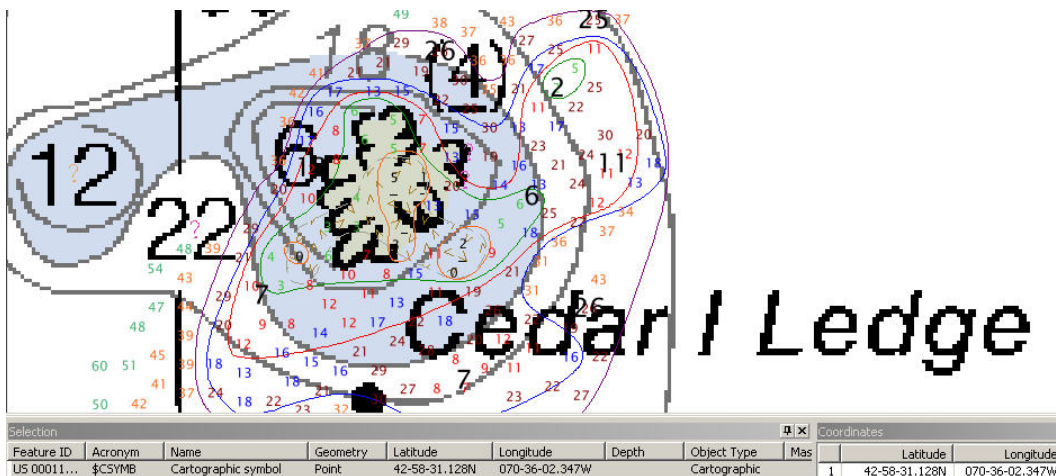
- 1) In the vicinity of Duck Island, south of Mingo Rock (Latitude 42-59-56.173N, Longitude 70-35-50.186W), is a charted 12 ft. shoal sounding. The current survey did not verify the existence of this shoal area. It is recommended this area be marked for follow-up survey to verify this shoal is no longer present and can be removed from the chart.



2) In the vicinity of Duck Island, north of Jimmies Ledge (Latitude 43-00-32.204N, Longitude 70-38-03.287W), is a charted 5 ft. shoal sounding. The current survey shows depths of 19 feet. It is recommended this area be marked for follow-up survey to verify this shoal is no longer present and can be removed from the chart.

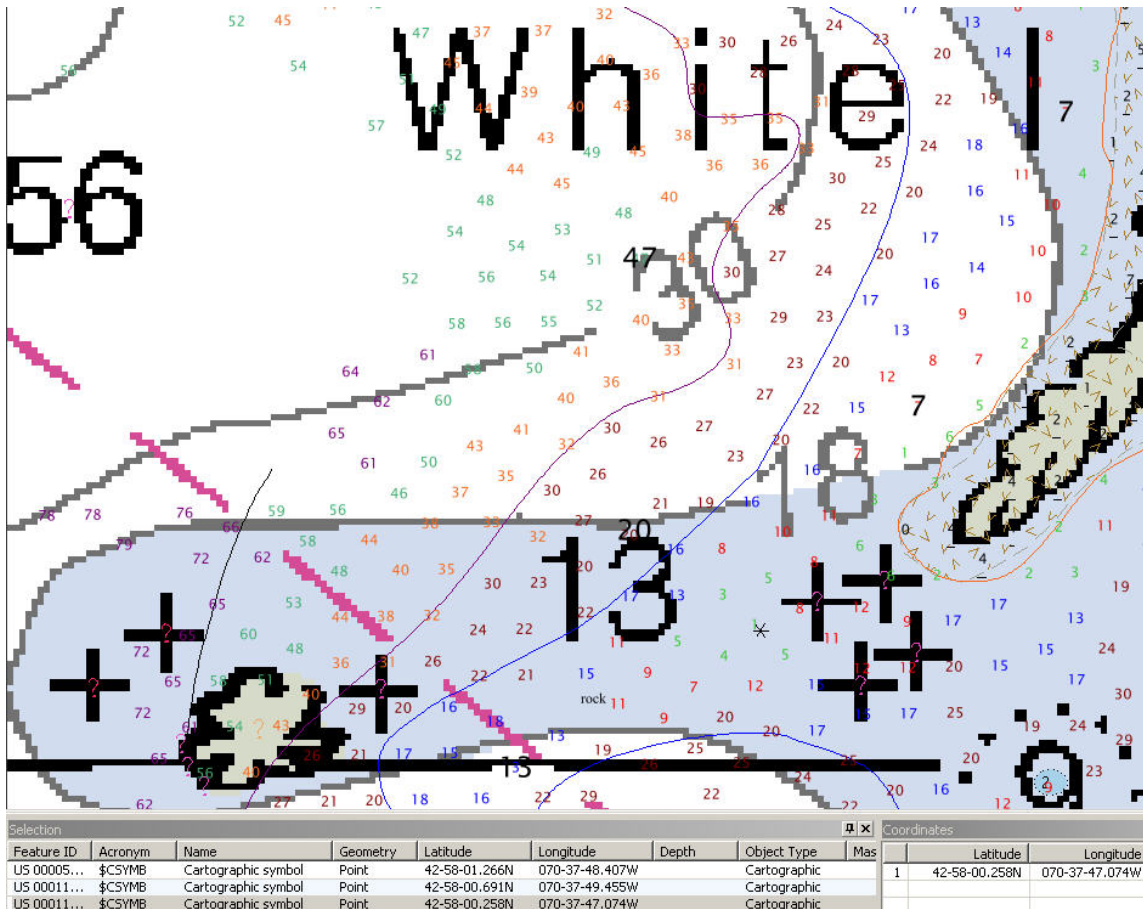


3) In the vicinity of Cedar Island west of Cedar Island Ledge (Latitude 42-58-31.128N, Longitude 70-36-02.347W), is a charted 12 ft. shoal sounding. The current survey did not verify the existence of this shoal area. It is recommended this area be marked for follow-up survey to verify this shoal is no longer present and can be removed from the chart.

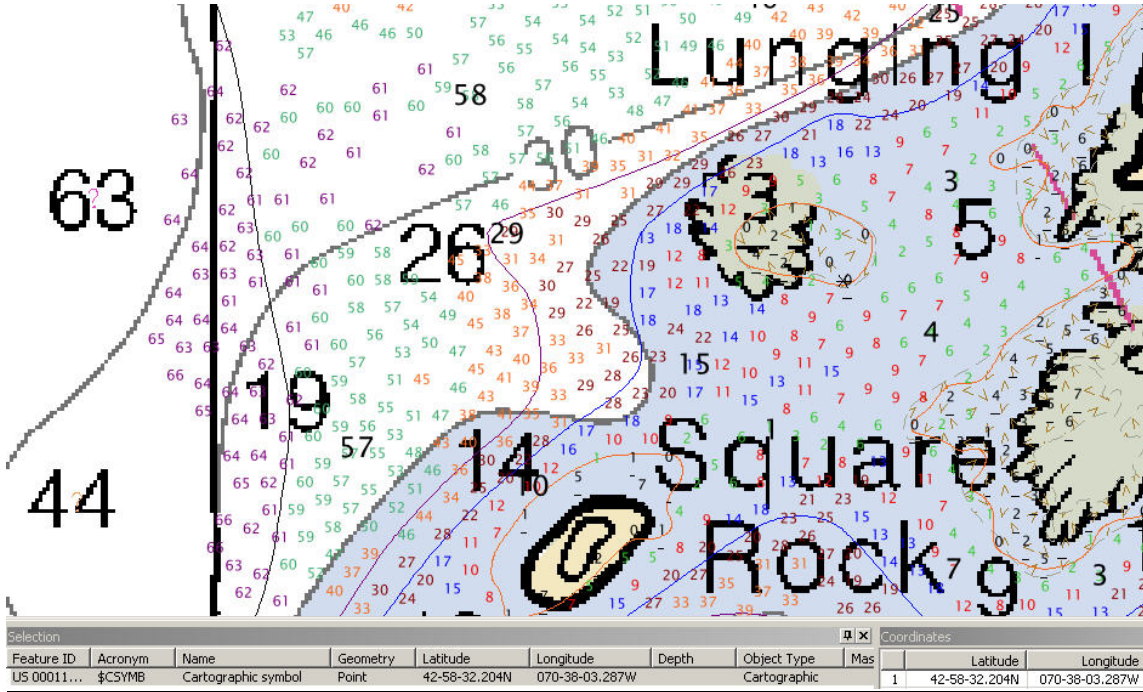


4) In the vicinity of White Island, north of White Island Ledge, charted features exist that were not verified by the current survey. The locations are listed below. It is recommended this area be marked for follow-up survey to verify these features are no longer present and can be removed from the chart.

<u>Latitude</u>	<u>Longitude</u>	<u>Feature</u>
42-58-01.266N	070-37-48.407W	rock awash
42-58-00.691N	070-37-49.455W	rock awash
42-58-00.487N	070-37-54.369W	27 ft. sounding



5) In the vicinity of Lunging Island, west of Square Rock (Latitude 42-58-32.204N, Longitude 70-38-03.287W), is a charted 44 ft. shoal sounding. The current survey did not verify the existence of this shoal area. It is recommended this area be marked for follow-up survey to verify this shoal is no longer present and can be removed from the chart.



Baselines

The existing Baseline points in the vicinity of the Isle of Shoals require revision based upon the MLLW limits as documented from this survey. Defer all Baseline updates to Marine Chart Division, Source Data Branch. Refer to included correspondence for a description of the Baseline points and their usage.

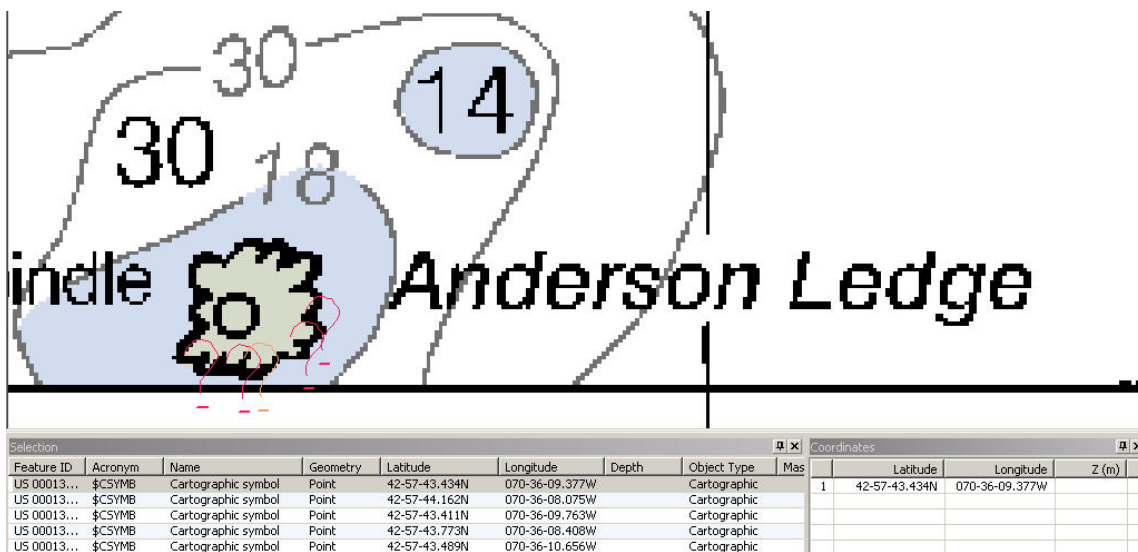
Per email conversation with Meredith Westington, Chief Geographer NOAA/NOS/Office of Coast Survey (Meredith.Westington@noaa.gov), the National Baseline is defined as follows:

The charted, offshore limits of U.S. jurisdiction-- Three Nautical Mile Line, 9 nautical mile (nm) Natural Resources Boundary, 12nm territorial sea, 24nm contiguous zone, and 200nm Exclusive Economic Zone (EEZ)—are measured from what is referred to as the “baseline.” A “normal baseline,” as defined in the Convention on the Law of the Sea, refers to the low-water line as marked on officially recognized, large-scale nautical charts. Since low water is not an official tidal datum, the U.S. applies the term to reference the lowest charted datum, which is mean lower low water (MLLW) in the U.S. As the charts are updated, so does the

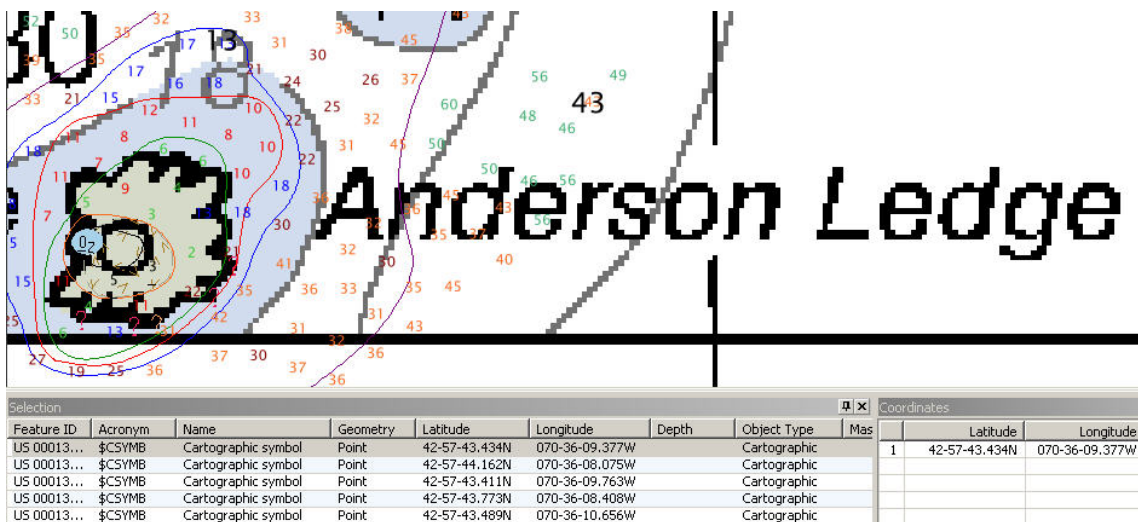
baseline and the related maritime zones. Examples of features that typically meet international baseline criteria are naturally-formed islands, islets, and rocks awash that bare at MLLW. Additionally, groins, breakwaters, jetties, and entrances to legally-defined bays, harbors, or rivers may also be included. Subsequent to the application of this survey, the following baseline features may be impacted by updates to the relevant nautical charts:

1) The Maritime Limit Baseline around Anderson Ledge (approx. 1.5 km SSE of Star Island in the Isles of Shoals) is between 10m to 23 m further offshore of the newly surveyed MLLW limits. (The images portray survey scale soundings and contours (colored by depth), and the survey's MLLW line is portrayed in orange.)

Maritime Baseline locations as currently charted:

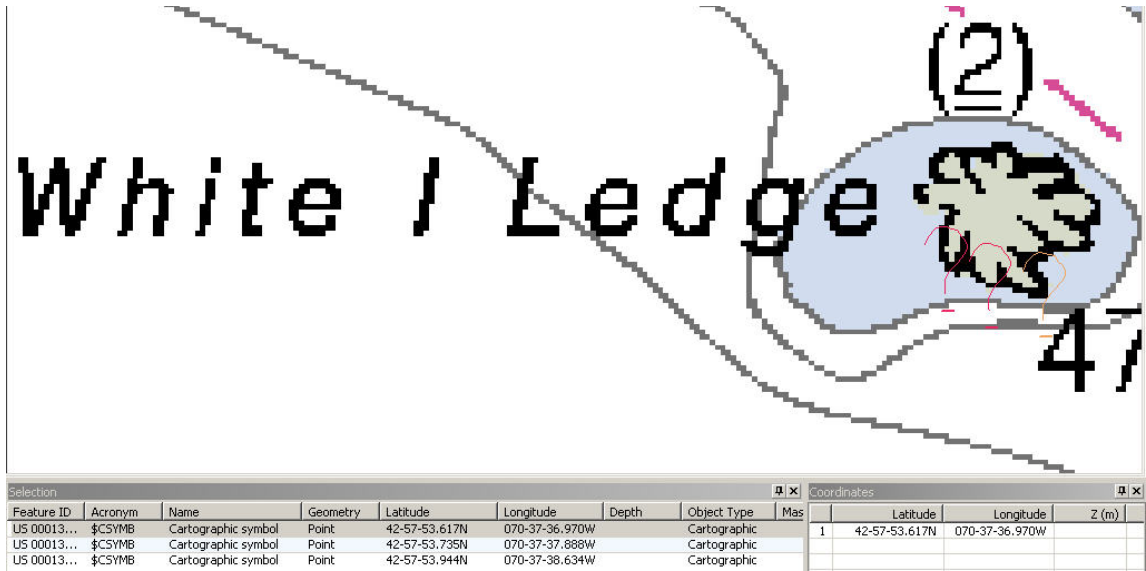


Updated MLLW limits based upon H11296:

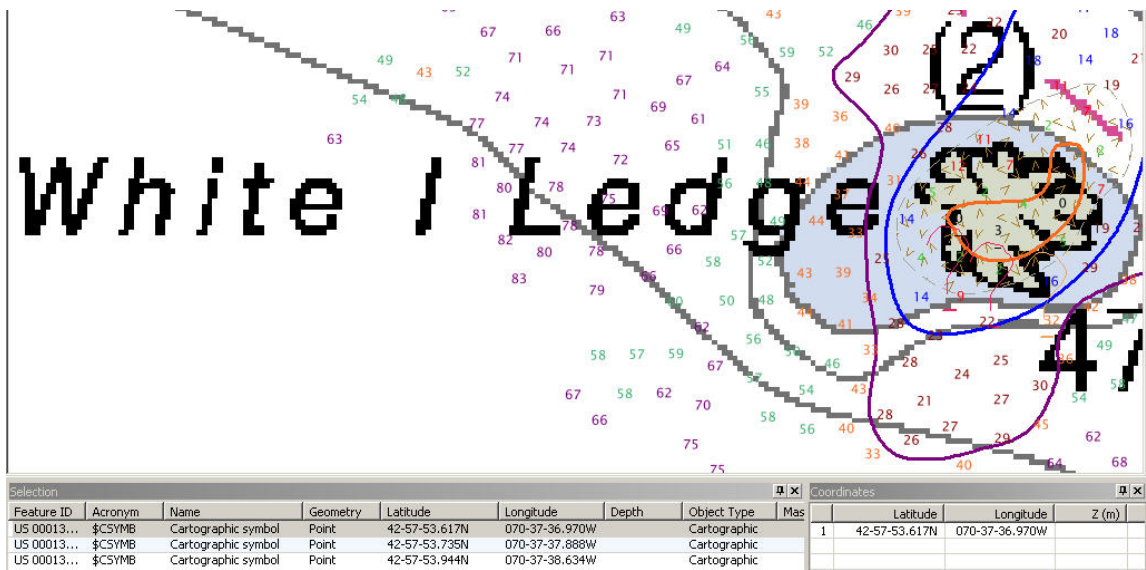


2) The Maritime Limit Baseline in the vicinity of White Is. Ledge in the Isles of Shoals is between 9m to 17m further offshore of the newly surveyed MLLW limits.

Maritime Baseline locations as currently charted:

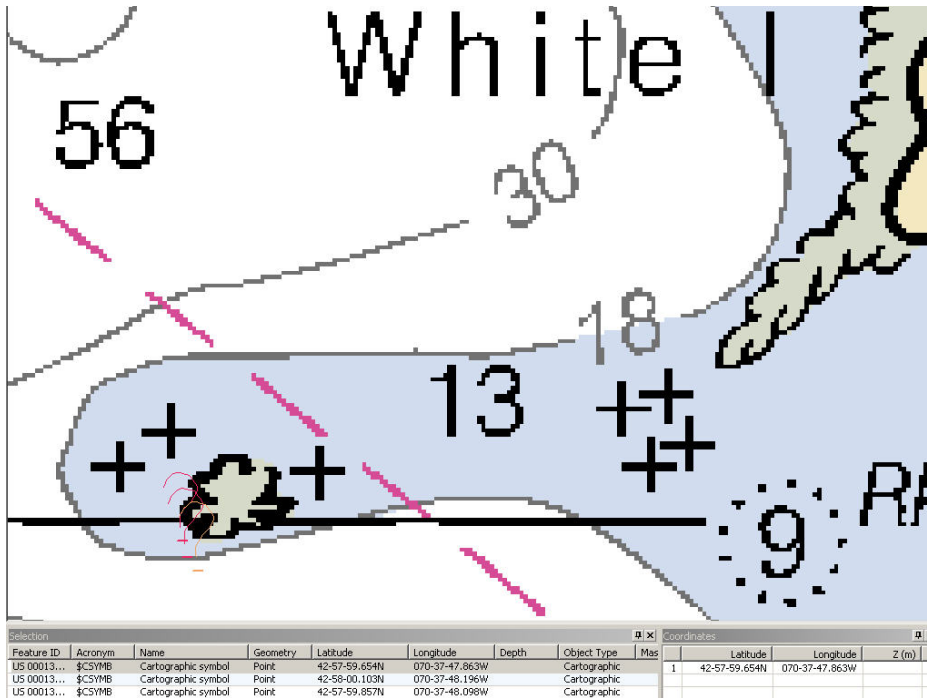


Updated MLLW limits based upon H11296:

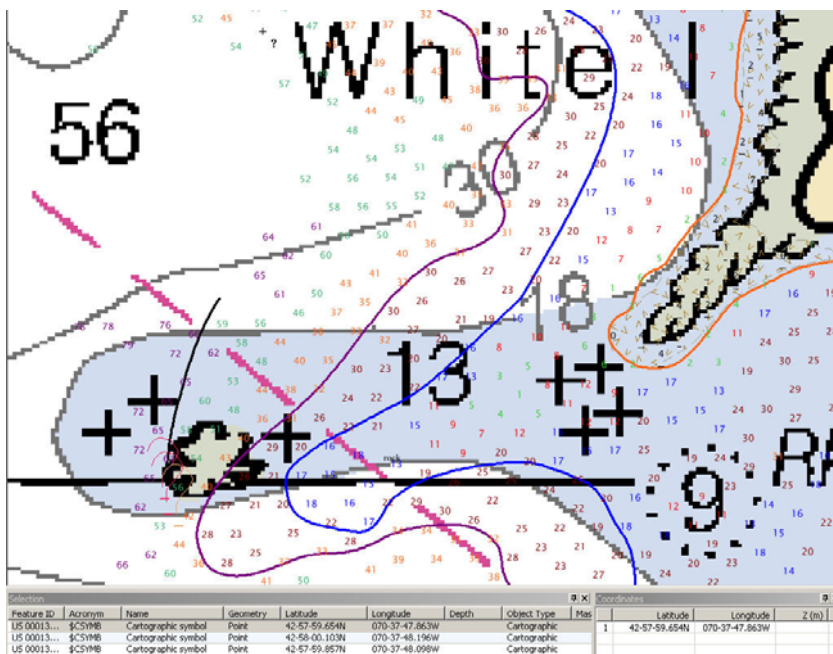


3) The Maritime Limit Baseline west of White Is. Ledge in the Isles of Shoals (approx. 350 m west of White Island) is approximately 240m offshore of the newly surveyed MLLW limits.

Maritime Baseline locations as currently charted:

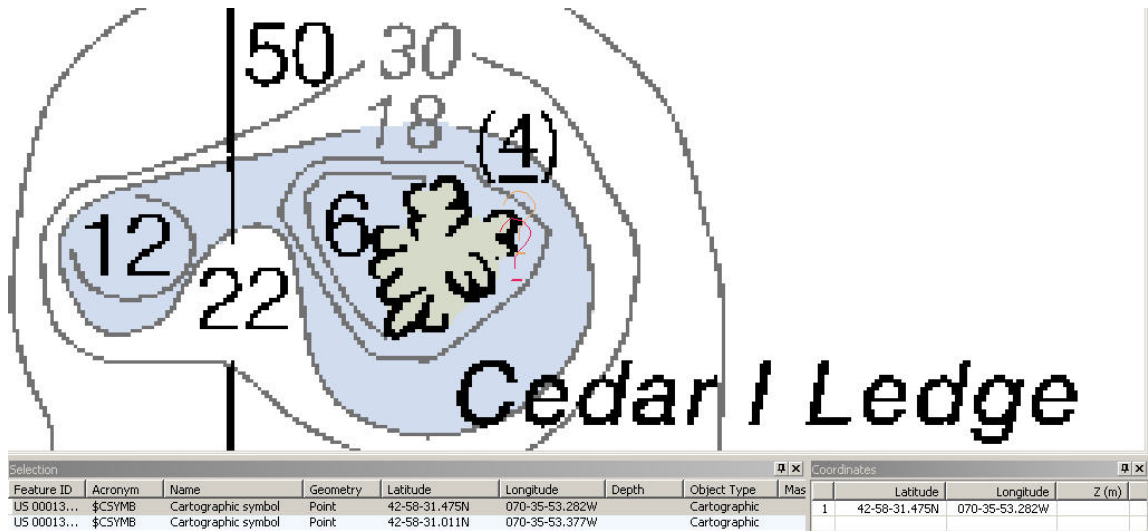


Updated MLLW limits based upon H11296:

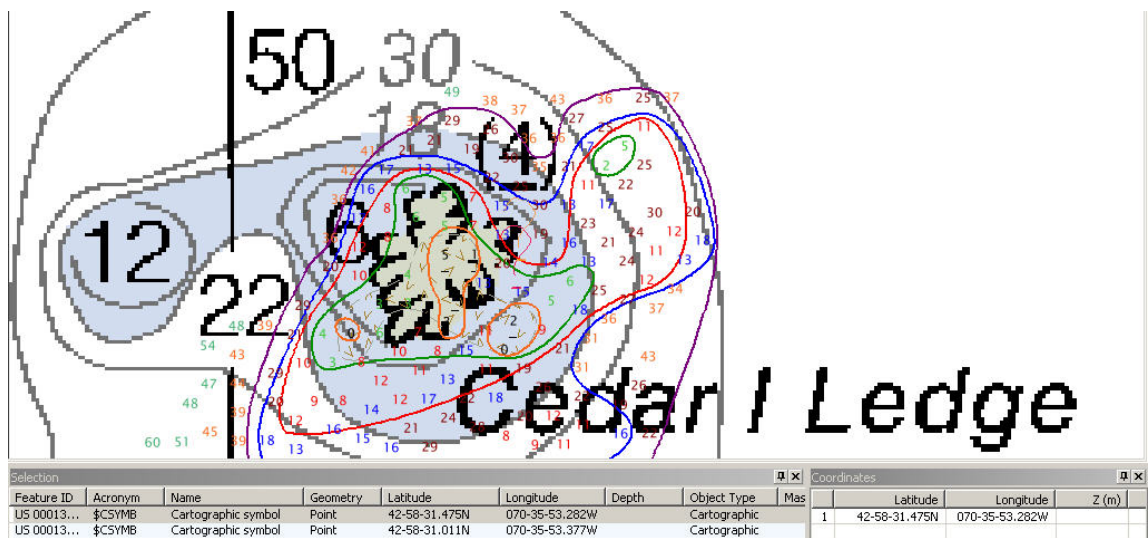


4) The Maritime Limit Baseline west of Cedar Is. Ledge (approx. 680 m SSE of Cedar Is. in the Isles of Shoals) is between 18m to 23m further offshore of the newly surveyed MLLW limits.

Maritime Baseline locations as currently charted:

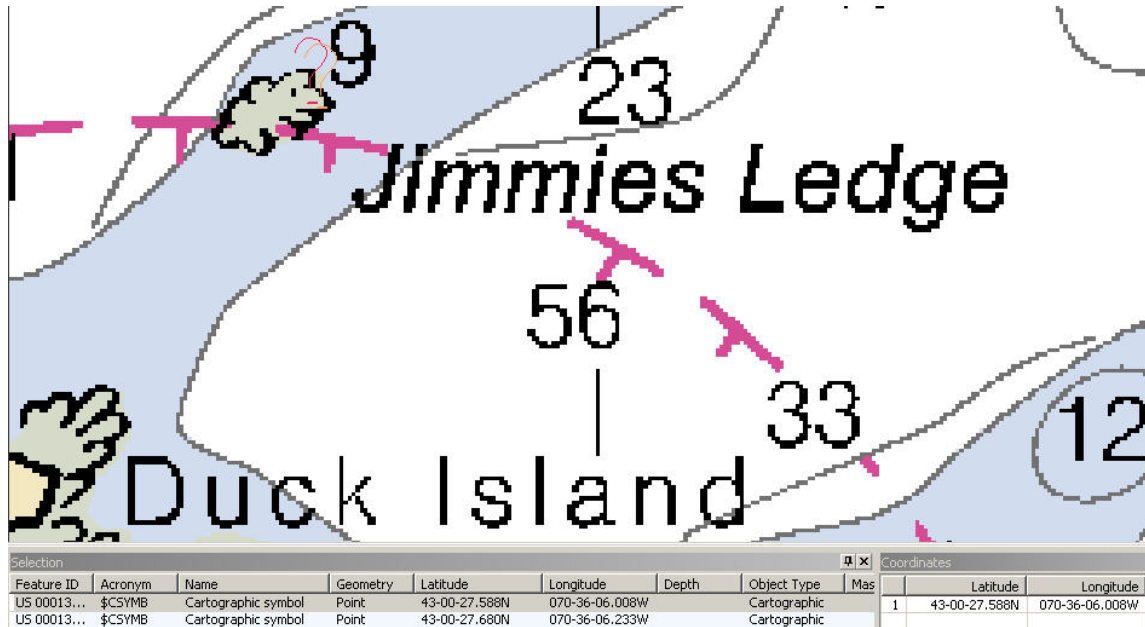


Updated MLLW limits based upon H11296:

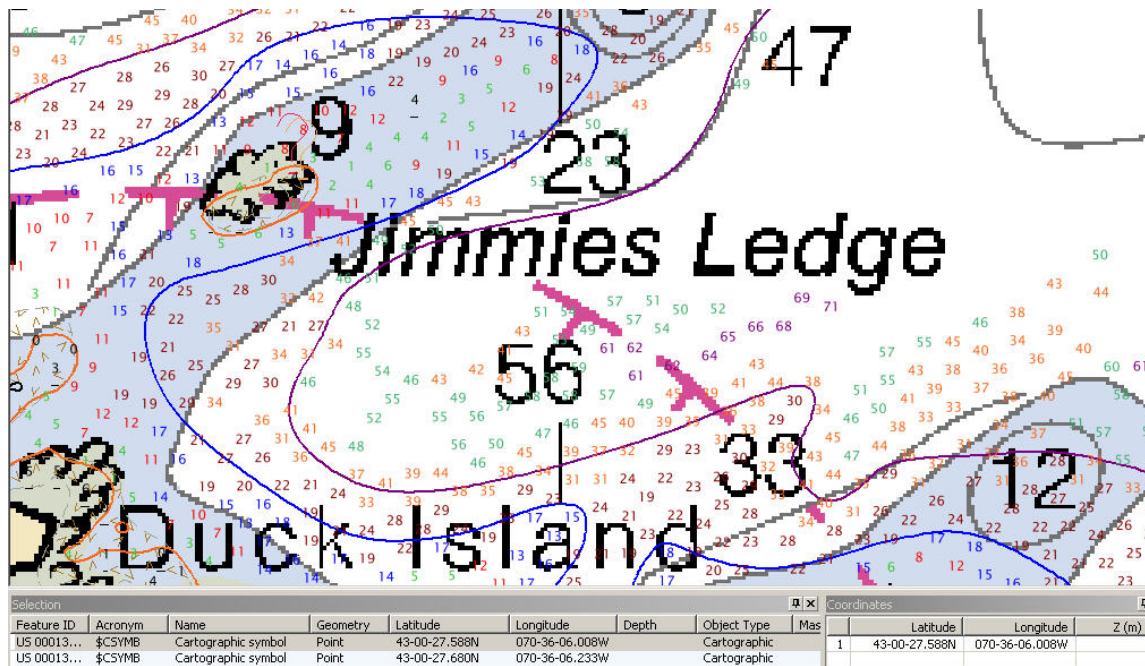


5) The Maritime Limit Baseline north of Jimmies Ledge (northwest of Duck Is. in the Isles of Shoals) is between 9m to 12m further offshore of the newly surveyed MLLW limits.

Maritime Baseline locations as currently charted:

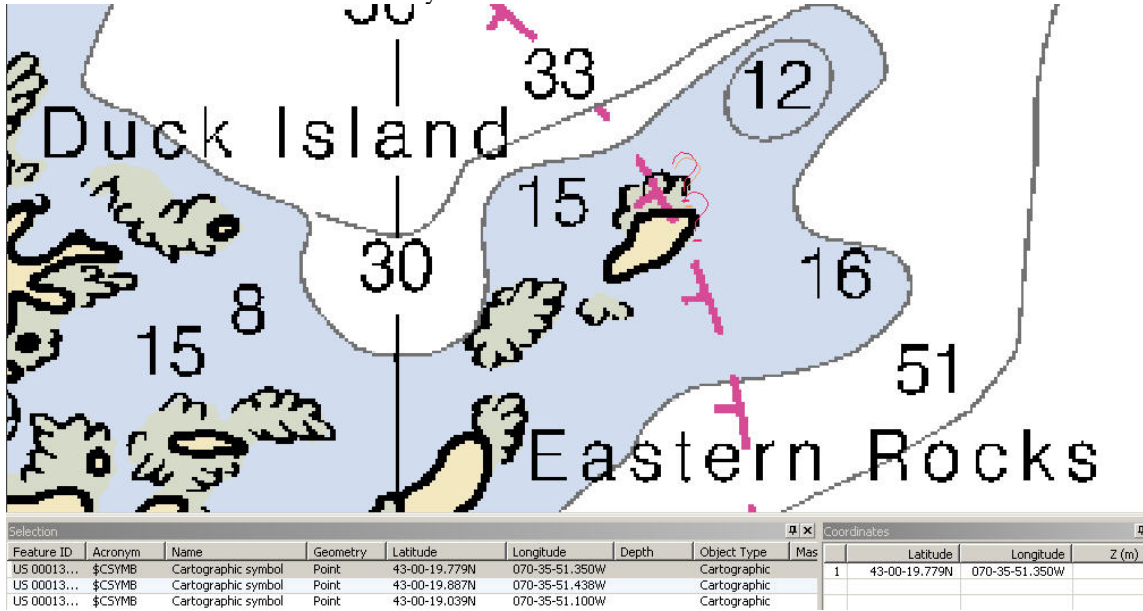


Updated MLLW limits based upon H11296:

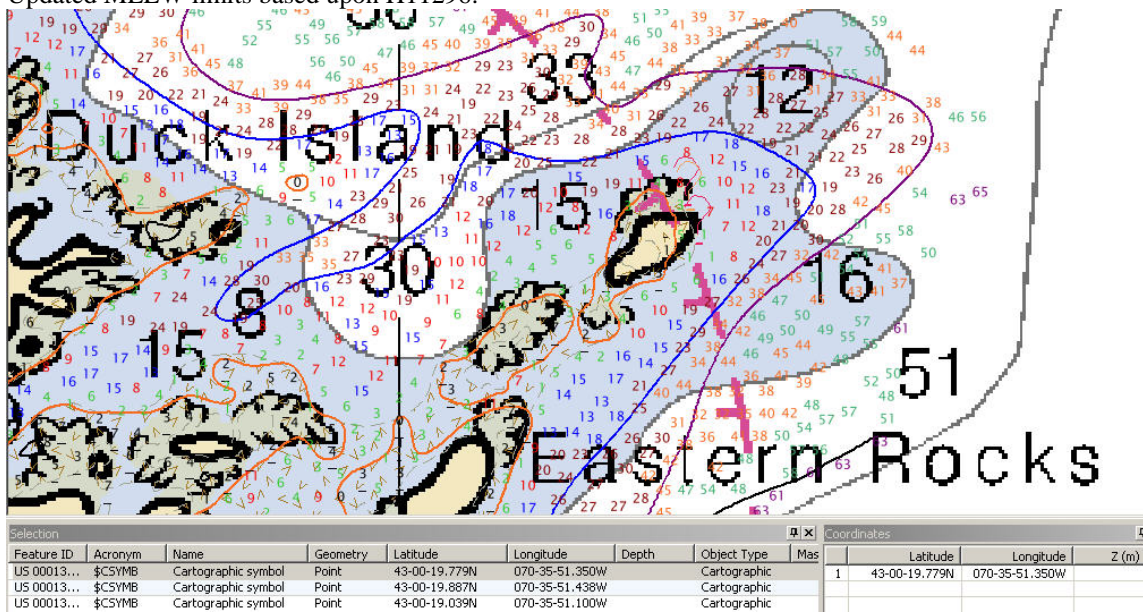


6) The Maritime Limit Baseline south of Jimmies Ledge (east of Duck Is. in the Isles of Shoals) is between 14m to 17m further offshore of the newly surveyed MLLW limits.

Maritime Baseline locations as currently charted:



Updated MLLW limits based upon H11296:



Bryan Chauveau

Bryan Chauveau
Physical Scientist
Evaluation Report

AHB COMPILATION PROCESS

Registry No.	H11296
Project No.	OPR-A321-KRL-05
Field Unit	Beechcraft King Air 90 (N91S)
Compilers	Bryan Chauveau

13283 (20th Edition, Oct/07)

Corrected through NM Oct. 27/07
 Corrected through LNM Oct. 23/07
 1:20,000 Scale

13278 (26th Edition, Jun./05)

Corrected through NM Jun. 11/05
 Corrected through LNM May. 31/05
 1:80,000 Scale

Largest Scale Chart	<p><u>US5NH02M</u> Portsmouth Harbor - Cape Neddick Harbor to Isle of Shoals Edition 7 Update Application Date 2007-09-13 Issue Date 2008-07-09 References: Charts 13283</p>
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US4MA04M

Portsmouth to Cape Ann
 Edition 8
 Update Application Date 2006-12-13
 Issue Date 2007-12-10
 References: Chart 13278

Survey Scale	1:10000
Date Of Survey	9-9 to 9-12-2005

Milestones	File Name
<i>Product Surface Creation</i>	H11296_Shoal_PS_5m.hns
<i>Shifted Surface</i>	H11296_Shoal_PS_Shifted_5m.hns
<i>Contours Layer</i>	H11296_Chart_Scale_Smooth_Contours.hob
<i>Survey Scale Soundings</i>	H11296_Survey_Scale_Soundings.hob
<i>Chart Scale Soundings</i>	H11296_Chart_Scale_Soundings.hob
<i>Feature Layers</i>	H11296_Rocks.hob H11296_DepAre.hob H11296_Seabed Areas.hob H11296_Retained_Chart_&_ENC_Features.hob H11441_H11224_F00521_Retained_Features.hob H11296_MHW_Sounding_Set.hob
<i>Meta-objects Layers</i>	H11296_MCovr.hob H11296_MQual.hob
<i>Blue Notes</i>	H11441_H11224_F00521_BlueNotes.hob

META-OBJECTS:

M_COVR attributes

Acronym	Value
CATCOV	1 - coverage available
SORDAT	20050912
SORIND	US,US,survey,H11296

M_QUAL attributes

Acronym	Value
CATZOC	zone of confidence U
INFORM	H11296,OPR-A321-KRL-05,Fugro,Beechcraft King Air 90 N91S
TECSOU	Laser
SURSTA	20050909
SUREND	20050912
POSACC	10
SORDAT	20050912
SORIND	US,US,survey,H11296

Final Grids Listing –

H11296_Shoal_Extracted_5m.hns
H11296_Shoal_Extracted_5m.xml
H11296_Shoal_Extracted_5m_Depth.bel

APPROVAL SHEET
H11296

The completed survey has been inspected with regard to survey coverage, delineation of depth curves, development of critical depths, cartographic symbolization, and verification or disproof of charted data. All revisions and additions made to the H-Cell files during survey processing have been entered in the digital data for this survey. The survey records and digital data comply with NOS requirements except where noted in the Evaluation Report.

Bryan Chauveau
Physical Scientist,
Atlantic Hydrographic Branch

All final products have undergone a comprehensive review as per the Atlantic Hydrographic Branch Processing Manual and are verified to be accurate and complete except where noted in the Evaluation Report.

I have reviewed the Base Cell files, accompanying data, and reports. This survey and accompanying Marine Chart Division deliverables meet or exceed NOS requirements and standards for products in support of nautical charting except where noted in the Evaluation Report.

Approved: _____
Lt. Commander Shepard M. Smith, NOAA
Chief, Atlantic Hydrographic Branch